HPE NFV Director

Integrator guide for NFVO Managed mode

Release 4.2
First Edition

Hewlett Packard
Enterprise

Notices

Legal notice

© Copyright 2017 Hewlett Packard Enterprise Development LP

Confidential computer software. Valid license from HPE required for possession, use or copying. Consistent with FAR 12.211 and 12.212, Commercial Computer Software, Computer Software Documentation, and Technical Data for Commercial Items are licensed to the U.S. Government under vendor's standard commercial license.

The information contained herein is subject to change without notice. The only warranties for HPE products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HPE shall not be liable for technical or editorial errors or omissions contained herein.

Printed in the US

Trademarks

Linux is the registered trademark of Linus Torvalds in the U.S. and other countries.
Oracle and Java are registered trademarks of Oracle and/or its affiliates.

Adobe®, Acrobat® and PostScript® are trademarks of Adobe Systems Incorporated.

Microsoft®, Internet Explorer, Windows®, Windows Server 2007®, Windows XP®, and Windows 7® are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

Firefox® is a registered trademark of the Mozilla Foundation.

Google Chrome® is a trademark of Google Inc.

EnterpriseDB® is a registered trademark of EnterpriseDB.

Postgres Plus® Advanced Server is a registered U.S. trademark of EnterpriseDB.

UNIX® is a registered trademark of The Open Group.

X/Open® is a registered trademark, and the X device is a trademark of X/Open Company Ltd. in the UK and other countries.

Red Hat® is a registered trademark of the Red Hat Company.

Apache CouchDB, CouchDB, and the project logo are trademarks of The Apache Software Foundation.

Node.js project. Joyent® and Joyent's logo are registered trademarks of Joyent, Inc.

Neo4j is a trademark of Neo Technology.

VMware ESX, VMWare ESXi, VMWare vCenter and VMWare vSphere are either registered trademarks or trademarks of VMware, Inc. in the United States and other jurisdictions.

Contents

Notices ***1***
Preface ***18***
About this guide **18**
Audience **18**
Document history **18**
Chapter 1 Operations tree. ***19***
Chapter 2 Deploy of an Organization - Default. ***20***
2.1 Specific Elements of the TLD Deploy Organization **22**
2.2 TLD INVENTORY ORGANIZATION: Provision Enterprise. **22**
2.3 TLD INVENTORY ORGANIZATION: Provision Macronet. **23**
2.4 TLD ACTIVE OO: Activate OO. **24**
2.5 TLD ACTIVATE ENTERPRISE PROFILE: Activate Enterprise Profile. **25**
2.6 TLD ACTIVATE ENTERPRISE: Activate Profile. **26**
2.7 TLD ACTIVATE MACRONET: Getting_Macronet. **27**
2.8 TLD ACTIVATE MACRONET: Activate_Macronet. **28**
2.9 TLD ORGANIZATION STATUS CHANGE: Organization Status Change. **29**
Chapter 3 Deploy of a Tenant - Default. ***30***
3.1 Specific Elements of the TLD Deploy Tenant. **31**
3.2 TLD DEPLOY_TENANT: Quota Assignment Task. **31**
3.3 TLD DEPLOY_TENANT: Tenant_Org_Rel. **32**
3.4 TLD DEPLOY_TENANT_INVENTORY: Create_VSwitch task. **33**
3.5 TLD DEPLOY_TENANT_INVENTORY: Create_Tenant_Openstack Task. **34**
3.6 TLD DEPLOY_TENANT_INVENTORY: Create_L3Domain Task. **35**
3.7 DEPLOY_TENANT_INVENTORY TLD: Create_Forwarding_Policy Task. **36**
3.8 DEPLOY_TENANT_INVENTORY TLD: Create_Egress_Policy Task. **37**
3.9 DEPLOY_TENANT_INVENTORY TLD: Create_Ingress_Policy Task. **38**
3.10 . TLD ACTIVE OO: Activate OO. **39**
3.11 . TLD ACTIVE: Activate_VSwitch task. **40**
3.12 . TLD ACTIVE: Activate_Tenant task. **41**
3.13 . TLD ACTIVE: Activate_L3Domain_Template task. **42**
3.14 . TLD ACTIVE: Activate_L3Domain task. **44**
3.15 . TLD ACTIVE_POLICIES: Getting L3Domain task. **45**
3.16 . TLD ACTIVE_POLICIES: Activate_Forwarding_Policy task. **46**
3.17 . TLD ACTIVE_POLICIES: Activate_Egress_Policy task. **47**
3.18 . TLD ACTIVE_POLICIES: Activate_Ingress_Policy task. **48**
3.19 . TLD DEPLOY_VIRTUAL_LINK_MGMT: CREATE_MGMT_NETWORK. **49**
3.20 . TLD ACTIVATE DCN ZONE: ACTIVATE_DCN_ZONE. **50**
3.21 . TLD ACTIVATE DCN SUBNET: ACTIVATE_DCN_SUBNET. **51**
3.22 . TLD ACTIVATE OPENSTACK NET: ACTIVATE_NETWORK_OPENSTACK. **52**
3.23 . TLD ACTIVATE OPENSTACK SUBNET: ACTIVATE_SUBNETWORK_OPENSTACK. **53**
3.24 . TLD INVENTORY DCN POLICIES: CREATE INGRESS ENTRY. **54**
3.25 . TLD INVENTORY DCN POLICIES: CREATE EGRESS ENTRY. **55**
3.26 . TLD ACTIVATE DCN POLICIES: ACTIVATE_INGRESS_ENTRY. **56**
3.27 . TLD ACTIVATE DCN POLICIES: ACTIVATE_EGRESS_ENTRY. **57**
3.28 . TLD CHANGE STATUS: Tenant_Status_Change task. **58**
3.29 . TLD CHANGE STATUS: Tenant_Status_Change task. **59**
Chapter 4 Deploy of a Virtual Link – Default/Bottom-Up. ***60***
4.1 Specific Elements of the TLD Deploy Virtual Link. **61**
4.2 TLD QUOTA ASSIGNMENT: Quota Assignment Task. **61**
4.3 TLD DEPLOY_VIRTUAL_LINK: CREATE_NETWORK. **62**
4.4 TLD ACTIVATE DCN ZONE: ACTIVATE_DCN_ZONE. **63**
4.5 TLD ACTIVATE DCN SUBNET: ACTIVATE_DCN_SUBNET **64**
4.6 TLD ACTIVATE OPENSTACK NET: ACTIVATE_NETWORK_OPENSTACK **65**
4.7 DEPLOY_ACTIVATE OPENSTACK SUBNET TLD: ACTIVATE_SUBNETWORK_OPENSTACK. **66**
4.8 TLD INVENTORY DCN POLICIES: CREATE_INGRESS_ENTRY_ANY. **67**
4.9 TLD **INVENTORY** DCN POLICIES: CREATE_INGRESS_ENTRY. **68**
4.10 TLD INVENTORY DCN POLICIES: CREATE_EGRESS_ENTRY_ANY. **69**
4.11 TLD INVENTORY DCN POLICIES: CREATE_INGRESS_ENTRY. **70**
4.12 TLD ACTIVATE DCN POLICIES: ACTIVATE_INGRESS_ENTRY **71**

4.13 TLD ACTIVATE DCN POLICIES: ACTIVATE_EGRESS_ENTRY **72**
4.14 TLD ACTIVATE DCN POLICIES: ACTIVATE_INGRESS_ENTRY_ANY **73**
4.15 TLD ACTIVATE DCN POLICIES: ACTIVATE_EGRESS_ENTRY_ANY **74**
4.16 . TLD VIRTUAL_LINK CHANGE STATUS: VIRTUAL_LINK_STATUS_CHANGE **75**
Chapter 5 Deploy of a VNF - Default. ***76***
5.1 Specific Elements of the TLD Deploy VNF. **77**
5.2 TLD QUOTA ASSIGNMENT: Quota Assignment Task. **77**
5.3 TLD RESOURCE ASSIGNMENT: RESOURCE ASSIGNMENT. **78**
5.4 TLD IMAGE PERMISSION: CHECK_IMAGE_PERMISSION. **79**
5.5 TLD INVENTORY KEYPAIR: CREATE_KEYPAIR. **80**
5.6 TLD INVENTORY: CREATE_FLAVOR **81**
5.7 TLD INVENTORY: CONNECT_SUBNET **82**
5.8 TLD INVENTORY: CREATE_SG **83**
5.9 TLD INVENTORY: CONNECT_TO_MANAGEMENT **84**
5.10 TLD INVENTORY: ATTACH_TO_MANAGEMENT **85**
5.11 TLD DEPLOY PRE: DEPLOY PRE. **86**
5.12 TLD ACTIVATE: DEPLOY_MONITOR. **87**
5.13 TLD ACTIVATE: ACTIVATE_FLAVOR. **88**
5.14 TLD ACTIVATE: ACTIVATE_SECURITY_GROUP **89**
5.15 TLD ACTIVATE: ACTIVATE_PORT_GROUP. **90**
5.16 TLD ACTIVATE: ACTIVATE_VOLUME. **91**
5.17 TLD ACTIVATE: ACTIVATE_KEYPAIR. **92**
5.18 TLD ACTIVATE SGR: ACTIVATE_SECURITY_GROUP_RULE **93**
5.19 TLD ACTIVATE Flavor ES: ACTIVATE_FLAVOR_EXTRA_SPECS. **94**
5.20 TLD ACTIVATE VM: ACTIVATE_VM **95**
5.21 TLD ACTIVATE Post VM: ATTACH_SECURITY_GROUP **96**
5.22 TLD DEPLOY POST: DEPLOY POST. **97**
5.23 TLD ACTIVATE Attach Volumen: ATTACH_VOLUME **98**
5.24 TLD CREATE VLAN: CREATE_VLAN **99**
5.25 . TLD ACTIVATE VLAN: Getting VPORT SRIOV or PCI-PASSTHROUGH. **100**
5.26 . TLD ACTIVATE VLAN: ACTIVATE_VLAN. **101**
5.27 . TLD ACTIVATE BRIDGE VPORT: ACTIVATE_BRIDGE_VPORT. **102**
5.28 . TLD ACTIVATE PHYSICAL SWITCH: ACTIVATE_PHYSICAL_SWITCH. **103**
5.29 . TLD START MONITORS: START_MONITOR. **104**
5.30 . TLD SEND PASSWORD: SEND_PASSWORD. **105**
5.31 . TLD VNF STATUS CHANGE: VNF_STATUS_CHANGE. **106**
Chapter 6 Deploy of a VNF Firewall - Default ***107***
6.1 Specific Elements of the TLD Deploy Firewall **108**
6.2 TLD QUOTA ASSIGMENT: Quota Assignment. **108**
6.3 TLD RESOURCE ASSIGNMENT: Resource Assignment. **109**
6.4 TLD CREATE_FLAVOR_AND_MGMT: CREATE_FLAVOR. **110**
6.5 TLD CREATE_FLAVOR_AND_MGMT: CONNECT_TO_MANAGEMENT. **111**
6.6 TLD CREATE_FLAVOR_AND_MGMT: ATTACH_TO_MANAGEMENT. **112**
6.7 TLD CREATE_IMAGE_SERVICE_KEYPAIR: CREATE_SERVICE_NET. **113**
6.8 TLD CREATE_IMAGE_SERVICE_KEYPAIR:: ATTACH_SERVICE_NET. **114**
6.9 TLD CREATE_IMAGE_SERVICE_KEYPAIR:CHECK_IMAGE_PERMISSION. **115**
6.10 TLD CREATE_IMAGE_SERVICE_KEYPAIR:CREATE_KEYPAIR. **116**
6.11 TLD ACTIVATE_DCN_ZONE: Activate_DCN_Zone Task. **117**
6.12 TLD ACTIVATE_DCN_SUBNET: Activate_DCN_Subnet Task **118**
6.13 TLD ACTIVATE_NETWORK: Activate_Network Task **119**
6.14 TLD ACTIVATE_NETWORK: Activate_Network Task **120**
6.15 TLD CREATE_POLICY_ENTRIES: Create_RT Task. **121**
6.16 TLD CREATE_POLICY_ENTRIES: Create_Ingress_Entries task. **122**
6.17 TLD CREATE_POLICY_ENTRIES: Create_Egress_Entries task. **123**
6.18 TLD CREATE_POLICY_ENTRIES: Create_Egress_Any_Entries task. **124**
6.19 TLD CREATE_FORWARDING_POLICIES:Crete_FW_Entry_Policies Task **125**
6.20 TLD CREATE_MIXED_POLICIES : CREATE_INGRESS_ENTRY_MIXED **126**
6.21 TLD CREATE_MIXED_POLICIES : CREATE_EGRESS_ENTRY_MIXED **127**
6.22 TLD ACTIVATE FEATURES: Activate_Flavor Task. **128**
6.23 TLD ACTIVATE FEATURES: Create_Volume Task. **129**
6.24 TLD **ACTIVATE** FEATURES: Deploy_Monitor task **130**
6.25 TLD **ACTIVATE** FEATURES: Activate_Keypair task **131**
6.26 TLD ACTIVATE_EXTRA_SPECS: Activate Task **132**

6.27 TLD CHANGE STATUS: Tenant_Status_Change Task **133**
6.28 TLD ACTIVATE_RT_POLICIES: Activate_SDN_Redirection_Target Task **134**
6.29 TLD ACTIVATE_RT: Get_Port_DCN Task **135**
6.30 TLD ACTIVATE_RT: Assign_VPort_RT Task **136**
6.31 TLD ACTIVATE_RT: Activate_Egress_Entries_Mixed Task **137**
6.32 TLD ACTIVATE_RT: Activate_Ingress_Entries_Mixed Task **138**
6.33 TLD ACTIVATE_POLICY_ENTRIES: Activate_SDN_Ingress_Forwarding_Entry Task **139**
6.34 TLD ACTIVATE_POLICY_ENTRIES: Getting Network Task **140**
6.35 TLD ACTIVATE_POLICY_ENTRIES: Getting Network Task **141**
6.36 TLD ACTIVATE_POLICY_ENTRIES: Getting Network Task **142**
6.37 TLD START MONITORS: Start_Monitor Task **143**
6.38 TLD VNF STATUS CHANGE: VNF_FW_Status_Change Task **144**
Chapter 7 Scale Down of a VNF - Default. ***145***
7.1 Specific Elements of the TLD Scale Down of a VNF. **146**
7.2 SCALE_DOWN ROOT TLD: Quota Assignment Task. **146**
7.3 SCALE_DOWN INVENTORY TLD: Scale_Down Inventory Task. **147**
7.4 SCALE_DOWN INVENTORY TLD: Switch_Scale Task. **148**
7.5 CHECK_SCALE_TLD: Check_Scale_Task **149**
7.6 LIVE_SCALE TLD: Live_Scale_MEM Task **150**
7.7 LIVE_SCALE TLD: Live_Scale_CPU Task **151**
7.8 RESIZE FLAVOR TLD: Check_Resize_Task **152**
7.9 RESIZE FLAVOR TLD: Resize Flavor Task **153**
7.10 ACTIVATE_FLAVOR TLD: Activate Flavor Task **154**
7.11 **RESIZE** TLD: Resize task **155**
7.12 VCenter RESIZE TLD: vCenter Reconfigure Task **156**
7.13 VCenter RESIZE TLD: Stop vCenter VM Task **157**
7.14 VCenter RESIZE TLD 2: vCenter Reconfigure Task **158**
7.15 VCenter Start TLD: Start vCenter VM Task **159**
7.16 **START_MONITOR TLD**: Start_Monitor Task **160**
Chapter 8 Scale Up of a VNF - Default. ***161***
8.1 Specific Elements of the TLD Deploy VNF. **162**
8.2 SCALE_UP ROOT TLD: Quota Assignment Task. **162**
8.3 SCALE_UP INVENTORY TLD: Scale_Up Inventory Task. **163**
8.4 SCALE_UP INVENTORY TLD: Switch_Scale Task. **164**
8.5 CHECK_SCALE_TLD: Check_Scale_Task **165**
8.6 LIVE_SCALE TLD: Live_Scale_MEM Task **166**
8.7 LIVE_SCALE TLD: Live_Scale_CPU Task **167**
8.8 RESIZE FLAVOR TLD: Check_Resize_Task **168**
8.9 RESIZE FLAVOR TLD: Resize Flavor Task **169**
8.10 ACTIVATE_FLAVOR TLD: Activate Flavor Task **170**
8.11 **RESIZE** TLD: Resize task **171**
8.12 VCenter RESIZE TLD: vCenter Reconfigure Task **172**
8.13 VCenter RESIZE TLD: Stop vCenter VM Task **173**
8.14 VCenter RESIZE TLD 2: vCenter Reconfigure Task **174**
8.15 VCenter Start TLD: Start vCenter VM Task **175**
8.16 **START_MONITOR TLD**: Start_Monitor Task **176**
Chapter 9 Scale In of a VNF - Default. ***178***
9.1 Specific Elements of the TLD Scale In VNF. **179**
9.2 TLD QUOTA ASSIGNMENT: Quota Assignment Task. **179**
9.3 SCALE IN PRE TLD: SCALE IN PRE. **181**
9.4 Undeploy VNF: STOP_MONITOR **182**
9.5 Deactivate VM : Deactivate_VM **183**
9.6 SCALE IN POST TLD: SCALE IN POST **184**
9.7 Delete vPort: DEACTIVATE_PORT_GROUP **185**
9.1 Delete vPort: Delete_vPort **186**
9.2 Undeploy Monitor: DELETE_VOLUME **187**
9.3 Undeploy Monitor: UNDEPLOY_MONITOR **188**
9.4 **.** Delete Inventory: DELETE_INVENTORY_COMPONENT_LEVEL. **189**
9.5 **.** TLD VNF STATUS CHANGE: VNF_STATUS_CHANGE. **190**
Chapter 10 Scale Out of a VNF - Default. ***191***
10.1 Specific Elements of the TLD Scale Out of a VNF. **193**
10.2 Scale Out Root TLD: Scale Inventory Task. **193**
10.3 TLD QUOTA ASSIGNMENT: Quota Assignment Task. **194**

10.4 TLD RESOURCE ASSIGNMENT: Resource_Assignment Task. **195**
10.5 TLD IMAGE PERMISSION: CHECK_IMAGE_PERMISSION. **196**
10.6 TLD KEYPAIR: Create_pair Task **197**
10.7 TLD INVENTORY: Create_Flavor Task **198**
10.8 TLD INVENTORY: Connect_Endpoints Task **199**
10.9 TLD INVENTORY: CONNECT_SUBNET **200**
10.10 TLD INVENTORY: CONNECT_TO_MANAGEMENT **201**
10.11 TLD INVENTORY: ATTACH_TO_MANAGEMENT **202**
10.12 **SCALE OUT PRE TLD** : SCALE OUT PRE **203**
10.13 TLD ACTIVATE: Activate_Keypair task. **204**
10.14 TLD ACTIVATE: ACTIVATE_FLAVOR **205**
10.15 TLD ACTIVATE: DEPLOY_MONITOR **206**
10.16 TLD ACTIVATE: Activate_Volume Task **207**
10.17 TLD ACTIVATE: Activate_Port_Group Task **208**
10.18 TLD ACTIVATE Flavor ES: **ACTIVATE**_FLAVOR_EXTRA_SPECS. **209**
10.19 TLD ACTIVATE VM: ACTIVATE_VM **210**
10.20 TLD DEPLOY POST: DEPLOY POST. **211**
10.21 TLD ACTIVATE Attach Volumen: ATTACH_VOLUME **212**
10.22 **.** TLD START MONITORS: START_MONITOR. **213**
10.23 **.** TLD VNF STATUS CHANGE: VNF_STATUS_CHANGE. **214**
Chapter 11 Undeploy of a VNF *- Default* ***215***
11.1 Specific Elements of the TLD Undeploy VNF **216**
11.2 TLD Undeploy PRE VNF: Undeploy PRE. **216**
11.3 TLD Undeploy VNF: STOP_MONITOR. **217**
11.4 TLD Deactivate VM : Deactivate_VM. **218**
11.5 TLD Deactivate VM : Deactivate_VM. **219**
11.6 TLD Undeploy POST VNF: Undeploy POST **220**
11.7 TLD Delete vPort: delete vport. **221**
11.8 TLD DEACTIVATE BRIDGE VPORT: DEACTIVATE_PORT_GROUP. **222**
11.9 TLD DEACTIVATE BRIDGE VPORT: DEACTIVATE_BRIDGE_VPORT. **223**
11.10 TLD DEACTIVATE SECURITY GROUP: DEACTIVATE_SECURITY_GROUP **224**
11.11 TLD DELETE SECURITY GROUP: DELETE_SG **225**
11.12 TLD DEACTIVTE VLAN: DEACTIVATE_VLAN **226**
11.13 TLD DELETE VLAN: DELETE_VLAN. **227**
11.14 TLD Undeploy Monitor, Volume: UNDEPLOY_MONITOR **228**
11.15 TLD Undeploy Monitor, Volume: DELETE_VOLUME **229**
11.16 TLD VNF Inventory Delete: DELETE_INVENTORY. **230**
Chapter 12 Undeploy of a Virtual Link *- Default.* ***231***
12.1 Specific Elements of the TLD Undeploy Virtual Link. **232**
12.2 TLD UNDEPLOY_VIRTUAL_LINK : Undeploy_Check **232**
12.3 TLD UNDEPLOY_VIRTUAL_LINK : Deactivate_Ingress Entry to Any. **233**
12.4 UNDEPLOY_VIRTUAL_LINK : Deactivate_Egress Entry to Any. **234**
12.5 TLD UNDEPLOY_VIRTUAL_LINK : Deactivate_Egress Entry. **235**
12.6 TLD UNDEPLOY_VIRTUAL_LINK : Deactivate_Ingress Entry. **236**
12.7 TLD DEACTIVATE OPENSTACK SUBNET: DEACTIVATE_SUBNETWORK_OPENSTACK. **237**
12.8 TLD DEACTIVATE OPENSTACK NET: DEACTIVATE_NETWORK_OPENSTACK **238**
12.9 TLD DEACTIVATE DCN SUBNET: DEACTIVATE _SUBNETWORK_DCN **239**
12.10 TLD DEACTIVATE DCN ZONE: DEACTIVATE_ZONE_DCN. **240**
12.11 TLD INVENTORY DELETE DCN POLICIES: DELETE EGRESS ENTRY ANY. **241**
12.12 TLD INVENTORY DELETE DCN POLICIES: DELETE INGRESS ANY. **242**
12.13 TLD INVENTORY DELETE DCN POLICIES: DELETE INGRESS ENTRY. **243**
12.14 TLD INVENTORY DELETE DCN POLICIES: DELETE EGRESS ENTRY. **244**
12.15 TLD INVENTORY DELETE NETWORKS: DELETE NETWORK. **245**
12.16 TLD INVENTORY DELETE VIRTUAL LINK: VIRTUAL LINK INVENTORY DELETE **246**
Chapter 13 Undeploy of a Tenant *- Default.* ***247***
13.1 Specific Elements of the TLD Undeploy Tenant. **248**
13.2 TLD DEACTIVATE ENTRIES: Undeploy_Check. **248**
13.3 TLD DEACTIVATE ENTRIES: DEACTIVATE_EGRESS_POLICY. **249**
13.4 TLD DEACTIVATE ENTRIES: DEACTIVATE INGRESS POLICY. **250**
13.5 TLD DELETE POLICIES: Deactivate Egress Policy. **251**
13.6 TLD DELETE POLICIES: Deactivate Ingress Policy. **252**
13.7 TLD DEACTIVATE OPENSTACK SUBNET: DEACTIVATE_SUBNETWORK_OPENSTACK. **253**
13.8 TLD DEACTIVATE OPENSTACK NET: DEACTIVATE_NETWORK_OPENSTACK **254**

13.9 TLD DEACTIVATE DCN SUBNET: DEACTIVATE _SUBNETWORK_DCN 255
13.10 TLD DEACTIVATE DCN ZONE: DEACTIVATE_ZONE_DCN. 256
13.11 TLD INVENTORY DELETE VIRTUAL LINK: DELETE NETWORK. 257
13.12 TLD UNDEPLOY POLICY GROUPS: Getting L3Domain. 258
13.13 TLD UNDEPLOY POLICY GROUPS: Deactivate Forwarding Policy. 259
13.14 TLD UNDEPLOY POLICY GROUPS: Deactivate Egress Policy. 260
13.15 TLD UNDEPLOY POLICY GROUPS: Deactivate Ingress Policy. 261
13.16 TLD DEACTIVATE: DEACTIVATE L3DOMAIN 262
13.17 TLD DEACTIVATE: DEACTIVATE TENANT 263
13.18 TLD DEACTIVATE: DEACTIVATE VSWITCH 264
13.19 TLD DEACTIVATE OO: DEACTIVATE L3DOMAIN TEMPLATE 265
13.20 TLD DEACTIVATE OO: Deactivate OO. 267
13.21 TLD DELETE POLICY GROUPS: Delete Forwarding Policy. 268
13.22 TLD DELETE POLICY GROUPS: Delete Egress Policy. 269
13.23 TLD DELETE POLICY GROUPS: Delete Ingress Policy. 270
13.24 TLD DELETE DOMAIN: Delete L3Domain. 271
13.25 TLD DELETE DOMAIN: Delete Tenant Openstack. 272
13.26 TLD DELETE DOMAIN: Delete_VSWITCH 273
13.27 TLD DELETE: Delete Tenant. 274
Chapter 14 Undeploy of an Organization *- Default.* ***..... 275***
14.1 Specific Elements of the TLD Undeploy Organization. 276
14.2 TLD CHECK UNDEPLOY AND DEACTIVATE: Undeploy_Check 276
14.3 TLD CHECK UNDEPLOY AND DEACTIVATE: Getting_Macronet 277
14.4 TLD CHECK UNDEPLOY AND DEACTIVATE: Deactivate Macronet 278
14.5 TLD DEACTIVATE ENTRIES: Deactivate Enterprise. 279
14.6 TLD DEACTIVATE ENTERPRISE Profile: Deactivate Enterprise Profile. 280
14.7 TLD DEACTIVATE OO: Deactivate OO. 281
14.8 TLD INVENTORY MACRONET DELETE: Deprovision Macronet. 282
14.9 TLD INVENTORY ORGANIZATION DELETE: Deprovision Enterprise. 283
14.10 TLD DELETE ORGANIZATION: Organization Delete 284
Chapter 15 Undeploy of a Firewall *- Default* ***..... 285***
15.1 Specific Elements of the TLD Undeploy Firewall 286
15.2 TLD STOP MONITOR : Stop Monitor. 286
15.3 TLD DEACTIVATE VM : Deactivate VM. 287
15.4 TLD UNDEPLOY MONITOR VOL: Delete vPort. 288
15.5 TLD UNDEPLOY MONITOR VOL: Undeploy Monitor 289
15.6 TLD UNDEPLOY MONITOR VOL: Delete Volume 290
15.7 TLD DEACTIVATE POLICIES: Deactivate Ingress Mixed. 291
15.8 TLD DEACTIVATE POLICIES: Deactivate Egress Mixed. 292
15.9 TLD DEACTIVATE POLICIES: Deactivate FWD. 293
15.10 TLD DEACTIVATE POLICIES: Getting Networks. 294
15.11 TLD DEACTIVATE POLICIES: Deactivate Ingress Service 295
15.12 TLD DEACTIVATE POLICIES: Deactivate Egress Service 296
15.13 TLD DEACTIVATE RT: Deactivate Redirection Target. 297
15.14 TLD DEACTIVATE OS SUBNET: Deactivate Subnetwork. 298
15.15 TLD DEACTIVATE OS NET: Deactivate Network 299
15.16 TLD DEACTIVATE DCN SUBNET: Deactivate Network 300
15.17 TLD Activate Flavor ES: Activate Flavor Extra Specs. 301
15.18 TLD Delete FW Policy Entries: Delete FW Policy Entries. 302
15.19 TLD DELETE POLICIES : Delete Service Ingress 303
15.20 TLD DELETE POLICIES : Delete Service Egress. 304
15.21 TLD DELETE POLICIES : Delete Redirection Target. 305
15.22 TLD DELETE POLICIES : Delete Ingress Mixed. 306
15.23 TLD DELETE POLICIES : Delete Egress Mixed. 307
15.24 TLD DELETE POLICIES : Delete Service Egress To Any. 308
15.25 TLD DELETE SERVICE NET: Deattach Service Net. 309
15.26 TLD DELETE SERVICE NET: Delete Service Net. 310
15.27 TLD VNF Inventory Delete: Delete Inventory 311
Abbreviations 313

List of tables

Table 1: Document history 18

List of figures

Figure 2: Provision of a Macronet. 23

Figure 3 : Activation of OO. 24

Figure 4: Activation of an Enterprise Profile 25

Figure 5: Activation of an Enterprise 26

Figure 6: Getting only Macronet artifacts 27

Figure 7:Activation of a Macronet 28

Figure 8: Change Organization Status. 29

Figure 9 Quota Assignment task 31

Figure 11: Creation of specific Quota for Tenant 32

Figure 12 : Provision of a Virtual Switch. 33

Figure 13: Creation of Tenant:Openstack artifact 34

Figure 14: Creation of the L3Domain and L3Domain template artifacts. 35

Figure 15: Creation of the Forwarding Policies. 36

Figure 16: Creation of the Egress Policies. 37

Figure 17: Creation of the Ingress Policies for Tenant 38

Figure 18 : Activation of the OO for Tenant. 39

Figure 19: Activation of a VSwitch artifact. 40

Figure 20: Activation of the Tenant artifact 41

Figure 21: Activate L3Domain Template. 42

Figure 22: Activate L3Domain Artifact. 44

Figure 23: Getting the adequate L3Domain 45

Figure 24: Activation of Forwarding Entry policies. 46

Figure 25: Activation of the Egress policies 47

Figure 26: Activation of Ingress policies. 48

Figure 27: Activation of a network in DCN. 50

Figure 28: Activation of a Subnetwork in DCN. 51

Figure 29: Activation of Network in Openstack Platform. 52

Figure 30: Activation of Subnetwork in Openstack Platform. 53

Figure 31: Create Ingress Entry policies for Tenant. 54

Figure 32: Create Egress Entry policies for Tenant 55

Figure 33: Activate Ingress Entry policies for Tenant. 56

Figure 34: Activate Ingress Entry policies for Tenant 57

Figure 35: Status change Virtual Link Management 58

Figure 36: Change status of the Tenant . 59

Figure 37: Quota Assignment task. 61

Figure 38: Creation of a network. 62

Figure 39 : Activation of a DCN Network. 63

Figure 40: Activation of a DCN Subnetwork. 64

Figure 41: Activation of a Network in the Openstack platform. 65

Figure 42: Activation of a Subnetwork in the Openstack platform. 66

Figure 43: Creation of the Ingress Entry Policies of type net to Any. 67

Figure 44: Creation of the Ingress Entry Policies. 68

Figure 45: Creation of the Egress Entry Policies, to ANY. 69

Figure 46: Creation of the Egress Entry Policies. 70

Figure 47: Activation of the Ingress Entry Policies for Virtual Link. 71

Figure 48: Activation of the Egress Entry Policies for Virtual Link 72

Figure 49: Activation of Ingress Entry policies for the VL, type to ANY. 73

Figure 50: Activation of Egress Entry policies for the VL, type to ANY. 74

Figure 51: Status change Virtual Link. 75

Figure 52: Quota Assignment task. 77

Figure 53: Assignment of the resources without cache. 78

Figure 54 : Checking the image permissions 79

Figure 55: Creation of a standard flavor 81

Figure 56: Connection of the Subnetwork to the VPort. 82

Figure 57: Creation of Security Groups under a VPort 83

Figure 58: Connection Management Network. 84

Figure 59: Attaching the Management Network. 85

Figure 60: Deploying Pre-Process policies. 86

Figure 61: Deployment of a Monitor. 87

Figure 62: Deployment of a Monitor. 88

Figure 63: Activate Security Group 89

Figure 64: Deployment of a Monitor. 90

Figure 65: Activation of a Volume. 91

Figure 66: Activation of the KeyPair 92

Figure 67: Activate Security Group Rule 93

Figure 68: Creation of the Egress Entry Policies. 94

Figure 69: Activation of Virtual Machine related to the VNF. 95

Figure 70: Activate Security Group Rule 96

Figure 71: Deploying Post-Processing policies. 97

Figure 72: Activation of Ingress Entry policies for the VL, type to ANY 98

Figure 73: Creation of the specific VLan 99

Figure 74: Getting the correct SRIOV or PCI-P Port. 100

Figure 75: Activation of the VLAN. 101

Figure 76: Activation of the Bridge Port. 102

Figure 77: Activation of the Physical Switch associated. 103

Figure 78: Starting Monitor. 104

Figure 79: Sending the new Password. 105

Figure 80: Changing the status of the VNF. 106

Figure 81: Quota Assignment 108

Figure 82: Resource Assignment. 109

Figure 83: Create Flavor. 110

Figure 84: Connect to Management. 111

Figure 85: Attach to management. 112

Figure 86: Create Service Network 113

Figure 87: Attach Service Network. 114

Figure 88: Check Image Permission 115

Figure 89: Create Keypair. 116

Figure 90: Activation of a DCN Network. 117

Figure 91: Activation of a DCN Subnetwork. 118

Figure 92: Activation of an Openstack Network. 119

Figure 93: Activation of an Openstack Subnetwork. 120

Figure 94: Creation Redirection Target. 121

Figure 95: Creation of Ingress Entries policies 122

Figure 96: Creation of Egress Entries policies 123

Figure 97: Creation of Egress Entry policies, Zone to Any. 124

Figure 98: Creation Forwarding Entry Policies. 125

Figure 99: Creation of Ingress Entry Mixed policies. 126

Figure 100: Creation of Egress Entry Mixed policies. 127

Figure 101: Activation Flavor. 128

Figure 102: Creation of a Volume. 129

Figure 103: Deployment of a Monitor 130

Figure 104: Activation of the Keypair. 131

Figure 105: Activation of a Flavor with Extra Specs 132

Figure 106: Activation of a Virtual Machine. 133

Figure 107: Activation of a Redirection Target 134

Figure 108: Getting port DCN. 135

Figure 109: Assignation of Virtual Port to Redirection Target 136

Figure 110: Activation of an Egress Entry Mixed policies. 137

Figure 111: Activation of an Ingress Entry Mixed policies. 138

Figure 112: Activation of Ingress Forwarding Entry policy 139

Figure 113: Getting Network for activation of policies 140

Figure 114: Activation of Egress Entries policies. 141

Figure 115: Activation of Ingress Entries policy. 142

Figure 116: Start of a Monitor. 143

Figure 117: VNF:FW Change of the status. 144

Figure 118 Stopping Monitor Task. 146

Figure 119 Checking inventory for the scale down. 147

Figure 120 Switching scales type UP/DOWN. 148

Figure 121 Last check of the escalation operations 149

Figure 122 Applying escalation policy over the Virtual Machine's memory 150

Figure 123 Applying escalation policy over the Virtual Machine's core. 151

Figure 124 Checking the changes on the VM in order to create a new flavor for it. 152

Figure 125 Resizing Flavor for the modified Virtual machine. 153

Figure 126 Activation of the recently created Flavor. 154

Figure 127 Resizing the Flavor for the escalated Virtual Machine. 155

Figure 128 VCenter Regonfigure Task 156

Figure 129 Stop VCenter Virtual machine 157

Figure 130 : VCenter Reconfigure Task 158

Figure 131Start vCenter VM Task 159

Figure 132 Starting of the monitors present. 160

Figure 133 Stopping Monitor Task 162

Figure 134 Checking inventory for the scale up. 163

Figure 135 Switching scales type UP/DOWN. 164

Figure 136 Last check of the escalation operations 165

Figure 137 applying escalation policy over the Virtual Machine's memory 166

Figure 138 Applying escalation policy over the Virtual Machine's core 167

Figure 139 Checking the changes on the VM in order to create a new flavor for it 168

Figure 140 resizing Flavor for the modified Virtual machine. 169

Figure 141Activation of the recently created Flavor 170

Figure 142 Resizing the Flavor for the escalated Virtual Machine. 171

Figure 143 VCenter Reconfigure Task 172

Figure 144 Stop VCenter Virtual machine. 173

Figure 145 VCenter Reconfigure Task 174

Figure 146 Start vCenter VM Task 175

Figure 147 Starting of the monitors present 176

Figure 148 Selection of the components for the Scale In 179

Figure 149 Deployment of Pre-Processing policies. 181

Figure 150 Stopping monitor. 182

Figure 151 Deactivation of a VM. 183

Figure 152 Deploying Post-Processing policies. 184

Figure 153 Deactivation of the Port Group associated. 185

Figure 154 Deletion of a vPort. 186

Figure 155 Deletion of the volume. 187

Figure 156 Undeployment of a monitor. 188

Figure 157 Deletion at component level. 189

Figure 158 Delete Virtual Machine from scaled out VNF. 190

Figure 159 scale Inventory task. 193

Figure 160 Quota Assignment task. 194

Figure 161 Assignment of the resources 195

Figure 162 checking the image permissions. 196

Figure 163 Creation the Keypair element. 197

Figure 164 Creation of a Flavor 198

Figure 165 Connection of the Endpoints. 199

Figure 166 Connection of the Subnetwork to the VPort 200

Figure 167 Connection to the management network. 201

Figure 168 Attaching the Management Network. 202

Figure 169 Deploying Pre-Process policies. 203

Figure 170 Activation of the Keypair. 204

Figure 171 Activation of the Flavor 205

Figure 172 Deployment of a Monitor 206

Figure 173 Activation of the Volume. 207

Figure 174 Activation of the Port Group associated. 208

Figure 175 : Activation of the Flavor Extra Specs. 209

Figure 176 : Activation of Virtual Machine related to the VNF. 210

Figure 177 Deploying Post-Processing policies. 211

Figure 178 Attaching of the Volume used. 212

Figure 179 Starting Monitor. 213

Figure 180 changing the status of the VNF. 214

Figure 181: Undeploy Preprocessing policies 216

Figure 182: Stop Monitor. 217

Figure 183: Deactivation of a stopped VM. 218

Figure 184: Deactivation of an active VM 219

Figure 185: Undeploy Post-processing policies 220

Figure 186: Delete vPort 221

Figure 187: Deactivation of the Port Group element. 222

Figure 188 : Deactivation of the BRIDGE Virtual Port. 223

Figure 189: Deactivate security group. 224

Figure 190: Delete security group. 225

Figure 191: Deactivate vLAN. 226

Figure 192: Delete vLAN. 227

Figure 193: Undeploy Monitor 228

Figure 194: Delete Volume. 229

Figure 195: Delete Inventory. 230

Figure 196: Check children for Undeploy. 232

Figure 197: Deactivate Ingress Entry to any. 233

Figure 198: Deactivate Egress entry to any. 234

Figure 199: Deactivate Egress entry. 235

Figure 200: Deactivate Ingress entry. 236

Figure 201: Deactivate S/N OS. 237

Figure 202: Deactivate N/W OS. 238

Figure 203: Deactivate S/N DCN. 239

Figure 204: Deactivate Zone DCN. 240

Figure 205: Delete Egress entry any. 241

Figure 206: Delete Ingress Any 242

Figure 207: Delete Ingress Entry. 243

Figure 208: Delete Egress Entry. 244

Figure 209: Delete Network. 245

Figure 210: Delete VL inventory 246

Figure 211: Checking for the undeployment of a firewall. 248

Figure 212: Deactivating Egress Entry policies for the Tenant. 249

Figure 213: Deactivating Ingress Entry policies for the Tenant. 250

Figure 214: Deactivating Egress policies for the Tenant 251

Figure 215: Deactivating Ingress Entry policies for the Tenant. 252

Figure 216: Deactivate Subnetwork OS 253

Figure 217: Deactivate Network Openstack 254

Figure 218: Deactivating Subnetwork DCN 255

Figure 219: Deactivate Zone DCN 256

Figure 220: Delete Network 257

Figure 221: Getting L3Domain 258

Figure 222: Delete Forwarding policy 259

Figure 223: Deactivate Egress policy. 260

Figure 224: Deactivate Ingress policy 261

Figure 225: Deactivate L3Domain 262

Figure 226: Deactivate Tenant. 263

Figure 227: Deactivate Virtual Switch 264

Figure 228: Deactivate L3Domain. 265

Figure 229: Deactivate OO 267

Figure 230: Delete Fwd policy. 268

Figure 231: Delete Egress policy 269

Figure 232: Delete Ingress policy. 270

Figure 233 :Deletion L3Domain artifact. 271

Figure 234: Deleting Openstack tenant. 272

Figure 235: Delete Virtual Switch 273

Figure 236: Delete Tenant. 274

Figure 237: Undeploy check. 276

Figure 238: Selecting the adequate Macronet to be deleted. 277

Figure 239: Deactivating the specific Macronet. 278

Figure 240: Deactivate Enterprise 279

Figure 241: Deactivate Enterprise profile. 280

Figure 242: Deactivate OO 281

Figure 243: Deprovision Macronet. 282

Figure 244: Deprovision Enterprise. 283

Figure 245: Organization Delete. 284

Figure 246: Stop monitor. 286

Figure 247: Deactivate Virtual Machine. 287

Figure 248: Delete Virtual Port 288

Figure 249: Undeploy Monitor. 289

Figure 250: Delete Volume 290

Figure 251: Deactivate Ingress Mixed. 291

Figure 252: Deactivate Egress Mixed. 292

Figure 253: Deactivate Forwarding policies. 293

Figure 254: getting Network. 294

Figure 255: Deactivate Ingress Service. 295

Figure 256: Deactivate Egress Service. 296

Figure 257: Deactivate Redirection Target. 297

Figure 258: Deactivate Subnetwork. 298

Figure 259: Deactivate Network. 299

Figure 260: Deactivate DCN Subnetwork. 300

Figure 261: Deactivate DCN Zone. 301

Figure 262: Delete Forwarding entry policies. 302

Figure 263: Delete service Ingress. 303

Figure 264: Delete Service Egress. 304

Figure 265: Delete Redirection Target. 305

Figure 266: Deletion of the Ingres Mixed Policies. 306

Figure 267: Deletion of the Egress Mixed policies. 307

Figure 268: Delete Service Egress to Any. 308

Figure 269: Deattach Service Network. 309

Figure 270: Delete Service Net. 310

Figure 271: Delete Inventory. 311

Preface

About this guide

This guide is intended to support the NFV Director integrator to understand and customize if needed “NFVO Managed” (default) mode.

It is NEVER recommended to modify the VIM manages mode directly but to create a full new copy with NEW ids for all artifacts and trees in order to avoid any conflict with the out of the box mode.

Audience

This document is targeting integrators specially HPE delivery and NFVD global practice so they can understand and customize if needed the behavior and limitations of current NFVD version.

For On boarding VNFs please refer to the *HPE NFV Director On boarding Guide*.

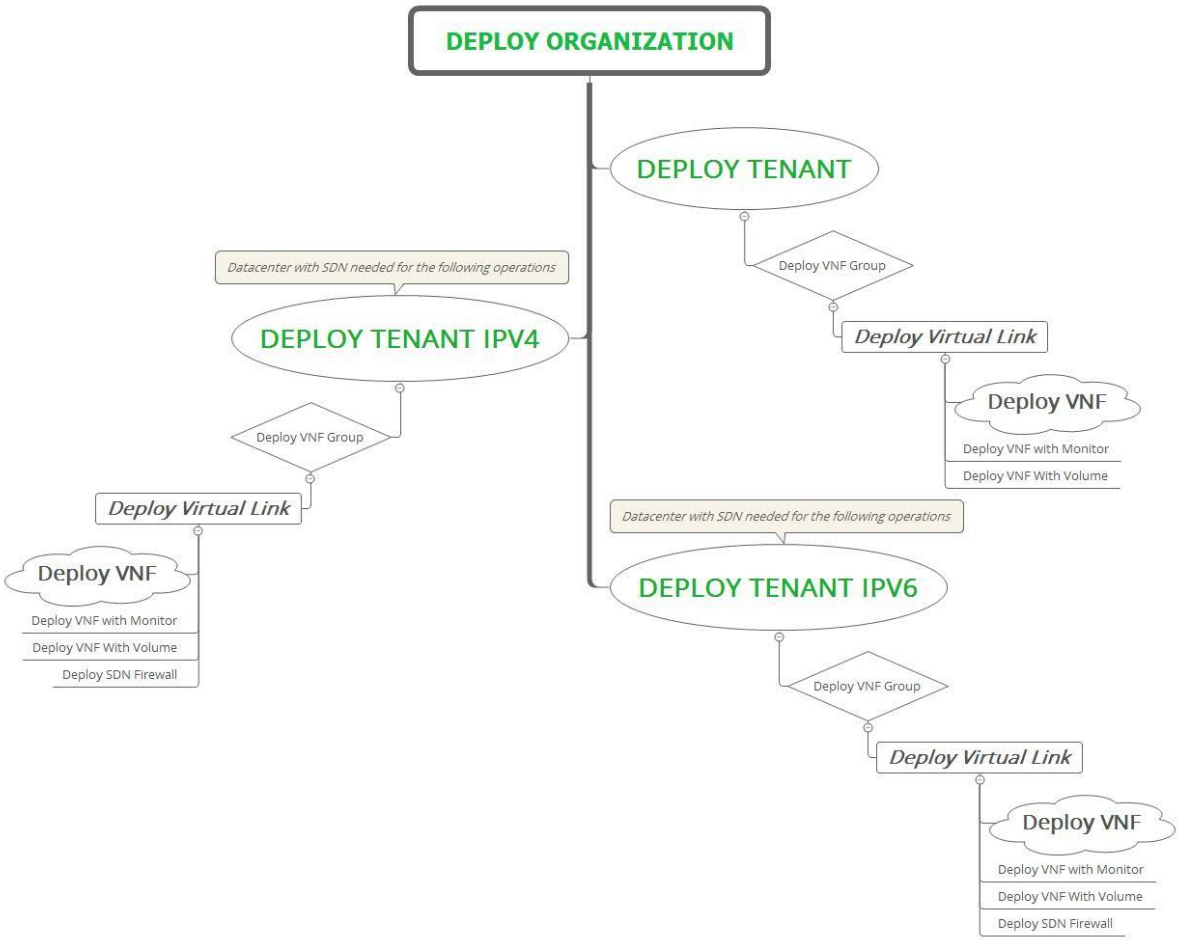
Document history

Table 1: Document history

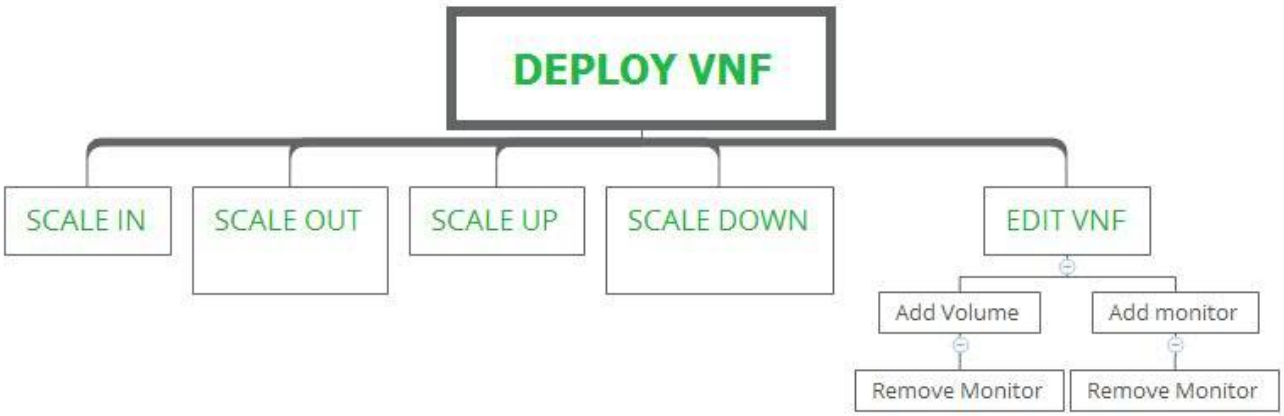
Edition	Date	Description
1.0	14 March, 2017	First Edition.

Chapter 1
Operations tree.

These are the different operations represented in a tree shape.



Once the VNF has been activated, the operations available change.



Chapter 2 Deploy of an Organization - Default.

From now on, and to make easier the understanding of the TLDs, we are going to explain the functionality of each set of TASK_LIST_DEFINITION:GENERIC, and the number of TASK_DEFINITION:GENERIC children of the previously mentioned TASK_LIST_DEFINITION:GENERIC.

Basically, the TASK_LIST_DEFINITION:GENERIC connect what we can consider “units of execution”, those are the TASK_DEFINITION:GENERIC, that have a WORKFLOW assigned to be executed when the execution of the TLD reach them.

If you like to have a more deep knowledge about the workflows mentioned through this document please refer to the specific document.

**

If in the category FIND, the attribute Path is present, the attribute FIND.ArtifactType will be the starting artifact for the Path, but the FIND.Status attribute refers to the last artifact on the Path.

FIND.ArtifactType == VIRTUAL_MACHINE
FIND.Status== INSTANTIATED
FIND.Path ==
VIRTUAL_MACHINE>VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE<REGION>COMPUTE>FLAVOR

In this example, we are looking for a FLAVOR in status INSTANTIATED, we do not expect to get a VIRTUAL_MACHINE, in status INSTANTIATED.

** If during the use of the TLDs, the “Regenerate UUIDs” option is used, the user should check the Id of the tree that brings all the elements of the TLD, this “id” is specific and it will be the same for all the tree groups in all the TLDs.

** The two modes available are “Default” and “Simulated”, the second one is only available if it is configured previously, by defect, and the mode that will be used is “Default”.

2.1 Specific Elements of the TLD Deploy Organization

In this chapter the different elements of the specific TLD will be explained conscientiously.

2.2 TLD INVENTORY ORGANIZATION: Provision Enterprise.

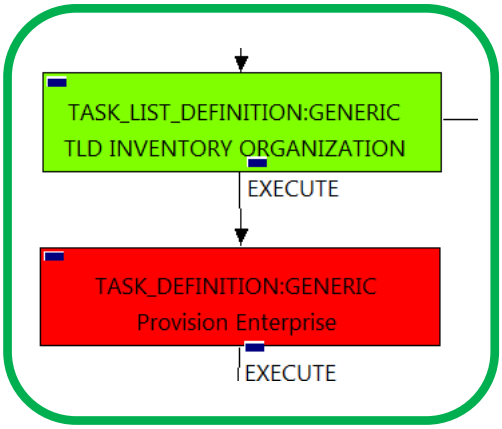


Figure: 1 Provision Enterprise TLD

The TDs that have present in the their names "Provision", are Task Definitions responsible of the creation and store of an artifact in DDBB, in this case, the artifact that it is going to be provisioned it is an "Enterprise", this means, when this workflow finish, we will have a new artifact "Enterprise" in our DDBB.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Provision Enterprise
FIND.Condition == **status==constant:INSTANTIATED**
EXECUTE.Workflow ==
"WF_TS_PROVISION_SDN_ENTERPRISE"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow ==
"WF_TS_DEPROVISION_SDN_ENTERPRISE"
DATA.Lock == true

The WorkFlow present in EXECUTE.Workflow it is going to seek an ORGANIZATION in Status INSTANTIATED in the DDBB, when the WF find it, it will start. This workflow create an artifact "Enterprise" and an "Enterprise_Profile" related between them, taking an Organization already present in the DDBB, as a template.

The WorkFlow also create all the relationship needed for the correct behavior of the recently created artifact.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. In this case, the TLD has assigned a rollback workflow, **"WF_TS_DEPROVISION_SDN_ENTERPRISE"**, so in case of error the rollback workflow will be triggered.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

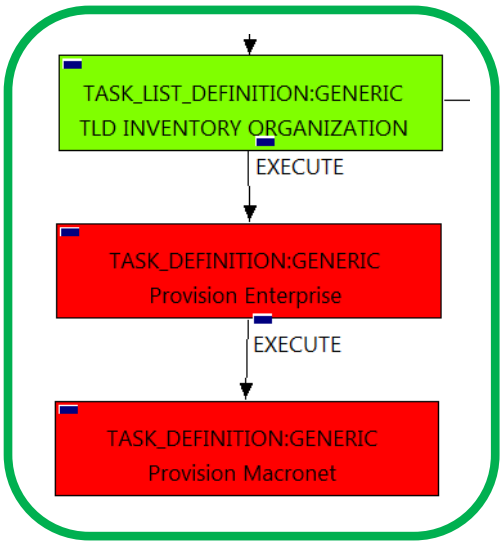


Figure 1: Provision of a Macronet.

The TDs that have present in the their names "Provision", are Task Definitions responsible of the creation and store of an artifact in DDBB, in this case, the artifact that it is going to be provisioned it is an "Enterprise", this means, when this workflow finish, we will have a new artifact "Enterprise" in our DDBB.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Provision Macronet
FIND.Condition == **status==constant:INSTANTIATED**
EXECUTE.Workflow ==
"WF_TS_PROVISION_SDN_ENTERPRISE"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow ==
"WF_TS_DEPROVISION_SDN_MACRONET"
DATA.Lock == false

The WorkFlow present in EXECUTE.Workflow it is going to seek an ORGANIZATION in Status INSTANTIATED in the DDBB, when the WF find it, it will start. This workflow it is going to create the exact number of Macronets present in our ENTERPRISE:MANAGEMENT, with same attributes and status INSTANTIATED. Also related with the Enterprise that have been provisioned in the previous WF.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. In this case, the TLD has assigned a rollback workflow, **"WF_TS_DEPROVISION_SDN_MACRONET"**, so in case of error the rollback workflow will be triggered.

Due to that the value of the attribute DATA.Lock is false, the artifact will be left without be blocked.

2.4 TLD ACTIVE OO: Activate OO.

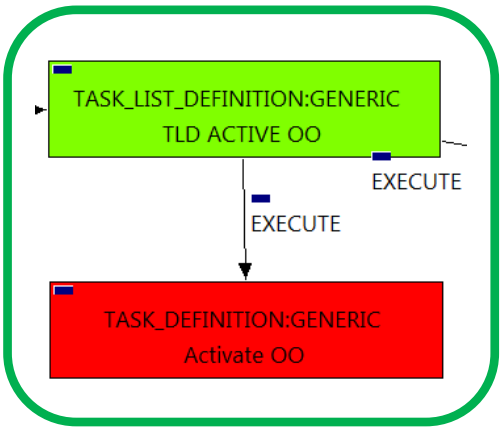


Figure 2 : Activation of OO.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, we are not going to activate any artifact, this TD associates the entity given with the LDAP group that it is corresponded to, to make the user's reference clear between entities.

Targets of the TASK DEFINITION: ENABLED	STATUS of the TD:
GENERAL.Name ==	Activate OO
FIND.Condition ==	**status==constant:INSTANTIATED**
EXECUTE.Workflow ==	**"WF_TS_ACTIVATE_OO_ORGANIZATION"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The WorkFlow present in EXECUTE.Workflow it is going to seek an ORGANIZATION in Status INSTANTIATED in the DDBB, when the WF find it, it will start.

This workflow it is going to query and update the entity given, in this case, Organization, with the values needed for the correct behavior of the users with the specific entity.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

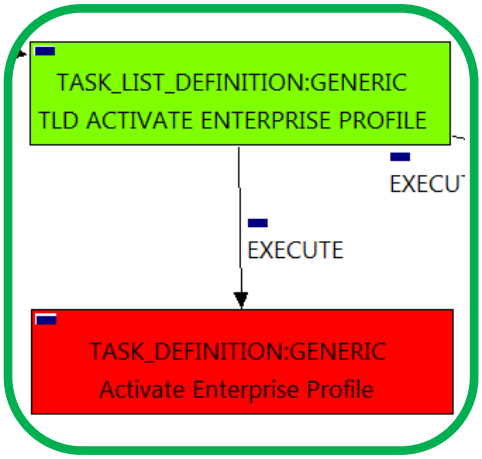


Figure 3: Activation of an Enterprise Profile.

The TDs that have present in the their names "Connect", are Task Definitions responsible of the connection between artifacts, this means, this TDs will create relationship of specific kind between concrete artifacts, in this case, it will create relationships of type USES and status ENABLED between a specific VIRTUAL_PORT, and the SUBNETWORKS (or the subnetworks's IPADDRESS:GENERIC) related as children of our VIRTUAL_LINK:MANAGEMENT that we are using.

Once finished, we should have all SUBNETWORKs related as children of our VL:MANAGEMENT bonded with a relationship of type USES and status ENABLED with the VIRTUAL_PORT found by the conditions of the TD.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Activate Enterprise Profile
FIND.Condition == **GENERAL.Name==%GENERAL.Name%_Profile**
FIND.Path==

ORGANIZATION>RESOURCE_POOL>VIM>AUTHENTICATION>REGION>NETWORKING
<SDN_CONTROLLER>ENTERPRISE:PROFILE:DCN@status=INSTANTIATED,
ORGANIZATION>RESOURCE_POOL>LOCATION>VIM>AUTHENTICATION>REGION>NETWORKING
<SDN_CONTROLLER>ENTERPRISE:PROFILE:DCN@status=INSTANTIATED,
ORGANIZATION>RESOURCE_POOL>DATACENTER>VIM>AUTHENTICATION>REGION>NETWORKING
<SDN_CONTROLLER>ENTERPRISE:PROFILE:DCN@status=INSTANTIATED,
ORGANIZATION>RESOURCE_POOL>SERVER<HYPERVISOR<VIM>AUTHENTICATION>REGION
>NETWORKING<SDN_CONTROLLER>ENTERPRISE:PROFILE:DCN@status=INSTANTIATED

SET.Running_Status == INSTANTIATED.
SET.Status == ACTIVE.
EXECUTE.Workflow == **"WF_TS_ACTIVATE_SDN_PROFILE"**
EXECUTE.Inactive== false
EXECUTE.OrderBy ==
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

The WorkFlow present in EXECUTE.Workflow attribute it is going to seek an ORGANIZATION:GENERIC in Status INSTANTIATED in the DDBB, this ORGANIZATION must have as GENERAL.Name, the Organization's name concatenated with the string "_Profile", means we are seeking the Enterprise_Profile of the Enterprise that we have been provisioned previously. The query it is going to use the Path present in the category FIND.Path (this path it is what we called a MultiPath, cover not only one path for the query) Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

.

2.6 TLD ACTIVATE ENTERPRISE: Activate Profile.

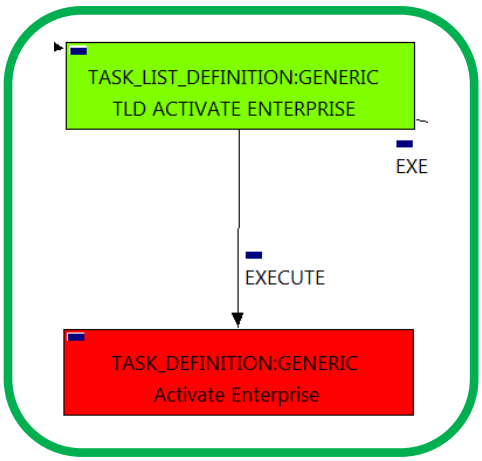


Figure 4: Activation of an Enterprise.

The TDs that have present in the their names "Connect", are Task Definitions responsible of the connection between artifacts, this means, this TDs will create relationship of specific kind between concrete artifacts, in this case, it will create relationships of type USES and status ENABLED between a specific VIRTUAL_PORT, and the SUBNETWORKS (or the subnetworks's IPADDRESS:GENERIC) related as children of our VIRTUAL_LINK:MANAGEMENT that we are using.

Once finished, we should have all SUBNETWORKs related as children of our VL:MANAGEMENT bonded with a relationship of type USES and status ENABLED with the VIRTUAL_PORT found by the conditions of the TD.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Activate Enterprise
FIND.Condition == **GENERAL.Name==%GENERAL.Name%_Profile**
FIND.Path==

ORGANIZATION>RESOURCE_POOL>VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE:DCN@status=INSTANTIATED,
ORGANIZATION>RESOURCE_POOL>LOCATION>VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE:DCN@status=INSTANTIATED,
ORGANIZATION>RESOURCE_POOL>DATACENTER>VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE:DCN@status=INSTANTIATED,
ORGANIZATION>RESOURCE_POOL>SERVER<HYPERVISOR<VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE:DCN@status=INSTANTIATED

SET.Running_Status == INSTANTIATED.
SET.Status == ACTIVE.
EXECUTE.Workflow == **"WF_TS_ACTIVATE_SDN_ENTERPRISE"**
EXECUTE.Inactive== false
EXECUTE.OrderBy ==
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

The WorkFlow present in EXECUTE.Workflow attribute it is going to seek an ORGANIZATION:GENERIC in Status INSTANTIATED in the DDBB, this ORGANIZATION must have as GENERAL.Name the same name of the ORGANIZATION sought, means we are seeking for the Enterprise that we have been provisioned previously. The query it is going to use the Path present in the category FIND.Path.(this path it is what we called a MultiPath, cover not only one path for the query) Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

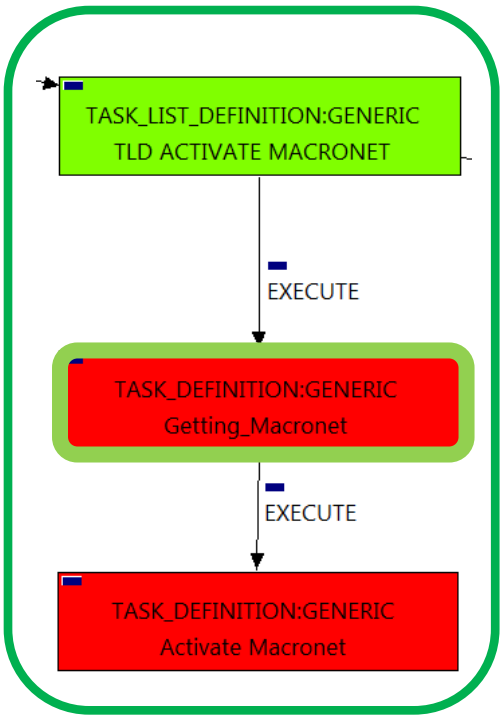


Figure 5: Getting only Macronet artifacts.

2.7 TLD ACTIVATE MACRONET: Getting_Macronet.

This TD assures that the activation of the MACRONETS it will be adjusted only to the ENTERPRISE that is parent of the MACRONETS, this means, the activation it will activated only the MACRONETS related to a specific ENTERPRISE, this specific ENTERPRISE it is going to be one whose GENERAL.Name matched with the "%GENERAL.Name%" present in the TD.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	Activate Enterprise
FIND.Condition ==	**GENERAL.Name==%GENERAL.Name%_Profile**
FIND.Path==	

ORGANIZATION>RESOURCE_POOL>VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE@status=ACTIVE,
ORGANIZATION>RESOURCE_POOL>LOCATION>VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE@status=ACTIVE,
ORGANIZATION>RESOURCE_POOL>DATACENTER>VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE@status=ACTIVE,
ORGANIZATION>RESOURCE_POOL>SERVER<HYPERVISOR<VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE@status=ACTIVE

SET.Running_Status ==	INSTANTIATED.
SET.Status ==	ACTIVE.
EXECUTE.Inactive==	false
EXECUTE.OrderBy ==	
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The WorkFlow present in EXECUTE.Workflow attribute it is going to seek an ORGANIZATION:GENERIC in Status INSTANTIATED in the DDBB, this ORGANIZATION must have as GENERAL.Name the value of the attribute FIND.Condition. The query it is going to use the Path present in the category FIND.Path.(this path it is what we called a MultiPath, cover not only one path for the query) Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

.

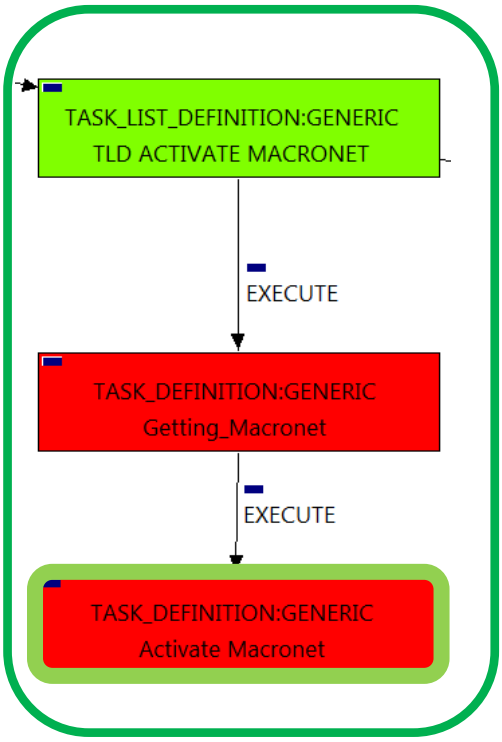


Figure 6:Activation of a Macronet.

2.8 TLD ACTIVATE MACRONET: Activate_Macronet.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB , in this case, the artifact that is going to be activated is a "Macronet", this means, when this workflow finish, we will have a "Macronet" with status ACTIVE , this macronet will be the one of the previously provisioned, this Macronet will be related with previously activate d Enterprise.

We will have one execution of this workflow per each Macronet provisioned for the previous Enterprise.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	Activate Enterprise
FIND.MainArtifact ==	**ENTERPRISE:DCN>MACRONET:DCN@status=INSTANTIATED**
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	ACTIVE.
EXECUTE.Workflow ==	**"WF_TS_ACTIVATE_SDN_MACRONET"**
EXECUTE.Inactive==	false
EXECUTE.OrderBy ==	
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	false

The WorkFlow present in EXECUTE.Workflow attribute it is going to seek an ORGANIZATION:GENERIC in Status INSTANTIATED in the DDBB, this ORGANIZATION must have as GENERAL.Name the same name of the ORGANIZATION seeked, means we are seeking for the Enterprise that we have been provisioned previously. The query it is going to use the Path present in the category FIND(this path it is what we called a MultiPath, cover not only one path for the query). Once found, the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, due to that the value of the attribute DATA.Lock is false, so the artifact which is being used in the execution will be left unblocked.

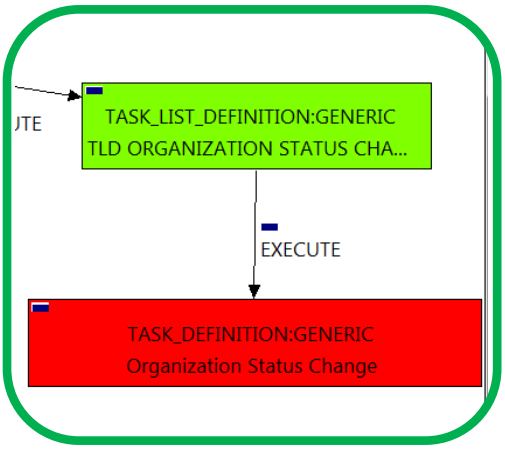


Figure 7: Change Organization Status.

The TDs that have present in the their names "Status Change", are Task Definitions responsible of the change in the status of the entity associated, in this case an ORGANIZATION. When the WF has finished we will have an ORGANIZATION with status ACTIVE in case of successful execution, or status ERROR in case of error, or simply not any change in the status because a ROLLBACK during the execution.

Targets of the TASK DEFINITION: ENABLED	STATUS of the TD:
GENERAL.Name ==	Activate Enterprise
FIND.Condition ==	**status==constant:INSTANTIATED**
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	ACTIVE.
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The TASK_DEFINITION do not execute any workflow, with the attributes present in the categories it is enough to change the status of the entity.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

Chapter 3 Deploy of a Tenant - Default.

From now on, and to make easier the understanding of the TLDs, we are going to explain the functionality of each set of TASK_LIST_DEFINITION:GENERIC, and the number of TASK_DEFINITION:GENERIC children of the previously mentioned TASK_LIST_DEFINITION:GENERIC.

Basically, the TASK_LIST_DEFINITION:GENERIC connect what we can consider "units of execution", those are the TASK_DEFINITION:GENERIC, that have a WORKFLOW assigned to be executed when the execution of the TLD reach them.

If you like to have a more deep knowledge about the workflows mentioned through this document please refer to the specific document.

**

If in the category FIND, the attribute Path is present, the attribute FIND.ArtifactType will be the starting artifact for the Path, but the FIND.Status attribute refers to the last artifact on the Path.

FIND.ArtifactType == VIRTUAL_MACHINE
FIND.Status== INSTANTIATED
FIND.Path ==
VIRTUAL_MACHINE>VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE<REGION>COMPUTE>FLAVOR

In this example, we are looking for a FLAVOR in status INSTANTIATED, we do not expect to get a VIRTUAL_MACHINE, in status INSTANTIATED.

** If during the use of the TLDs, the "Regenerate UUIDs" option is used, the user should check the Id of the tree that brings all the elements of the TLD, this "id" is specific and it will be the same for all the tree groups in all the TLDs.

** The two modes available are "Default" and "Simulated", the second one is only available if it is configured previously, by defect, and the mode that will be used is "Default".

3.1 Specific Elements of the TLD Deploy Tenant.

In this chapter the different elements of the specific TLD will be explained conscientiously.

3.2 TLD DEPLOY_TENANT: Quota Assignment Task.

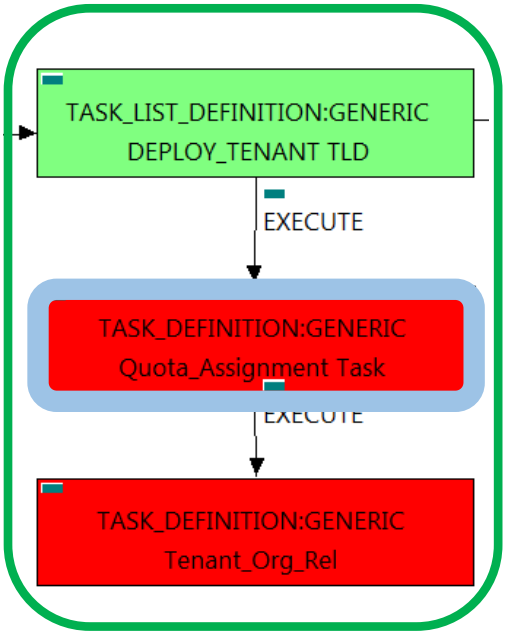


Figure 8 Quota Assignment task.

The TDs that have present in the their names "Assignment", are Task Definitions responsible of the assignation of resources for an specific artifact, in the case of the quotas, the TLD it is going to assign an amount of each resource needed for the correct execution of the deployment.

Once finished, our VNF should have every quota needed for a successful deployment assigned, having taken in consideration all the rules for the assignment. This is crucial, because our component consume quotas during the execution of the TLD.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Quota_Assignment Task
SET.Status == INSTANTIATED.
EXECUTE.Workflow == **"WF_NFVD_ASSIGNMENT_QUOTA"**
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
DATA.Lock == false
INPUT_MAPPING.MAPPING_LIST == **assignmentRelationshipID=Quota_Assignment; resourceTreeID=nfvd#quotaResourceID**

The Workflow present in EXECUTE.Workflow it is going to seek the artifact identified by the Id given, this id should belong to an artifact TENANT:GENERIC in Status INSTANTIATED in the DDBB, when the WF find it, it will start. This workflow will assign all the resources needed by the TENANT:GENERIC to get a successful Deploy, it will check the available resources and decide which one should be assigned.

The Workflow also check the affinity policies , in case our TLD has it, the way the assignation it is going to behave depends also of this policies, once checked, we launch the assignation of resources.

The assignation of resources it uses another WF that it is called from our workflow, "WF_NFVD_ASSIGN_RESOURCES".

In case of error during the execution, the workflow jump to the ROLLBACK category, if the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. In this case, the TLD has not assigned a rollback workflow, so in this case the TD will only change the status of the artifact which is being used.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

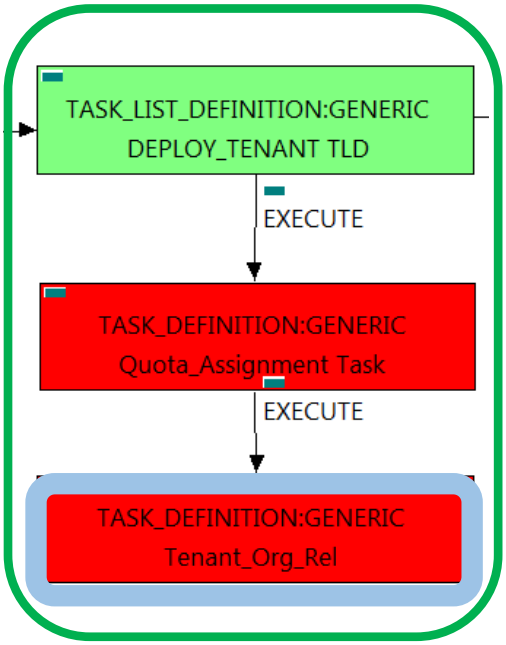


Figure 9: Creation of specific Quota for Tenant.

The TDs that have present in their names "Assignment", are Task Definitions responsible of the assignation of resources for a specific artifact or deploy, in this case, we are looking for a TENANT to assign the Quotas "Compute" needed for the future deployment. In order to have a successful assignation we must have in our TLD Deploy TENANT an artifact POLICY: ASSIGMENT_RELATIONSHIP, with a GENERAL.Name=="Resource_Assigment", also this artifact must be related with the OPERATION_GROUP: GENERIC of our TLD with a relationship of type PROVIDES and status ENABLED.

Once finished, our TENANT should have every Quota needed for a successful deployment assigned, having taken in consideration all the rules for the assignment.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Tenant_Org_Rel
EXECUTE.Workflow == **"WF_NFVD_CREATE_QUOTA_ORG_TENANT_REL"**
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
DATA.Lock == false
INPUT_MAPPING.MAPPING_LIST == **resourceTreeID=nfvd#currentArtifactID**

The Workflow present in EXECUTE.Workflow it is going to seek in the DDBB the artifact identified by the Id given, this artifact will be a TENANT:GENERIC, when the WF find it, it will start. This workflow assign all the Quotas "Compute" needed by the TENANT:GENERIC to get a successful Deploy, it will check the available resources and decide which one should be assigned.

The Workflow also check the affinity policies , in case our TLD has it, the way the assignation it is going to behave depends also of this policies, once checked, we launch the assignation of resources.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. In this case, the TLD has not assigned a rollback workflow, so no action taken.

Due to that the value of the attribute DATA.Lock is false, the artifact will be left without be blocked.

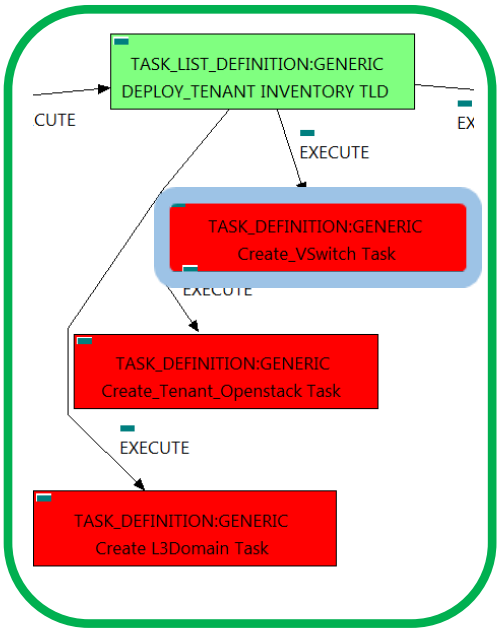


Figure 10 : Provision of a Virtual Switch.

3.4 TLD DEPLOY_TENANT_INVENTORY: Create_VSwitch task..

The TDs that have present in the their names "Provision" or "Create", are Task Definitions responsible of the creation and store of an artifact in DDBB, in this case, the artifact that it is going to be provisioned it is an "VSWITCH:VCENTER", also it will be checked and created the relationship of type "ACCESS" with the artifact "PORT:GENERIC" child of a "SERVER:GENERIC", this means, when this workflow finish, we will have a new artifact properly stored in our DDBB, one "VSWITCH:VCENTER" with status INSTANTIATED, and a relationship of type "ACCESS" between the artifact and the port. Due to the nature of the artifact, the artifact will not be duplicated if already exists for the specified VCENTER.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Create_VSwitch Task
SET.Running_Status == INSTANTIATED.
Set.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_PROVISION_VSWITCH"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow==
"WF_TS_PROVISION_SDN_DOMAIN_UNDO"
DATA.Lock == true

The Workflow present in EXECUTE.Workflow it is going to seek in the DDBB the artifact identified by the Id given, this artifact will be a TENANT:GENERIC, when the WF find it, it will start. This workflow will query looking for an artifact Hypervisor of the type VCENTER to start the provisioning of the specific VSwitch, in case such artifact exist in our DDBB, the workflow will start a secondary workflow, this one is the responsible of the rest of the configurations needed to have properly instantiated the artifact VSwitch, the name of this workflow is: "WF_TS_PROVISION_VSWITCH_VCENTER".

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. In this case, the TLD has assigned the rollback workflow "WF_TS_PROVISION_SDN_DOMAIN_UNDO". For this TD the behavior set is "STOP", if an error take place in this TD , no action will be taken, the execution of the TLD will continue.

Due to that the value of the attribute DATA.Lock is true, once the TD has finished, the artifact VSwitch recently provisioned, will be blocked.

3.5 TLD DEPLOY_TENANT_INVENTORY: Create_Tenant_Openstack Task..

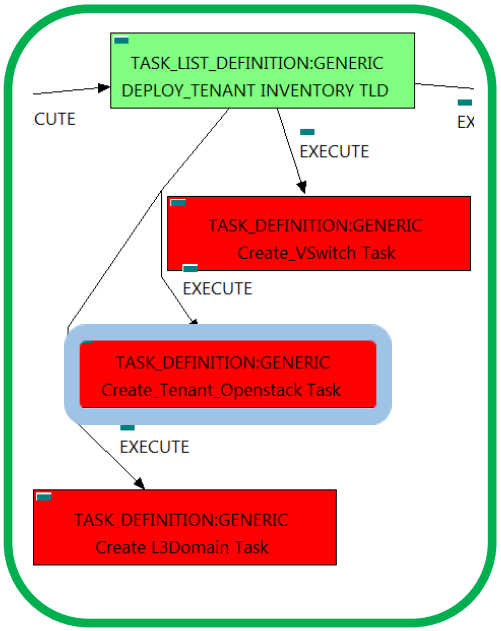


Figure 11: Creation of Tenant:Openstack artifact.

The TDs that have present in the their names "Provision", are Task Definitions responsible of the creation and store of an artifact in DDBB, in this case, the artifact that it is going to be provisioned it is an "TENANT:OPENSTACK", this means, when this workflow finish, we will have a new artifact "TENANT:OPENSTACK" in our DDBB, as well, due to the nature of the artifact, the artifact will be prepared to be activated in the platform Openstack when will be required.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	Create_Tenant_Openstack Task
SET.Running_Status ==	INSTANTIATED.
Set.Status ==	INSTANTIATED.
EXECUTE.Workflow ==	**"WF_TS_PROVISION_TENANT"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow it is going to seek in the DDBB the artifact identified by the Id given, this artifact will be a TENANT:GENERIC, when the WF find it, it will start. This workflow create an artifact "TENANT:OPENSTACK" with status INSTANTIATED.

The WorkFlow also create all the relationship needed for the correct behavior of the recently created artifact.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

.

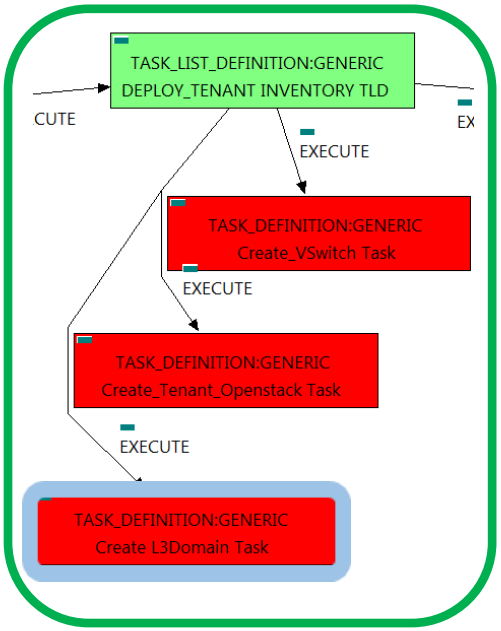


Figure 12: Creation of the L3Domain and L3Domain template artifacts.

The TDs that have present in the their names "Provision", are Task Definitions responsible of the creation and store of an artifact in DDBB, in this case, the artifact that it is going to be provisioned it is an "L3DOMAIN:DCN" and a "L3DOMAIN:TEMPALTE:DCN", this means, when this workflow finish, we will have two new artifacts properly stored in our DDBB, one "L3DOMAIN:DCN" and one"L3DOMAIN:TEMPLATE:DCN" with status INSTANTIATED, and a relationship of type "USE" between them. Due to the nature of the artifact, the artifact will be prepared to be activated in the platform VSD when will be required.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Create L3Domain Task
SET.Running_Status == INSTANTIATED.
Set.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_PROVISION_SDN_DOMAIN"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow ==
"WF_TS_PROVISION_SDN_DOMAIN_UNDO"
DATA.Lock == true

The Workflow present in EXECUTE.Workflow it is going to seek in the DDBB the artifact identified by the Id given, this artifact will be a TENANT:GENERIC, when the WF find it, it will start. This workflow create a L3DOMAIN:DCN, and a L3DOMAIN:TEMPLATE:DCN artifacts

The TD also create all the relationship needed for the correct behavior of the recently created artifact.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is "WF_TS_PROVISION_SDN_DOMAIN_UNDO", but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

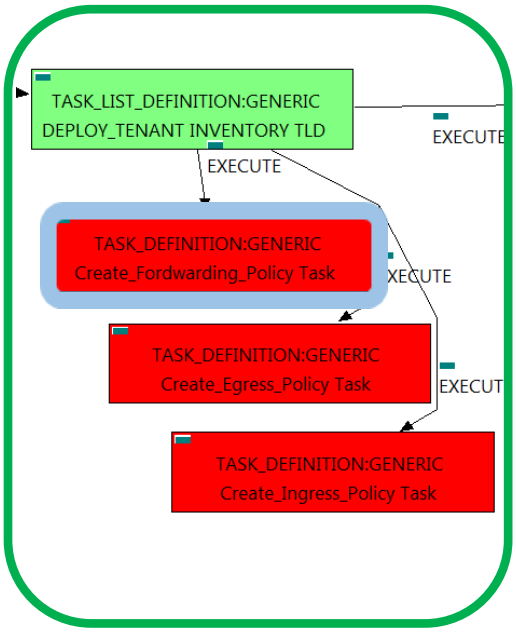


Figure 13: Creation of the Forwarding Policies.

3.7 DEPLOY_TENANT_INVENTORY TLD: Create_Forwarding_Policy Task..

This TD it is going to provision a INGRESSADVFORWARD:TEMPLATE:DCN policies, this means, the WF implied in this TLD is going to query from TENANT:GENERIC through the SDN_CONTROLLER reaching the L3DOMAIN:DCN to create the policy. Once the TD has the artifact that it is going to act as parent, the TD will start to validate some attributes present in those artifacts in order to create the policy INGRESSADVFORWARD:TEMPLATE:DCN related to policy L3DOMAIN:DCN with a relationship of type MANAGE and status ENABLED.

Once finished, we will have provisioned an INGRESSADVFORWARD:TEMPLATE:DCN with status INSTANTIATED and all the relationship needed for the correct behavior of the artifact, prepare to be activated when required, a relationship of type MANAGE between our L3DOMAIN and the policy INGRESSADVFORWARD recently created.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Create_Fordwarding_Policy Task
SET.Running_Status == INSTANTIATED.
Set.Status == INSTANTIATED.
EXECUTE.Workflow == **"WF_TS_PROVISION_SDN_FORWARD_POLICIES"**
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow == **"WF_TS_PROVISION_SDN_FORWARD_POLICIES_UNDO"**
DATA.Lock == true

The Workflow present in EXECUTE.Workflow it is going to seek in the DDBB the artifact identified by the Id given, this artifact will be a TENANT:GENERIC, when the WF find it, it will start the provisioning, if the provision it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

The TD also create all the relationship needed for the correct behavior of the recently created artifact.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is "WF_TS_PROVISION_SDN_FORWARD_POLICIES_UNDO", but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

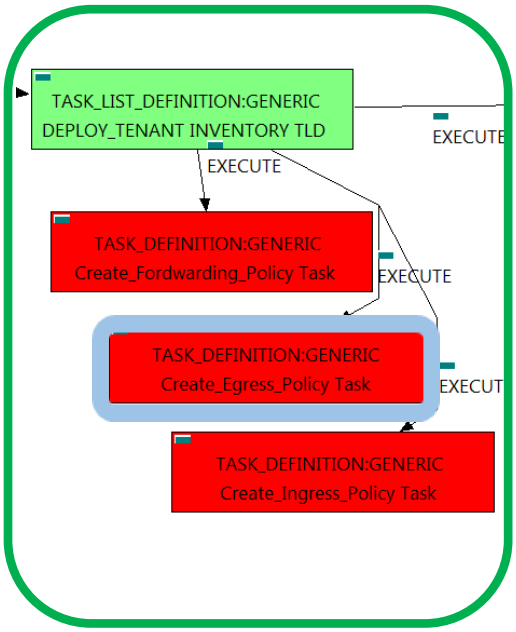


Figure 14: Creation of the Egress Policies.

3.8 DEPLOY_TENANT_INVENTORY TLD: Create_Egress_Policy Task..

This TD it is going to provision a EGRESSACL:TEMPLATE:DCN policies, this means, the WF implied in this TLD is going to query from TENANT:GENERIC through the SDN_CONTROLLER reaching the L3DOMAIN:DCN to create the policy. Once the TD has the artifact that it is going to act as parent, the TD will start to validate some attributes present in those artifacts in order to create the policy EGRESSACL:TEMPLATE:DCN related to policy L3DOMAIN:DCN with a relationship of type MANAGE and status ENABLED.

Once finished, we will have provisioned an EGRESSACL:TEMPLATE:DCN with status INSTANTIATED and all the relationship needed for the correct behavior of the artifact, prepare to be activated when required, a relationship of type MANAGE between our L3DOMAIN and the policy EGRESSACL recently created.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Create_Egress_Policy Task
SET.Running_Status == INSTANTIATED.
Set.Status == INSTANTIATED.
EXECUTE.Workflow == **"WF_TS_PROVISION_SDN_EGRESSACL_POLICIES"**
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow == **"WF_TS_PROVISION_SDN_EGRESSACL_POLICIES_UNDO"**
DATA.Lock == true

The Workflow present in EXECUTE.Workflow it is going to seek in the DDBB the artifact identified by the Id given, this artifact will be a TENANT:GENERIC, when the WF find it, it will start the provisioning of the EGRESSSACL policies for the Tenant, if the provision it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

The TD also create all the relationship needed for the correct behavior of the recently created artifact.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is "WF_TS_PROVISION_SDN_EGRESSACL_POLICIES_UNDO", but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

.

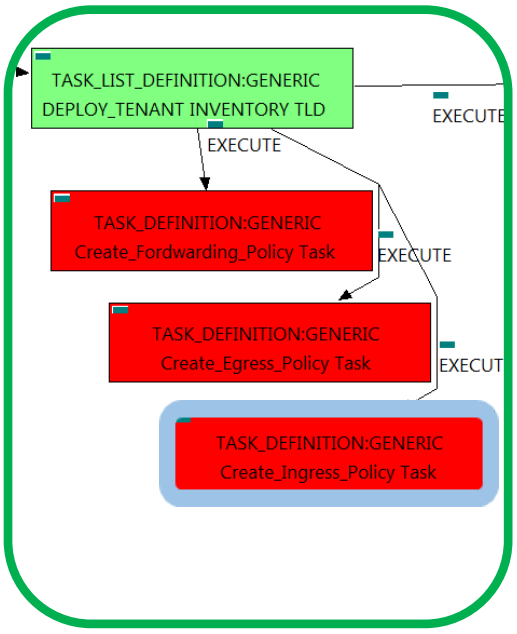


Figure 15: Creation of the Ingress Policies for Tenant.

This TD it is going to provision a INGRESSACL:TEMPLATE:DCN policies, this means, the WF implied in this TLD is going to query from TENANT:GENERIC through the SDN_CONTROLLER reaching the L3DOMAIN:DCN to create the policy. Once the TD has the artifact that it is going to act as parent, the TD will start to validate some attributes present in those artifacts in order to create the policy INGRESSACL:TEMPLATE:DCN related to policy L3DOMAIN:DCN with a relationship of type MANAGE and status ENABLED.

Once finished, we will have provisioned an INGRESSACL:TEMPLATE:DCN with status INSTANTIATED and all the relationship needed for the correct behavior of the artifact, prepare to be activated when required, a relationship of type MANAGE between our L3DOMAIN and the policy INGRESSACL recently created.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Create_Ingress_Policy Task
SET.Running_Status == INSTANTIATED.
Set.Status == INSTANTIATED.
EXECUTE.Workflow == **"WF_TS_PROVISION_SDN_INGRESSACL_POLICIES"**
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow == **"WF_TS_PROVISION_SDN_INGRESSACL_POLICIES_UNDO"**
DATA.Lock == true

The Workflow present in EXECUTE.Workflow it is going to seek in the DDBB the artifact identified by the Id given, this artifact will be a TENANT:GENERIC, when the WF find it, it will start the provisioning of the INGRESSSACL policies for the Tenant, if the provision it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

The TD also create all the relationship needed for the correct behavior of the recently created artifact.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is "WF_TS_PROVISION_SDN_INGRESSACL_POLICIES_UNDO", but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

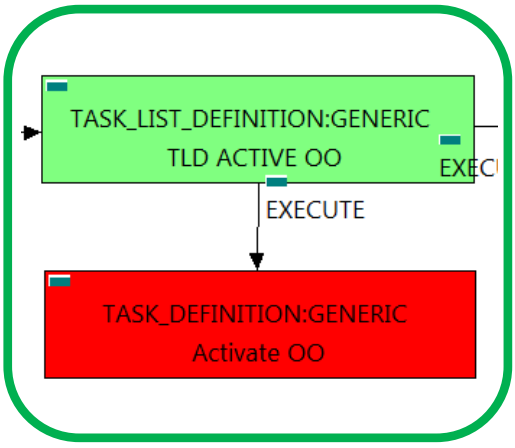


Figure 16 : Activation of the OO for Tenant.

3.10 • TLD ACTIVE OO: Activate OO.

The TDs that have present in their names "Check", are Task Definitions that validate the configuration of an artifact, in this case, the configuration of the IMAGE present in our DCs, the workflow will check, validate, and in case of need, deploy the IMAGE related with the VMs present in our DC.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	Activate OO
FIND.Condition ==	status==constant:INSTANTIATED
EXECUTE.Workflow ==	**"WF_TS_ACTIVATE_OO_TENANT"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow it is going to seek in the DDBB the artifact identified by the Id given, this artifact will be a TENANT:GENERIC, when the WF find it, it will start.This workflow it is going to query and update the entity given, in this case, Tenant, with the values needed for the correct behavior of the users with the specific entity.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. In this case, the TLD has not assigned a rollback workflow, so no action taken.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

3.11 • TLD ACTIVE: Activate_VSwitch task.

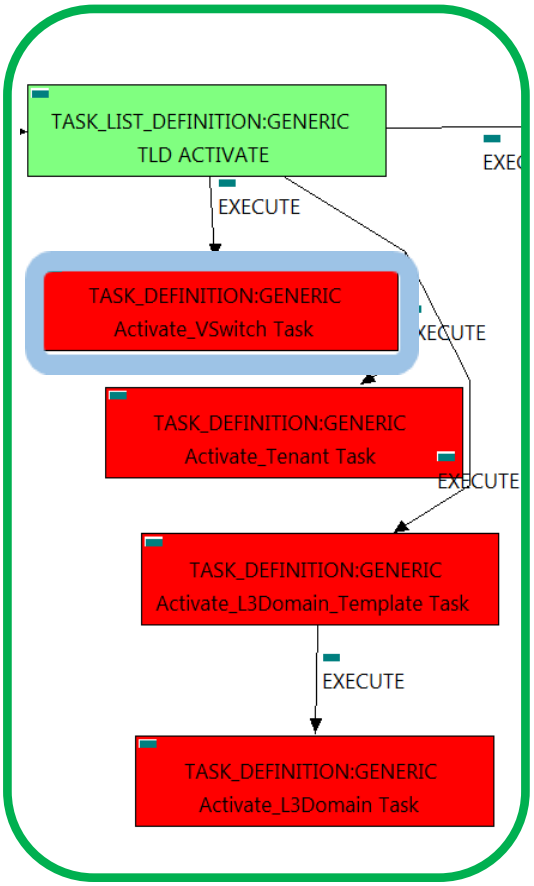


Figure 17: Activation of a VSwitch artifact.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "VSWITCH:VCENTER", this means, when this workflow finish, we will have a VSWITCH:VCENTER with status ACTIVE in our platform.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

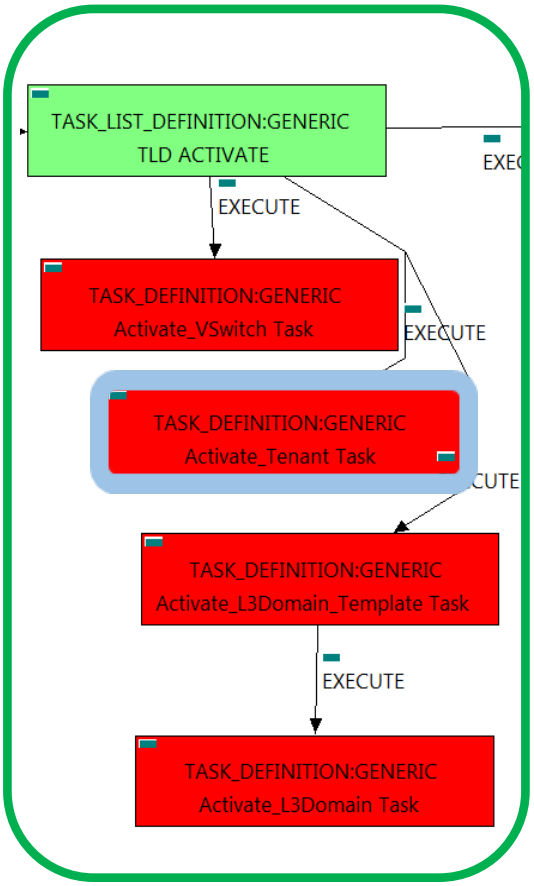
GENERAL.Name == Activate_VSwitch Task
FIND.MainArtifact ==
TENANT>RESOURCE_POOL>DATACENTER>HYPERVISOR>SERVER>VSWITCH:VCENTER#GENERAL.Name=NFVD
SET.Running_Status == INSTANTIATED.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_ACTIVATE_VSWITCH_VCENTER"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow ==
"WF_TS_DEACTIVATE_SDN_L3DOMAIN"
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a VSWITCH:VCENTER that match the FIND.MainArtifact attribute with value "GENERAL.Name==NFVD" in Status INSTANTIATED in the DDBB, notice that we are not trying to get a TENANT:GENERIC in status INSTANTIATED. The query it is going to use the path present in the category FIND.MainArtifact. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is "WF_TS_DEACTIVATE_SDN_L3DOMAIN", but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

3.12 • TLD ACTIVE: Activate_Tenant task.



The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "TENANT:OPENSTACK", this means, when this workflow finish, we will have a TENANT:OPENSTACK with status ACTIVE in our Openstack platform, also the TD will update the status and other attributes of the instance that represents the artifact TENANT:OS in the DDBB and in the platform, creating all the relationships needed for a correct activation.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Activate_VSwitch Task
FIND.Condition == **GENERAL.VDC_id==%Id%**
FIND.path ==

Figure 18: Activation of the Tenant artifact.

TENANT:GENERIC>RESOURCE_POOL>VIM>TENANT:OPENSTACK@status=INSTANTIATED,
TENANT:GENERIC>RESOURCE_POOL>LOCATION>VIM>TENANT:OPENSTACK@status=INSTANTIATED,
TENANT:GENERIC>RESOURCE_POOL>DATACENTER>VIM>TENANT:OPENSTACK@status=INSTANTIATED,
TENANT:GENERIC>RESOURCE_POOL>SERVER<HYPERVISOR<VIM>TENANT:OPENSTACK@status=INSTANTIATED

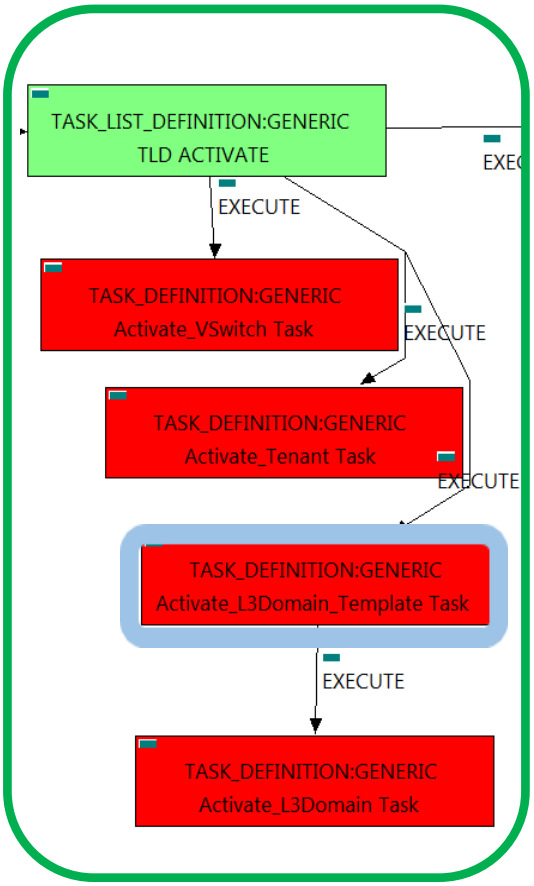
"WF_TS_ACTIVATE_TENANT"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow ==
"WF_TS_DEACTIVATE_TENANT"
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a TENANT:OPENSTACK that match the FIND.Condition attribute with value "GENERAL.VDC_id==%Id%" with a Status INSTANTIATED in the DDBB, notice that we are not trying to get a TENANT:GENERIC in status INSTANTIATED. The query it is going to use the MultiplePath present in the category FIND. Once found, the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is "WF_TS_DEACTIVATE_TENANT", but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

3.13 • TLD ACTIVE: Activate_L3Domain_Template task.



The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "L3DOMAIN:TEMPLATE:DCN", this means, when this workflow finish, we will have a L3DOMAIN:TEMPLATE:DCN", with status ACTIVE in our VSD platform, also the TD will update the status and other attributes of the instance that represents the artifact "L3DOMAIN:TEMPLATE:DCN", in the DDBB and in the platform, creating all the relationships needed for a correct activation.

Targets of the TASK DEFINITION: STATUS of the TD:
ENABLED

GENERAL.Name == Activate_L3Domain_Template Task
FIND.Condition == **GENERAL.VDC_id== Id%**
FIND.path ==

Figure 19: Activate L3Domain Template.

TENANT:GENERIC>RESOURCE_POOL>VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE:DCN>L3DOMAIN:TEMPLATE@status=INSTANTIATED,
TENANT:GENERIC>RESOURCE_POOL>LOCATION>VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE:DCN>L3DOMAIN:TEMPLATE@status=INSTANTIATED,
TENANT:GENERIC>RESOURCE_POOL>DATACENTER>VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE:DCN>L3DOMAIN:TEMPLATE@status=INSTANTIATED,
TENANT:GENERIC>RESOURCE_POOL>SERVER<HYPERVISOR<VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE:DCN>L3DOMAIN:TEMPLATE@status=INSTANTIATED

SET.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_ACTIVATE_L3DOMAIN_TEMPLATE"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow ==
"WF_TS_DEACTIVATE__SDN_L3DOMAIN_TEMPLATE"
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "L3DOMAIN:TEMPLATE:DCN" that match the FIND.Condition attribute with value "GENERAL.VDC_id==%Id%",in Status INSTANTIATED in the DDBB, notice that we are not trying to get a TENANT:GENERIC in status INSTANTIATED. The query it is going to use the MultiplePath present in the category FIND. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is "WF_TS_DEACTIVATE_SDN_L3DOMAIN_TEMPLATE", but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as “Locked”.

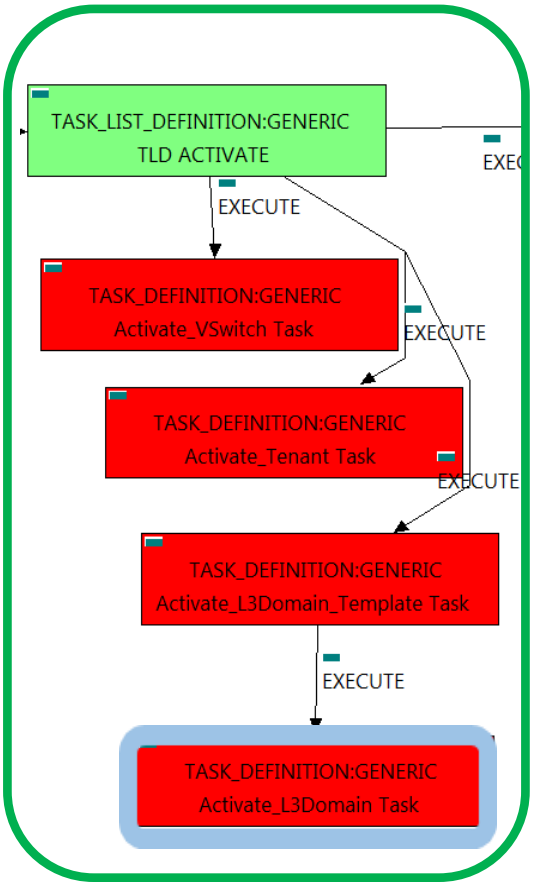


Figure 20: Activate L3Domain Artifact.

3.14 • TLD ACTIVE: Activate_L3Domain task.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "L3DOMAIN:DCN", this means, when this workflow finish, we will have a L3DOMAIN:DCN", with status ACTIVE in our VSD platform, also the TD will update the status and other attributes of the instance that represents the artifact "L3DOMAIN:DCN", in the DDBB and in the platform, creating all the relationships needed for a correct activation.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Activate_L3Domain Task
FIND.MainArtifact == **L3DOMAIN:TEMPLATE>L3DOMAIN:DCN@status=INSTANTIATED**
SET.Running_Status == INSTANTIATED.
SET.Status == ACTIVE.
EXECUTE.Workflow == **"WF_TS_ACTIVATE_SDN_L3DOMAIN"**
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow == **"WF_TS_DEACTIVATE_SDN_L3DOMAIN"**
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "L3DOMAIN:DCN with Status INSTANTIATED in the DDBB. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is "WF_TS_DEACTIVATE_SDN_L3DOMAIN", but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

3.15 • TLD ACTIVE_POLICIES: Getting L3Domain task.

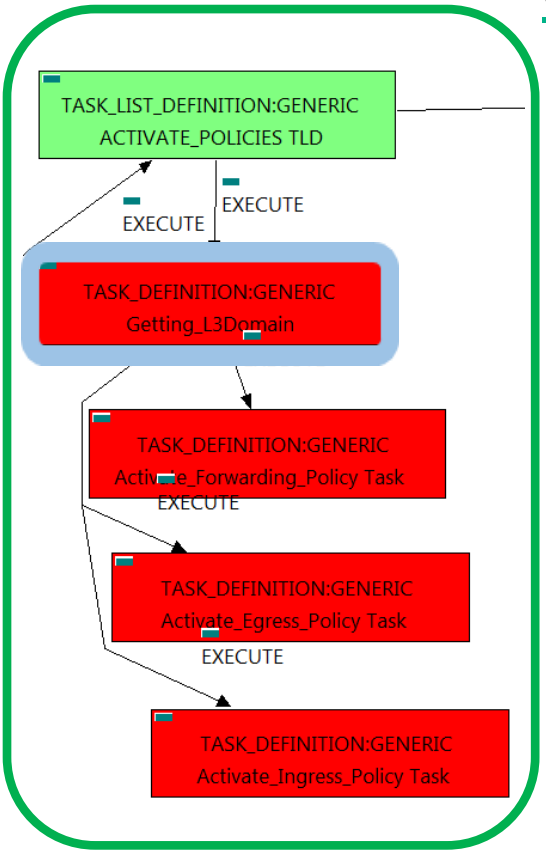


Figure 21: Getting the adequate L3Domain.

This TD it is going to assure the selection of the correct artifact that later on will be used by the workflow executed.

Once finished, we will have assured that all the policies of types INGRESSACL, EGRESSACL and INGRESSADVFORWARD are children of the right L3DOMAIN:DCN, as well as they will be prepared to be activated when required.

Targets of the TASK DEFINITION: STATUS of the TD:
ENABLED

GENERAL.Name == Getting_L3Domain Task
FIND.Condition == **GENERAL.VDC_id==%Id%**
FIND.Path ==

TENANT:GENERIC>RESOURCE_POOL>VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE>L3DOMAIN:DCN@status=ACTIVE,
TENANT:GENERIC>RESOURCE_POOL>LOCATION>VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE>L3DOMAIN:DCN@status=ACTIVE,
TENANT:GENERIC>RESOURCE_POOL>DATACENTER>VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE>L3DOMAIN:DCN@status=ACTIVE,
TENANT:GENERIC>RESOURCE_POOL>SERVER<HYPERVISOR<VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE>L3DOMAIN:DCN@status=ACTIVE

SET.Running_Status == ACTIVE.
SET.Status == ACTIVE.
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a “L3DOMAIN:GENERIC” in Status ACTIVE in the DDBB that matches the condition present in the attribute FIND.Condition, notice that we are not trying to get a TENANT:GENERIC in status ACTIVE. The query it is going to use the MultiplePath present in the category FIND.Path.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a “STOP” as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as “Locked”.

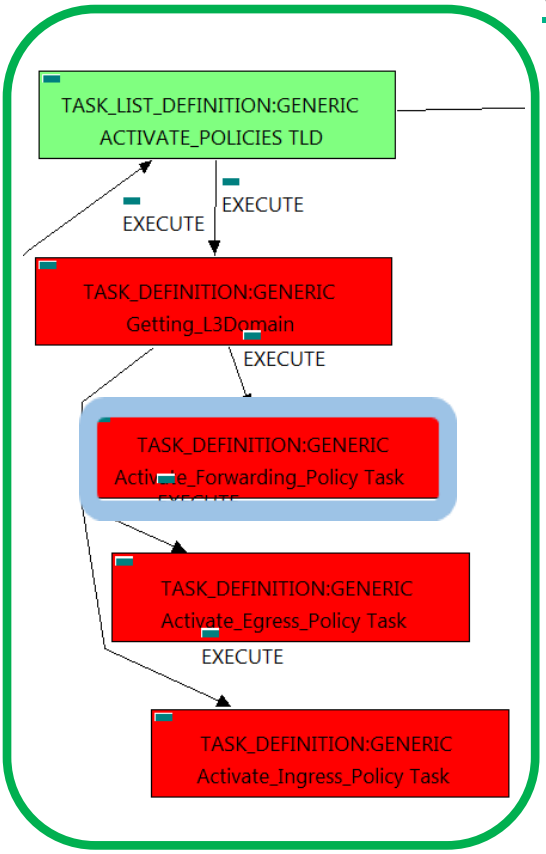


Figure 22: Activation of Forwarding Entry policies.

3.16 • TLD ACTIVE_POLICIES: Activate_Forwarding_Policy task.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "INGRESSADVFORWARD", this means, when this workflow finish, we will have a INGRESSADVFORWARD with status ACTIVE associated to the L3DOMAIN:DCN, and finally related to the TENANT:GENERIC that it is going to be used it in the activation.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	Activate_Forwarding_Policy Task
FIND.MainArtifact ==	**L3DOMAIN:DCN> INGRESSADVFORWARD:TEMPLATE:DCN@status=INSTANTIATED**
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	ACTIVE.
EXECUTE.Workflow ==	**"WF_TS_ACTIVATE_SDN_INGRESS_ADVANCED_FORWARDING"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
ROLLBACK.Workflow =	**"WF_TS_DEACTIVATE_SDN_INGRESS_ADVANCED_FORWARDING"**
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek an INGRESSADVFORWARD:TEMPLATE:DCN in Status INSTANTIATED in the DDBB that matches the condition present in the attribute FIND.MainArtifact, notice that we are not trying to get a L3DOMAIN:DCN in status ACTIVE. The query it is going to use the Path present in the attribute FIND.MainArtifact.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is "WF_TS_DEACTIVATE_SDN_INGRESS_ADVANCED_FORWARDING", but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

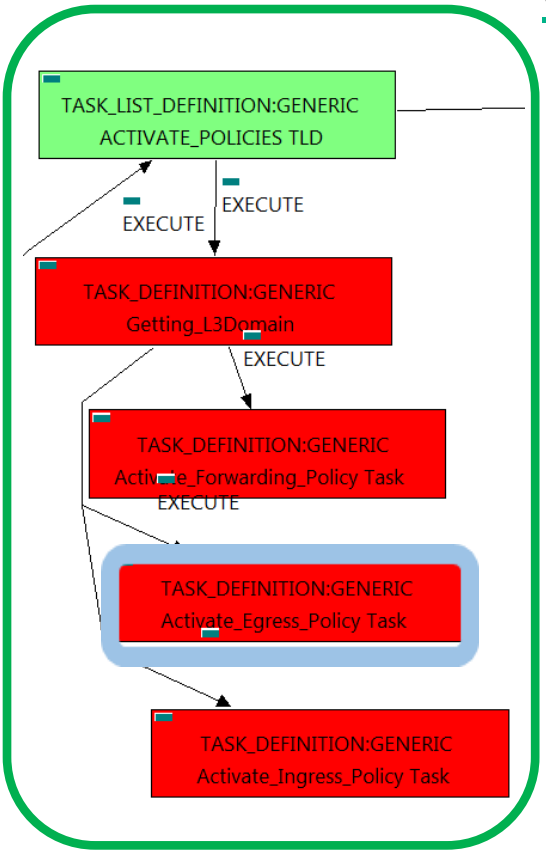


Figure 23: Activation of the Egress policies.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "EGRESSACL", this means, when this workflow finish, we will have a EGRESSACL with status ACTIVE associated to the L3DOMAIN:DCN, and finally related to the TENANT:GENERIC that it is going to be used it in the activation.

Targets of the TASK DEFINITION: STATUS of the TD:
ENABLED

GENERAL.Name == Activate_Egress_Policy Task
FIND.MainArtifact ==
L3DOMAIN:DCN>
EGRESSACL:TEMPLATE:DCN@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_ACTIVATE_SDN_EGRESSACL_POLICY"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow =
"WF_TS_DEACTIVATE_SDN_EGRESSACL_POLICY"
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek an EGRESSACL:TEMPLATE:DCN in Status INSTANTIATED in the DDBB that matches the condition present in the attribute FIND.MainArtifact, notice that we are not trying to get a L3DOMAIN:DCN in status ACTIVE. The query it is going to use the Path present in the attribute FIND.MainArtifact.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is "WF_TS_DEACTIVATE_SDN_EGRESSACL_POLICY", but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

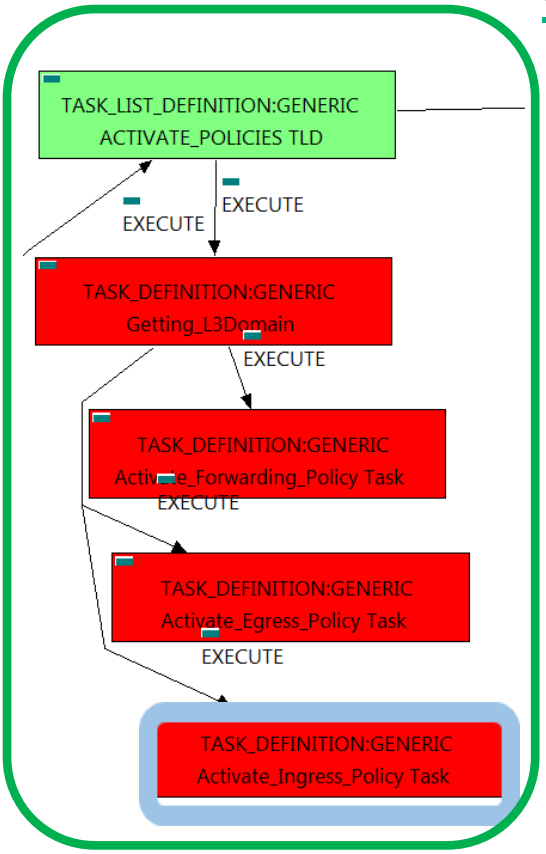


Figure 24: Activation of Ingress policies.

3.18 • TLD ACTIVE_POLICIES: Activate_Ingress_Policy task.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "INGRESSACL", this means, when this workflow finish, we will have a INGRESSACL with status ACTIVE associated to the L3DOMAIN:DCN, and finally related to the TENANT:GENERIC that it is going to be used it in the activation.

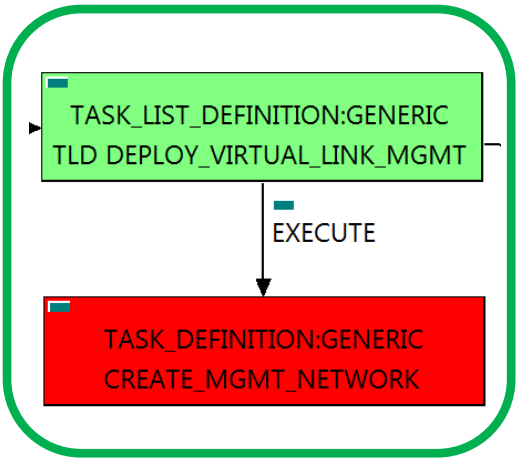
Targets of the TASK DEFINITION: STATUS of the TD:
ENABLED

GENERAL.Name == Activate_Ingress_Policy Task
FIND.MainArtifact ==
L3DOMAIN:DCN>
INGRESSACL:TEMPLATE:DCN@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_ACTIVATE_SDN_INGRESSACL_POLICY"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow =
"WF_TS_DEACTIVATE_SDN_INGRESSACL_POLICY"
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek an INGRESSACL:TEMPLATE:DCN in Status INSTANTIATED in the DDBB that matches the condition present in the attribute FIND.MainArtifact, notice that we are not trying to get a L3DOMAIN:DCN in status ACTIVE. The query it is going to use the Path present in the attribute FIND.MainArtifact.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is "WF_TS_DEACTIVATE_SDN_INGRESSACL_POLICY", but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".



3.19 • TLD DEPLOY_VIRTUAL_LINK_MGMT: CREATE_MGMT_NETWORK.

The TDs that have present in the their names "Create", are Task Definitions responsible of the creation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifacts that are going to be provisioned are a number of NETWORKs and SUBNETWORKs..

Once finished, we should have a ZONE:DCN and a SUBNETWORK:DCN related to the previous ZONE:DCN, also, we should have at the end of the execution of the TD, a NETWORK:OPENSTACK and a SUBNETWORK:OPENSTACK related to the previous NETWORK:OPENSTACK, also we must have all the relationship needed for the correct behavior of the Service Net. All of the elements related to the entity given.

Targets of the TASK DEFINITION: STATUS of the TD:
ENABLED

GENERAL.Name == CREATE_MGMT_NETWORK
FIND.MainArtifact ==
TENANT:GENERIC>
VIRTUAL_LINK:MANAGEMENT@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_PROVISION_NETWORK"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow =
"WF_TS_PROVISION_NETWORK_UNDO"
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a TENANT:GENERIC in Status INSTANTIATED in the DDBB . Once found , the WF will start the provision, if the provision it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

This workflow will start another two more, the one that provision in SDN, "WF_TS_PROVISION_NETWORK_SDN" and the one that provision in the Openstack platform, "WF_TS_PROVISION_NETWORK_OPENSTACK".

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is "WF_TS_PROVISION_NETWORK_UNDO", but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

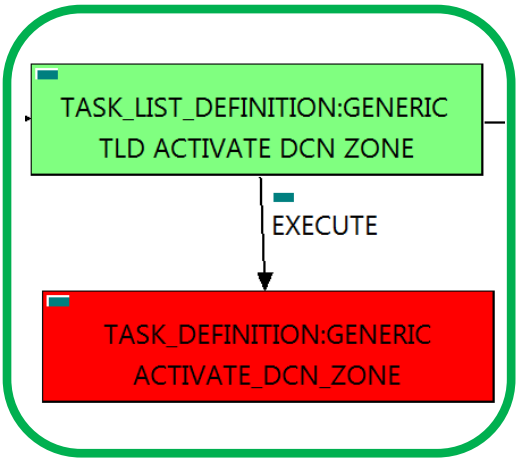


Figure 25: Activation of a network in DCN.

3.20 • TLD ACTIVATE DCN ZONE: ACTIVATE_DCN_ZONE.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "ZONE:DCN", this means, when this workflow finish, we will have a ZONE(Network) with status ACTIVE.

Targets of the TASK DEFINITION: STATUS of the TD:
ENABLED

GENERAL.Name == CREATE_MGMT_NETWORK
FIND.MainArtifact ==
TENANT:GENERIC>VIRTUAL_LINK:MANAGEMENT>
NETWORK:GENERIC>ZONE:TEMPLATE>
ZONE:DCN@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_ACTIVATE_SDN_ZONE"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow =
"WF_TS_DEACTIVATE_SDN_ZONE"
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "ZONE" in Status INSTANTIATED in the DDBB . Notice that we are not trying to get a TENANT:GENERIC in status INSTANTIATED. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is "WF_TS_DEACTIVATE_SDN_ZONE", but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

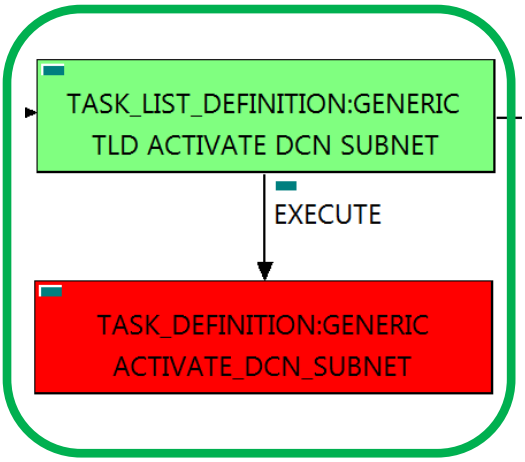


Figure 26: Activation of a Subnetwork in DCN.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "SUBNETWORK:DCN", this means, when this workflow finish, we will have a SUBNETWORK:DCN with status ACTIVE.

Targets of the TASK DEFINITION: STATUS of the TD:
ENABLED

GENERAL.Name == ACTIVATE_DCN_SUBNET
FIND.MainArtifact ==
**TENANT:GENERIC>VIRTUAL_LINK:MANAGEMENT>
NETWORK:GENERIC>ZONE:TEMPLATE>SUBNETWORK:TEMPLATE:D(
SUBNETWORK:DCN@status=INSTANTIATED**
SET.Running_Status == INSTANTIATED.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_ACTIVATE_SDN_SUBNETWORK"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow =
"WF_TS_DEACTIVATE_SDN_SUBNETWORK"
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "SUBNETWORK" in Status INSTANTIATED in the DDBB . Notice that we are not trying to get a TENANT:GENERIC in status INSTANTIATED. The query it is going to use the Path present in the category FIND.Path. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is "WF_TS_DEACTIVATE_SDN_SUBNETWORK", but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

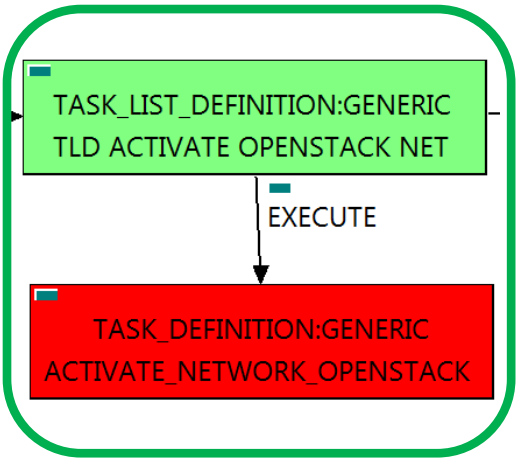


Figure 27: Activation of Network in Openstack Platform.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "NETWORK:OPENSTACK", this means, when this workflow finish, we will have a NETWORK:OPENSTACK with status ACTIVE.

Targets of the TASK DEFINITION: STATUS of the TD:
ENABLED

GENERAL.Name == ACTIVATE_NETWORK_OPENSTACK
FIND.MainArtifact ==
TENANT:GENERIC>VIRTUAL_LINK:MANAGEMENT>
NETWORK:GENERIC>
NETWORK:OPENSTACK@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_ACTIVATE_NETWORK"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow =
"WF_TS_DEACTIVATE_NETWORK"
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "NETWORK:OPENSTACK" in Status INSTANTIATED in the DDBB . Notice that we are not trying to get a TENANT:GENERIC in status INSTANTIATED. The query it is going to use the Path present in the category FIND.MainArtifact. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is "WF_TS_DEACTIVATE_NETWORK", but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

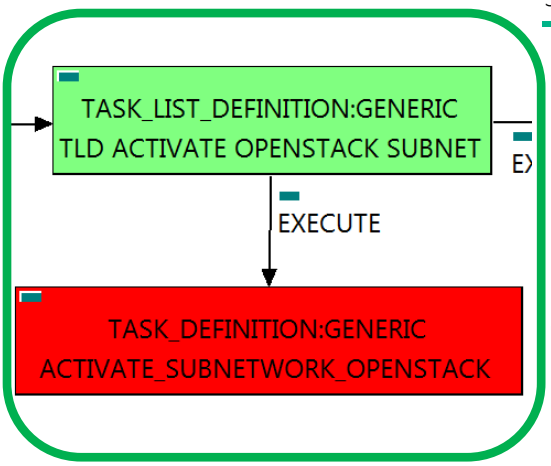


Figure 28: Activation of Subnetwork in Openstack Platform.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "SUBNETWORK:OPENSTACK", this means, when this workflow finish, we will have a SUBNETWORK:OPENSTACK with status ACTIVE identified as part of the Service Network.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == ACTIVATE_SUBNETWORK_OPENSTACK
FIND.MainArtifact ==
TENANT:GENERIC>VIRTUAL_LINK:MANAGEMENT>NETWORK:GENERIC>NETWORK:OPENSTACK>SUBNETWORK:OPENSTACK@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_ACTIVATE_SUBNETWORK"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow =
"WF_TS_DEACTIVATE_SUBNETWORK"
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "SUBNETWORK:OPENSTACK" in Status INSTANTIATED in the DDBB . Notice that we are not trying to get a TENANT:GENERIC in status INSTANTIATED. The query it is going to use the Path present in the category FIND.Path. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is "WF_TS_DEACTIVATE_SUBNETWORK", but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

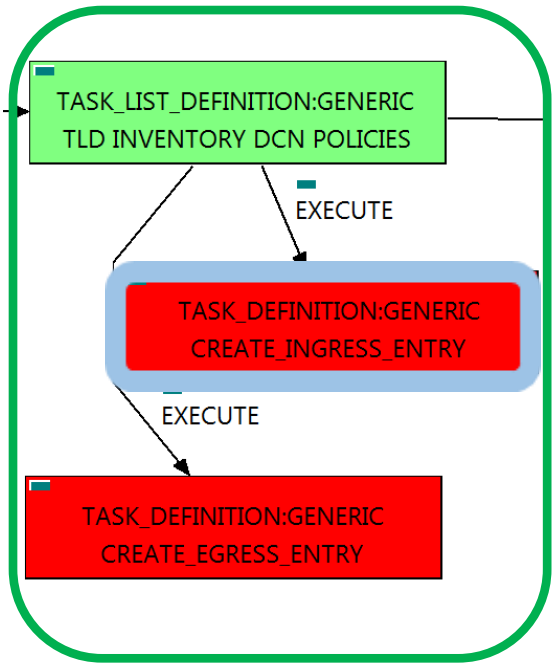


Figure 29: Create Ingress Entry policies for Tenant.

3.24 • TLD INVENTORY DCN POLICIES: CREATE INGRESS ENTRY.

This TD it is going to provision a INGRESSACLENTRY:TEMPLATE:DCN for each NETWORK or SUBNETWORK on each VIRTUAL_LINK that we have in our DC**, this means, the WF implied in this TLD is going to query the VIRTUAL_LINK trying to reach the NETWORKS on the VL:MANAGEMENT component. Once the TD has the list it is going to validate some attributes present in those Networks or Subnetworks in order to create the policy** INGRESSACLENTRY:TEMPLATE:DCN **related to policy** INGRESSACL:TEMPLATE:DCN **with a relationship of type DEFINE and status ENABLED.**

Once finished, we will have provisioned an INGRESSACLENTRY:TEMPLATE:DCN artifact with status INSTANTIATED for each NETWORK or SUBNETWORK(depends on the validation of the cited attributes) **with all the relationship needed for the correct behavior of the artifact, prepared to be activated when required, which is a relationship of type DEFINE between each policy created and the** INGRESSACL:TEMPLATE:DCN that is unique and it is acting as parent in the relationship.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == CREATE_INGRESS_ENTRY
FIND.MainArtifact ==
TENANT:GENERIC>
VIRTUAL_LINK:MANAGEMENT@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_PROVISION_SDN_INGRESSACLENTRIES_POLICIES"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow =
"WF_TS_PROVISION_SDN_INGRESSACLENTRIES_POLICIES_UNDO"
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "VIRTUAL_LINK" in Running Status INSTANTIATED in the DDBB . Once found, the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is "WF_TS_PROVISION_SDN_INGRESSACLENTRIES_POLICIES_UNDO", but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

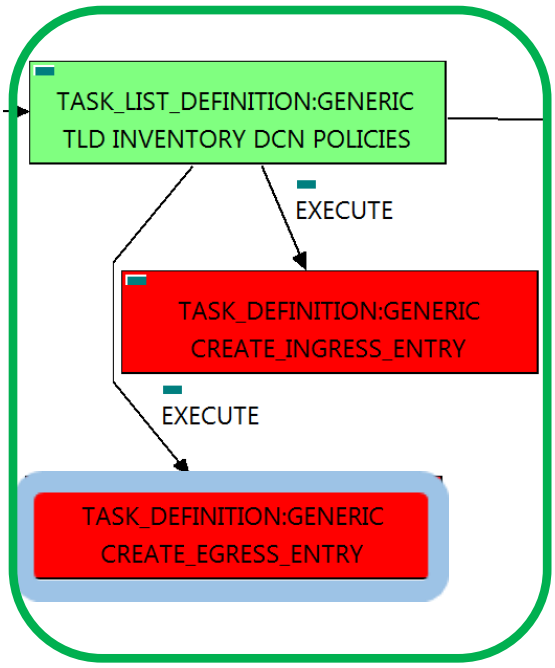


Figure 30: Create Egress Entry policies for Tenant.

3.25 • TLD INVENTORY DCN POLICIES: CREATE EGRESS ENTRY.

This TD it is going to provision a EGRESSACLENTRY:TEMPLATE:DCN for each NETWORK or SUBNETWROK on each VIRTUAL_LINK that we have in our DC**, this means, the WF implied in this TLD is going to query the VIRTUAL_LINK trying to reach the NETWORKS on the VL:MANAGEMENT component. Once the TD has the list it is going to validate some attributes present in those Networks or Subnetworks in order to create the policy** EGRESSACLENTRY:TEMPLATE:DCN **related to policy** EGRESSACL:TEMPLATE:DCN **with a relationship of type DEFINE and status ENABLED.**

Once finished, we will have provisioned an EGRESSACLENTRY:TEMPLATE:DCN artifact with status INSTANTIATED for each NETWORK or SUBNETWORK(depends on the validation of the cited attributes) **with all the relationship needed for the correct behavior of the artifact, prepared to be activated when required, which is a relationship of type DEFINE between each policy created and the** EGRESSACL:TEMPLATE:DCN that is unique and it is acting as parent in the relationship.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == CREATE_EGRESS_ENTRY
FIND.MainArtifact ==
TENANT:GENERIC>
VIRTUAL_LINK:MANAGEMENT@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_PROVISION_SDN_EGRESSACLENTRIES_POLICIES"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow =
"WF_TS_PROVISION_SDN_EGRESSACLENTRIES_POLICIES_UNDO"
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "VIRTUAL_LINK" in Running Status INSTANTIATED in the DDBB . Once found, the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is "WF_TS_PROVISION_SDN_EGRESSACLENTRIES_POLICIES_UNDO", but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

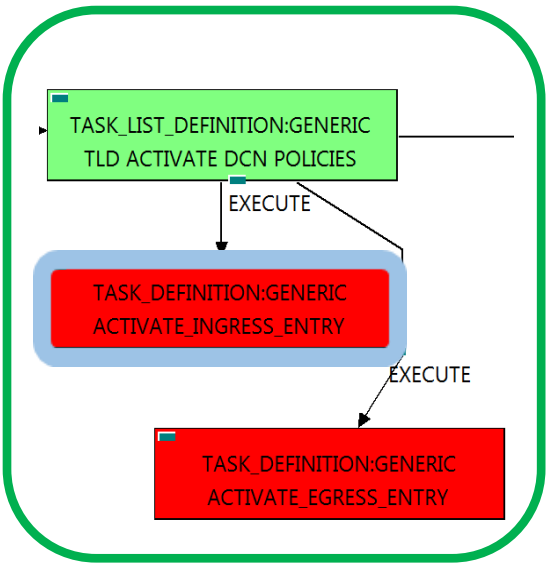


Figure 31: Activate Ingress Entry policies for Tenant.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "INGRESSACLENTRY", this means, when this workflow finish, we will have a INGRESSACLENTRY with status ACTIVE associated to the INGRESSACL policy, and finally related to the VIRTUAL_LINK that it is going to be used it in the activation.

Targets of the TASK DEFINITION: STATUS of the TD:
ENABLED

GENERAL.Name == ACTIVATE_INGRESS_ENTRY
FIND.MainArtifact ==
TENANT:GENERIC>VIRTUAL_LINK:MANAGEMENT>
NETWORK:GENERIC>ZONE:TEMPLATE>ZONE:DCN
<L3DOMAIN:DCN>INGRESSACL>
INGRESSACLENTRY@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_ACTIVATE_SDN_INGRESSACLENTRY_POLICY"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow =
"WF_TS_DEACTIVATE_SDN_INGRESSACLENTRY_POLICY"
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "INGRESSACLENTRY" in Status INSTANTIATED in the DDBB . Notice that we are not trying to get a TENANT:GENERIC in status INSTANTIATED. The query it is going to use the Path present in the category FIND.Path. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is "WF_TS_DEACTIVATE_SDN_INGRESSACLENTRIES_POLICY", but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

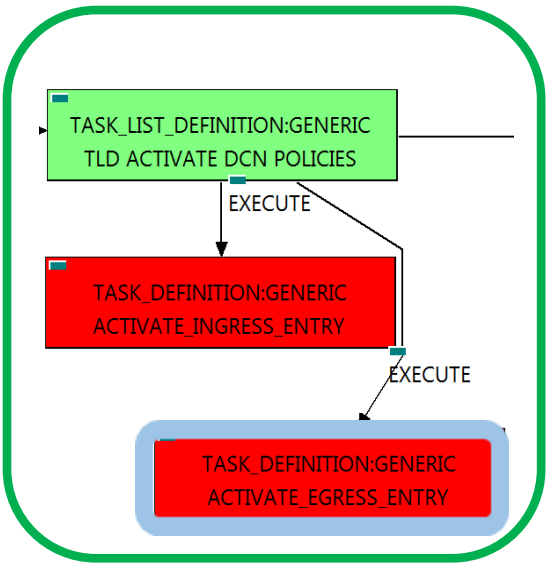


Figure 32: Activate Ingress Entry policies for Tenant.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "EGRESSACLENTRY", this means, when this workflow finish, we will have a EGRESSACLENTRY with status ACTIVE associated to the EGRESSACL policy, and finally related to the VIRTUAL_LINK that it is going to be used it in the activation.

Targets of the TASK DEFINITION: STATUS of the TD:
ENABLED

GENERAL.Name == ACTIVATE_EGRESS_ENTRY
FIND.MainArtifact ==
TENANT:GENERIC>VIRTUAL_LINK:MANAGEMENT>
NETWORK:GENERIC>ZONE:TEMPLATE>ZONE:DCN
<L3DOMAIN:DCN>INGRESSACL>
INGRESSACLENTRY@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_ACTIVATE_SDN_EGRESSACLENTRY_POLICY"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow =
"WF_TS_DEACTIVATE_SDN_EGRESSACLENTRY_POLICY"
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "EGRESSACLENTRY" in Status INSTANTIATED in the DDBB . Notice that we are not trying to get a TENANT:GENERIC in status INSTANTIATED. The query it is going to use the Path present in the category FIND.Path. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is "WF_TS_DEACTIVATE_SDN_EGRESSACLENTRIES_POLICY", but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

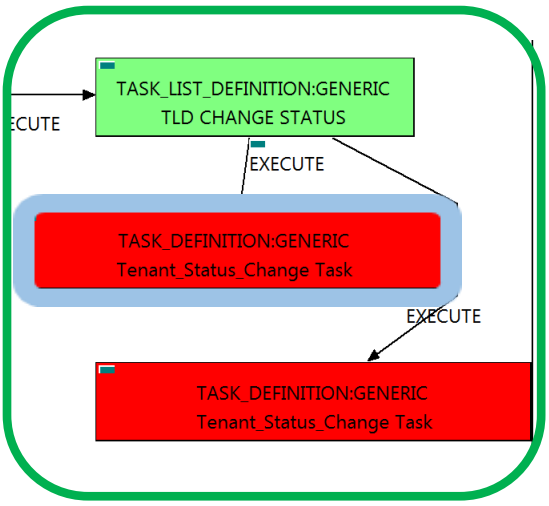


Figure 33: Status change Virtual Link Management.

3.28 • TLD CHANGE STATUS: Tenant_Status_Change task.

The TDs that have present in their names "Status Change", are Task Definitions responsible of the change in the status of the entity associated, in this case a TENANT:GENERIC. When the WF has finished we will have an TENANT:GENERIC with status ACTIVE in case of successful execution, or status ERROR in case of error, or simply not any change in the status because a ROLLBACK during the execution.

Targets of the TASK DEFINITION: ENABLED	STATUS of the TD:
GENERAL.Name ==	Tenant_Status_Change Task
FIND.MainArtifact ==	**TENANT:GENERIC> VIRTUAL_LINK:MANAGEMENT@status=INSTANTIATED**
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	ACTIVE.
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The TASK_DEFINITION do not execute any workflow, with the attributes present in the categories it is enough to change the status of the entity.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

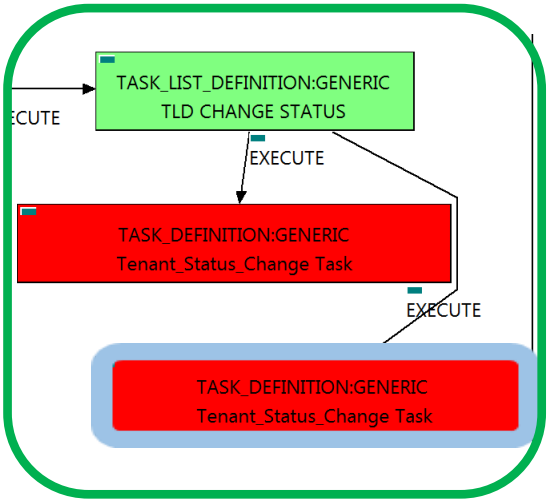


Figure 34: Change status of the Tenant .

3.29 • TLD CHANGE STATUS: Tenant_Status_Change task.

The TDs that have present in their names "Status Change", are Task Definitions responsible of the change in the status of the entity associated, in this case a "VIRTUAL_LINK:MANAGEMENT". When the WF has finished we will have an "VIRTUAL_LINK:MANAGEMENT" with status ACTIVE in case of successful execution, or status ERROR in case of error, or simply not any change in the status because a ROLLBACK during the execution.

Targets of the TASK DEFINITION: ENABLED	STATUS of the TD:
GENERAL.Name ==	Tenant_Status_Change Task
FIND.Condition ==	**status==constant:INSTANTIATED**
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	ACTIVE.
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The TASK_DEFINITION do not execute any workflow, with the attributes present in the categories it is enough to change the status of the entity.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Chapter 4 Deploy of a Virtual Link – Default/Bottom-Up.

From now on, and to make easier the understanding of the TLDs, we are going to explain the functionality of each set of TASK_LIST_DEFINITION:GENERIC, and the number of TASK_DEFINITION:GENERIC children of the previously mentioned TASK_LIST_DEFINITION:GENERIC.

Basically, the TASK_LIST_DEFINITION:GENERIC connect what we can consider "units of execution", those are the TASK_DEFINITION:GENERIC, that have a WORKFLOW assigned to be executed when the execution of the TLD reach them.

If you like to have a more deep knowledge about the workflows mentioned through this document please refer to the specific document.

**

If in the category FIND, the attribute Path is present, the attribute FIND.ArtifactType will be the starting artifact for the Path, but the FIND.Status attribute refers to the last artifact on the Path.

FIND.ArtifactType == VIRTUAL_MACHINE
FIND.Status== INSTANTIATED
FIND.Path ==
VIRTUAL_MACHINE>VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE<REGION>COMPUTE>FLAVOR

In this example, we are looking for a FLAVOR in status INSTANTIATED, we do not expect to get a VIRTUAL_MACHINE, in status INSTANTIATED.

**

If during the use of the TLDs, the "Regenerate UUIDs" option is used, the user should check the Id of the tree that brings all the elements of the TLD, this "id" is specific and it will be the same for all the tree groups in all the TLDs.

**

The two modes available are "Default" and "Simulated", the second one is only available if it is configured previously, by defect, and the mode that will be used is "Default".

4.1 Specific Elements of the TLD Deploy Virtual Link.

In this chapter the different elements of the specific TLD will be explained conscientiously.

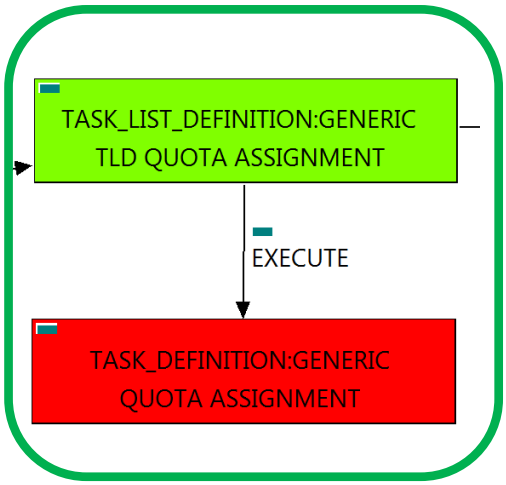


Figure 35: Quota Assignment task.

4.2 TLD QUOTA ASSIGNMENT: Quota Assignment Task.

The TDs that have present in the their names "Assignment", are Task Definitions responsible of the assignation of resources for an specific artifact, in the case of the quotas, the TLD it is going to assign an amount of each resource needed for the correct execution of the deployment.

Once finished, our VNF should have every quota needed for a successful deployment assigned, having taken in consideration all the rules for the assignment. This is crucial, because our component consume quotas during the execution of the TLD.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Quota_Assignment
FIND.MainArtifact == VIRTUAL_LINK:PHYSICAL
EXECUTE.Workflow ==
"WF_NFVD_ASSIGNMENT_QUOTA"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
DATA.Lock == false
INPUT_MAPPING.MAPPING_LIST ==
assignmentRelationshipID=Quota_Assignment;
resourceTreeID=nfvd#quotaResourceID;
cacheLevel=full

The Workflow present in EXECUTE.Workflow it is going to seek the artifact identified by the Id given, this id should belong to an artifact VIRTUAL_LINK:PHYSICAL in Status INSTANTIATED in the DDBB, when the WF find it, it will start. This workflow will assign all the resources needed by the VIRTUAL_LINK:PHYSICAL to get a successful Deploy, it will check the available resources and decide which one should be assigned.

The Workflow also check the affinity policies , in case our TLD has it, the way the assignation it is going to behave depends also of this policies, once checked, we launch the assignation of resources.

The assignation of resources it uses another WF that it is called from our workflow, "WF_NFVD_ASSIGN_RESOURCES".

In case of error during the execution, the workflow jump to the ROLLBACK category, if the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. In this case, the TLD has not assigned a rollback workflow, so in this case the TD will only change the status of the artifact which is being used.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

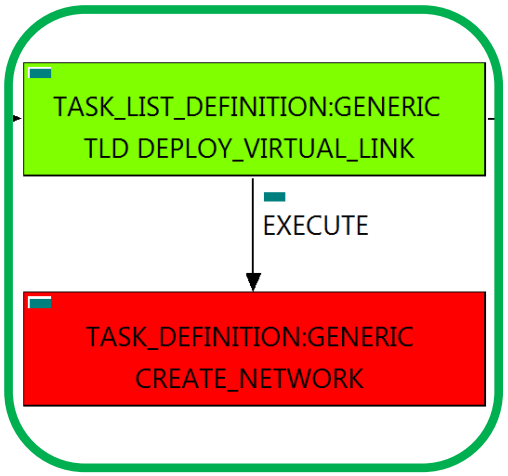


Figure 36: Creation of a network.

4.3 TLD DEPLOY_VIRTUAL_LINK: CREATE_NETWORK.

The TDs that have present in the their names "Create", are Task Definitions responsible of the provision of an specific artifact, in this case, NETWORKs of two types, DCN and OPENSTACK, the TLD it is going to query ORGANIZATION, END_POINTS, TENANTs and other entities needed, until the TD finish with the harvest of all the attributes needed for the creation, and after, for the correct behavior of the component during the activation.

Once finished, our TD should have provisioned every NETWORK needed for a successful deployment assigned, on DCN and OPENSTACK platform, these artifacts must be properly related to the VIRTUAL_LINK given.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	CREATE_NETWORK
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	INSTANTIATED.
EXECUTE.Workflow ==	**"WF_TS_PROVISION_NETWORK"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	ROLLBACK
ROLLBACK.Number_of_retries ==	0
ROLLBACK.Workflow ==	**"WF_TS_PROVISION_NETWORK_UNDO"**
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow it is going to provision a NETWORK:GENERIC in a Status INSTANTIATED in the DDBB. This workflow assign all the resources needed by the Virtual Link to get a successful Deploy, it will check the available resources and decide which one should be assigned.

The creation Networks it uses two other WFs that it are called from our workflow depending the needs of the provision, these workflows are "WF_TS_PROVISION_NETWORK_SDN" and "WF_TS_PROVISION_NETWORK_OPENSTACK".

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. In this case, the TLD has assigned the rollback workflow "WF_TS_PROVISION_NETWORK_UNDO". For this TD the behavior set is "STOP", if an error take place in this TD , no action will be taken, the execution of the TLD will continue.

Due to that the value of the attribute DATA.Lock is true, once the TD has finished, the artifact Network recently provisioned, will be blocked.

4.4 TLD ACTIVATE DCN ZONE: ACTIVATE_DCN_ZONE.

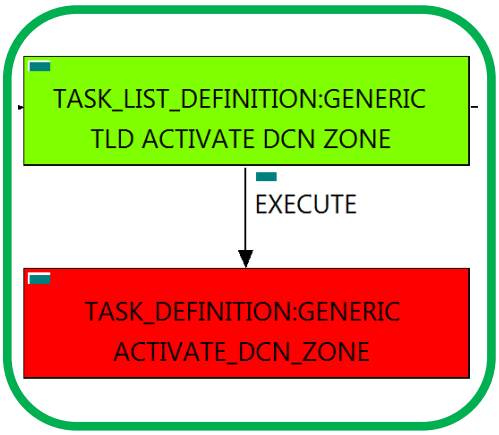


Figure 37 : Activation of a DCN Network.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "ZONE: DCN", this means, when this workflow finish, we will have a ZONE (Network) with status ACTIVE identified as part of the Service Network.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	ACTIVATE_DCN_ZONE
FIND.MainArtifact ==	**VIRTUAL_LINK>NETWORK:GENERIC> ZONE:TEMPLATE>ZONE:DCN@status=INSTANTIATED**
SET.Running_Status ==	INSTANTIATED.
Set.Status ==	ACTIVE.
EXECUTE.Workflow ==	**"WF_TS_ACTIVATE_SDN_ZONE"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
ROLLBACK.Workflow==	**"WF_TS_DEACTIVATE_SDN_ZONE"**
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "ZONE:DCN" in Status INSTANTIATED in the DDBB. Notice that we are not trying to get a VIRTUAL_LINK in status INSTANTIATED. The query it is going to use the Path present in the category FIND.MainArtifact. Once found, the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. In this case, the TLD has assigned the rollback workflow "WF_TS_DEACTIVATE_SDN_ZONE". For this TD the behavior set is "STOP", if an error take place in this TD , no action will be taken, the execution of the TLD will continue.

Due to that the value of the attribute DATA.Lock is true, once the TD has finished, the artifact Network recently activated, will be blocked.

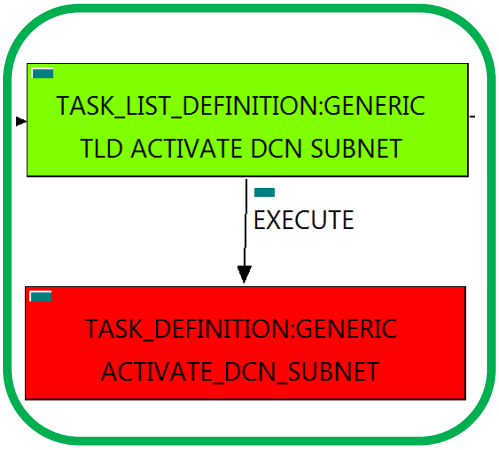


Figure 38: Activation of a DCN Subnetwork.

4.5 TLD ACTIVATE DCN SUBNET: ACTIVATE_DCN_SUBNET

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "SUBNETWORK: DCN", this means, when this workflow finish, we will have a SUBNETWORK: DCN with status ACTIVE identified as part of the Service Network.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == ACTIVATE_DCN_SUBNET
FIND.MainArtifact ==
VIRTUAL_LINK>NETWORK:GENERIC>ZONE:TEMPLATE>SUBNETWORK:TEMPLATE:DCN>SUBNETWORK:DCN@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
Set.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_ACTIVATE_SDN_SUBNETWORK"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow==
"WF_TS_DEACTIVATE_SDN_SUBNETWORK"
DATA.Lock ==
true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "SUBNETWORK:DCN" in Status INSTANTIATED in the DDBB. Notice that we are not trying to get a VIRTUAL_LINK in status INSTANTIATED. The query it is going to use the Path present in the category FIND.MainArtifact. Once found, the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. In this case, the TLD has assigned the rollback workflow "WF_TS_DEACTIVATE_SDN_SUBNETWORK". For this TD the behavior set is "STOP", if an error take place in this TD, no action will be taken, the execution of the TLD will continue.

Due to that the value of the attribute DATA.Lock is true, once the TD has finished, the artifact Subnetwork recently activated, will be blocked.

.

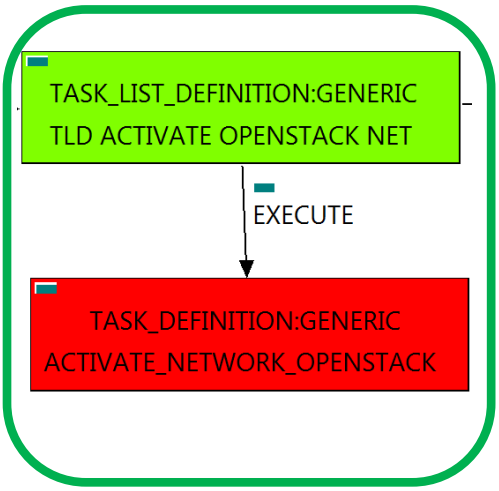


Figure 39: Activation of a Network in the Openstack platform.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "NETWORK:OPENSTACK", this means, when this workflow finish, we will have a NETWORK:OPENSTACK with status ACTIVE identified as part of the Service Network.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name ==ACTIVATE_NETWORK _OPENSTACK
FIND.MainArtifact ==
VIRTUAL_LINK>NETWORK:GENERIC>
NETWORK:OPENSTACK@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
Set.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_ACTIVATE_NETWORK"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow ==
"WF_TS_DEACTIVATE_NETWORK"
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "NETWORK:OPENSTACK" in Status INSTANTIATED in the DDBB . Notice that we are not trying to get a VIRTUAL_LINK in status INSTANTIATED. The query it is going to use the Path present in the category FIND.MainArtifact. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

The TD also create all the relationship needed for the correct behavior of the recently created artifact.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is "WF_TS_DEACTIVATE_NETWORK", but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

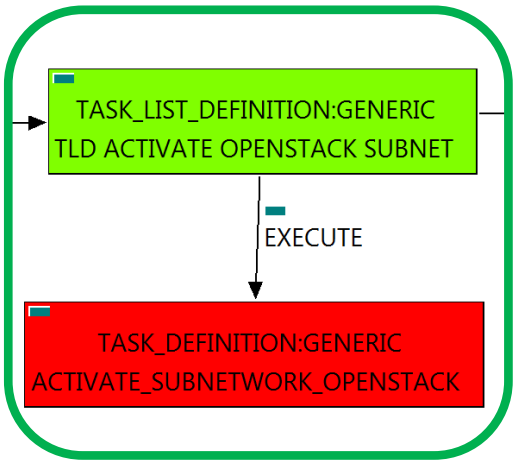


Figure 40: Activation of a Subnetwork in the Openstack platform.

4.7 DEPLOY_ACTIVATE OPENSTACK SUBNET TLD: ACTIVATE_SUBNETWORK_OPENSTACK.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "SUBNETWORK:OPENSTACK", this means, when this workflow finish, we will have a SUBNETWORK:OPENSTACK with status ACTIVE identified as part of the Service Network.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name ==ACTIVATE_NETWORK _OPENSTACK
FIND.MainArtifact ==
VIRTUAL_LINK>NETWORK:GENERIC>NETWORK:OPENSTACK> SUBNETWORK:OPENSTACK@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
Set.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_ACTIVATE_SUBNETWORK"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow ==
"WF_TS_DEACTIVATE_SUBNETWORK"
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "SUBNETWORK:OPENSTACK" in Status INSTANTIATED in the DDBB . Notice that we are not trying to get a VIRTUAL_LINK in status INSTANTIATED. The query it is going to use the Path present in the category FIND.Path. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is "WF_TS_DEACTIVATE_SUBNETWORK", but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

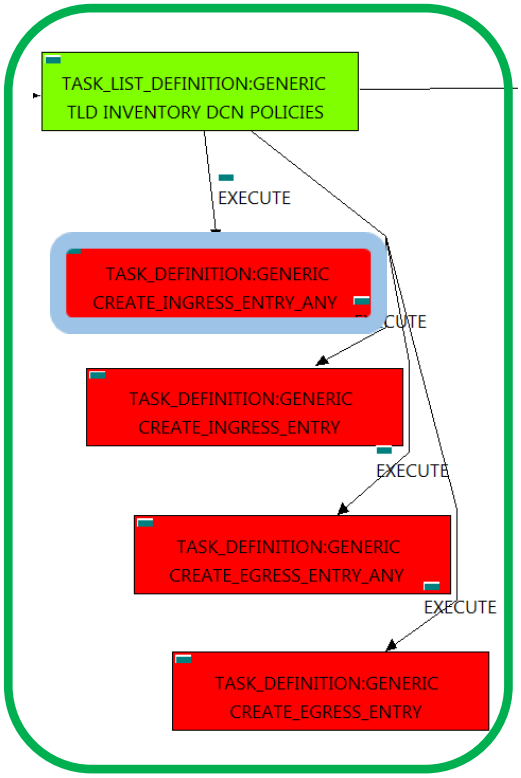


Figure 41: Creation of the Ingress Entry Policies of type net to Any.

4.8 TLD INVENTORY DCN POLICIES: CREATE_INGRESS_ENTRY_ANY.

This TD it is going to provision a INGRESSACLENTRY:TEMPLATE:DCN "ANY" for each NETWORK or SUBNETWORK on each VIRTUAL_LINK that we have in our DC**, this means, the WF implied in this TLD is going to query from END_POINT:FW to the VIRTUAL_LINK trying to reach the NETWORKS on the VL component. Once the TD has the list it is going to validate some attributes present in those Networks or Subnetworks in order to create the policy** INGRESSACLENTRY:TEMPLATE:DCN **related to policy** INGRESSACL:TEMPLATE:DCN **with a relationship of type DEFINE and status ENABLED.**

These policies allow the traffic in both direction from the element that owns the policy to the rest of the elements reachable underneath the ORGANIZATION artifact.

Once finished, we will have provisioned an INGRESSACLENTRY:TEMPLATE:DCN artifact with status INSTANTIATED for each NETWORK or SUBNETWORK(depends on the validation of the cited attributes) **with all the relationship needed for the correct behavior of the artifact, prepared to be activated when required, which is a relationship of type DEFINE between each policy created and the** INGRESSACL:TEMPLATE:DCN that is unique and it is acting as parent in the relationship.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	CREATE_INGRESS_ENTRY
FIND.MainArtifact==	**VIRTUAL_LINK>NETWORK#SDN.Access_level=ANY**
SET.Running_Status ==	INSTANTIATED.
Set.Status ==	INSTANTIATED.
EXECUTE.Workflow ==	**"WF_TS_PROVISION_SDN_ZONE_ANY_INGRESSACL_ENTRY"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	ROLLBACK
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "VIRTUAL_LINK" in Running Status INSTANTIATED in the DDBB, that matches the condition present in the attribute FIND.MainArtifact:" SDN.Access_level==constant:ANY". Once found, the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, the TD has not a rollback workflow set, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

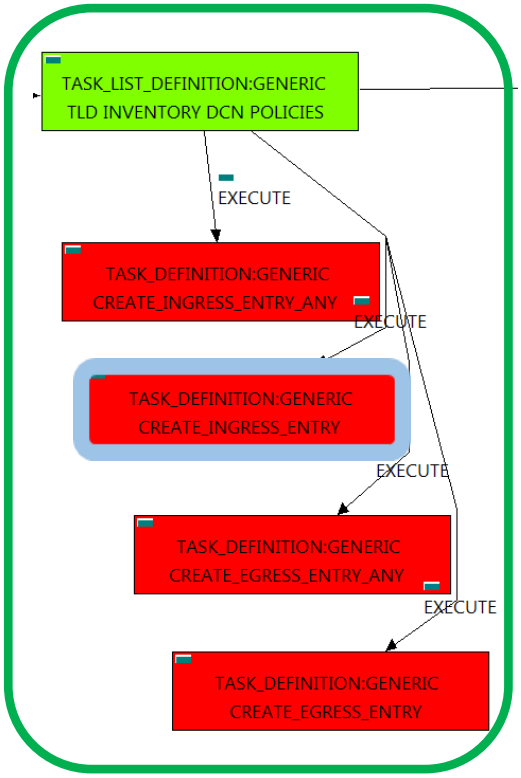


Figure 42: Creation of the Ingress Entry Policies.

4.9 TLD **INVENTORY** DCN POLICIES: CREATE_INGRESS_ENTRY.

This TD it is going to provision a INGRESSACLENTRY:TEMPLATE:DCN for each NETWORK or SUBNETWORK on each VIRTUAL_LINK that we have in our DC**, this means, the WF implied in this TLD is going to query from END_POINT:FW to the VIRTUAL_LINK trying to reach the NETWORKS on the VL component. Once the TD has the list it is going to validate some attributes present in those Networks or Subnetworks in order to create the policy** INGRESSACLENTRY:TEMPLATE:DCN **related to policy** INGRESSACL:TEMPLATE:DCN **with a relationship of type DEFINE and status ENABLED.**

Once finished, we will have provisioned an INGRESSACLENTRY:TEMPLATE:DCN artifact with status INSTANTIATED for each NETWORK or SUBNETWORK(depends on the validation of the cited attributes) **with all the relationship needed for the correct behavior of the artifact, prepared to be activated when required, which is a relationship of type DEFINE between each policy created and the** INGRESSACL:TEMPLATE:DCN that is unique and it is acting as parent in the relationship.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == CREATE_INGRESS_ENTRY
SET.Running_Status == INSTANTIATED.
Set.Status == INSTANTIATED.
EXECUTE.Workflow == **"WF_TS_PROVISION_SDN_INGRESSACLENTRIES_POLICIES"**
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow == **"WF_TS_PROVISION_SDN_INGRESSACLENTRIES_POLICIES_UNDO"**
DATA.Lock == true
INPUT_MAPPING.MAPPING_LIST== **assignmentRelationshipID=Resource_Assignment; resourceTreeID=resourceArtifactID**

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "VIRTUAL_LINK in Running Status INSTANTIATED in the DDBB . Once found, the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is "WF_TS_PROVISION_SDN_EGRESSACL_POLICIES_UNDO", if the TD cannot find the workflow specified, the execution will throw an error and finish.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

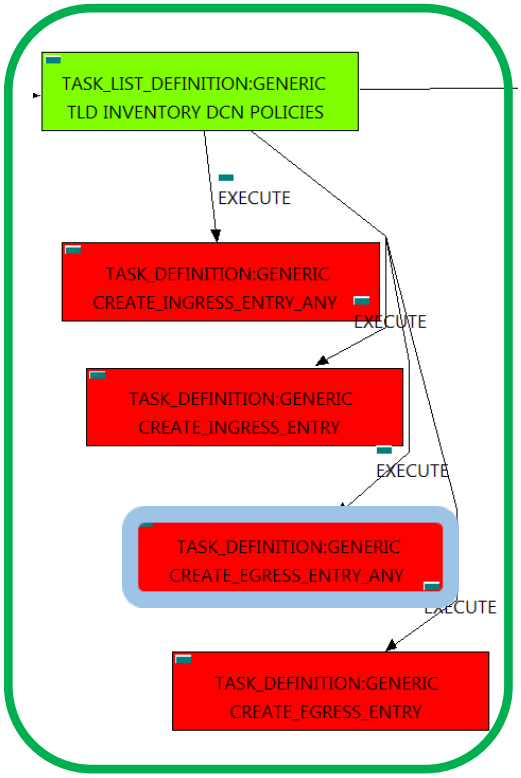


Figure 43: Creation of the Egress Entry Policies, to ANY.

4.10 TLD INVENTORY DCN POLICIES: CREATE_EGRESS_ENTRY_ANY.

This TD it is going to provision a EGRESSACLENTRY:TEMPLATE:DCN "ANY" for each NETWORK or SUBNETWORK on each VIRTUAL_LINK that we have in our DC**, this means, the WF implied in this TLD is going to query from END_POINT:FW to the VIRTUAL_LINK trying to reach the NETWORKS on the VL component. Once the TD has the list it is going to validate some attributes present in those Networks or Subnetworks in order to create the policy** EGRESSACLENTRY:TEMPLATE:DCN **related to policy** EGRESSACL:TEMPLATE:DCN **with a relationship of type DEFINE and status ENABLED.**

These policies allow the traffic in both direction from the element that owns the policy to the rest of the elements reachable underneath the ORGANIZATION artifact.

Once finished, we will have provisioned an EGRESSACLENTRY:TEMPLATE:DCN artifact with status INSTANTIATED for each NETWORK or SUBNETWORK(depends on the validation of the cited attributes) **with all the relationship needed for the correct behavior of the artifact, prepared to be activated when required, which is a relationship of type DEFINE between each policy created and the** EGRESSACL:TEMPLATE:DCN that is unique and it is acting as parent in the relationship.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	CREATE_EGRESS_ENTRY
FIND.MainArtifact==	**VIRTUAL_LINK>NETWORK#SDN.Access_level=ANY**
SET.Running_Status ==	INSTANTIATED.
Set.Status ==	INSTANTIATED.
EXECUTE.Workflow ==	**"WF_TS_PROVISION_SDN_ZONE_ANY_EGRESSACL_ENTRY"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	ROLLBACK
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "VIRTUAL_LINK" in Running Status INSTANTIATED in the DDBB, that matches the condition present in the attribute FIND.MainArtifact:" SDN.Access_level==constant:ANY". Once found, the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is "WF_TS_PROVISION_SDN_ZONE_ANY_EGRESSACL_ENTRY".

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

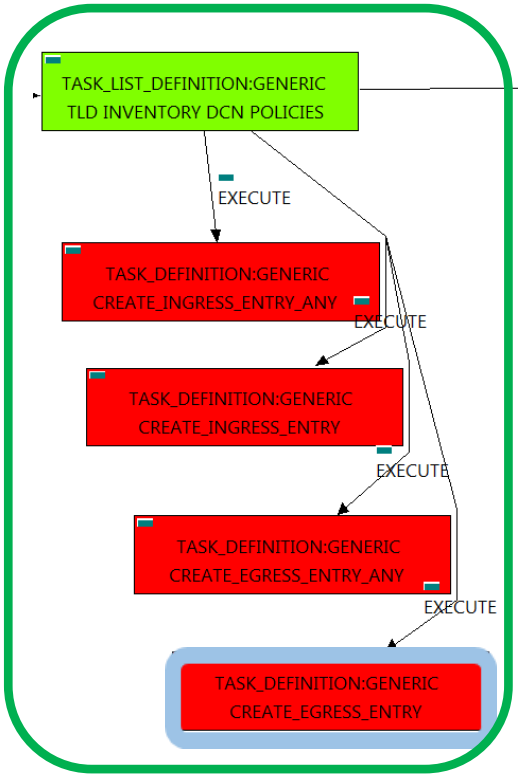


Figure 44: Creation of the Egress Entry Policies.

4.11 TLD INVENTORY DCN POLICIES: CREATE_INGRESS_ENTRY.

This TD it is going to provision a EGRESSACLENTRY:TEMPLATE:DCN for each NETWORK or SUBNETWROK on each VIRTUAL_LINK that we have in our DC**, this means, the WF implied in this TLD is going to query from END_POINT:FW to the VIRTUAL_LINK trying to reach the NETWORKS on the VL component. Once the TD has the list it is going to validate some attributes present in those Networks or Subnetworks in order to create the policy** EGRESSACLENTRY:TEMPLATE:DCN **related to policy** EGRESSACL:TEMPLATE:DCN **with a relationship of type DEFINE and status ENABLED.**

Once finished, we will have provisioned an EGRESSACLENTRY:TEMPLATE:DCN artifact with status INSTANTIATED for each NETWORK or SUBNETWORK(depends on the validation of the cited attributes) **with all the relationship needed for the correct behavior of the artifact, prepared to be activated when required, which is a relationship of type DEFINE between each policy created and the** EGRESSACL:TEMPLATE:DCN that is unique and it is acting as parent in the relationship.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	CREATE_EGRESS_ENTRY
SET.Running_Status ==	INSTANTIATED.
Set.Status ==	INSTANTIATED.
EXECUTE.Workflow ==	**"WF_TS_PROVISION_SDN_EGRESSACLENTRIES_POLICIES**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	ROLLBACK
ROLLBACK.Number_of_retries ==	0
ROLLBACK.Workflow ==	**"WF_TS_PROVISION_SDN_EGRESSACLENTRIES_POLICIES_UNDO"**
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "VIRTUAL_LINK in Running Status INSTANTIATED in the DDBB . Once found, the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is "WF_TS_PROVISION_SDN_EGRESSACL_POLICIES_UNDO", but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

4.12 TLD ACTIVATE DCN POLICIES: ACTIVATE_INGRESS_ENTRY

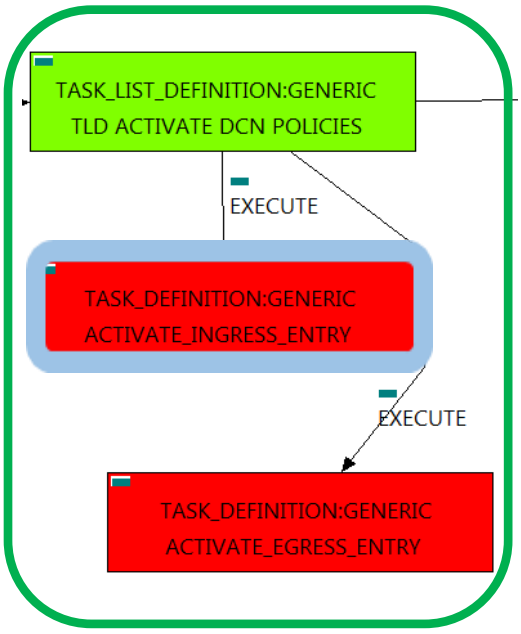


Figure 45: Activation of the Ingress Entry Policies for Virtual Link.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "INGRESSACLENTRY", this means, when this workflow finish, we will have a INGRESSACLENTRY with status ACTIVE associated to the INGRESSACL policy, and finally related to the VIRTUAL_LINK that it is going to be used it in the activation.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == ACTIVATE_INGRESS_ENTRY
FIND.MainArtifact== VIRTUAL_LINK>NETWORK:GENERIC
FIND.Condition ==
GENERAL.Name==INGRESSACL_%GENERAL.Name%_PolicyBase&&
ACLENTRY.LocationType==constant:ZONE&&
ACLENTRY.NetworkType==constant:ZONE
FIND.Path ==
NETWORK:GENERIC>ZONE:TEMPLATE>
ZONE:DCN<L3DOMAIN:DCN>INGRESSACL>
INGRESSACLENTRY@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
Set.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_ACTIVATE_SDN_INGRESSACLENTRY_POLICY"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow ==
"WF_TS_DEACTIVATE_SDN_INGRESSACLENTRY_POLICY"
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "INGRESSACLENTRY" in Status INSTANTIATED in the DDBB . Notice that we are not trying to get a NETWORK:GENERIC in status INSTANTIATED. The TD it is going to look for and artifact that matches the condition present in the FIND.Condition: "GENERAL.Name==INGRESSACL_%GENERAL.Name%_PolicyBase&&ACLENTRY.LocationType==constant:ZONE &&ACLENTRY.NetworkType==constant:ZONE" reachable by the Path present in the category FIND.Path.

Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is "WF_TS_DEACTIVATE_SDN_INGRESSACLENTRY_POLICY", but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

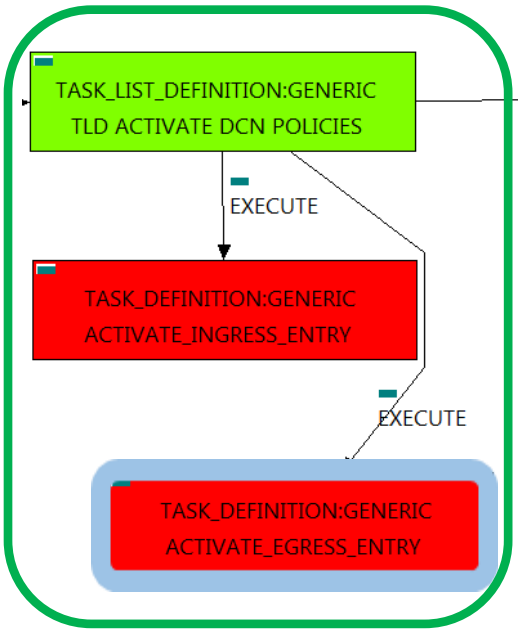


Figure 46: Activation of the Egress Entry Policies for Virtual Link.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "EGRESSACLENTRY", this means, when this workflow finish, we will have a EGRESSACLENTRY with status ACTIVE associated to the EGRESSACL policy, and finally related to the VIRTUAL_LINK that it is going to be used it in the activation.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == ACTIVATE_EGRESS_ENTRY
FIND.MainArtifact== VIRTUAL_LINK>NETWORK:GENERIC
FIND.Condition ==
GENERAL.Name==EGRESSACL_%GENERAL.Name%_PolicyBase&&ACLENTRY.LocationType==constant:ZONE&&ACLENTRY.NetworkType==constant:ZONE
FIND.Path ==
NETWORK:GENERIC>ZONE:TEMPLATE>ZONE:DCN<L3DOMAIN:DCN>EGRESSACL>EGRESSACLENTRY@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
Set.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_ACTIVATE_SDN_EGRESSACLENTRY_POLICY"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow ==
"WF_TS_DEACTIVATE_SDN_EGRESSACLENTRY_POLICY"
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "EGRESSACLENTRY" in Status INSTANTIATED in the DDBB . Notice that we are not trying to get a NETWORK:GENERIC in status INSTANTIATED. The TD it is going to look for and artifact that matches the condition present in the FIND.Condition: "GENERAL.Name==EGRESSACL_%GENERAL.Name%_PolicyBase&&ACLENTRY.LocationType==constant:ZONE&&ACLENTRY.NetworkType==constant:ZONE" reachable by the Path present in the category FIND.Path.

Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, this is "WF_TS_DEACTIVATE_SDN_EGRESSACLENTRY_POLICY", but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

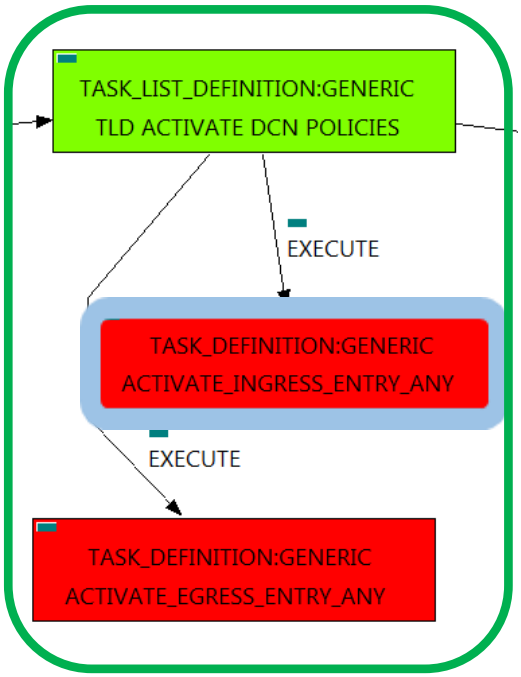


Figure 47: Activation of Ingress Entry policies for the VL, type to ANY.

4.14 TLD ACTIVATE DCN POLICIES: ACTIVATE_INGRESS_ENTRY_ANY

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "INGRESSACLENTRY", this means, when this workflow finish, we will have a INGRESSACLENTRY with status ACTIVE associated to the INGRESSACL policy, and finally related to the VIRTUAL_LINK that it is going to be used it in the activation.

These policies allow the traffic in both direction from the element that owns the policy to the rest of the elements reachable underneath the ORGANIZATION artifact.

Once finished, the TD will be activated the rest of the **INGRESSACLENTRY_Any policies waiting for activation after the end of the first TD for activate INGRESS policies.**

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == ACTIVATE_INGRESS_ENTRY
FIND.MainArtifact== VIRTUAL_LINK>NETWORK:GENERIC
FIND.Condition ==
GENERAL.Name==INGRESSACL_%GENERAL.Name%_ANY&&
ACLENTRY.LocationType==constant:ZONE&&
ACLENTRY.NetworkType==constant:ANY
FIND.Path ==
NETWORK:GENERIC>ZONE:TEMPLATE>
ZONE:DCN<L3DOMAIN:DCN>INGRESSACL>
INGRESSACLENTRY@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
Set.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_ACTIVATE_SDN_INGRESSACLENTRY_POLICY"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "INGRESSACLENTRY" in Status INSTANTIATED in the DDBB . Notice that we are not trying to get a NETWORK:GENERIC in status INSTANTIATED. The TD it is going to look for and artifact that matches the condition present in the FIND.Condition: "GENERAL.Name==INGRESSACL_%GENERAL.Name%_ANY&&ACLENTRY.LocationType==constant:ZONE&&ACLENTRY.NetworkType==constant:ANY" reachable by the Path present in the category FIND.Path.

Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

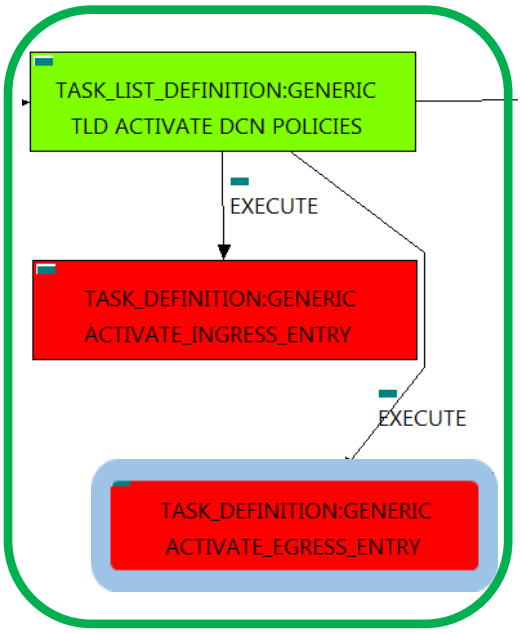


Figure 48: Activation of Egress Entry policies for the VL, type to ANY..

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "EGRESSACLENTRY", this means, when this workflow finish, we will have a EGRESSACLENTRY with status ACTIVE associated to the EGRESSACL policy, and finally related to the VIRTUAL_LINK that it is going to be used it in the activation.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == ACTIVATE_EGRESS_ENTRY
FIND.MainArtifact== VIRTUAL_LINK>NETWORK:GENERIC
FIND.Condition ==
GENERAL.Name==EGRESSACL_%GENERAL.Name%_ANY&&
ACLENTRY.LocationType==constant:ZONE&&
ACLENTRY.NetworkType==constant:ANY
FIND.Path ==
NETWORK:GENERIC>ZONE:TEMPLATE>
ZONE:DCN<L3DOMAIN:DCN>EGRESSACL>
EGRESSACLENTRY@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
Set.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_ACTIVATE_SDN_EGRESSACLENTRY_POLICY"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "EGRESSACLENTRY" in Status INSTANTIATED in the DDBB . Notice that we are not trying to get a NETWORK:GENERIC in status INSTANTIATED. The TD it is going to look for and artifact that matches the condition present in the FIND.Condition: "GENERAL.Name==EGRESSACL_%GENERAL.Name%_ANY&&ACLENTRY.LocationType==constant:ZONE&&ACLENTRY.NetworkType==constant:ANY" reachable by the Path present in the category FIND.Path.

Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will continue without noticing.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

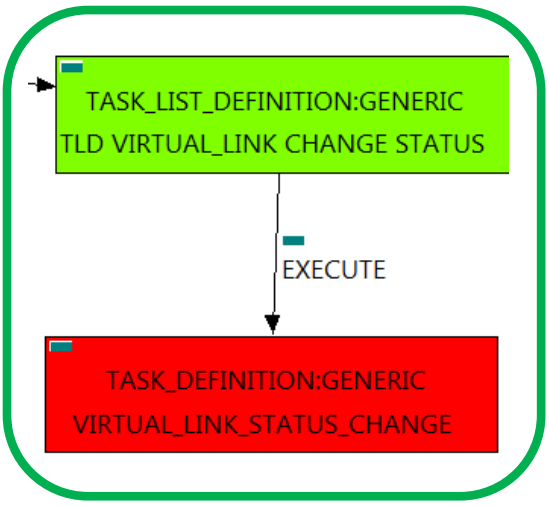


Figure 49: Status change Virtual Link.

The TDs that have present in their names "Status Change", are Task Definitions responsible of the change in the status of the entity associated, in this case a VIRTUAL_LINK. When the TD has finished we will have an VIRTUAL_LINK with status ACTIVE in case of successful execution, or status ERROR in case of error, or simply not any change in the status because a ROLLBACK during the execution.

Targets of the TASK DEFINITION: ENABLED	STATUS of the TD:
GENERAL.Name ==	VIRTUAL_LINK_STATUS_CHANGE
FIND.Condition ==	**status==constant:INSTANTIATED**
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	ACTIVE.
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The TASK_DEFINITION do not execute any workflow, with the attributes present in the categories it is enough to change the status of the entity.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Chapter 5 Deploy of a VNF - Default.

From now on, and to make easier the understanding of the TLDs, we are going to explain the functionality of each set of TASK_LIST_DEFINITION:GENERIC, and the number of TASK_DEFINITION:GENERIC children of the previously mentioned TASK_LIST_DEFINITION:GENERIC.

Basically, the TASK_LIST_DEFINITION:GENERIC connect what we can consider “units of execution”, those are the TASK_DEFINITION:GENERIC, that have a WORKFLOW assigned to be executed when the execution of the TLD reach them.

If you like to have a more deep knowledge about the workflows mentioned through this document please refer to the specific document.

**

If in the category FIND, the attribute Path is present, the attribute FIND.ArtifactType will be the starting artifact for the Path, but the FIND.Status attribute refers to the last artifact on the Path.

FIND.ArtifactType == VIRTUAL_MACHINE
FIND.Status== INSTANTIATED
FIND.Path ==
VIRTUAL_MACHINE>VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE<REGION>COMPUTE>FLAVOR

In this example, we are looking for a FLAVOR in status INSTANTIATED, we do not expect to get a VIRTUAL_MACHINE, in status INSTANTIATED.

**

If during the use of the TLDs, the “Regenerate UUIDs” option is used, the user should check the Id of the tree that brings all the elements of the TLD, this “id” is specific and it will be the same for all the tree groups in all the TLDs.

**

The two modes available are “Default” and “Simulated”, the second one is only available if it is configured previously, by defect, and the mode that will be used is “Default”.

5.1 Specific Elements of the TLD Deploy VNF.

In this chapter the different elements of the specific TLD will be explained conscientiously.

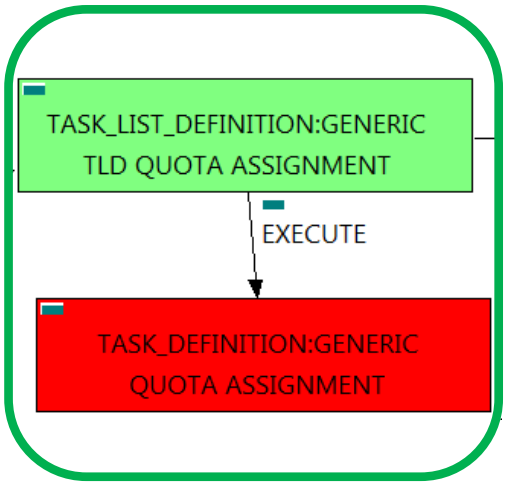


Figure 50: Quota Assignment task.

5.2 TLD QUOTA ASSIGNMENT: Quota Assignment Task.

The TDs that have present in the their names "Assignment", are Task Definitions responsible of the assignation of resources for an specific artifact, in the case of the quotas, the TLD it is going to assign an amount of each resource needed for the correct execution of the deployment.

Once finished, our VNF should have every quota needed for a successful deployment assigned, having taken in consideration all the rules for the assignment. This is crucial, because our component consume quotas during the execution of the TLD.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Quota_Assignment
SET.Running_Status == INSTANTIATED.
SET.Status == INSTANTIATED.
EXECUTE.Workflow == **"WF_NFVD_ASSIGNMENT_QUOTA"**
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
DATA.Lock == true
INPUT_MAPPING.MAPPING_LIST ==
assignmentRelationshipID=Quota_Assignment;
resourceTreeID=nfvd#quotaResourceID;
cacheLevel=full

The Workflow present in EXECUTE.Workflow it is going to seek a VNF in Status INSTANTIATED in the DDBB, when the WF find it, it will start. This workflow assign all the resources needed by the VNF to get a successful Deploy, it will check the available resources and decide which one should be assigned.

The Workflow also check the affinity policies , in case our TLD has it, the way the assignation it is going to behave depends also of this policies, once checked, we launch the assignation of resources.

The assignation of resources it uses another WF that it is called from our workflow, "WF_NFVD_ASSIGN_RESOURCES".

In case of error during the execution, the workflow jump to the ROLLBACK category, if the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. In this case, the TLD has not assigned a rollback workflow, so in this case the TD will only change the status of the artifact which is being used.

Due to that the value of the attribute DATA.Lock is true, once the TD has finished, the Quota recently assigned, will be blocked.

5.3 TLD RESOURCE ASSIGNMENT: RESOURCE ASSIGNMENT.

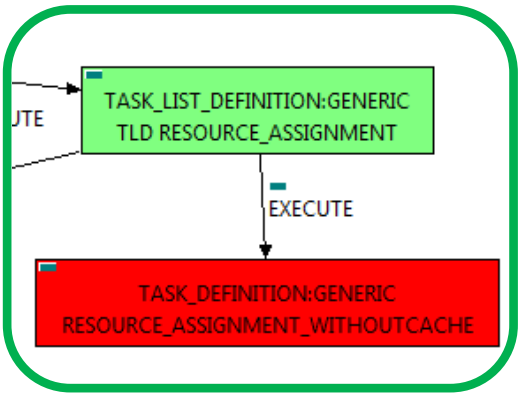


Figure 51: Assignment of the resources without cache.

The TDs that have present in their names "Assignment", are Task Definitions responsible of the assignation of resources for a specific artifact or deploy, in this case, we are looking for a VNF to assign the resources needed for the future deployment. In order to have a successful assignation we must have in our TLD Deploy VNF an artifact POLICY: ASSIGMENT_RELATIONSHIP, with a GENERAL.Name=="Resource_Assigment", also this artifact must be related with the OPERATION_GROUP: GENERIC of our TLD with a relationship of type PROVIDES and status ENABLED.

Once finished, our VNF should have every resources needed for a successful deployment assigned, having taken in consideration all the rules for the assignment.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	RESOURCE_ASSIGNMENT
FIND.Condition ==	**status==constant:INSTANTIATED**
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	INSTANTIATED.
EXECUTE.Workflow ==	**"WF_NFVD_ASSIGNMENT_WITHOUTCACHE"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	ROLLBACK
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true
INPUT_MAPPING.MAPPING_LIST ==	**assignmentRelationshipID=Resource_Assignment; resourceTreeID=resourceArtifactID; def_exclusion_list=TENANT:OPENSTACK, NETWORKING,COMPUTE,IMAGE_STORAGE**

The Workflow present in EXECUTE.Workflow it is going to seek a VNF in Status INSTANTIATED in the DDBB, when the WF find it, it will start. This workflow assign all the resources needed by the VNF to get a successful Deploy, it will check the available resources and decide which one should be assigned.

The Workflow also check the affinity policies , in case our TLD has it, the way the assignation it is going to behave depends also of this policies, once checked, we launch the assignation of resources.The assignation of resources it uses another WF that it is called from our workflow, "WF_NFVD_ASSIGN_RESOURCES".

In case of error during the execution, the workflow jump to the ROLLBACK category, if the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. In this case, the TLD has not assigned a rollback workflow, so in this case the TD will only change the status of the artifact which is being used.

Due to that the value of the attribute DATA.Lock is true, once the TD has finished, the artifact recently assigned, will be blocked.

5.4 TLD IMAGE PERMISSION: CHECK_IMAGE_PERMISSION.

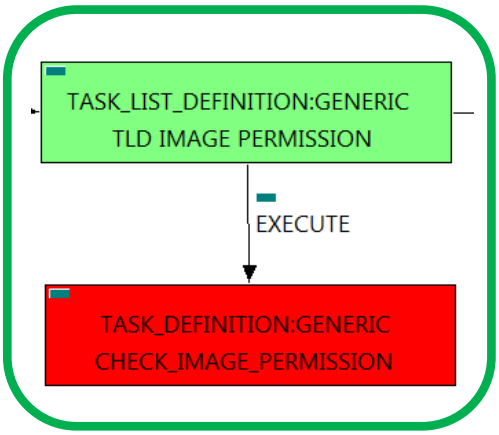


Figure 52 : Checking the image permissions.

The TDs that have present in the their names "Provision", are Task Definitions responsible of the creation and store of an artifact in DDBB, in this case, the artifact that it is going to be provisioned it is an "TENANT:OPENSTACK", this means, when this workflow finish, we will have a new artifact "TENANT:OPENSTACK" in our DDBB, as well, due to the nature of the artifact, the artifact will be prepared to be activated in the platform Openstack when will be required.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == CHECK_IMAGE_PERMISSION
FIND.MainArtifact ==
VNF>VNF_COMPONENT>
VIRTUAL_MACHINE@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_CHECK_VM_IMAGE"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow it is going to seek a VIRTUAL_MACHINE in Status INSTANTIATED in the DDBB, when the WF find it, it will start. This workflow will start another two more, the one that check the permissions of the IMAGE, "WF_TS_CHECK_IMAGE_PERMISSIONS", and the one that will deploy our IMAGE if it is not deployed, "WF_TS_DEPLOY_IMAGE".

In case of IMAGE managed by VIM, "WF_TS_CHECK_IMAGE_PERMISSIONS will work the same way, however in that case "WF_TS_DEPLOY_IMAGE" couldn't work the same way, the image can be reused it previously has been deployed in the VIM, but can not generate a new deployed IMAGE.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. If an error take place in this TD , no action will be taken, the execution of the TLD will try to start a rollback workflow but there is not a workflow to be executed in the attribute ROLLBACK.Workflow, so the execution will continue.

Due to that the value of the attribute DATA.Lock is true, once the TD has finished, the artifact recently checked, will be blocked.

5.5 TLD INVENTORY KEYPAIR: CREATE_KEYPAIR.

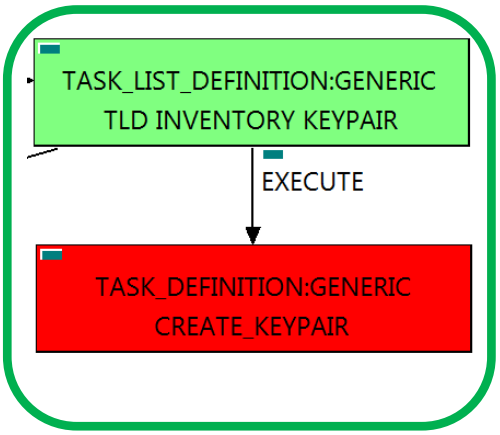


Figure 4: Creating "KeyPair".

The TDs that have present in the their names "Create" or "Inventory", are Task Definitions responsible of the provision of an element, in the platform targeted or in the DDBB, or both, in this case, the artifact that is going to be provisioned is a "KEYPAIR", this means, when this workflow finish, we will have a KEYPAIR with status INSTANTIATED.

Targets of the TASK DEFINITION: ENABLED	STATUS of the TD:
GENERAL.Name ==	CREATE_KEYPAIR
FIND.MainArtifact == **VNF>VNF_COMPONENT> VIRTUAL_MACHINE@status=INSTANTIATED**	
FIND.Condition== **KEYPAIR.Pubkey_Data != null || KEYPAIR.Pubkey_Path != null**	
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	INSTANTIATED.
EXECUTE.Workflow == **"WF_TS_NFVD_CREATE_KEY_PAIR_INVENTORY"**	
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	ROLLBACK
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow it is going to seek for a KEYPAIR element in Status INSTANTIATED in the DDBB, when the WF find it, it will start.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. If an error take place in this TD , no action will be taken, the execution of the TLD will try to start a rollback workflow but there is not a workflow to be executed in the attribute ROLLBACK.Workflow, so the execution will continue.

Due to that the value of the attribute DATA.Lock is true, once the TD has finished, the artifact recently checked, will be blocked.

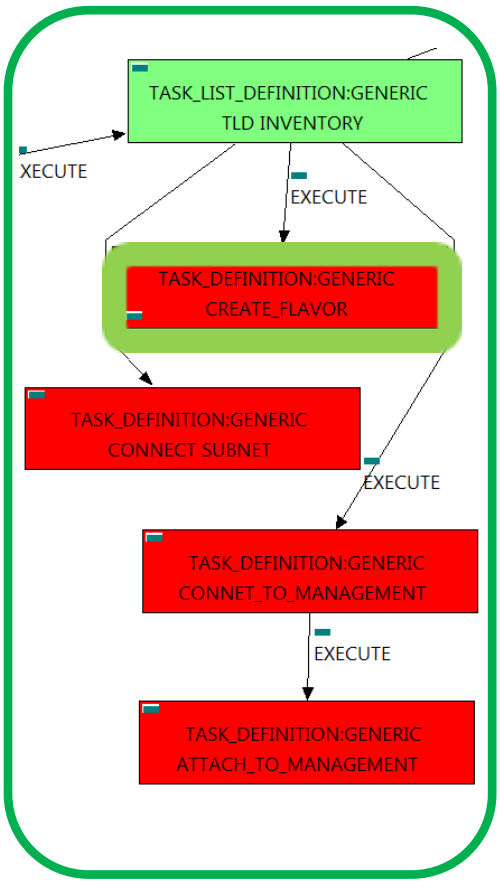


Figure 53: Creation of a standard flavor.

5.6 TLD INVENTORY: CREATE_FLAVOR

This TD it is going to create the FLAVORS needed for each VMs to be activated later on**, this means, the WFs implied in this TLD are going to check each element of our VMs to gather all the information needed to create a specific FLAVOR artifact, during the execution of the TD, the ENTITY_SCALE Policies are going to be consulted, the situation of these policies are required for the correct creation of the FLAVOR.**

Once finished, we will have a number of FLAVORS bonded to a VM or VMs, prepare to be activated with these FLAVORS.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name ==	CREATE_FLAVOR
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	INSTANTIATED.
EXECUTE.Workflow ==	**"WF_NFVD_CREATE_FLAVOR_INSTANCES"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	ROLLBACK
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow it is going to seek a VNF with Running_Status INSTANTIATED in the DDBB, if the WF find some artifact that fill all the conditions, it will start.

This workflow will start another two more, the one that check if the FLAVOR needs Extra_Specs, a special set of configurations for the FLAVOR, "WF_NFVD_CREATE_FLAVOR_EXTRA_INVENTORY", and the one that will create the Flavor Instance in OPENSTACK platform, "WF_NFVD_CREATE_FLAVOR_OS_INSTANCE".

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. If an error take place in this TD , no action will be taken, the execution of the TLD will try to start a rollback workflow but there is not a workflow to be executed in the attribute ROLLBACK.Workflow, so the execution will continue without error.

Due to that the value of the attribute DATA.Lock is true, once the TD has finished, the artifact recently created, will be blocked.

.

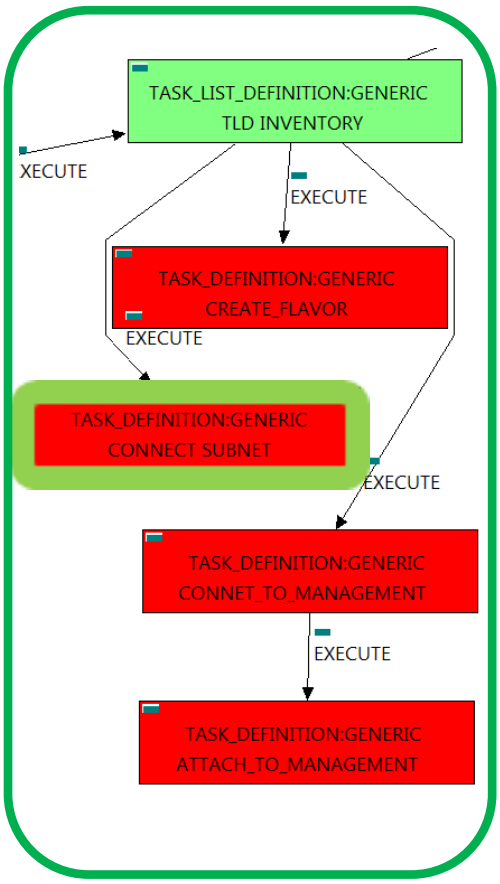


Figure 54: Connection of the Subnetwork to the VPort.

5.7 TLD INVENTORY: CONNECT_SUBNET

The TDs that have present in the their names "Connect", are Task Definitions responsible of the connection between artifacts, this means, this TDs will create relationship of specific kind between concrete artifacts, in this case, the WF it is going to query the DDBB looking for all the VIRTUAL_LINK:END_POINTS with Status "TO_BE_CONNECTED", once the WF has the VL:EP, it will query for all the SUBNETWORKS, NETWORKS and IPADDRESS of the VL, when the WF reach this point, it will query for the VPORTS related to these artifacts, after that, it is going to evaluate the relationships between the previously mentioned artifacts and the VPORTS, creating VPORTs and new relationships of type ALLOCATED and USES depending on the artifacts which are going to be related, mainly, SUBNETWORKs and VPORTs. The last thing this WF will do is change the status of the relationship between VL:EPs and the VNF:EP to CONNECTED.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	CONNECT SUBNET
FIND.MainArtifact ==	**VNF>VNF_ENDPOINT**
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	INSTANTIATED.
EXECUTE.Workflow ==	**"WF_TS_CONNECT_VM_SUBNET"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	ROLLBACK
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow it is going to seek a VNF_ENDPOINT with Running_Status INSTANTIATED in the DDBB, if the WF find some artifact that fill all the conditions, it will start.

In case of error during the execution, the workflow jump to the ROLLBACK category, if the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. If an error take place in this TD, no action will be taken, the execution of the TLD will try to start a rollback workflow but there is not a workflow to be executed in the attribute ROLLBACK.Workflow, so the execution will continue without error.

Due to that the value of the attribute DATA.Lock is true, once the TD has finished, the artifact recently created, will be blocked.

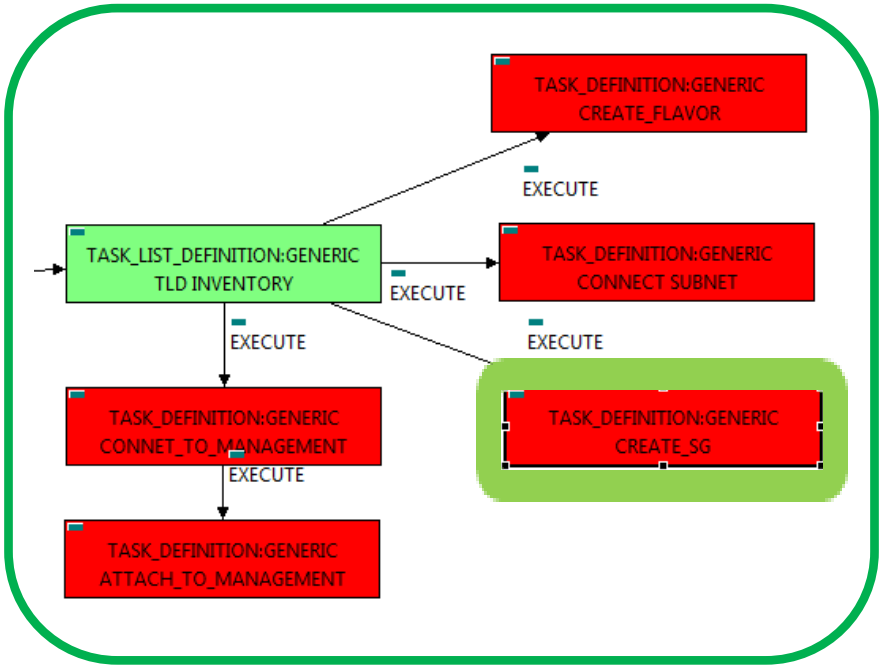


Figure 55: Creation of Security Groups under a VPort

That TD is going to create Security Groups used by VM's VPorts for allowing or dropping the traffic there. For carrying out this, the workflow WF_TS_CREATE_SECURITY_GROUP will check if there is any security group with the same rules already provisioned or is a new one, provisioning in each case the OpenStack artifacts (gathering the information from Security Groups connected to VPorts) and/or relationships required.

One finished, we will have a number of Security Groups allowing or dropping the traffic in VM's VPorts.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name ==	CREATE_SG
SET.Running_Status ==	INSTANTIATED
SET.Status ==	INSTANTIATED
EXECUTE.Workflow==	**"WF_TS_CREATE_SECURITY_GROUP"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	ROLLBACK
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow is going to seek a VNF with Running_Status INSTANTIATED in the DDBB, if the WF find some artifact that fill all the conditions, it will start searching all the Security Groups contains in VPorts for beginning the provision of OpenStack artifacts.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. If an error take place in this TD, no action will be taken, the execution of the TLD will try to start a rollback workflow but there is not a workflow to be executed in the attribute ROLLBACK.Workflow, so the execution will continue without error.

Due to that the value of the attribute DATA.Lock is true, once the TD has finished, the artifact recently created, will be blocked.

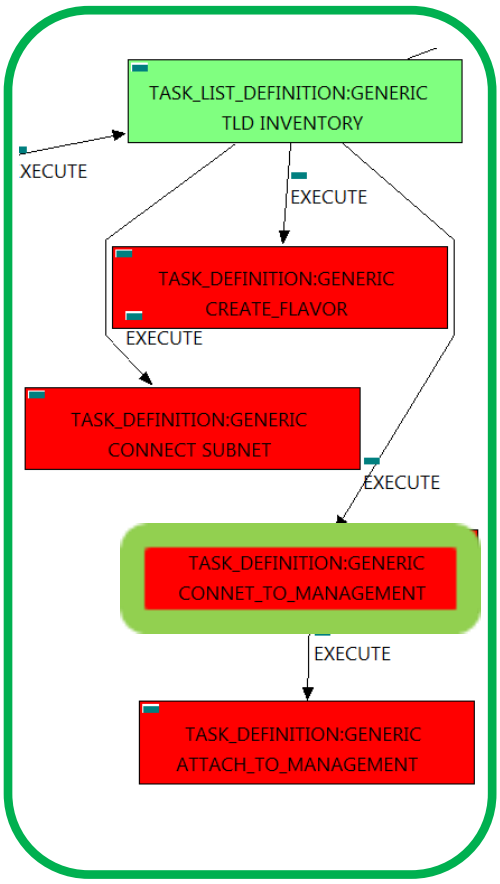


Figure 56: Connection Management Network.

5.9 TLD INVENTORY: CONNECT_TO_MANAGEMENT

The TDs that have present in the their names "Connect", are Task Definitions responsible of the connection between artifacts, this means, this TDs will create relationship of specific kind between concrete artifacts, in this case, it will create relationships of type USES and status ENABLED between a specific VIRTUAL_PORT, and the SUBNETWORKS (or the subnetworks's IPADDRESS:GENERIC) related as children of our VIRTUAL_LINK:MANAGEMENT that we are using.

Once finished, we should have all SUBNETWORKs related as children of our VL:MANAGEMENT bonded with a relationship of type USES and status ENABLED with the VIRTUAL_PORT found by the conditions of the TD.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == CONNET_TO_MANAGEMENT
FIND.MainArtifact ==
VNF>VNF_COMPONENT>VIRTUAL_MACHINE>
VIRTUAL_PORT#INFO.NetworkType=MANAGEMENT
SET.Running_Status == INSTANTIATED.
SET.Status ==
EXECUTE.Workflow ==
"WF_TS_CONNECT_MANAGEMENT_NETWORK"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow it is going to seek a VIRTUAL_PORT with Running_Status INSTANTIATED in the DDBB, if the WF find some artifact that fill all the conditions, it will start.

This workflow it is going to create a relationship of type USES and status INSTANTIATED between the VIRTUAL_PORT found and each SUBNETWORK of our VL:MANAGEMENT, in case that the SUBNETWORKS have IPADDRESS as children, the relationship would be created between these IPs and the VP.

In case of error during the execution, the workflow jump to the ROLLBACK category, if the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. If an error take place in this TD, no action will be taken, the execution of the TLD will try to start a rollback workflow but there is not a workflow to be executed in the attribute ROLLBACK.Workflow, so the execution will continue without error.

Due to that the value of the attribute DATA.Lock is true, once the TD has finished, the artifact recently created, will be blocked.

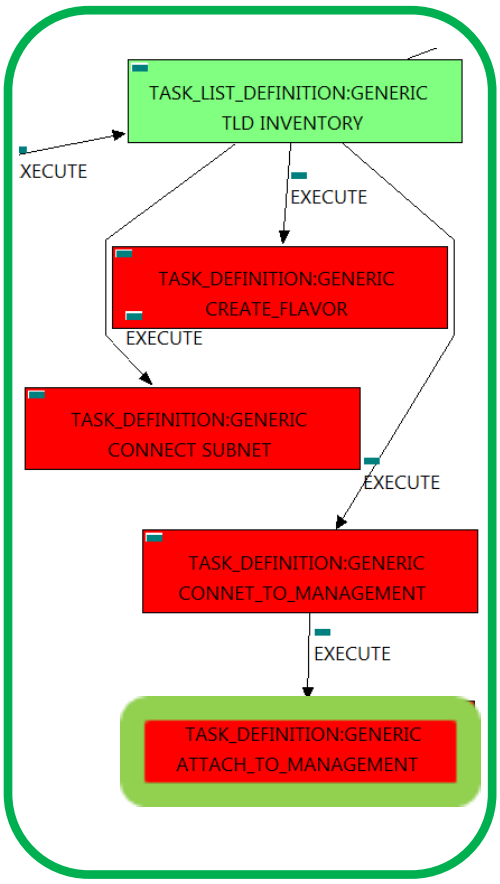


Figure 57: Attaching the Management Network.

5.10 TLD INVENTORY: ATTACH_TO_MANAGEMENT

The TDs that have present in the their names "Attach", are Task Definitions responsible of the connection between artifacts, this means, this TDs will create relationship of specific kind between concrete artifacts, in this case, it will create relationships of type ALLOCATED and status ENABLED between a specific VIRTUAL_PORT, and the SUBNETWORKS:DCN (or the subnetworks's IPADDRESS:GENERIC) related as children of our NETWORK:DCN that belongs to the VIRTUAL_LINK:MANAGEMENT that we are using, and the SUBNETWORK:OS of Management.

Once finished, we should have all SUBNETWORK: DCN and SUBNETWORK: OS related as children of our VL:MANAGEMENT bonded with a relationship of type ALLOCATED and status ENABLED with the VIRTUAL_PORT found by the conditions of the TD.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	ATTACH_TO_MANAGEMENT
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	INSTANTIATED
EXECUTE.Workflow ==	**"WF_TS_CONNECT_MGMT_NET_VPORT"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	ROLLBACK
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow it is going to seek a VIRTUAL_PORT that match the FIND.Condition attribute with value INFO.NetworkType == constant:MANAGEMENT and with Running_Status INSTANTIATED in the DDBB, if the WF find some artifact that fill all the conditions, it will start. if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates.

This workflow it is going to create a relationship of type ALLOCATED and status INSTANTIATED between the VIRTUAL_PORT found and each SUBNETWORK:DCN and SUBNETWORK:OS of our VL:MANAGEMENT, in case that the SUBNETWORKS have IPADDRESS as children, the relationship would be created between these IPs and the VP.

In case of error during the execution, the workflow jump to the ROLLBACK category, if the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. If an error take place in this TD, no action will be taken, the execution of the TLD will try to start a rollback workflow but there is not a workflow to be executed in the attribute ROLLBACK.Workflow, so the execution will continue without error.

Due to that the value of the attribute DATA.Lock is true, once the TD has finished, the artifact recently created, will be blocked.

5.11 TLD DEPLOY PRE: DEPLOY PRE.

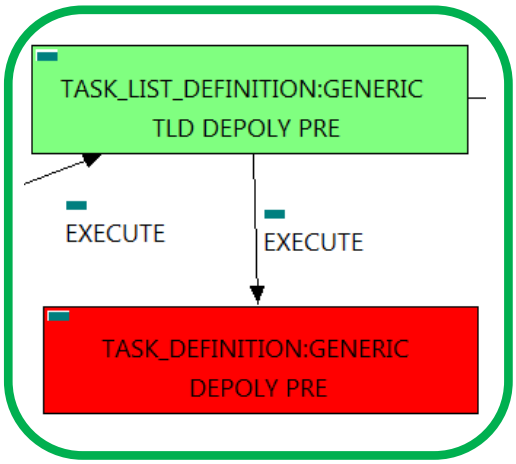


Figure 58: Deploying Pre-Process policies.

This TD is responsible of the provision in the right order of the artifacts referenced by the PreProcessing policies, these policies allow the user to set a number of elements that should be taken in consideration in a certain order, in other case, the execution will fail depending on the event occurred.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
FIND.MainArtifact ==	POLICY:POSTPRE_PROCESSING
FIND.Condition ==	**PROCESSING_JOB.Job_type==constant:PRE&& PROCESSING_JOB.Operation==constant:DEPLOY**
EXECUTE.OrderBy ==	PROCESSING_JOB.OrderBy
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	false

In this TD there is not a workflow to be executed, the target of this TD is process in the correct order the PreProcessing policies present in the VNF, these policies should be executed in a specific order to make the changes or configurations properly, in other case an error will be launched

If the TD ends successfully, the Pre-Processing policies will have been processed adequately.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK,but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will stop.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

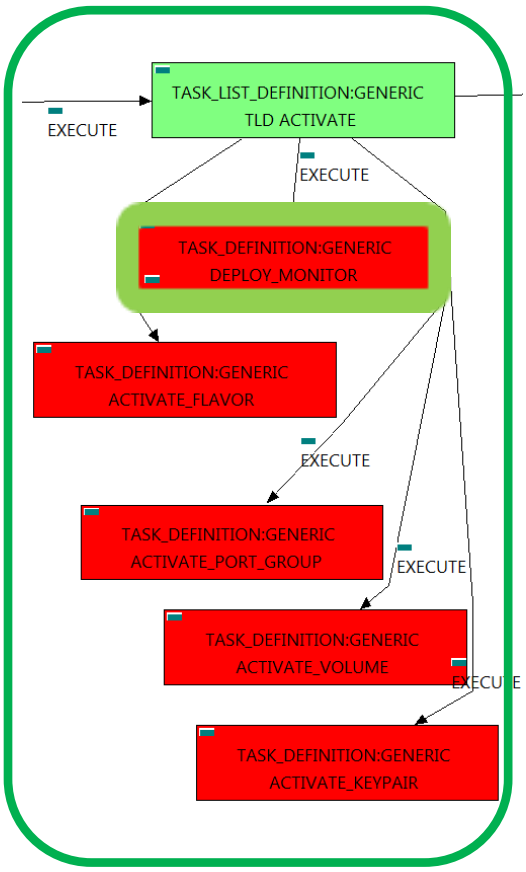


Figure 59: Deployment of a Monitor.

5.12 TLD ACTIVATE: DEPLOY_MONITOR.

The TDs that have present in the their names "Deploy" are Task Definitions responsible of the deployment in the platform targeted and the updating of the status in the platform and the DDBB , these deployments are slightly different to the ones we launch for our entities, as a rule, they are small components as the MONITORs. In this case, the artifact that is going to be deployed is a "MONITOR", this means, when this workflow finish, we will have a MONITOR deployed with status DEPLOYED.

Targets of the TASK DEFINITION: ENABLED	STATUS of the TD:
GENERAL.Name ==	CREATE_INGRESS_ENTRY
FIND.MainArtifact==	**VIRTUAL_LINK>NETWORK#SDN.Access_level=ANY**
SET.Running_Status ==	INSTANTIATED.
Set.Status ==	INSTANTIATED.
EXECUTE.Workflow ==	**"WF_TS_PROVISION_SDN_ZONE_ANY_INGRESSACL_ENTRY"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	ROLLBACK
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a MONITOR in Status INSTANTIATED in the DDBB . Once found , the WF will start the deployment, if the deployment is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, the TD has not a rollback workflow set, so no Rollback it is going to be initiated, the execution will stop.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

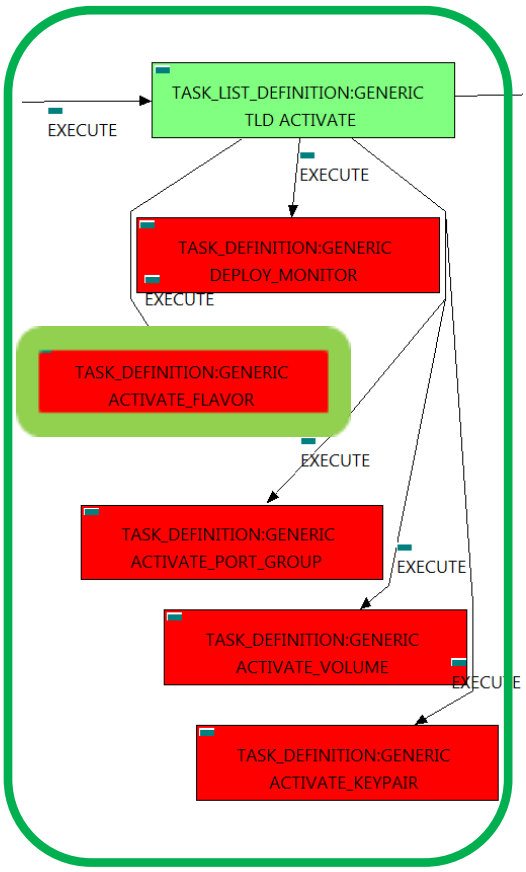


Figure 60: Deployment of a Monitor.

5.13 TLD ACTIVATE: ACTIVATE_FLAVOR.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "FLAVOR", this means, when this workflow finish, we will have a FLAVOR with status ACTIVE associated to the VIRTUAL_MACHINE that it is going to use it in the activation.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name ==	ACTIVATE_FLAVOR
FIND.MainArtifact==	**VNF>VNF_COMPONENT>VIRTUAL_MACHINE> VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE <REGION>COMPUTE>FLAVOR@status=INSTANTIATED**
SET.Running_Status ==	INSTANTIATED.
Set.Status ==	ACTIVE.
EXECUTE.Workflow ==	**"WF_TS_ACTIVATE_FLAVOR"**
EXECUTE.Inactive ==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a FLAVOR in Status INSTANTIATED in the DDBB . Notice that we are not trying to get a VIRTUAL_MACHINE in status INSTANTIATED. The query it is going to use the Path present in the category FIND. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

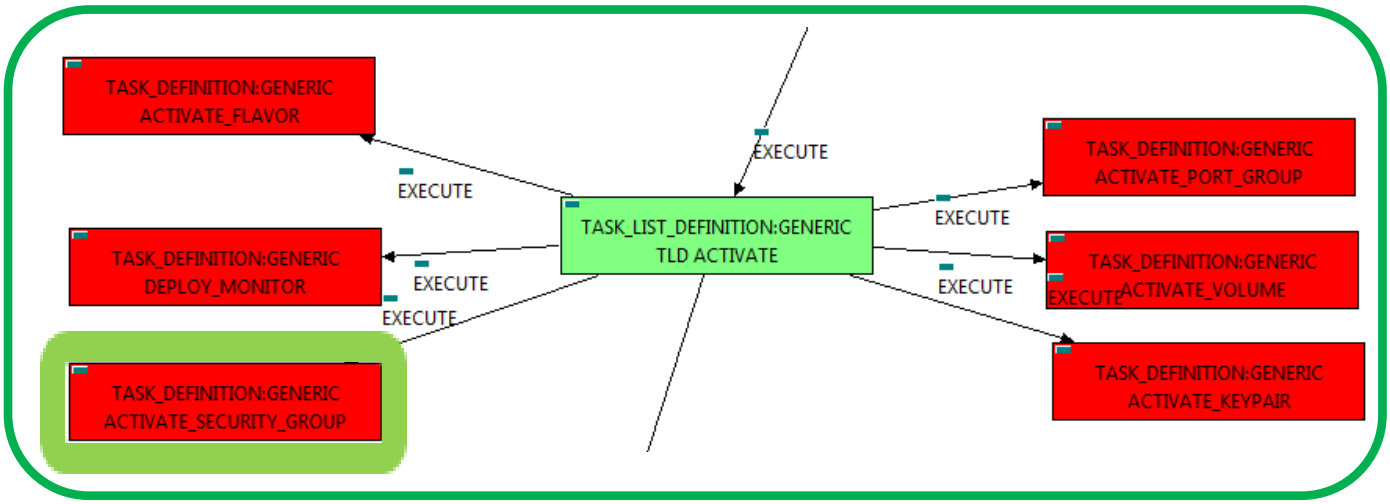


Figure 61: Activate Security Group

TD is going to activate Security Groups in OpenStack platform and set the artifact status to ACTIVE, which is going to be used in next tasks for grouping rules and attaching security groups to VPorts.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name ==	ACTIVATE_SECURITY_GROUP
FIND.MainArtifact==	VNF>VNF_COMPONENT>VIRTUAL_MACHINE> VIRTUAL_PORT>SECURITY_GROUP#GENERAL. Discovery=no>SECURITY_GROUP:OPENSTACK
FIND.Condition==	status==constant:INSTANTIATED
SET.Running_Status ==	INSTANTIATED
SET.Status ==	ACTIVE
EXECUTE.Workflow==	**"WF_TS_ACTIVATE_SECURITY_GROUP"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a SECURITY_GROUP:OPENSTACK with status INSTANTIATED and not discovered, through the path set in the category FIND. Once found, the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, stopping the deploy process in this case. So, no Rollback it is going to be initiated and there will be integrity in DDBB. Also, when deploy is retry, it will continue in this task activation.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

5.15 TLD ACTIVATE: ACTIVATE_PORT_GROUP.

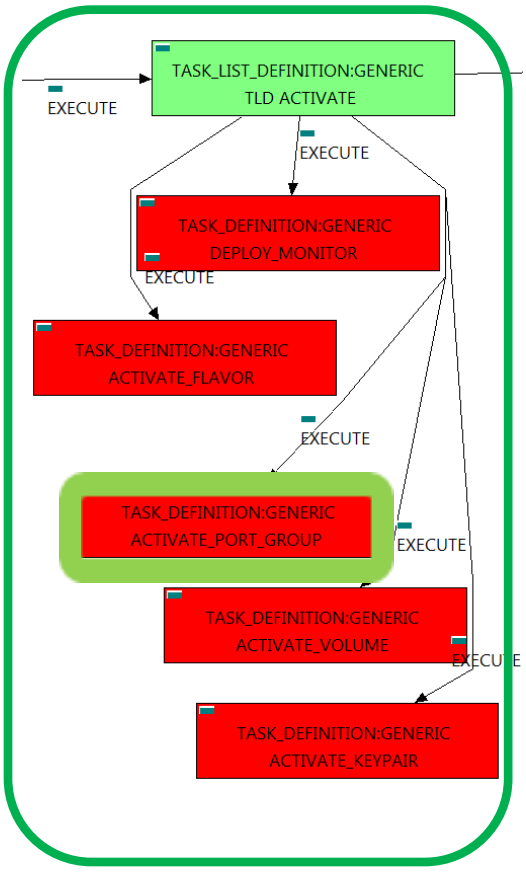


Figure 62: Deployment of a Monitor.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "PORT_GROUP:VCENTER", this means, when this workflow finish, we will have a PORT_GROUP with status ACTIVE associated to the VSWITCH:VCENTER that it is going to be used in the activation.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name ==	Activate Port Group
FIND.MainArtifact== **VNF>VNF_COMPONENT>VIRTUAL_MACHINE> VIRTUAL_PORT<PORT_GROUP**	
SET.Running_Status ==	
Set.Status ==	ACTIVE.
EXECUTE.Workflow ==	**"WF_TS_ACTIVATE_PORT_GROUP_VCENTER"**
EXECUTE.Inactive ==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to find a PORT_GROUP in Status INSTANTIATED in the DDBB. Notice that we are not trying to get a VNF in status INSTANTIATED. The query it is going to use the Path present in the category FIND.MainArtifact. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. If the TD ends properly the user will have a fully activated PORT_GROUP, related to a VSWITCH:VCENTER as children.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

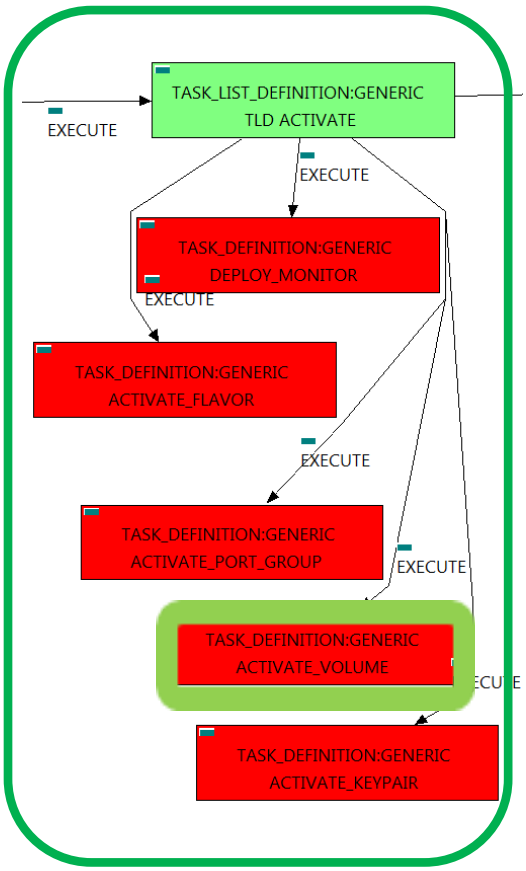


Figure 63: Activation of a Volume.

5.16 TLD ACTIVATE: ACTIVATE_VOLUME.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "VOLUME", this means, when this workflow finish, we will have a VOLUME with status CREATED.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	ACTIVATE_VOLUME
FIND.MainArtifact== VNF>VNF_COMPONENT>VIRTUAL_MACHINE> VIRTUAL_LUN@status=INSTANTIATED	
SET.Running_Status ==	INSTANTIATED.
Set.Status ==	ACTIVE.
EXECUTE.Workflow ==	"WF_TS_CREATE_VOLUME"
EXECUTE.Inactive ==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a VIRTUAL_LUN in Status INSTANTIATED in the DDBB . Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

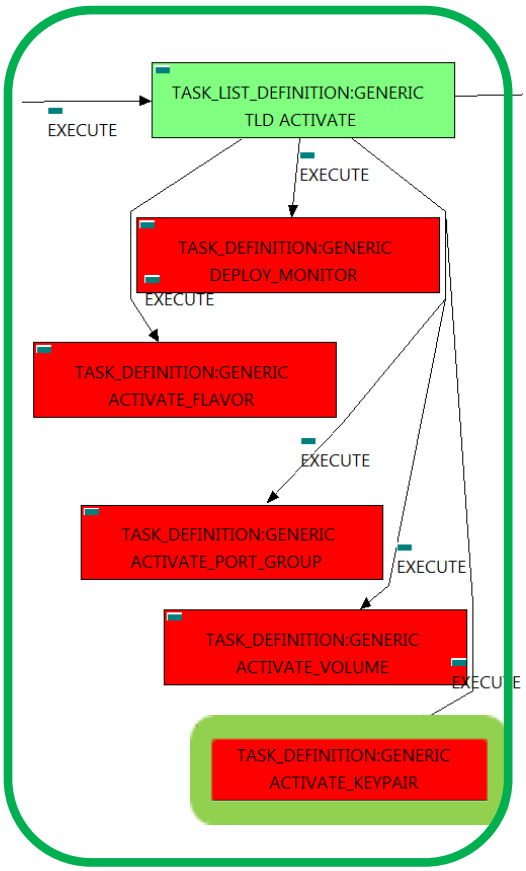


Figure 64: Activation of the KeyPair.

5.17 TLD ACTIVATE: ACTIVATE_KEYPAIR.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "KEYPAIR", this means, when this workflow finish, we will have a KEYPAIR with status ACTIVE.

Targets of the TASK DEFINITION: STATUS of the TD:
ENABLED

GENERAL.Name == ACTIVATE_KEYPAIR
FIND.MainArtifact==
VNF>VNF_COMPONENT>VIRTUAL_MACHINE>
VIRTUAL_CORE<CORE<CPU<SERVER
<AVAILABILITY_ZONE<REGION>COMPUTE>KEY_PAIR@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
Set.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_CREATE_KEY_PAIR"
EXECUTE.Inactive == false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a KEYPAIR that match the FIND.Condition attribute with value KEYPAIR.Pubkey_Data==%GENERAL.Pubkey_Data% in Status INSTANTIATED in the DDBB, notice that we are not trying to get a VIRTUAL_MACHINE in status INSTANTIATED. The query it is going to use the Path present in the category FIND. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

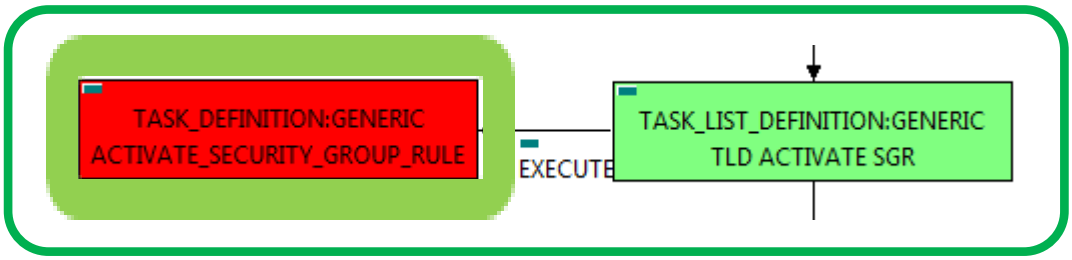


Figure 65: Activate Security Group Rule

TD is going to activate Security Group Rules in OpenStack platform and set the artifact status to ACTIVE, being associated to the security group activated previously. These rules have been provisioned in create Security Group tasks, with a specific values defined by the user.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name ==	ACTIVATE_SG_RULE
FIND.MainArtifact==	VNF>VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_PORT>SECURITY_GROUP#GENERAL.Discovery=no>SECURITY_GROUP>SECURITY_GROUP_RULE:OPENSTACK
FIND.Condition==	status==constant:INSTANTIATED
SET.Running_Status ==	INSTANTIATED
SET.Status ==	ACTIVE
EXECUTE.Workflow==	**"WF_TS_ACTIVATE_SECURITY_GROUP_RULE"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a SECURITY_GROUP_RULE:OPENSTACK with status INSTANTIATED and not discovered, through the path set in the category FIND. Once found, the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, stopping the deploy process in this case. So, no Rollback it is going to be initiated and there will be integrity in DDBB. Also, when deploy is retry, it will continue in this task activation.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

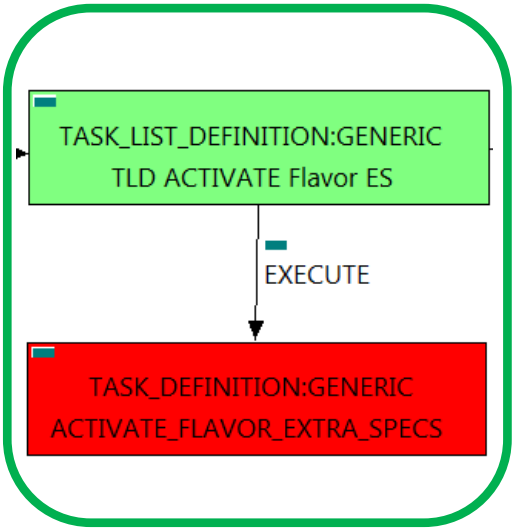


Figure 66: Creation of the Egress Entry Policies.

5.19 TLD ACTIVATE Flavor ES: ACTIVATE_FLAVOR_EXTRA_SPECS.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "FLAVOR" with EXTRA_SPECS, this means, when this workflow finish, we will have a FLAVOR with EXTRA_SPECS with status ACTIVE associate to the VIRTUAL_MACHINE that it is going to use it in the activation.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == ACTIVATE_FLAVOR_EXTRA_SPECS
FIND.MainArtifact ==
VNF>VNF_COMPONENT>VIRTUAL_MACHINE>
VIRTUAL_CORE<CORE<CPU<SERVER
<AVAILABILITY_ZONE<REGION>COMPUTE>
FLAVOR>EXTRA_SPECS:HELION_CG@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
Set.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_ACTIVATE_ATTACH_EXTRA_SPECS"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "HELION_CG" in Status INSTANTIATED in the DDBB . Notice that we are not trying to get a VIRTUAL_MACHINE in status INSTANTIATED. The query it is going to use the Path present in the category FIND.Path. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

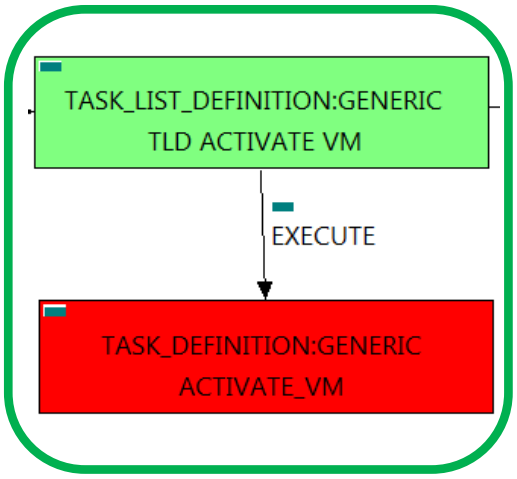


Figure 67: Activation of Virtual Machine related to the VNF.

5.20 TLD ACTIVATE VM: ACTIVATE_VM

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "VIRTUAL_MACHINE, this means, when this workflow finish, we will have a VIRTUAL_MACNIHE with status ACTIVE.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	ACTIVATE_VM
FIND.MainArtifact== **VNF>VNF_COMPONENT> VIRTUAL_MACHINE@status=INSTANTIATED**	
SET.Running_Status ==	INSTANTIATED.
Set.Status ==	ACTIVE.
EXECUTE.Workflow ==	**"WF_TS_ACTIVATE_VM"**
EXECUTE.Inactive==	alse
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "VIRTUAL_MACHINE" in Status INSTANTIATED in the DDBB . Once found , the WF will start the activation of the Virtual Machine, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

This TD could launch different workflows depending on the type of the VM that it is going to be activated, the main kinds of our VIRTUAL_MACHINEs are CG and HELION, so two of the WFs that are going to be used in this activation are: "WF_TS_ACTIVATE_VM_CARRIER_GRADE" and "WF_TS_ACTIVATE_VM_HELION". In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

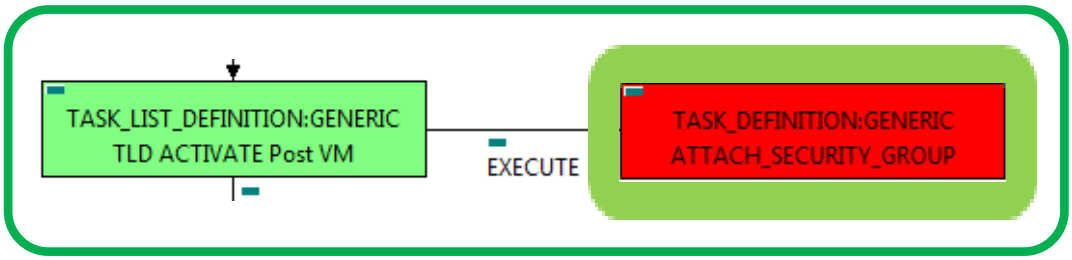


Figure 68: Activate Security Group Rule

TD is going to attach one or more Security Groups to Vports in OpenStack, thus we are able to allow or drop the traffic in Vms.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name ==	ATTACH_SECURITY_GROUP
FIND.MainArtifact==	VNF>VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_PORT@status=ACTIVE
SET.Running_Status ==	ACTIVE
SET.Status ==	ACTIVE
EXECUTE.Workflow==	**"WF_TS_ATTACH_SECURITY_GROUP"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek all the security groups arranged or discovered to a VPort with status ACTIVE and it going to send a command for update the Vport with all rules to apply. I activation is successful we set the status of the artifact as the SET.Status attribute. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, stopping the deploy process in this case. So, no Rollback it is going to be initiated and there will be integrity in DDBB. Also, when deploy is retry, it will continue in this task activation.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

5.22 TLD DEPLOY POST: DEPLOY POST.

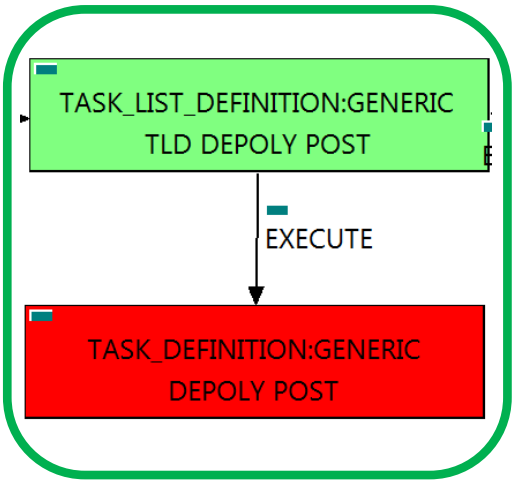


Figure 69: Deploying Post-Processing policies.

This TD is responsible of the provision in the right order of the artifacts referenced by the Post-Processing policies, these policies allow the user to treat a number of elements that should be taken in consideration after the execution of some TD in a specific order, in other case, the execution will fail depending on the event occurred.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
FIND.MainArtifact ==	POLICY:POSTPRE_PROCESSING
FIND.Condition ==	**PROCESSING_JOB.Job_type==constant:POST&& PROCESSING_JOB.Operation==constant:DEPLOY**
EXECUTE.OrderBy ==	PROCESSING_JOB.OrderBy
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	false

In this TD there is not a workflow to be executed, the target of this TD is process in the correct order the PostProcessing policies present in the VNF, these policies should be executed in a specific order to make the changes or configurations properly, in other case an error will be launched

If the TD ends successfully, the Post-Processing policies will have been applied adequately.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK,but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will stop.

Due to that the value of the attribute DATA.Lock is fase, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

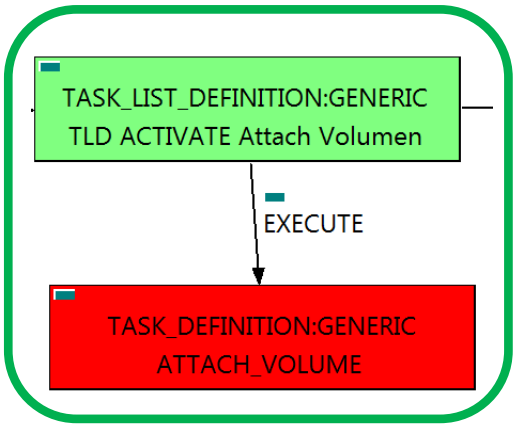


Figure 70: Activation of Ingress Entry policies for the VL, type to ANY.

The TDs that have present in the their names "Attach", are Task Definitions responsible of the connection between artifacts, this means, this TDs will attach a VOLUME to a specific VIM, this specific VIM could change, so the workflow implied in this TD it will launch a custom WF for each kind of VIM. The VOLUMEs that are activated by this TD have two final uses, directly linked with a VIM, or used as External Storage.

Once finished, we should have a number of VOLUMEs activated, liable to a VIM or acting as external Storage.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	ATTACH_VOLUME
FIND.MainArtifact==	**VNF>VNF_COMPONENT> VIRTUAL_MACHINE>VIRTUAL_LUN@status=CREATED**
SET.Running_Status ==	CREATED.
Set.Status ==	ACTIVE.
EXECUTE.Workflow ==	**"WF_TS_ATTACH_VOLUME"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will stop.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

5.24 TLD CREATE VLAN: CREATE_VLAN

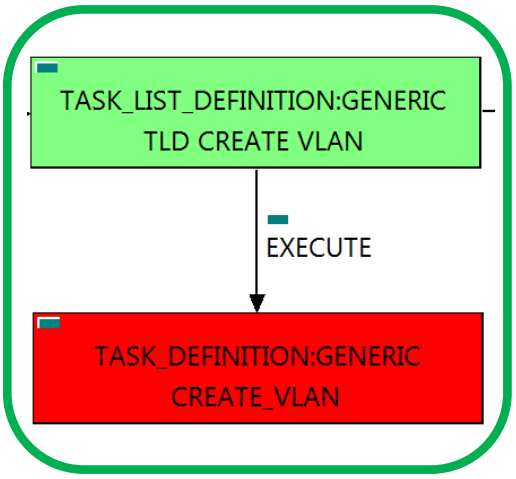


Figure 71: Creation of the specific VLan.

This TD it is going to provision a VLAN:DCN**, this means, the WF implied in this TLD is going to query the SRIOV and SWITCH VIRTUAL_PORTs that are related with our VIRTUAL_LINK:PHYSICAL to get the NETWORKS:GENERIC of type "vlan" and NETWORKS:OS related to these NETWORK "vlan" of the VL specified, in order to provision our VLAN:DCN.**

Once finished, we will have provisioned a VLAN:DCN with all the relationship needed for the correct behavior of the artifact, prepare to be activated when required.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == CREATE_VLAN
FIND.MainArtifact==
VNF>VNF_COMPONENT>VIRTUAL_MACHINE>
VIRTUAL_PORT@status=ACTIVE
FIND.Condition ==
INFO.Type==constant:pci-passthrough ||
INFO.Type==constant:sriov
SET.Running_Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_PROVISION_SDN_VLAN"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "VIRTUAL_PORT" in Status ACTIVE in the DDBB . Once found , it will chech that the VIRTUAL_PORT retrieved matches the condition present in the attribute FIND.Condition. Once validated, the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will stop.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

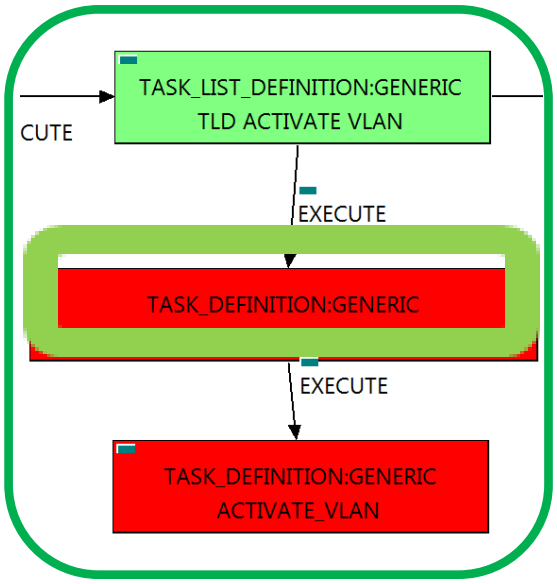


Figure 72: Getting the correct SRIOV or PCI-P Port.

5.25 • TLD ACTIVATE VLAN: Getting VPORT SRIOV or PCI-PASSTHROUGH.

This TD it is going to assure the selection of the correct artifact that later on will be used by the workflow executed.

Once finished, we will have assured that the only two possible types of VPORT s to activate by the use of our VLAN are going to be of typos SRIOV or PCI-Passthrough uniquely, prepared to be activated when required.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	Get VPORT SRIOV or PCI-PASSTHROUGH
FIND.MainArtifact ==	**VNF>VNF_COMPONENT>VIRTUAL_MACHINE> VIRTUAL_PORT:GENERIC@status=ENABLED**
FIND.Condition ==	**INFO.Type==constant:pci-passthrough || INFO.Type==constant:sriov**
SET.Running_Status ==	ENABLED.
SET.Status ==	ENABLED.
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a VIRTUAL_PORT:GENERIC given by the path present in the attribute FIND.Mainartifact, that also matches the FIND.Condition attribute with value "FIND.Condition==constant:pci-passthrough|| INFO.Type==constant:sriov" in Status ENABLED in the DDBB.

Once found, the TD would execute the WF present in EXECUTE.Workflow, in this case, there is no workflow to execute so no changes will be triggered during the execution of this TD, neither exists change in the status of the artifact targeted by the TD, remains as "ENABLED".

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

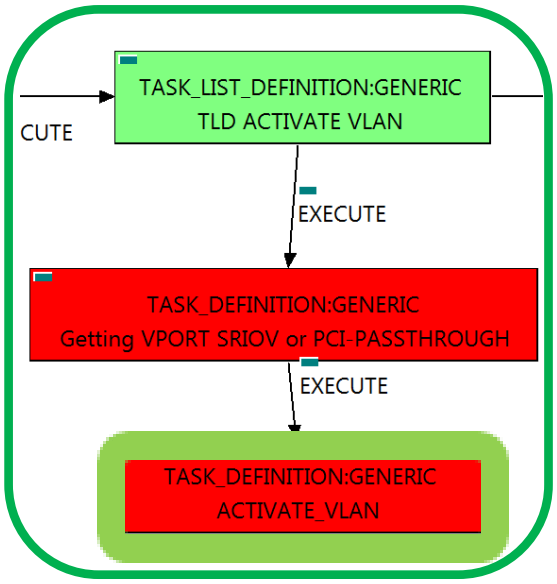


Figure 73: Activation of the VLAN.

5.26 • TLD ACTIVATE VLAN: ACTIVATE_VLAN.

This TD it is going to provision a VLAN:DCN**, this means, the WF implied in this TLD is going to query the SRIOV and SWITCH VIRTUAL_PORTs that are related with our VIRTUAL_LINK:PHYSICAL to get the NETWORKS:GENERIC of type "vlan" and NETWORKS:OS related to these NETWORK "vlan" of the VL specified, in order to provision our VLAN:DCN.**

Once finished, we will have provisioned a VLAN:DCN with all the relationship needed for the correct behavior of the artifact, prepare to be activated when required.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	ACTIVATE_VLAN
FIND.MainArtifact ==	**VIRTUAL_PORT>VLAN@status=INSTANTIATED**
SET.Running_Status ==	INSTANTIATED
EXECUTE.Workflow ==	**"WF_TS_ACTIVATE_SDN_VLAN"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a VIRTUAL_PORT:GENERIC that match the FIND.Condition attribute with value "VIRTUAL_PORT:GENERIC#INFO.Type=pci-sriov>VLAN" in Status INSTANTIATED in the DDBB.

Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

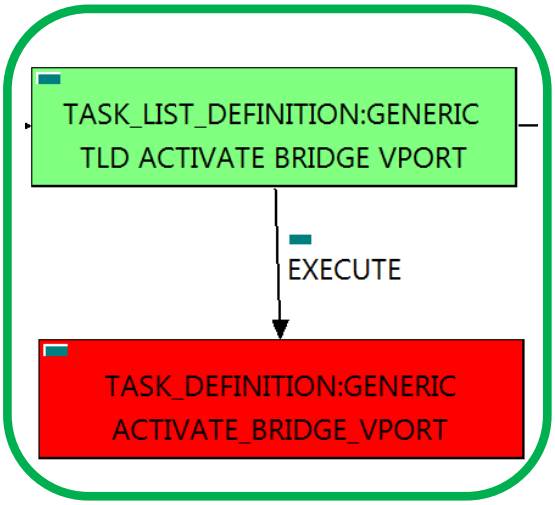


Figure 74: Activation of the Bridge Port.

This TD it is going to create and activate our BRIDGE VPORT**, this means, the WF implied in this TLD is going to query the SRIOV:VPORT and the VLANs that belong to this, in order to create and activate a BRIDGE PORT.**

Once finished, we will have provisioned and activated a BRIDGE PORT with all the relationship needed for the correct behavior of the artifact, prepare to be used when required.

Targets of the TASK DEFINITION: STATUS of the TD:
ENABLED

GENERAL.Name == ACTIVATE_BRIDGE_VPORT
FIND.MainArtifact ==
VNF>VNF_COMPONENT>VIRTUAL_MACHINE>
VIRTUAL_PORT@status=ENABLED
FIND.Condition ==
INFO.Type==constant:pci-passthrough || INFO.Type==constant:sriov
SET.Running_Status == ENABLED
EXECUTE.Workflow ==
“WF_TS_ACTIVATE_SDN_BRIDGE_VPORT”
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

The Workflow present in EXECUTE.Workflow attribute it is going to seek a VIRTUAL_PORT that match the FIND.Condition attribute with value “INFO.Type==constant:pci-passthrough || INFO.Type==constant:sriov” with Status ENABLED.

Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a “STOP” set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

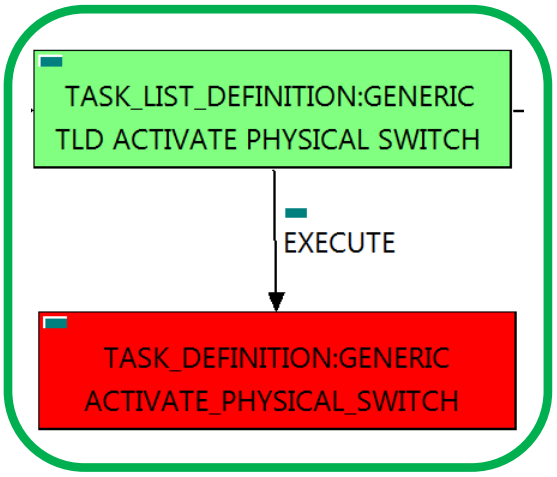


Figure 75: Activation of the Physical Switch associated.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "PHYSICAL_SWITCH", this means, when this workflow finish, we will have all the features of the PHYSICAL_SWITCH at our disposal, prepare to be used when required.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	ACTIVATE_PHYSICAL_SWITCH
FIND.MainArtifact ==	**VNF>VNF_COMPONENT>VIRTUAL_MACHINE> VIRTUAL_PORT@status=PROVISIONED**
FIND.Condition ==	**INFO.Type==constant:pci-passthrough || INFO.Type==constant:sriov**
SET.Running_Status ==	ENABLED
EXECUTE.Workflow ==	**"WF_TS_ACTIVATE_PHYSICAL_SWITCH"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	false

The Workflow present in EXECUTE.Workflow attribute it is going to seek a VIRTUAL_PORT using the path given by the attribute FIND.MainArtifact, that matches the FIND.Condition attribute with value "INFO.Type==constant:pci-passthrough || INFO.Type==constant:sriov" and with Status PROVISIONED.

Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

5.29 • TLD START MONITORS: START_MONITOR.

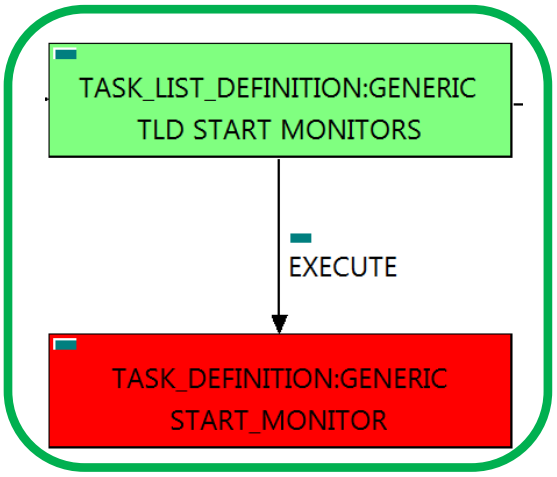


Figure 76: Starting Monitor.

The TDs that have present in the their names "Start" are Task Definitions responsible of the launching of the component in the platform targeted and the updating of the status in the platform and the DDBB , these deployments are slightly different to the ones we launch for our entities, as a rule, they are small components as the MONITORs. In this case, the artifact that is going to be deployed is a "MONITOR", this means, when this workflow finish, we will have a MONITOR deployed with status STARTED ready to monitories.

Targets of the TASK DEFINITION: ENABLED	STATUS of the TD:
GENERAL.Name ==	START_MONITOR
FIND.MainArtifact ==	**MONITOR**
FIND.Condition ==	**status==constant:DEPLOYED**
SET.Running_Status ==	DEPLOYED
SET.Status ==	STARTED.
EXECUTE.Workflow ==	**"WF_TS_MONITOR_START"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a MONITOR with Status DEPLOYED.

Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

5.30 • TLD SEND PASSWORD: SEND_PASSWORD.

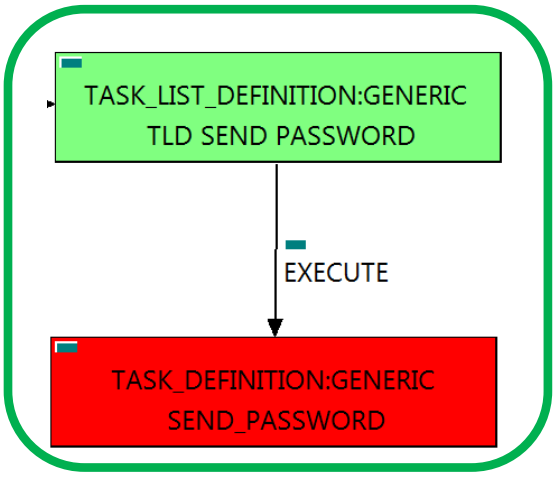


Figure 77: Sending the new Password.

This TD it is going to query and check different attributes from the VIRTUAL_MACHINE and TENANT given, and compose a mail with sensitive information that it is going to be sent to the receiver that the workflow dictates. We will not make any changes in status or artifacts.

Targets of the TASK DEFINITION:	STATUS of the TD:
ENABLED	
GENERAL.Name ==	SEND_PASSWORD
FIND.MainArtifact ==	**VNF>VNF_COMPONENT>VIRTUAL_MACHINE@status=ACTIVE**
FIND.Condition ==	**CREDENTIALS.AdminPassword != null || CREDENTIALS.AdminPassword != null**
SET.Running_Status ==	ACTIVE
SET.Status ==	ACTIVE.
EXECUTE.Workflow ==	**"WF_TS_ACTIVATE_SEND_MAIL"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	CONTINUE
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a VIRTUAL_MACHINE with Status ACTIVE.

Once found, the WF will start the composing of the mail, after the mail is composed, the WF just send it to the proper addressee. In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "CONTINUE" value set as behavior, no Rollback it is going to be initiated, so the execution it is going to continue with the next Task List Definition in case of error.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

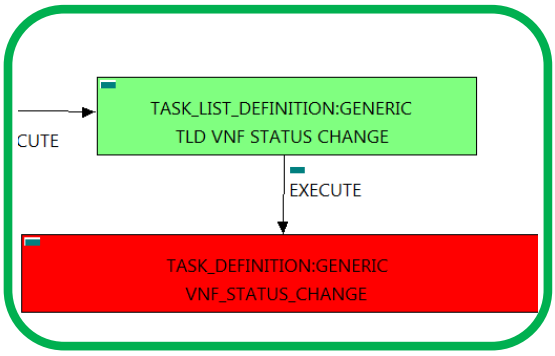


Figure 78: Changing the status of the VNF.

The TDs that have present in their names "Status Change", are Task Definitions responsible of the change in the status of the entity associated, in this case a VNF. When the WF has finished we will have an VNF with status ACTIVE in case of successful execution, or status ERROR in case of error, or simply not any change in the status because a ROLLBACK during the execution.

Targets of the TASK DEFINITION: ENABLED	STATUS of the TD:
GENERAL.Name ==	VNF STATUS CHANGE
FIND.MainArtifact ==	**VNF>VNF_COMPONENT>VIRTUAL_MACHINE@status=ACTIVE**
FIND.Condition ==	**status==constant:INSTANTIATED**
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	ACTIVE.
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The TASK_DEFINITION do not execute any workflow, with the attributes present in the categories it is enough to change the status of the entity.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The TLD will finish correctly once the execution reaches this point, the VNF will change its status to "ACTIVE".

Chapter 6 Deploy of a VNF Firewall - Default.

From now on, and to make easier the understanding of the TLDs, we are going to explain the functionality of each set of TASK_LIST_DEFINITION:GENERIC, and the number of TASK_DEFINITION:GENERIC children of the previously mentioned TASK_LIST_DEFINITION:GENERIC.

Basically, the TASK_LIST_DEFINITION:GENERIC connect what we can consider “units of execution”, those are the TASK_DEFINITION:GENERIC, that have a WORKFLOW assigned to be executed when the execution of the TLD reach them.

If you like to have a more deep knowledge about the workflows mentioned through this document please refer to the specific document.

**

If in the category FIND, the attribute Path is present, the attribute FIND.ArtifactType will be the starting artifact for the Path, but the FIND.Status attribute refers to the last artifact on the Path.

FIND.ArtifactType == VIRTUAL_MACHINE
FIND.Status== INSTANTIATED
FIND.Path ==
VIRTUAL_MACHINE>VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE<REGION>COMPUTE>FLAVOR

In this example, we are looking for a FLAVOR in status INSTANTIATED, we do not expect to get a VIRTUAL_MACHINE, in status INSTANTIATED.

**

If during the use of the TLDs, the “Regenerate UUIDs” option is used, the user should check the Id of the tree that brings all the elements of the TLD, this “id” is specific and it will be the same for all the tree groups in all the TLDs.

**

The two modes available are “Default” and “Simulated”, the second one is only available if it is configured previously, by defect, and the mode that will be used is “Default”.

6.1 Specific Elements of the TLD Deploy Firewall

In this chapter the different elements of the specific TLD will be explained conscientiously.

6.2 TLD QUOTA ASSIGMENT: Quota Assignment.

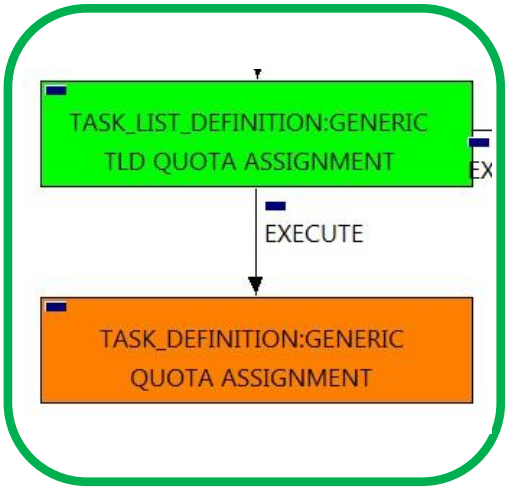


Figure 79: Quota Assignment.

The TDs that have present in the their names "Assignment", are Task Definitions responsible of the assignation of resources for an specific artifact, in the case of the quotas, the TLD it is going to assign an amount of each resource needed for the correct execution of the deployment.

Once finished, our VNF should have every quota needed for a successful deployment assigned, having taken in consideration all the rules for the assignment. This is crucial, because our component consume quotas during the execution of the TLD.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == QUOTA ASSIGNMENT
SET.Running_Status == INSTANTIATED.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_NFVD_ASSIGNMENT_QUOTA"
EXECUTE.Inactive== false
EXECUTE.OrderBy ==
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
DATA.Lock == true
INPUT_MAPPING.MAPPING_LIST==
assignmentRelationshipID=Quota_Assignment;
resourceTreeID=nfvd#quotaResourceID;
cacheLevel=full;

The Workflow present in EXECUTE.Workflow it is going to seek a firewall in Status INSTANTIATED in the DDBB, when the WF find it, it will start. This workflow assign all the resources needed by the VNF:FW to get a successful Deploy, it will check the available resources and decide which one should be assigned.

The Workflow also check the affinity policies , in case our TLD has it, the way the assignation it is going to behave depends also of this policies, once checked, we launch the assignation of resources. The assignation of resources it uses another WF that it is called from our workflow, "WF_NFVD_ASSIGN_RESOURCES".

In case of error during the execution, the workflow jump to the ROLLBACK category. If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. In this case, the TLD has not assigned a rollback workflow, so only the status of the artifact will change.

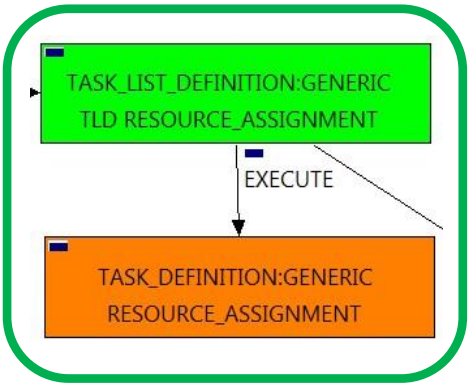


Figure 80: Resource Assignment.

The TDs that have present in their names "Assignment", are Task Definitions responsible of the assignation of resources for a specific artifact or deploy, in this case, we are looking for a VNF:FW to assign the resources needed for the future deployment. In order to have a successful assignation we must have in our TLD Deploy VNF:FW an artifact POLICY: ASSIGMENT_RELATIONSHIP, with a GENERAL.Name=="Resource_Assigment", also this artifact must be related with the OPERATION_GROUP: GENERIC of our TLD with a relationship of type PROVIDES and status ENABLED.

Once finished, our VNF:FW should have every resources needed for a successful deployment assigned, having taken in consideration all the rules for the assignment.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == RESOURCE_ASSIGNMENT.
SET.Running_Status == INSTANTIATED.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_NFVD_ASSIGNMENT"
EXECUTE.Inactive== false
EXECUTE.OrderBy ==
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
DATA.Lock == true
INPUT_MAPPING.MAPPING_LIST==
assignmentRelationshipID=Resource_Assignment;
resourceTreeID=resourceArtifactID;

The Workflow present in EXECUTE.Workflow it is going to seek a RESURRECTION_ASSIGNMENT in Status INSTANTIATED in the DDBB, when the WF find it, it will start. This workflow assign all the resources needed by the VNF:FW to get a successful Deploy, it will check the available resources and decide which one should be assigned.

The Workflow also check the affinity policies , in case our TLD has it, the way the assignation it is going to behave depends also of this policies, once checked, we launch the assignation of resources.

The assignation of resources it uses another WF that it is called from our workflow, "WF_NFVD_ASSIGN_RESOURCES".

In case of error during the execution, the workflow jump to the ROLLBACK category. If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts.

6.4 TLD CREATE_FLAVOR_AND_MGMT: CREATE_FLAVOR.

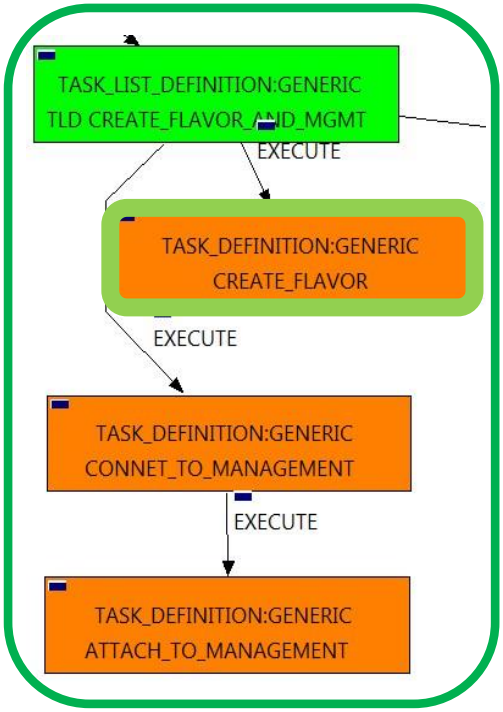


Figure 81: Create Flavor.

This TD it is going to create the FLAVORS needed for each VMs to be activated later on, this means, the WFs implied in this TLD are going to check each element of our VMs to gather all the information needed to create a specific FLAVOR artifact, during the execution of the TD, the ENTITY_SCALE Policies are going to be consulted, the situation of these policies are required for the correct creation of the FLAVOR.

Once finished, we will have a number of FLAVORS bonded to a VM or VMs, prepare to be activated with these FLAVORS.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == CREATE_FLAVOR.
SET.Running_Status == INSTANTIATED.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_NFVD_CREATE_FLAVOR_INSTANCES"
EXECUTE.Inactive== false
EXECUTE.OrderBy ==
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow it is going to seek a VNF:FW with Running_Status INSTANTIATED in the DDBB, if the WF find some artifact that fill all the conditions, it will start.

This workflow will start another two more, the one that check if the FLAVOR needs Extra_Specs, a special set of configurations for the FLAVOR, "WF_NFVD_CREATE_FLAVOR_EXTRA_INVENTORY", and the one that will create the Flavor Instance in OPENSTACK platform, "WF_NFVD_CREATE_FLAVOR_OS_INSTANCE".

In case of error during the execution, the workflow jump to the ROLLBACK category. If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts.

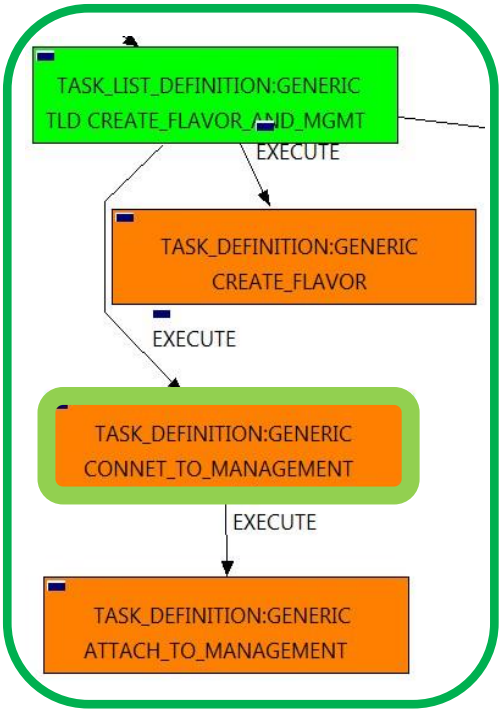


Figure 82: Connect to Management.

The TDs that have present in the their names "Connect", are Task Definitions responsible of the connection between artifacts, this means, this TDs will create relationship of specific kind between concrete artifacts, in this case, it will create relationships of type USES and status ENABLED between a specific VIRTUAL_PORT, and the SUBNETWORKS (or the subnetworks's IPADDRESS:GENERIC) related as children of our VIRTUAL_LINK:MANAGEMENT that we are using.

Once finished, we should have all SUBNETWORKs related as children of our VL:MANAGEMENT bonded with a relationship of type USES and status ENABLED with the VIRTUAL_PORT found by the conditions of the TD.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == CONNET_TO_MANAGEMENT.
FIND.MainArtifact ==
VNF:FW>VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_PORT#INFO.NetworkType=MANAGEMENT
SET.Running_Status == INSTANTIATED.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_CONNECT_MANAGEMENT_NETWORK"
EXECUTE.Inactive== false
EXECUTE.OrderBy ==
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow it is going to seek a VIRTUAL_PORT that match the FIND.MainArtifact attribute with value INFO.NetworkType == MANAGEMENT and with Running_Status INSTANTIATED in the DDBB, if the WF find some artifact that fill all the conditions, it will start. If the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. This workflow it is going to create a relationship of type USES and status INSTANTIATED between the VIRTUAL_PORT found and each SUBNETWORK of our VL:MANAGEMENT, in case that the SUBNETWORKS have IPADDRESS as children, the relationship would be created between these IPs and the VP.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have not a workflow present in the attribute, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

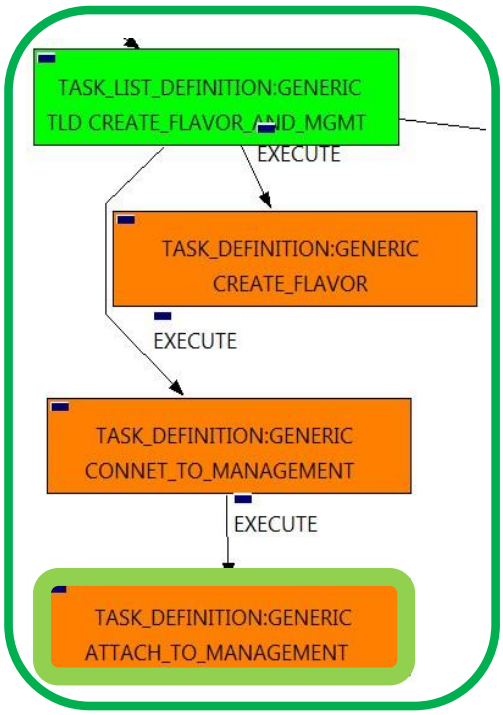


Figure 83: Attach to management.

The TDs that have present in the their names "Attach", are Task Definitions responsible of the connection between artifacts, this means, this TDs will create relationship of specific kind between concrete artifacts, in this case, it will create relationships of type ALLOCATED and status ENABLED between a specific VIRTUAL_PORT, and the SUBNETWORKS:DCN (or the subnetworks's IPADDRESS:GENERIC) related as children of our NETWORK:DCN that belongs to the VIRTUAL_LINK:MANAGEMENT that we are using, and the SUBNETWORK:OS of Management.

Once finished, we should have all SUBNETWORK: DCN and SUBNETWORK: OS related as children of our VL:MANAGEMENT bonded with a relationship of type ALLOCATED and status ENABLED with the VIRTUAL_PORT found by the conditions of the TD.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	ATTACH_TO_MANAGEMENT.
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	INSTANTIATED.
EXECUTE.Workflow ==	**"WF_TS_CONNECT_MGMT_NET_VPORT"**
EXECUTE.Inactive==	false
EXECUTE.OrderBy ==	
ROLLBACK.Behaviour_on_error ==	ROLLBACK
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow it is going to seek a VIRTUAL_PORT that match the FIND.MainArtifact attribute with value INFO.NetworkType == MANAGEMENT and with Running_Status INSTANTIATED in the DDBB, notice that this attributes are not present in this TD, but are present and available in the parent TD. If the WF find some artifact that fill all the conditions, it will start. If the activation it is successful we set the status of the artifact as the SET.Status attribute dictates.

This workflow it is going to create a relationship of type ALLOCATED and status INSTANTIATED between the VIRTUAL_PORT found and each SUBNETWORK:DCN and SUBNETWORK:OS of our VL:MANAGEMENT, in case that the SUBNETWORKS have IPADDRESS as children, the relationship would be created between these IPs and the VP.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

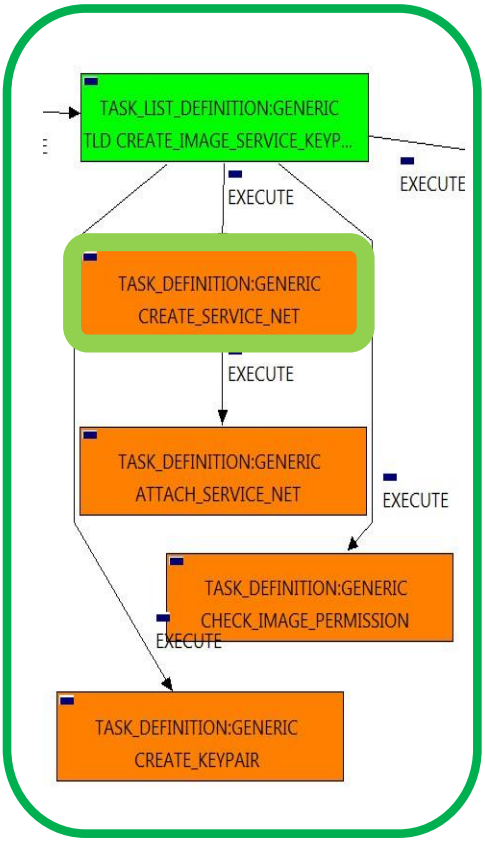


Figure 84: Create Service Network

The TDs that have present in the their names "Create", are Task Definitions responsible of the creation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifacts that are going to be provisioned are a number of NETWORKs and SUBNETWORKs. This artifacts are going to become the Service Net.

Once finished, we should have a ZONE:DCN and a SUBNETWORK:DCN related to the previous ZONE:DCN, both labeled as with a name that should have concatenated "Service_", also, we should have at the end of the execution of the TD, a NETWORK:OPENSTACK and a SUBNETWORK:OPENSTACK related to the previous NETOWRK:OPENSTACK, also we must have all the relationship needed for the correct behavior of the Service Net. All of the elements related to the entity given.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == CREATE_SERVICE_NET.
SET.Running_Status == INSTANTIATED.
SET.Status == INSTANTIATED.
EXECUTE.Workflow == **"WF_TS_PROVISION_NETWORK_FW"**
EXECUTE.Inactive== false
EXECUTE.OrderBy ==
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek an artifact identified by an Id, in this case, the id will represent a VNF:FW in Status INSTANTIATED in the DDBB. Once found, the WF will start the provision of the Service Network for the Firewall, if the provision it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts.

In this case, there is not a workflow designated for the Rollback process, so in case of error the TD will change the status of the artifact identified by the specific ID which it is been used during the execution of the Workflow.

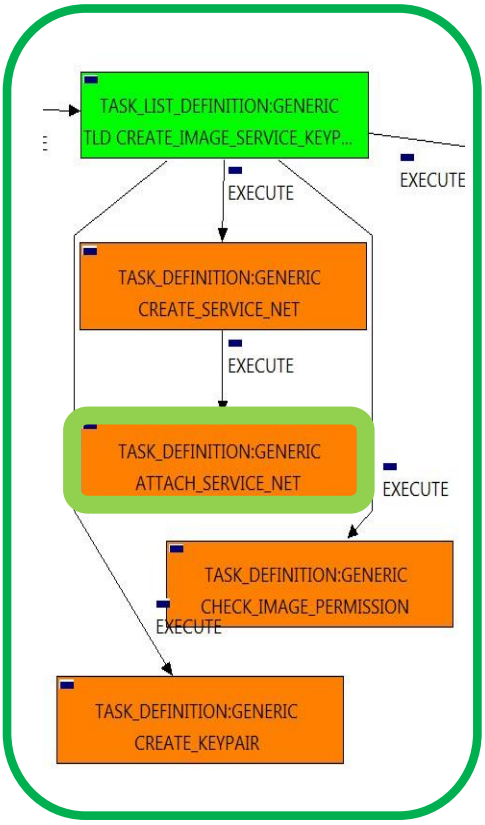


Figure 85: Attach Service Network.

The TDs that have present in the their names "Attach", are Task Definitions responsible of the connection between artifacts, this means, this TDs will create relationship of specific kind between concrete artifacts, in this case, it will create relationships of type ALLOCATED and status ENABLED between a specific VIRTUAL_PORT, and the SUBNETWORKS:DCN and SUBNETWORK:OPENSTACK that the TLD recently has provisioned, as part of our Service Net.

Once finished, we should have all SUBNETWORK: DCN and SUBNETWORK: OS related as children of our VNF:FW bonded with a relationship of type ALLOCATED and status ENABLED with the VIRTUAL_PORT found by the conditions of the WF.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	ATTACH_SERVICE_NET.
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	INSTANTIATED.
EXECUTE.Workflow ==	**"WF_TS_CONNECT_FW_VPORT"**
EXECUTE.Inactive==	false
EXECUTE.OrderBy ==	
ROLLBACK.Behaviour_on_error ==	ROLLBACK
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek an artifact identified by an Id, in this case, the id will represent a VNF:FW in Status INSTANTIATED in the DDBB. if the WF find some artifact that fill all the conditions, it will start. If the creation of the relationships it is successful we set the status of the artifact as the SET.Status attribute dictates.

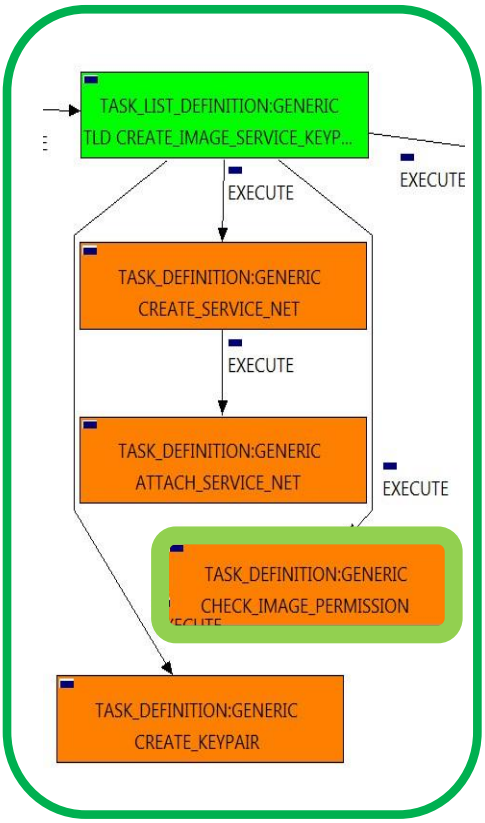
This workflow it is going to create a number of relationships of type ALLOCATED and status INSTANTIATED between the VIRTUAL_PORT found and each SUBNETWORK:DCN and SUBNETWORK:OS of our VNF:FW.

This workflow will start another two more, the one that provision in SDN, "WF_TS_PROVISION_NETWORK_SDN" and the one that provision in the OpenStack platform, "WF_TS_PROVISION_NETWORK_OPENSTACK".

In case of error during the execution, the workflow jump to the ROLLBACK category. If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts.

In this case, there is not a workflow designated for the Rollback process, so in case of error the TD will change the status of the artifact identified by the specific ID which it is been used during the execution of the Workflow.

6.9 TLD CREATE_IMAGE_SERVICE_KEYPAIR:CHECK_IMAGE_PERMISSION.



The TDs that have present in their names "Check", are Task Definitions that validate the configuration of an artifact, in this case, the configuration of the IMAGE present in our DCs, the workflow will check, validate, and in case of need, deploy the IMAGE related with the VMs present in our DC.

Targets of the TASK DEFINITION: STATUS of the TD:
ENABLED

GENERAL.Name == CHECK_IMAGE_PERMISSION.
FIND.mainArtifact == VNF:FW>VNF_COMPONENT>VIRTUAL_MACHINE
SET.Running_Status == INSTANTIATED.
SET.Status == INSTANTIATED.
EXECUTE.Workflow == **"WF_TS_CHECK_VM_IMAGE"**
EXECUTE.Inactive== false
EXECUTE.OrderBy ==
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

Figure 86: Check Image Permission.

The Workflow present in EXECUTE.Workflow it is going to seek a VIRTUAL_MACHINE in Status INSTANTIATED in the DDBB, when the WF find it, it will start. This workflow will start another two more, the one that check the permissions of the IMAGE, "WF_TS_CHECK_IMAGE_PERMISSIONS", and the one that will deploy our IMAGE if it is not deployed, "WF_TS_DEPLOY_IMAGE".

In case of IMAGE managed by VIM, "WF_TS_CHECK_IMAGE_PERMISSIONS will work the same way, however in that case "WF_TS_DEPLOY_IMAGE" couldn't work the same way, the image can be reused it previously has been deployed in the VIM, but can not generate a new deployed IMAGE.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts if the first launch attempt fails.

In this case, there is not a workflow designated for the Rollback process, so in case of error the TD will change the status of the artifact identified by the specific ID which it is been used during the execution of the Workflow.

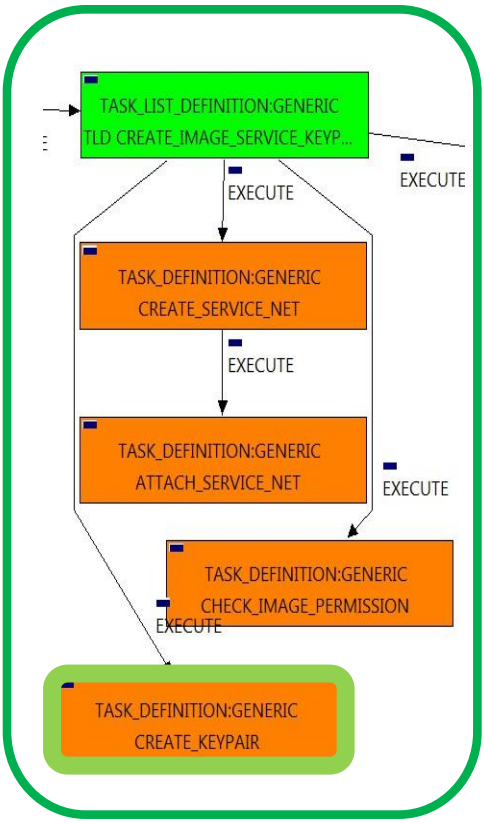


Figure 87: Create Keypair.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "TENANT:OPENSTACK", this means, when this workflow finish, we will have a TENANT:OPENSTACK with status ACTIVE in our Openstack platform, also the TD will update the status and other attributes of the instance that represents the artifact TENANT:OS in the DDBB and in the platform, creating all the relationships needed for a correct activation.

Targets of the TASK DEFINITION: STATUS of the TD:
ENABLED

GENERAL.Name == CREATE_KEYPAIR
FIND.MainArtifact == VNF:FW>VNF_COMPONENT>VIRTUAL_MACHINE
FIND.Condition ==
KEYPAIR.Pubkey_Data != null || KEYPAIR.Pubkey_Path != null
SET.Running_Status == INSTANTIATED.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_NFVD_CREATE_KEY_PAIR_INVENTORY"
EXECUTE.Inactive== false
EXECUTE.OrderBy ==
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow it is going to seek a VIRTUAL_MACHINE in Status INSTANTIATED in the DDBB, also the artifact which we are looking for have to match the FIND.Condition, means, that our VM must have as KEYPAIR.Pubkey_Data a not null value, neither can be null the value in KEYPAIR.Pubkey_Path, if the TD find some artifact that fill all the conditions, the WF will start the creation of the KEY_PAIR.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts.

In this case, there is not a workflow designated for the Rollback process, so in case of error the TD will change the status of the artifact identified by the specific ID which it is been used during the execution of the Workflow.

The attribute "DATA.Lock" is set with a true value, so when the WF has finished its execution, the TLD will lock the artifact identified by the ID used in the execution of the workflow.

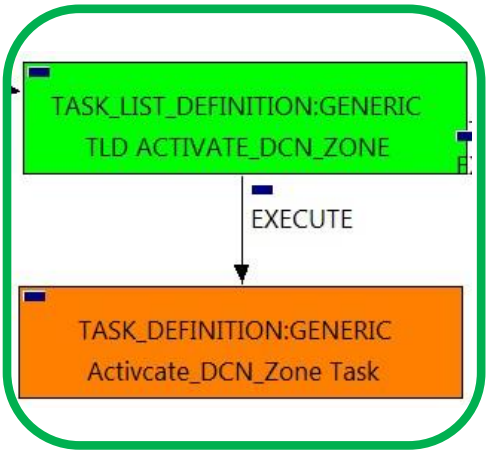


Figure 88: Activation of a DCN Network.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "ZONE:DCN", this means, when this workflow finish, we will have a ZONE(Network) with status ACTIVE identified as part of the Service Network.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Activcate_DCN_Zone Task
FIND.MainArtifact ==
VNF:FW>VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_PORT
<SUBNETWORK:GENERIC>
SUBNETWORK:TEMPLATE>
SUBNETWORK<ZONE@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_ACTIVATE_SDN_ZONE"
EXECUTE.Inactive== false
EXECUTE.OrderBy ==
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "ZONE" in Status INSTANTIATED in the DDBB. Notice that we are not trying to get a VIRTUAL_MACHINE in status INSTANTIATED. The query it is going to use the Path present in the category FIND.MainArtifact. Once found, the WF will start the activation of the "ZONE"(Network), if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so only the status of the artifact identified by the id will be changed.

The attribute "DATA.Lock" is set with a true value, so when the WF has finished its execution, the TLD will lock the artifact identified by the ID used in the execution of the workflow.

6.12 TLD ACTIVATE_DCN_SUBNET: Activate_DCN_Subnet Task

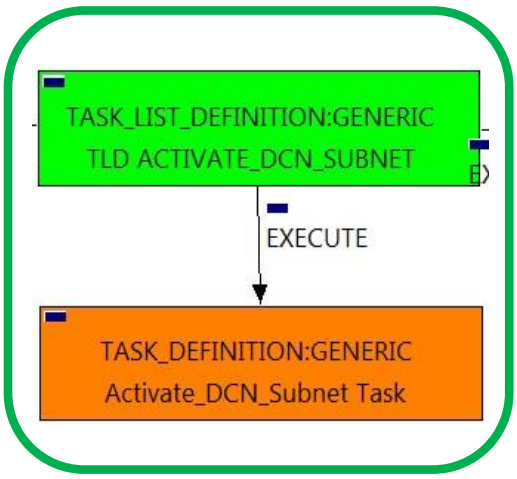


Figure 89: Activation of a DCN Subnetwork.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "SUBNETWORK:DCN", this means, when this workflow finish, we will have a SUBNETWORK:DCN with status ACTIVE identified as part of the Service Network.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Activcate_DCN_Zone Task
FIND.MainArtifact ==
VNF:FW>VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_PORT <SUBNETWORK:GENERIC> SUBNETWORK:TEMPLATE> SUBNETWORK@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_ACTIVATE_SDN_SUBNETWORK"
EXECUTE.Inactive== false
EXECUTE.OrderBy ==
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "SUBNETWORK" in Status INSTANTIATED in the DDBB. Notice that we are not trying to get a VIRTUAL_MACHINE in status INSTANTIATED. The query it is going to use the Path present in the category FIND.MainArtifact. Once found, the WF will start the activation of the Subnetwork in SDN, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so only the status of the artifact identified by the id will be changed.

The attribute "DATA.Lock" is set with a true value, so when the WF has finished its execution, the TLD will lock the artifact identified by the ID used in the execution of the workflow.

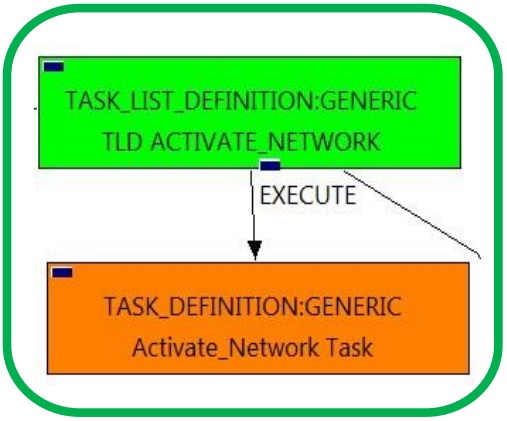


Figure 90: Activation of an Openstack Network.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "NETWORK:OPENSTACK", this means, when this workflow finish, we will have a NETWORK:OPENSTACK with status ACTIVE .

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Activcate_DCN_Zone Task
FIND.MainArtifact ==
VNF:FW>VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_PORT <SUBNETWORK:OPENSTACK<NETWORK:OPENSTACK@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_ACTIVATE_NETWORK"
EXECUTE.Inactive== false
EXECUTE.OrderBy ==
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "NETWORK:OPENSTACK" in Status INSTANTIATED in the DDBB. Notice that we are not trying to get a VIRTUAL_MACHINE in status INSTANTIATED. The query it is going to use the Path present in the category FIND.MainArtifact.

Once found, the WF will start the activation of the Network in the Openstack Platform, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so only the status of the artifact identified by the id will be changed.

The attribute "DATA.Lock" is set with a true value, so when the WF has finished its execution, the TLD will lock the artifact identified by the ID used in the execution of the workflow.

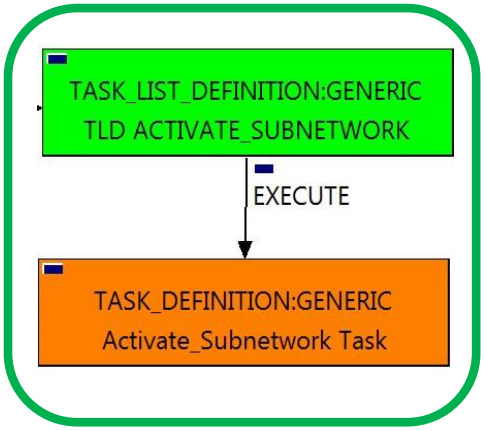


Figure 91: Activation of an Openstack Subnetwork.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "SUBNETWORK:OPENSTACK", this means, when this workflow finish, we will have a SUBNETWORK:OPENSTACK with status ACTIVE identified as part of the Service Network.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Activcate_DCN_Zone Task
FIND.MainArtifact ==
VNF:FW>VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_PORT <SUBNETWORK:OPENSTACK@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_ACTIVATE_SUBNETWORK"
EXECUTE.Inactive== false
EXECUTE.OrderBy ==
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "SUBNETWORK:OPENSTACK" in Status INSTANTIATED in the DDBB. Notice that we are not trying to get a VNF:FW in status INSTANTIATED. The query it is going to use the Path present in the category FIND.MainArtifact.

Once found, the WF will start the activation of the subnetwork in the platform Openstack, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so only the status of the artifact identified by the id will be changed.

The attribute "DATA.Lock" is set with a true value, so when the WF has finished its execution, the TLD will lock the artifact identified by the ID used in the execution of the workflow.

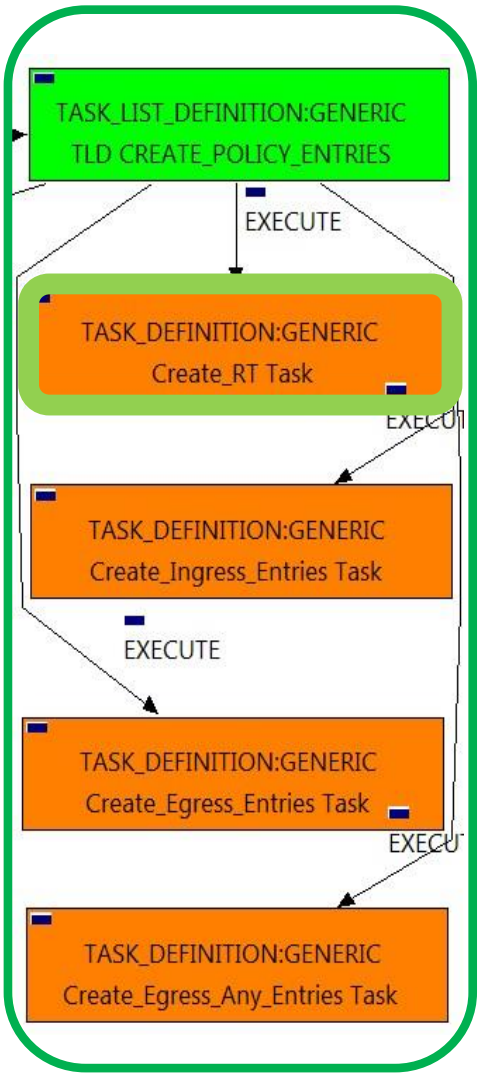


Figure 92: Creation Redirection Target.

This TD it is going to provision a REDIRECTION_TARGET:DCN, this means, the WF implied in this TLD is going to query the policies of the TENANT and the artifact L3DOMAIN of our Management Network in order to create the artifact REDIRECTION_TARGET over this L3DOMAIN artifact, and related to it.

Once finished, we will have provisioned a REDIRECTION_TARGET:DCN with status INSTANTIATED and all the relationship needed for the correct behavior of the artifact, prepare to be activated when required. In this case, the relationship it is going to be only between the L3DOMAIN and the newly created REDIRECTION_TARGE, it will be a relationship of type MANAGE and Status ENABLED.

Targets of the TASK DEFINITION: ENABLED	STATUS of the TD:
GENERAL.Name ==	Create_RT Task
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	INSTANTIATED.
EXECUTE.Workflow ==	**"WF_TS_PROVISION_SDN_REDIRECTION_TARGET"**
EXECUTE.Inactive==	false
EXECUTE.OrderBy ==	
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek the artifact identified by the id given to the TLD, in this case this artifact will be a "VNF:FW" in Running Status INSTANTIATED in the DDBB.

Once found, the WF will start the provison of the new RedirectionTarget artifact, if the provision it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so only the status of the artifact identified by the id will be changed.

The attribute "DATA.Lock" is set with a true value, so when the WF has finished its execution, the TLD will lock the artifact identified by the ID used in the execution of the workflow.

6.16 TLD CREATE_POLICY_ENTRIES: Create_Ingress_Entries task.

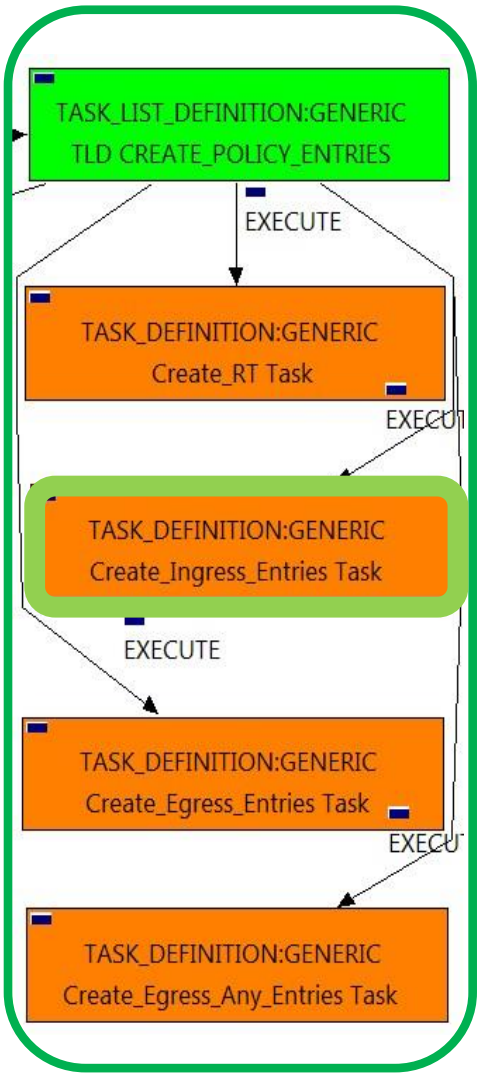


Figure 93: Creation of Ingress Entries policies.

This TD it is going to provision a INGRESSACLENTRY:TEMPLATE:DCN for each INGRESSACL:TEMPLATE:DCN, this means, the WF implied in this TLD is going to query from VNF:FW to the artifact L3DOMAIN of our Management Network , and to the INGRESSACL policy related to the L3DOMAIN artifact, in order to create the policy INGRESSACLENTRY:TEMPLATE:DCN over the policy INGRESSACL:TEMPLATE:DCN with a relationship of type DEFINE and status ENABLED.

Once finished, we will have provisioned an INGRESSACLENTRY:TEMPLATE:DCN with status INSTANTIATED and all the relationship needed for the correct behavior of the artifact, prepare to be activated when required. In this case, the relationship it is going to be created only between the INGRESSACL:TEMPLATE:DCN and the newly created INGRESSACLENTRY:TEMPLATE:, it will be a relationship of type DEFINE and Status ENABLED.

Targets of the TASK DEFINITION: ENABLED	STATUS of the TD:
GENERAL.Name ==	Create_Ingress_Entries Task
FIND.MainArtifact ==	**VNF:FW>NETWORK:GENERIC**
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	INSTANTIATED.
EXECUTE.Workflow ==	**“WF_TS_PROVISION_SDN_ZONE_ANY_INGRESSACL_ENTRY”**
EXECUTE.Inactive==	false
EXECUTE.OrderBy ==	
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
ROLLBACK.Workflow ==	**“WF_TS_PROVISION_SDN_ZONE_ANY_INGRESSACL_ENTRY_UNDO”**
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a “NETWORK:GENERIC” in Running Status INSTANTIATED in the DDBB. Once found, the WF will start the provision of the Ingress Entries policies, if the provision it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK.workflow, if our TD fails, the TD executed the rollback workflow **“**WF_TS_PROVISION_SDN_ZONE_ANY_INGRESSACL_ENTRY_UNDO”.

If the execution of the TD was successful the DATA.Lock attribute is set with the value “true”, because of this the artifact which was used in the execution will be locked.

The execution of the TLD continues with the next TLD or TD.

6.17 TLD CREATE_POLICY_ENTRIES: Create_Egress_Entries task.

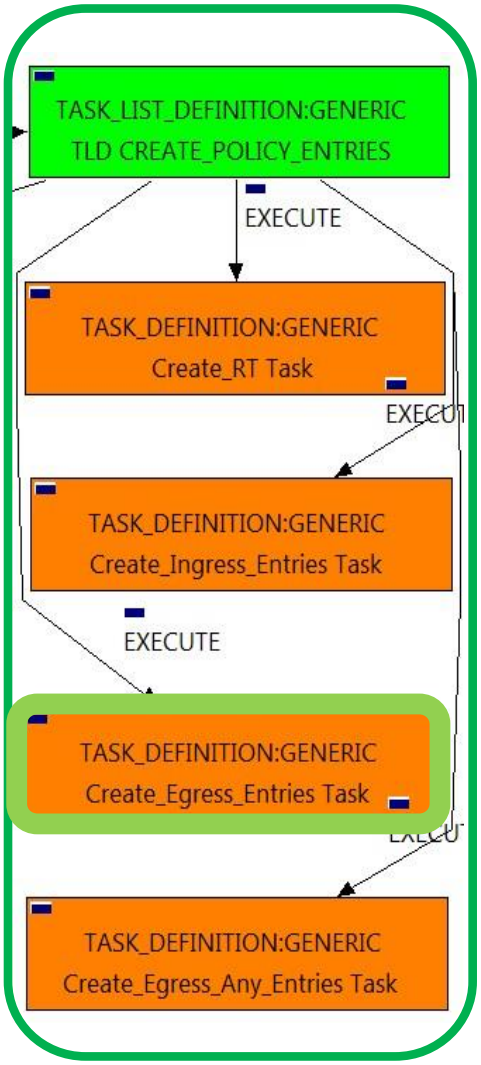


Figure 94: Creation of Egress Entries policies.

This TD it is going to provision a EGRESSACLENTRY:TEMPLATE:DCN for each EGRESSACL:TEMPLATE:DCN, this means, the WF implied in this TLD is going to query from VNF:FW to the artifact L3DOMAIN of our Management Network , and to the EGRESSACL policy related to the L3DOMAIN artifact, in order to create the policy EGRESSACLENTRY:TEMPLATE:DCN over the policy EGRESSACL:TEMPLATE:DCN with a relationship of type DEFINE and status ENABLED.

Once finished, we will have provisioned a EGRESSACLENTRY:TEMPLATE:DCN with status INSTANTIATED and all the relationship needed for the correct behavior of the artifact, prepare to be activated when required. In this case, the relationship it is going to be created only between the EGRESSACL:TEMPLATE:DCN and the newly created EGRESSACLENTRY:TEMPLATE:, it will be a relationship of type DEFINE and Status ENABLED.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	Create_Ingress_Entries Task
FIND.MainArtifact ==	**VNF:FW>NETWORK:GENERIC**
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	INSTANTIATED.
EXECUTE.Workflow ==	**“WF_TS_PROVISION_SDN_ZONE_ANY_EGRESSACL_ENTRY”**
EXECUTE.Inactive==	false
EXECUTE.OrderBy ==	
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
ROLLBACK.Workflow ==	**“WF_TS_PROVISION_SDN_ZONE_ANY_EGRESSACL_ENTRY_UNDO”**
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a “NETWORK:GENERIC” in Running Status INSTANTIATED in the DDBB. Once found, the WF will start the provision of the Ingress Entries policies, if the provision it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK.workflow, if our TD fails, the TD executed the rollback workflow **“**WF_TS_PROVISION_SDN_ZONE_ANY_INGRESSACL_ENTRY_UNDO”, but this specific case the attribute ROLLBACK.Behaviour_on_error is set with the value “STOP”, so the execution will only change the status of the artifact specified.

If the execution of the TD was successful the DATA.Lock attribute is set with the value “true”, because of this the artifact which was used in the execution will be locked.

The execution of the TLD continues with the next TLD or TD.

6.18 TLD CREATE_POLICY_ENTRIES: Create_Egress_Any_Entries task.

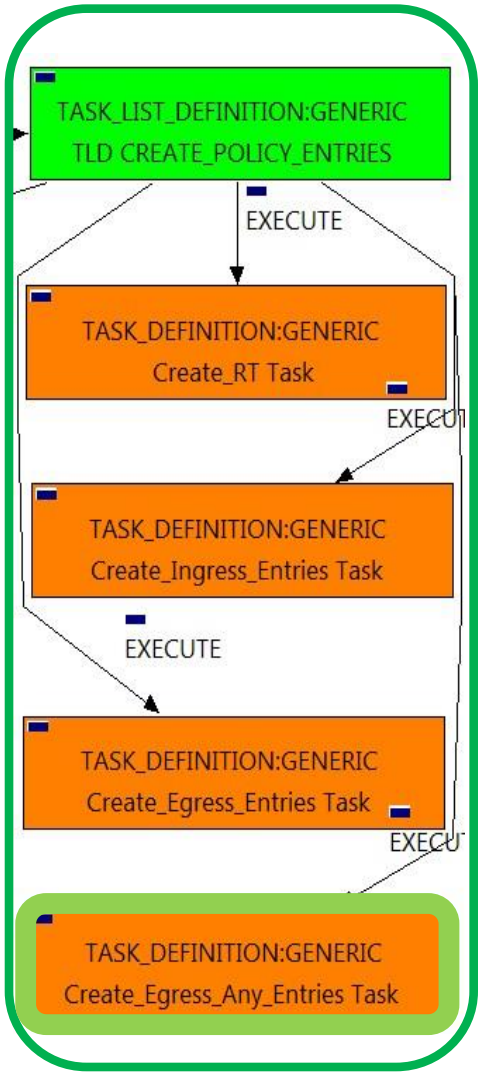


Figure 95: Creation of Egress Entry policies, Zone to Any.

This TD it is going to provision a EGRESSACLENTRY:TEMPLATE:DCN for each EGRESSACL:TEMPLATE:DCN, this means, the WF implied in this TLD is going to query from VNF:FW to the artifact L3DOMAIN of our Management Network , and to the EGRESSACL policy related to the L3DOMAIN artifact, in order to create the policy EGRESSACLENTRY:TEMPLATE:DCN over the policy EGRESSACL:TEMPLATE:DCN with a relationship of type DEFINE and status ENABLED.

Once finished, we will have provisioned a EGRESSACLENTRY:TEMPLATE:DCN with status INSTANTIATED and all the relationship needed for the correct behavior of the artifact, prepare to be activated when required. In this case, the relationship it is going to be created only between the EGRESSACL:TEMPLATE:DCN and the newly created EGRESSACLENTRY:TEMPLATE:, it will be a relationship of type DEFINE and Status ENABLED.

Targets of the TASK DEFINITION: ENABLED	STATUS of the TD:
GENERAL.Name ==	Create_Egress_Any_Entries Task
FIND.MainArtifact ==	**VNF:FW>NETWORK:GENERIC**
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	INSTANTIATED.
EXECUTE.Workflow ==	**“WF_TS_PROVISION_SDN_ZONE_ANY_EGRESSACL_ENTRY”**
EXECUTE.Inactive==	false
EXECUTE.OrderBy ==	
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
ROLLBACK.Workflow ==	**“WF_TS_PROVISION_SDN_ZONE_ANY_EGRESSACL_ENTRY_UNDO”**
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a “NETWORK:GENERIC” in Running Status INSTANTIATED in the DDBB. Once found, the WF will start the provision of the Egress policies “Zone to Any”, if the provision it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK.workflow. As is plain to see, in this case, the TD will execute in a ROLLBACK case the workflow “**WF_TS_PROVISION_SDN_ZONE_ANY_EGRESSACL_ENTRY_UNDO**”.

If the execution of the TD was successful the DATA.Lock attribute is set with the value “true”, because of this the artifact which was used in the execution will be locked.

The execution of the TLD continues with the next TLD or TD.

6.19 TLD CREATE_FORWARDING_POLICIES:Crete_FW_Entry_Policies Task

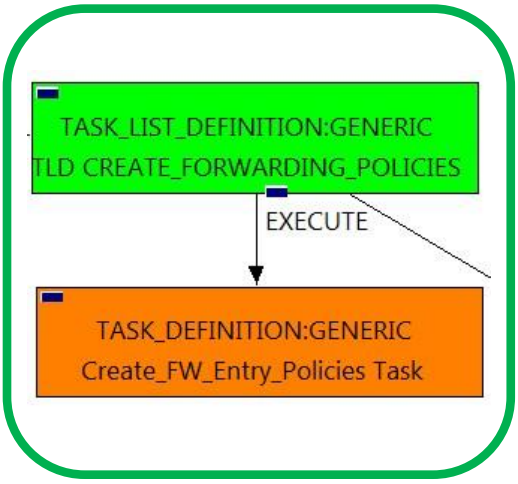


Figure 96: Creation Forwarding Entry Policies.

This TD it is going to provision a INGRESSADVFORWARDENTRY:TEMPLATE:DCN for each NETWORK on each VIRTUAL_LINK that we have in our DC, this means, the WF implied in this TLD is going to query from VNF:FW through the firewall's END_POINT to the VIRTUAL_LINK trying to reach the NETWORKS on the VL component. Once the TD has the list it is going to validate some attributes present in those Networks in order to create the policy INGRESSADVFORWARDENTRY:TEMPLATE:DCN related to policy INGRESSADVFORWARD:TEMPLATE:DCN with a relationship of type DEFINE and status ENABLED.

Also, this TD should create a relationship of type USE between the REDIRECTION_TARGET provisioned previously and each of the policies INGRESSADVFORWARDENTRY:TEMPLATE:DCN the TD has just created.

Once finished, we will have provisioned an INGRESSADVFORWARDENTRY:TEMPLATE:DCN with status INSTANTIATED and all the relationship needed for the correct behavior of the artifact, prepared to be activated when required, a relationship of type USE between our REDIRECTION_TARGET and each policy INGRESSADVFORWARDENTRY recently created, and on last place, the TD must change the relationship between the END_POINT of the VNF:FW and the VIRTUAL_LINK's END_POINT of the state "TO_BE_CONNECTED" to "CONNECTED" .

Targets of the TASK DEFINITION: ENABLED	STATUS of the TD:
GENERAL.Name ==	Create_FW_Entry_Policies Task
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	INSTANTIATED.
EXECUTE.Workflow ==	**"WF_TS_PROVISION_SDN_FWDENTRIES_POLICIES"**
EXECUTE.Inactive==	false
EXECUTE.OrderBy ==	
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek for an artifact identified by the id passed to the TD at the beginning of its execution, in this case the artifact will be a VNF:FW in Running Status INSTANTIATED in the DDBB.

Once found, the WF will start the provision of the Forwarding Entries policies, if the provision it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK.workflow. As is plain to see, in this case, the TD will not have any workflow assigned for the rollback process so the TD only is going to change the status of the artifact which was used during the execution of the TD.

If the execution of the TD was successful the DATA.Lock attribute is set with the value "true", because of this the artifact which was used in the execution will be locked.

The execution of the TLD continues with the next TLD or TD.

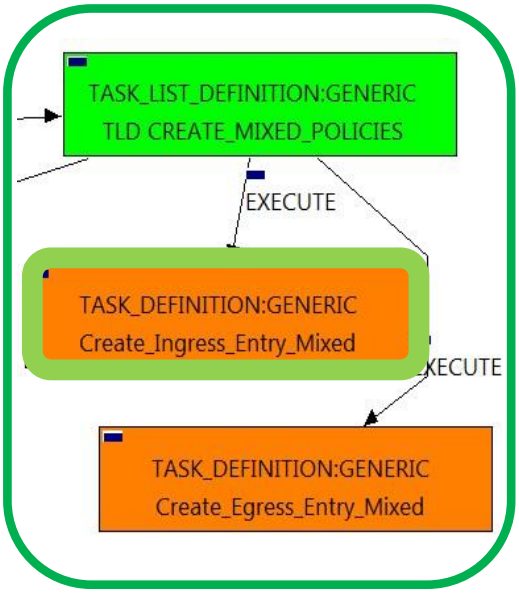


Figure 97: Creation of Ingress Entry Mixed policies.

6.20 TLD CREATE_MIXED_POLICIES : CREATE_INGRESS_ENTRY_MIXED

This TD it is going to provision a INGRESSACLENTRY:TEMPLATE:DCN for each NETWORK or SUBNETWORK on each VIRTUAL_LINK that we have in our DC,this means, the WF implied in this TLD is going to query from END_POINT:FW to the VIRTUAL_LINK trying to reach the NETWORKS on the VL component. Once the TD has the list it is going to validate some attributes present in those Networks or Subnetworks in order to create the policy INGRESSACLENTRY:TEMPLATE:DCN related to policy INGRESSACL:TEMPLATE:DCN with a relationship of type DEFINE and status ENABLED.

Once finished, we will have provisioned an INGRESSACLENTRY:TEMPLATE:DCN artifact with status INSTANTIATED for each NETWORK or SUBNETWORK(depends on the validation of the cited attributes) with all the relationship needed for the correct behavior of the artifact, prepared to be activated when required, which is a relationship of type DEFINE between each policy created and the INGRESSACL:TEMPLATE:DCN that is unique and it is acting as parent in the relationship.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	CREATE_INGRESS_ENTRY_MIXED
FIND.MainArtifact==	**VNF:FW>VNF_COMPONENT>VIRTUAL_MACHINE<FW_ENDPOINT**
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	INSTANTIATED.
EXECUTE.Workflow ==	**“WF_TS_PROVISION_SDN_INGRESSACLENTRIES_POLICIES_MIXED”**
EXECUTE.Inactive==	false
EXECUTE.OrderBy ==	
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a “FW_ENDPOINT” in Running Status INSTANTIATED in the DDBB, using the path present in the attribute FIND.MainArtifact : “**VNF:FW>VNF_COMPONENT>VIRTUAL_MACHINE<FW_ENDPOINT** “.

Once found, the WF will start the provision of the Ingress Entry Mixed policies, if the provision it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK.workflow. If the execution of the TD was successful the DATA.Lock attribute is set with the value “true”, because of this the artifact which was used in the execution will be locked once the execution has finished.

6.21 TLD CREATE_MIXED_POLICIES : CREATE_EGRESS_ENTRY_MIXED

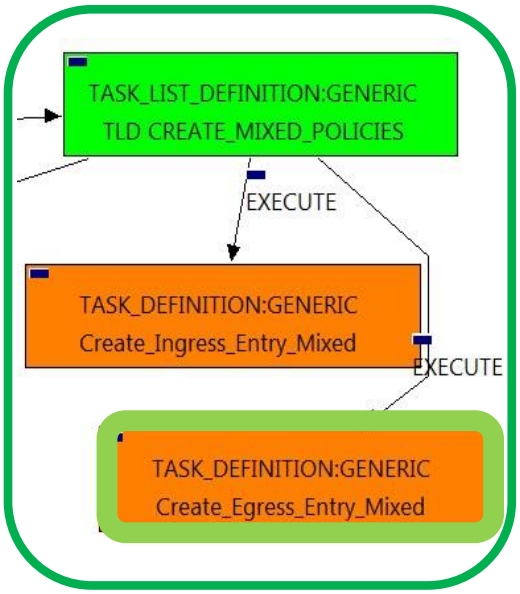


Figure 98: Creation of Egress Entry Mixed policies.

This TD it is going to provision a EGRESSACLENTRY:TEMPLATE:DCN for each NETWORK or SUBNETWORK on each VIRTUAL_LINK that we have in our DC,this means, the WF implied in this TLD is going to query from END_POINT:FW to the VIRTUAL_LINK trying to reach the NETWORKS on the VL component. Once the TD has the list it is going to validate some attributes present in those Networks or Subnetworks in order to create the policy EGRESSACLENTRY:TEMPLATE:DCN related to policy EGRESSACL:TEMPLATE:DCN with a relationship of type DEFINE and status ENABLED.

Once finished, we will have provisioned an EGRESSACLENTRY:TEMPLATE:DCN artifact with status INSTANTIATED for each NETWORK or SUBNETWORK(depends on the validation of the cited attributes) with all the relationship needed for the correct behavior of the artifact, prepared to be activated when required, which is a relationship of type DEFINE between each policy created and the EGRESSACL:TEMPLATE:DCN that is unique and it is acting as parent in the relationship.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	CREATE_EGRESS_ENTRY_MIXED
FIND.MainArtifact==	**VNF:FW>VNF_COMPONENT>VIRTUAL_MACHINE<FW_ENDPOINT**
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	INSTANTIATED.
EXECUTE.Workflow ==	**“WF_TS_PROVISION_SDN_EGRESSACLENTRIES_POLICIES_MIXED”**
EXECUTE.Inactive==	false
EXECUTE.OrderBy ==	
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a “FW_ENDPOINT” in Running Status INSTANTIATED in the DDBB, using the path present in the attribute FIND.MainArtifact : “**VNF:FW>VNF_COMPONENT>VIRTUAL_MACHINE<FW_ENDPOINT** “.

Once found, the WF will start the provision of the Egress Entry Mixed policies, if the provision it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK.workflow.

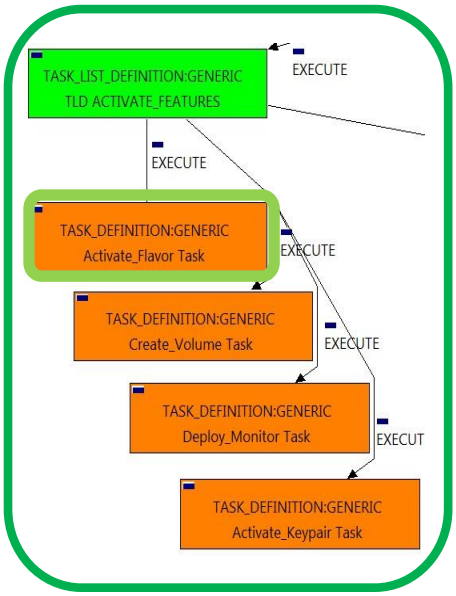


Figure 99: Activation Flavor.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "FLAVOR", this means, when this workflow finish, we will have a FLAVOR with status ACTIVE associated to the VIRTUAL_MACHINE that it is going to use it in the activation.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Activate_Flavor Task
FIND.MainArtifact==
VNF:FW>VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE<REGION>COMPUTE>FLAVOR@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
SET.Status == ACTIVE.
EXECUTE.Workflow == **"WF_TS_ACTIVATE_FLAVOR"**
EXECUTE.Inactive== false
EXECUTE.OrderBy ==
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a FLAVOR in Status INSTANTIATED in the DDBB, as from the path given by the attribute FIND.MainArtifact. Notice that we are not trying to get a VNF:FW in status INSTANTIATED. Once found, the WF will start the activation of the Flavor specified, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so once finished the TD only have changed the status of the FLAVOR specified.

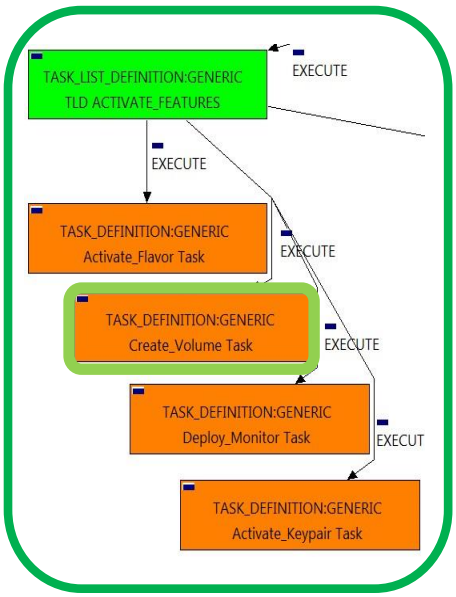


Figure 100: Creation of a Volume.

The TDs that have present in the their names “Activate”, are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a “VOLUME”, this means, when this workflow finish, we will have a VOLUME with status CREATED

Targets of the TASK DEFINITION: ENABLED	STATUS of the TD:
GENERAL.Name ==	Create_Volume Task
FIND.MainArtifact==	**VNF>VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_LUN@status=INSTANTIATED**
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	CREATED.
EXECUTE.Workflow ==	**“WF_TS_CREATE_VOLUME”**
EXECUTE.Inactive==	false
EXECUTE.OrderBy ==	
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a VIRTUAL_LUN in Status INSTANTIATED in the DDBB, usinf the path given by the attribute “FIND.MainArtifact”. Once found , the WF will start the provision of the Volume, if the provision it is successful the TD will set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK.workflow. . If the execution of the TD was successful the DATA.Lock attribute is set with the value “true”, because of this the artifact which was used in the execution will be locked once the execution has finished.

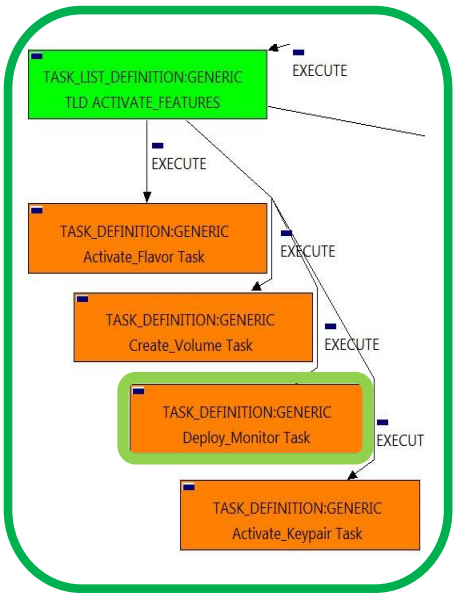


Figure 101: Deployment of a Monitor.

The TDs that have present in the their names “Deploy” are Task Definitions responsible of the deployment in the platform targeted and the updating of the status in the platform and the DDBB , these deployments are slightly different to the ones we launch for our entities, as a rule, they are small components as the MONITORs. In this case, the artifact that is going to be deployed is a “MONITOR”, this means, when this workflow finish, we will have a MONITOR deployed with status DEPLOYED.

Targets of the TASK DEFINITION: ENABLED	STATUS of the TD:
GENERAL.Name ==	Deploy_Monitor Task
FIND.MainArtifact==	MONITOR
FIND.Condition ==	status==constant:INSTANTIATED
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	DEPLOYED.
EXECUTE.Workflow ==	**“WF_TS_MONITOR_DEPLOY”**
EXECUTE.Inactive==	false
EXECUTE.OrderBy ==	
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a MONITOR in Status INSTANTIATED in the DDBB, both of the condifitons for the search are described by the attributes FIND.MainArtifact, and FIND.Condition. Once found , the WF will start the deployment, if the deployment is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a “STOP” set as behavior, so no Rollback it is going to be initiated, the only change that the execution is allowed to perform, it is the change of the status of the Monitor artifact used during the execution of the TD and Workflow. If the execution of the TD was successful the DATA.Lock attribute is set with the value “true”, because of this the artifact which was used in the execution will be locked once the execution has finished.

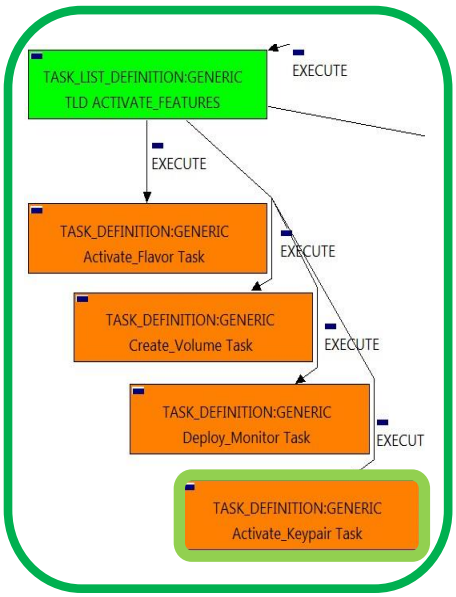


Figure 102: Activation of the Keypair.

The TDs that have present in the their names “Activate”, are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a “KEYPAIR”, this means, when this workflow finish, we will have a KEYPAIR with status ACTIVE.

Targets of the TASK DEFINITION: ENABLED	STATUS of the TD:
GENERAL.Name ==	Activate_Keypair Task
FIND.MainArtifact == **VNF>VNF_COMPONENT>VIRTUAL_MACHINE> VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE <REGION>COMPUTE>KEY_PAIR@status=INSTANTIATED**	
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	ACTIVE.
EXECUTE.Workflow ==	**“WF_TS_CREATE_KEY_PAIR”**
EXECUTE.Inactive==	false
EXECUTE.OrderBy ==	
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a KEYPAIR as from the path described by the FIND.MainArtifact attribute with value “**VNF>VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE<REGION>COMPUTE>KEY_PAIR@status=INSTANTIATED**“ in Status INSTANTIATED in the DDBB, notice that we are not trying to get a VNF in status INSTANTIATED.

Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a “STOP” set as behavior, so no Rollback it is going to be initiated, the only change that the execution is allowed to perform, it is the change of the status of the Monitor artifact used during the execution of the TD and Workflow. If the execution of the TD was successful the DATA.Lock attribute is set with the value “true”, because of this the artifact which was used in the execution will be locked once the execution has finished.

.

6.26 TLD ACTIVATE_EXTRA_SPECS: Activate Task

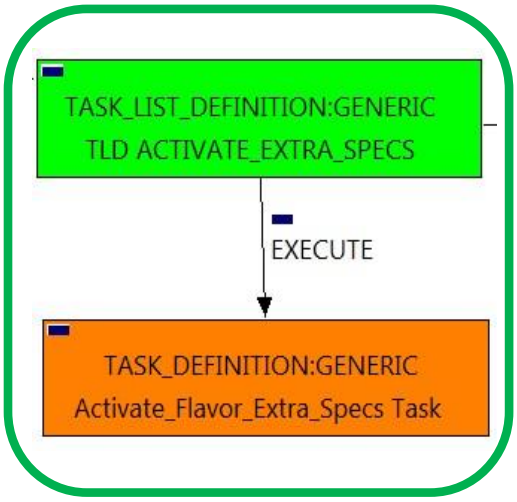


Figure 103: Activation of a Flavor with Extra Specs.

The TDs that have present in the their names “Activate”, are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a “FLAVOR” with EXTRA_SPECS, this means, when this workflow finish, we will have a FLAVOR with EXTRA_SPECS with status Active.

Targets of the TASK DEFINITION: ENABLED	STATUS of the TD:
GENERAL.Name ==	Activate_Flavor_Extra_Specs Task
FIND.MainArtifact ==	**VNF>VNF_COMPONENT>VIRTUAL_MACHINE> VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE <REGION>COMPUTE>FLAVOR>EXTRA_SPECS:HELION_CG@status=INSTANTIATED**
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	ACTIVE.
EXECUTE.Workflow ==	**“WF_TS_ACTIVATE_ATTACH_EXTRA_SPECS”**
EXECUTE.Inactive==	false
EXECUTE.OrderBy ==	
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a “HELION_CG” in Status INSTANTIATED in the DDBB. Notice that we are not trying to get a VNF in status INSTANTIATED. The query it is going to use the Path present in the category FIND.MainArtifact. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a “STOP” set as behavior, so no Rollback it is going to be initiated, only the status of the artifact which is been used in the execution will change. If the execution of the TD was successful the DATA.Lock attribute is set with the value “true”, because of this the artifact which was used in the execution will be locked once the execution has finished.

.

6.27 TLD CHANGE STATUS: Tenant_Status_Change Task

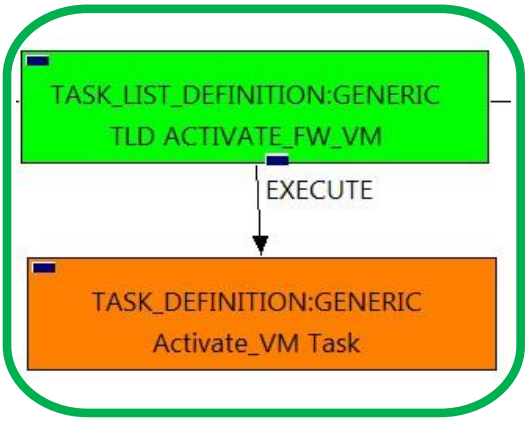


Figure 104: Activation of a Virtual Machine.

The TDs that have present in the their names “Activate”, are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a “VIRTUAL_MACHINE, this means, when this workflow finish, we will have a VIRTUAL_MACNIHE with status ACTIVE.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	Activate_VM Task
FIND.MainArtifact ==	**VNF>VNF_COMPONENT>VIRTUAL_MACHINE@status=INSTANTIATED**
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	ACTIVE.
EXECUTE.Workflow ==	**“WF_TS_ACTIVATE_VM”**
EXECUTE.Inactive==	false
EXECUTE.OrderBy ==	
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a “VIRTUAL_MACHINE” in Status INSTANTIATED in the DDBB, using the path given by the attribute FIND.MainArtifact.

Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

This TD could launch different workflows depending on the type of the VM that it is going to be activated, the main kinds of our VIRTUAL_MACHINEs are CG and HELION, and so two of the WFs that are going to be used in this activation are: “WF_TS_ACTIVATE_VM_CARRIER_GRADE” and “WF_TS_ACTIVATE_VM_HELION”.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a “STOP” set as behavior, so no Rollback it is going to be initiated, only the status of the artifact which is been used in the execution will change. If the execution of the TD was successful the DATA.Lock attribute is set with the value “true”, because of this the artifact which was used in the execution will be locked once the execution has finished.

6.28 TLD ACTIVATE_RT_POLICIES: Activate_SDN_Redirection_Target Task

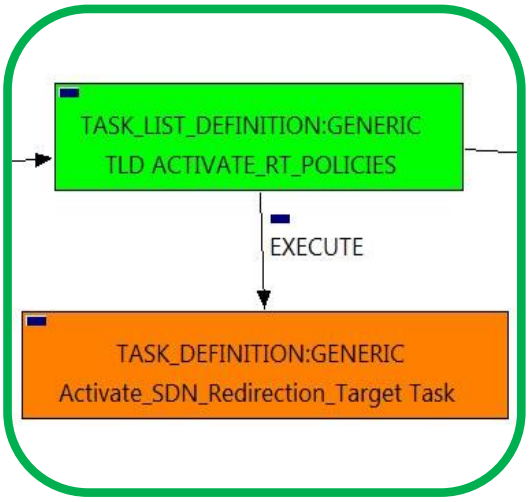


Figure 105: Activation of a Redirection Target.

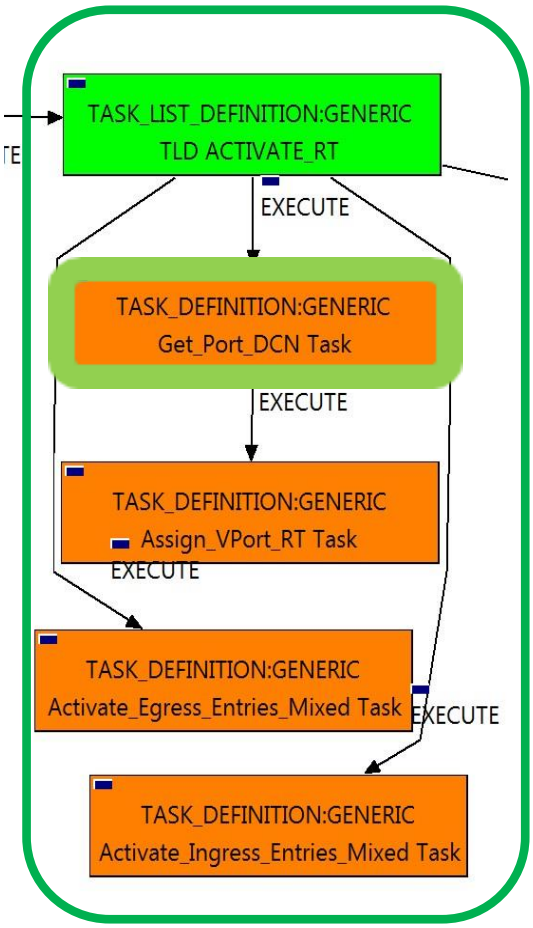
The TDs that have present in the their names “Activate”, are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a “VIRTUAL_MACHINE, this means, when this workflow finish, we will have a VIRTUAL_MACNIHE with status ACTIVE.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	Activate_SDN_Redirection_Target Task
FIND.MainArtifact ==	**VNF:FW>NETWORK:GENERIC>ZONE:TEMPLATE>ZONE:DCN <L3DOMAIN:DCN>INGRESSADVFORWARD> INGRESSADVFORWARDENTRY<REDIRECTION_TARGET@status=INSTANTIATED**
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	ACTIVE.
EXECUTE.Workflow ==	**“WF_TS_ACTIVATE_SDN_REDIRECTION_TARGET”**
EXECUTE.Inactive==	false
EXECUTE.OrderBy ==	
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a “REDIRECTION_TARGET” in Status INSTANTIATED in the DDBB. Notice that we are not trying to get a VNF:FW in status INSTANTIATED. The query it is going to use the Path present in the category FIND.MainArtifact. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a “STOP” set as behavior, so no Rollback it is going to be initiated, only the status of the artifact which is been used in the execution will change. If the execution of the TD was successful the DATA.Lock attribute is set with the value “true”, because of this the artifact which was used in the execution will be locked once the execution has finished.

6.29 TLD ACTIVATE_RT: Get_Port_DCN Task



The TDs that have present in the their names "Get", are Task Definitions responsible of the harvest of an specific artifact, attribute or element in the DDBB or in the platform targeted, in this case, the artifact that is going to be harvested is the VIRTUAL_PORT:DCN, and more specifically a set of attributes of the VIRTUAL_PORT that need to be updated in this stage of the execution, when this workflow finish, we will have the artifact VIRTUAL_PORT given updated, remaining its status ACTIVE.

Targets of the TASK DEFINITION: ENABLED	STATUS of the TD:
GENERAL.Name ==	Get_Port_DCN Task
FIND.MainArtifact == **VNF>VNF_COMPONENT>VIRTUAL_MACHINE> VIRTUAL_PORT<FW_ENDPOINT>VIRTUAL_PORT@status=ACTIVE**	
SET.Running_Status ==	ACTIVE.
SET.Status ==	ACTIVE.
EXECUTE.Workflow ==	**"WF_TS_DCN_GET_VPORT"**
EXECUTE.Inactive==	false
EXECUTE.OrderBy ==	
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

Figure 106: Getting port DCN.

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "VIRTUAL_PORT" in Status ACTIVE in the DDBB. Notice that we are not trying to get a VNF in status ACTIVE. The query it is going to use the Path present in the category FIND.MainArtifact. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, only the status of the artifact which is been used in the execution will change. If the execution of the TD was successful the DATA.Lock attribute is set with the value "true", because of this the artifact which was used in the execution will be locked once the execution has finished.

6.30 TLD ACTIVATE_RT: Assign_VPort_RT Task

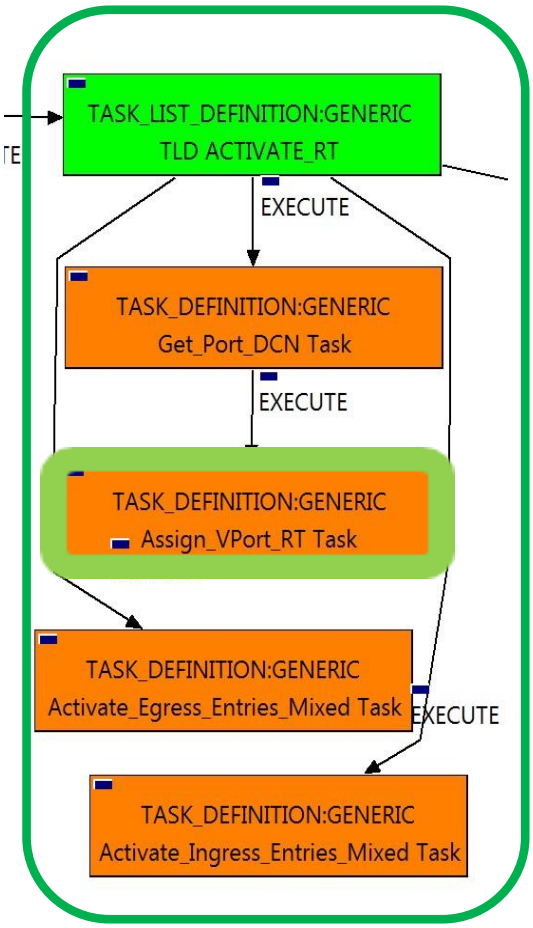


Figure 107: Assignation of Virtual Port to Redirection Target

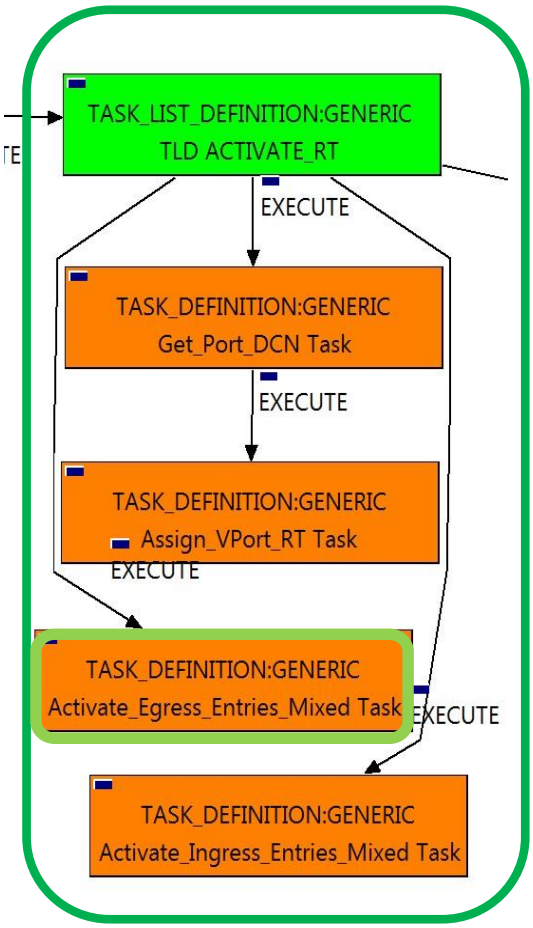
The TDs that have present in the their names “Get”, are Task Definitions responsible of the harvest of an specific artifact, attribute or element in the DDBB or in the platform targeted, in this case, the artifact that is going to be harvested is the VIRTUAL_PORT:DCN, and more specifically a set of attributes of the VIRTUAL_PORT that need to be updated in this stage of the execution, when this workflow finish, we will have the artifact VIRTUAL_PORT given updated, remaining its status ACTIVE.

Targets of the TASK DEFINITION: ENABLED	STATUS of the TD:
GENERAL.Name ==	Assign_VPort_RT Task
SET.Running_Status ==	ACTIVE.
SET.Status ==	ACTIVE.
EXECUTE.Workflow ==	**“WF_TS_ASSIGN_VPORT_RT”**
EXECUTE.Inactive==	false
EXECUTE.OrderBy ==	
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a “VIRTUAL_PORT” in Status ACTIVE in the DDBB, this port its going to be the same used in the parent TD. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a “STOP” set as behavior, so no Rollback it is going to be initiated, only the status of the artifact which is been used in the execution will change. If the execution of the TD was successful the DATA.Lock attribute is set with the value “true”, because of this the artifact which was used in the execution will be locked once the execution has finished.

6.31 TLD ACTIVATE_RT: Activate_Egress_Entries_Mixed Task



The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "EGRESSACLENTRY mixed", this means, when this workflow finish, we will have a EGRESSACLENTRY with status ACTIVE associated to the EGRESSACL policy, and finally related to the VNF:FW that it is going to be used it in the activation.

Targets of the TASK DEFINITION: ENABLED	STATUS of the TD:
GENERAL.Name ==	Activate_Egress_Entries_Mixed Task
FIND.MainArtifact ==	**VNF:FW>NETWORK:GENERIC>ZONE:TEMPLATE>ZONE:DCN <L3DOMAIN:DCN>EGRESSACL> EGRESSACLENTRY@status=INSTANTIATED**
FIND.Condition ==	**ACLENTRY.NetworkType==ACLENTRY.LocationType && ACLENTRY.NetworkID!=ACLENTRY.LocationID**
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	ACTIVE.
EXECUTE.Workflow ==	**"WF_TS_ACTIVATE_SDN_EGRESSACLENTRY_POLICY"**
EXECUTE.Inactive==	false
EXECUTE.OrderBy ==	
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

Figure 108: Activation of an Egress Entry Mixed policies.

The Workflow present in EXECUTE.Workflow attribute it is going to seek an EGRESSACLENTRY that match the FIND.Condition attribute with value: "ACLENTRY.NetworkType==ACLENTRY.LocationType &&ACLENTRY.NetworkID!=ACLENTRY.LocationID ",in Status INSTANTIATED in the DDBB, notice that we are not trying to get a VNF:FW in status INSTANTIATED.

The TD it is going to use the Path present in the category FIND.MainArtifact, "VNF:FW>NETWORK:GENERIC>ZONE:TEMPLATE>ZONE:DCN<L3DOMAIN:DCN>EGRESSACL>EGRESSACLENTRY@status=INSTANTIATED".

Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, only the status of the artifact which is been used in the execution will change. If the execution of the TD was successful the DATA.Lock attribute is set with the value "true", because of this the artifact which was used in the execution will be locked once the execution has finished.

6.32 TLD ACTIVATE_RT: Activate_Ingress_Entries_Mixed Task

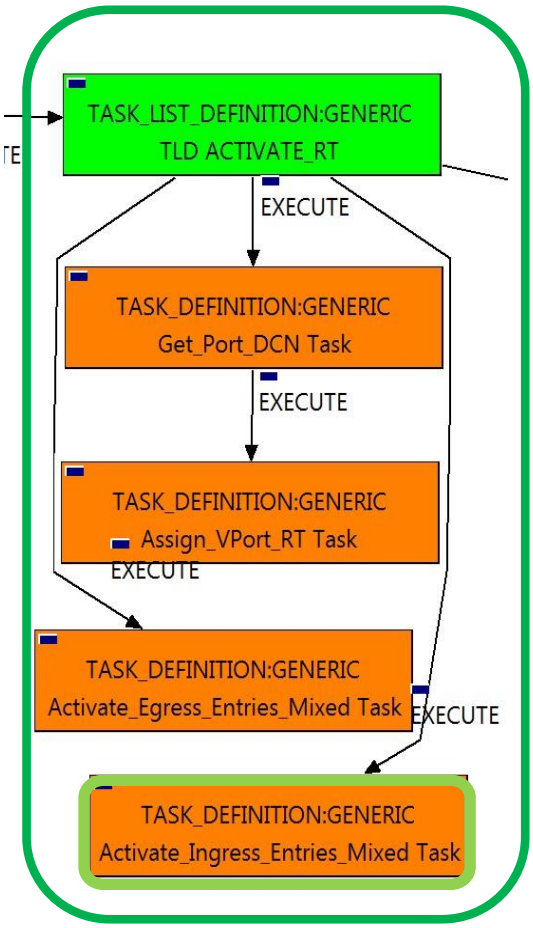


Figure 109: Activation of an Ingress Entry Mixed policies.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "INGRESSACLENTRY mixed", this means, when this workflow finish, we will have a INGRESSACLENTRY with status ACTIVE associated to the INGRESSACL policy, and finally related to the VNF:FW that it is going to be used it in the activation.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	Activate_Ingress_Entries Task
FIND.MainArtifact ==	**VNF:FW>NETWORK:GENERIC>ZONE:TEMPLATE>ZONE:DCN <L3DOMAIN:DCN>INGRESSACL> INGRESSACLENTRY@status=INSTANTIATED**
FIND.Condition ==	**ACLENTRY.NetworkType==ACLENTRY.LocationType && ACLENTRY.NetworkID!=ACLENTRY.LocationID**
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	ACTIVE.
EXECUTE.Workflow ==	**"WF_TS_ACTIVATE_SDN_INGRESSACLENTRY_POLICY"**
EXECUTE.Inactive==	false
EXECUTE.OrderBy ==	
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek an INGRESSACLENTRY that match the FIND.Condition attribute with value: "ACLENTRY.NetworkType==ACLENTRY.LocationType &&ACLENTRY.NetworkID!=ACLENTRY.LocationID ",in Status INSTANTIATED in the DDBB, notice that we are not trying to get a VNF:FW in status INSTANTIATED.

The TD it is going to use the Path present in the category FIND.MainArtifact, "VNF:FW>NETWORK:GENERIC>ZONE:TEMPLATE>ZONE:DCN<L3DOMAIN:DCN>INGRESSACL>INGRESSACLENTRY@status=INSTANTIATED".

Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, only the status of the artifact which is been used in the execution will change. If the execution of the TD was successful the DATA.Lock attribute is set with the value "true", because of this the artifact which was used in the execution will be locked once the execution has finished.

6.33 TLD ACTIVATE_POLICY_ENTRIES: Activate_SDN_Ingress_Forwarding_Entry Task

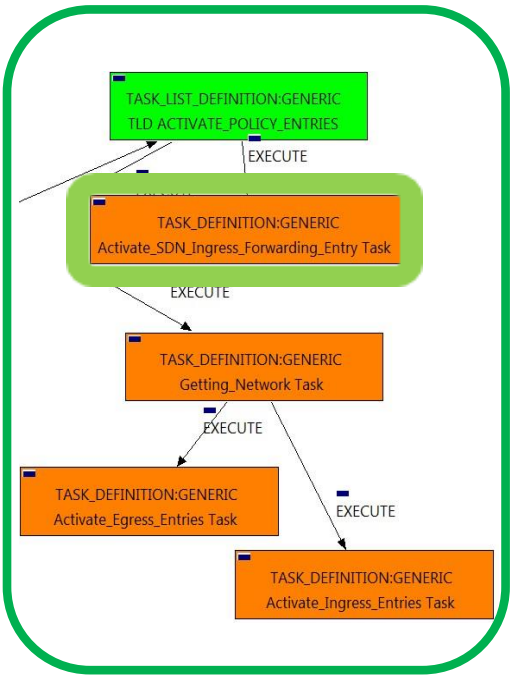


Figure 110: Activation of Ingress Forwarding Entry policy.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "INGRESSADVFORWARDENTRY" linked to our REDIRECTION_TARGET artifact, this means, when this workflow finish, we will have a INGRESSADVFORWARDENTRY with status ACTIVE associated to the INGRESSADVFORWARD policy, and finally related to the VNF:FW that it is going to be used it in the activation.

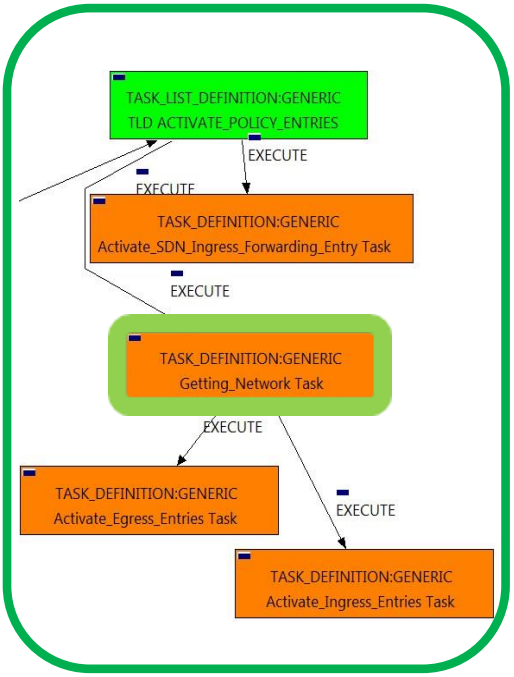
Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name ==
Activate_SDN_Ingress_Forwarding_Entry Task
FIND.MainArtifact ==
VNF:FW>NETWORK:GENERIC>ZONE:TEMPLATE>ZONE:DCN <L3DOMAIN:DCN>INGRESSADVFORWARD> INGRESSADVFORWARDENTRY@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_ACTIVATE_SDN_INGRESS_ADVANCED_FORWARDING_ENTRY"
EXECUTE.Inactive== false
EXECUTE.OrderBy ==
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "INGRESSADVFORWARDENTRY" in Status INSTANTIATED in the DDBB. Notice that we are not trying to get a VNF:FW in status INSTANTIATED. The query it is going to use the Path present in the category FIND.Path. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, only the status of the artifact which is been used in the execution will change. If the execution of the TD was successful the DATA.Lock attribute is set with the value "true", because of this the artifact which was used in the execution will be locked once the execution has finished.

6.34 TLD ACTIVATE_POLICY_ENTRIES: Getting Network Task



This TD it is going to assure the selection of the correct artifact that later on will be used by the workflow executed. Once finished, we will have assured that all the policies of types INGRESSACLENTRY and EGRESSACLENTRY are prepared to be activated when required.

Targets of the TASK DEFINITION: ENABLED	STATUS of the TD:
GENERAL.Name ==	Getting_Network Task
FIND.MainArtifact ==	**VNF:FW>NETWORK:GENERIC@status=INSTANTIATED**
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	INSTANTIATED
EXECUTE.Workflow ==	
EXECUTE.Inactive==	false
EXECUTE.OrderBy ==	
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

Figure 111: Getting Network for activation of policies.

The Workflow present in EXECUTE.Workflow attribute it is going to Seek a "NETWORK:GENERIC" in Status INSTANTIATED in the DDBB. Notice that we are not trying to get a VNF:FW in status INSTANTIATED. The query it is going to use the Path present in the category FIND.Path. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, only the status of the artifact which is been used in the execution will change. If the execution of the TD was successful the DATA.Lock attribute is set with the value "true", because of this the artifact which was used in the execution will be locked once the execution has finished.

6.35 TLD ACTIVATE_POLICY_ENTRIES: Getting Network Task

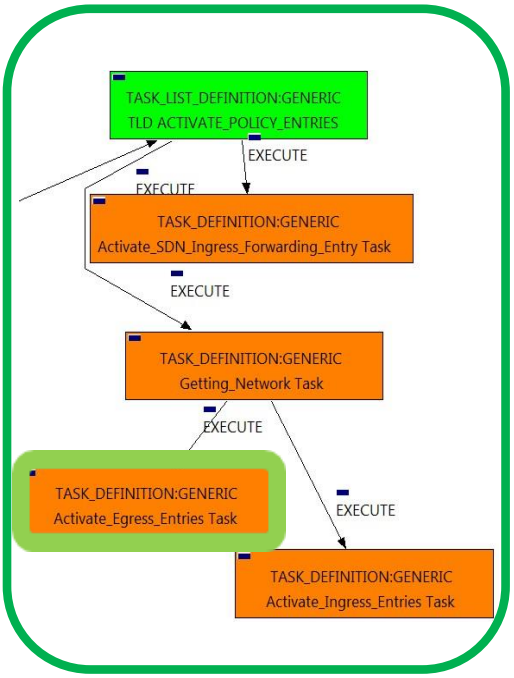


Figure 112: Activation of Egress Entries policies.

The TDs that have present in the their names “Activate”, are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a “EGRESSACLENTRY”, this means, when this workflow finish, we will have a EGRESSACLENTRY with status ACTIVE associated to the EGRESSACL policy, and finally related to the VNF:FW that it is going to be used it in the activation.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	Activate_Egress_Entries Task
FIND.Condition ==	**GENERAL.Name==EGRESSACL_%GENERAL.Name%_ANY|| GENERAL.Name==EGRESSACL_ANY_%GENERAL.Name%**
FIND.Path ==	**NETWORK:GENERIC>ZONE:TEMPLATE>ZONE:DCN <L3DOMAIN:DCN>EGRESSACL> EGRESSACLENTRY@status=INSTANTIATED**
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	ACTIVE
EXECUTE.Workflow ==	**“WF_TS_ACTIVATE_SDN_EGRESSACLENTRY_POLICY”**
EXECUTE.Inactive==	false
EXECUTE.OrderBy ==	
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek an EGRESSACLENTRY that match the FIND.Condition attribute with value:

GENERAL.Name==EGRESSACL_%GENERAL.Name%_ANY||
GENERAL.Name==EGRESSACL_ANY_%GENERAL.Name%

, in Status ACTIVE in the DDBB, notice that we are not trying to get a NETWORK:GENERIC in status ACTIVE.

The query it is going to use the Path present in the category FIND.Path,

NETWORK:GENERIC>ZONE:TEMPLATE>ZONE:DCN<L3DOMAIN:DCN>EGRESSACL>
EGRESSACLENTRY@status=INSTANTIATED

Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a “STOP” set as behavior, so no Rollback it is going to be initiated, only the status of the artifact which is been used in the execution will change. If the execution of the TD was successful the DATA.Lock attribute is set with the value “true”, because of this the artifact which was used in the execution will be locked once the execution has finished.

6.36 TLD ACTIVATE_POLICY_ENTRIES: Getting Network Task

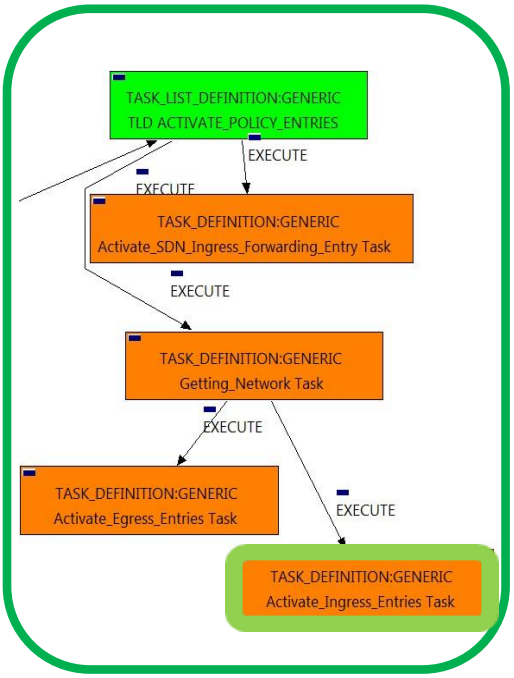


Figure 113: Activation of Ingress Entries policy.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "INGRESSACLENTRY", this means, when this workflow finish, we will have a INGRESSACLENTRY with status ACTIVE associated to the INGRESSACL policy, and finally related to the VNF:FW that it is going to be used it in the activation.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	Activate_Egress_Entries Task
FIND.Condition ==	**GENERAL.Name==INGRESSACL_%GENERAL.Name%_ANY|| GENERAL.Name==INGRESSACL_ANY_%GENERAL.Name%**
FIND.Path ==	**NETWORK:GENERIC>ZONE:TEMPLATE>ZONE:DCN <L3DOMAIN:DCN>INGRESSACL> INGRESSACLENTRY@status=INSTANTIATED**
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	ACTIVE
EXECUTE.Workflow ==	**"WF_TS_ACTIVATE_SDN_INGRESSACLENTRY_POLICY"**
EXECUTE.Inactive==	false
EXECUTE.OrderBy ==	
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek an INGRESSACLENTRY that match the FIND.Condition attribute with value:

GENERAL.Name==INGRESSACL_%GENERAL.Name%_ANY||
GENERAL.Name==INGRESSACL_ANY_%GENERAL.Name%

, in Status ACTIVE in the DDBB, notice that we are not trying to get a NETWORK:GENERIC in status ACTIVE.

The query it is going to use the Path present in the category FIND.Path,

NETWORK:GENERIC>ZONE:TEMPLATE>ZONE:DCN<L3DOMAIN:DCN>INGRESSACL>
INGRESSACLENTRY@status=INSTANTIATED

Once found, the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, only the status of the artifact which is been used in the execution will change. If the execution of the TD was successful the DATA.Lock attribute is set with the value "true", because of this the artifact which was used in the execution will be locked once the execution has finished.

6.37 TLD START MONITORS: Start_Monitor Task

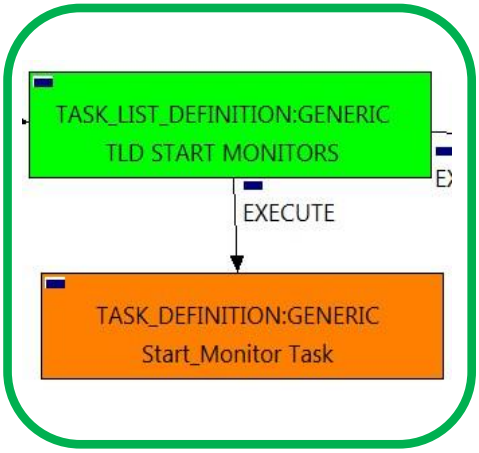


Figure 114: Start of a Monitor.

The TDs that have present in the their names "Start" are Task Definitions responsible of the launching of the component in the platform targeted and the updating of the status in the platform and the DDBB , these deployments are slightly different to the ones we launch for our entities, as a rule, they are small components as the MONITORs. In this case, the artifact that is going to be deployed is a "MONITOR", this means, when this workflow finish, we will have a MONITOR deployed with status STARTED ready to monitories.

Targets of the TASK DEFINITION: ENABLED	STATUS of the TD:
GENERAL.Name ==	Start_Monitor Task
FIND.MainArtifact ==	MONITOR
FIND.Condition ==	**status==constant:DEPLOYED**
SET.Running_Status ==	DEPLOYED.
SET.Status ==	STARTED.
EXECUTE.Workflow ==	**"WF_TS_MONITOR_START"**
EXECUTE.Inactive==	false
EXECUTE.OrderBy ==	
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a MONITOR with Status DEPLOYED.

Once found , the WF will start the MONITOR, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, only the status of the artifact which is been used in the execution will change. If the execution of the TD was successful the DATA.Lock attribute is set with the value "true", because of this the artifact which was used in the execution will be locked once the execution has finished.

6.38 TLD VNF STATUS CHANGE: VNF_FW_Status_Change Task

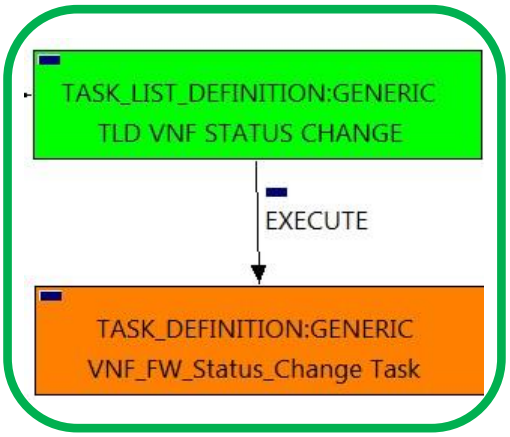


Figure 115: VNF:FW Change of the status.

The TDs that have present in their names “Status Change”, are Task Definitions responsible of the change in the status of the entity associated, in this case a VNF:FW. When the WF has finished we will have an VNF:FW with status ACTIVE in case of successful execution, or status ERROR in case of error, or simply not any change in the status because a ROLLBACK during the execution.

Targets of the TASK DEFINITION: ENABLED	STATUS of the TD:
GENERAL.Name ==	VNF_FW_Status_Change Task
FIND.Condition ==	**status==constant:INSTANTIATED**
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	ACTIVE.
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The TASK_DEFINITION do not execute any workflow, with the attributes present in the categories it is enough to change the status of the entity.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a “STOP” set as behavior, so no Rollback it is going to be initiated, only the status of the artifact which is been used in the execution will change. If the execution of the TD was successful the DATA.Lock attribute is set with the value “true”, because of this the artifact which was used in the execution will be locked once the execution has finished.

Chapter 7 Scale Down of a VNF - Default.

From now on, and to make easier the understanding of the TLDs, we are going to explain the functionality of each set of TASK_LIST_DEFINITION:GENERIC, and the number of TASK_DEFINITION:GENERIC children of the previously mentioned TASK_LIST_DEFINITION:GENERIC.

Basically, the TASK_LIST_DEFINITION:GENERIC connect what we can consider “units of execution”, those are the TASK_DEFINITION:GENERIC, that have a WORKFLOW assigned to be executed when the execution of the TLD reach them.

If you like to have a more deep knowledge about the workflows mentioned through this document please refer to the specific document.

**

If in the category FIND, the attribute Path is present, the attribute FIND.ArtifactType will be the starting artifact for the Path, but the FIND.Status attribute refers to the last artifact on the Path.

FIND.ArtifactType == VIRTUAL_MACHINE
FIND.Status== INSTANTIATED
FIND.Path ==
VIRTUAL_MACHINE>VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE<REGION>COMPUTE>FLAVOR

In this example, we are looking for a FLAVOR in status INSTANTIATED, we do not expect to get a VIRTUAL_MACHINE, in status INSTANTIATED.

**

If during the use of the TLDs, the “Regenerate UUIDs” option is used, the user should check the Id of the tree that brings all the elements of the TLD, this “id” is specific and it will be the same for all the tree groups in all the TLDs.

**

The two modes available are “Default” and “Simulated”, the second one is only available if it is configured previously, by defect, and the mode that will be used is “Default”.

7.1 Specific Elements of the TLD Scale Down of a VNF.

In this chapter the different elements of the specific TLD will be explained conscientiously.

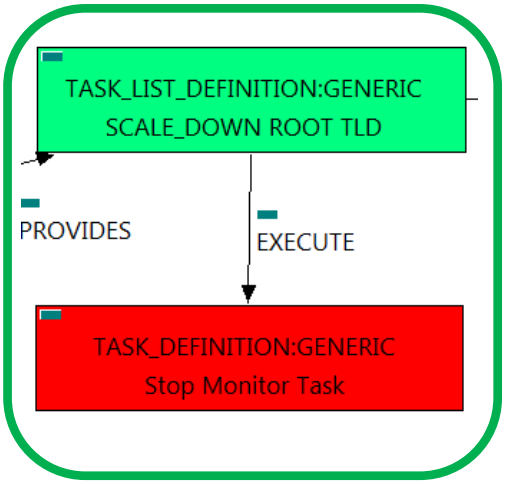


Figure 116 Stopping Monitor Task.

7.2 SCALE_DOWN ROOT TLD: Quota Assignment Task.

The TDs that have present in the their names "Stop", are Task Definitions responsible of the stopping of an specific artifact or element, in this case of the MONITORs, the TLD it is going to stop the MONITOR element given.

Once finished, our VNF should have the MONITOR given in status DEPLOYED, having taken in consideration all the rules for the stopping.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Stop_Monitor Task
FIND.MainArtifact == MONITOR.
FIND.Condition== status==constant:STARTED
SET.Running_Status == STARTED.
SET.Status == STOPPED.
EXECUTE.Workflow == **"WF_TS_MONITOR_STOP"**
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Status == **STARTED**
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow == **"WF_TS_MONITOR_START"**
DATA.Lock == true

The Workflow present in EXECUTE.Workflow it is going to seek a MONITOR in Status STARTED in the DDBB, when the WF find it, it will start. This workflow stop the given MONITOR needed by the VNF to get a successful Undeploy.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, in this case, the workflow that will be executed is "WF_TS_MONITOR_START", this Wf will re-initiate the monitor that the TD was trying to stop.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be locked.

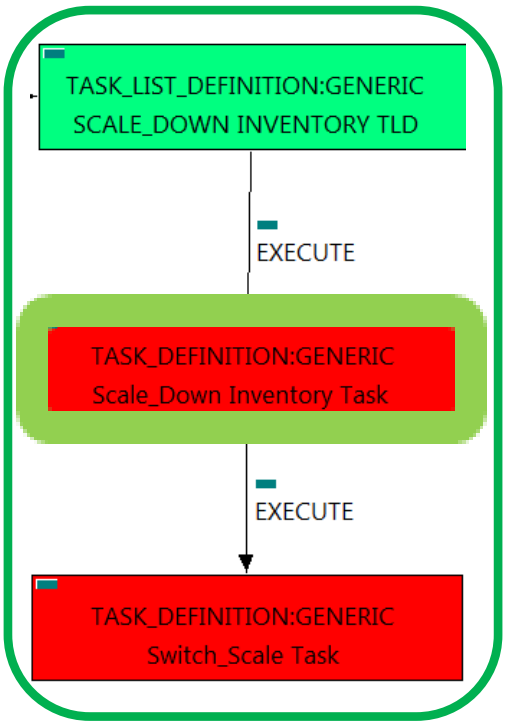


Figure 117 Checking inventory for the scale down.

This TD is the responsible to list and harvest all the artifacts and relationships of the Virtual Machine that is going to be escalated down, the main workflow will check the scale policies of the entity and apply the actions that these policies dictates, inside this TD another workflow will be thrown," WF_NFVD_INSTANCE_VALIDATION", it will be the responsible of the creation of the validation of the new instances related to the memory or core that are going to be enhanced in the Virtual Machine.

Once finished, our Scale down will be validated the new values of the memory or the core of the Virtual Machine.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Scale_Down Inventory Task
FIND.MainArtifact == **VNF>VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_MEMORY> POLICY:ENTITY_SCALE@status=INSTANTIATED, VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_MEMORY> POLICY:ENTITY_SCALE@status=INSTANTIATED, VIRTUAL_MACHINE>VIRTUAL_MEMORY> POLICY:ENTITY_SCALE@status=INSTANTIATED, VIRTUAL_MEMORY> POLICY:ENTITY_SCALE@status=INSTANTIATED, VIRTUAL_CORE>POLICY:ENTITY_SCALE@status=INSTANTIATED**
SET.Status == INSTANTIATED.
EXECUTE.Workflow == **"WF_NFVD_SCALE_DOWN_INVENTORY"**
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
ROLLBACK.Status == ACTIVE
ROLLBACK.Workflow == **"WF_NFVD_SCALE_UP_INVENTORY"**
DATA.Lock == true

The Workflow present in EXECUTE.Workflow it is going to seek a POLICY:ENTITY_SCALE in Status INSTANTIATED in the DDBB, when the WF find it, it will start. This workflow assign all the resources needed by the VNF to get a successful Scale Down, it will check the available resources and decide which one should be assigned. The workflow responsible of this task is "" WF_NFVD_INSTANCE_VALIDATION", if its execution end successfully the TD has validated each element necessary.

In case of error during the execution, the workflow jump to the ROLLBACK category, if the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. In this case, the TLD has assigned a rollback workflow, "WF_NFVD_SCALE_DOWN_INVENTORY", it is plain to see that the rollback workflow is the opposite operation of the Scale Down, in this way, in case of error the execution will recover the initial state of the scenario.

Due to that the value of the attribute DATA.Lock is true, once the TD has finished, the artifact recently assigned, will be blocked.

7.4 SCALE_DOWN INVENTORY TLD: Switch_Scale Task.

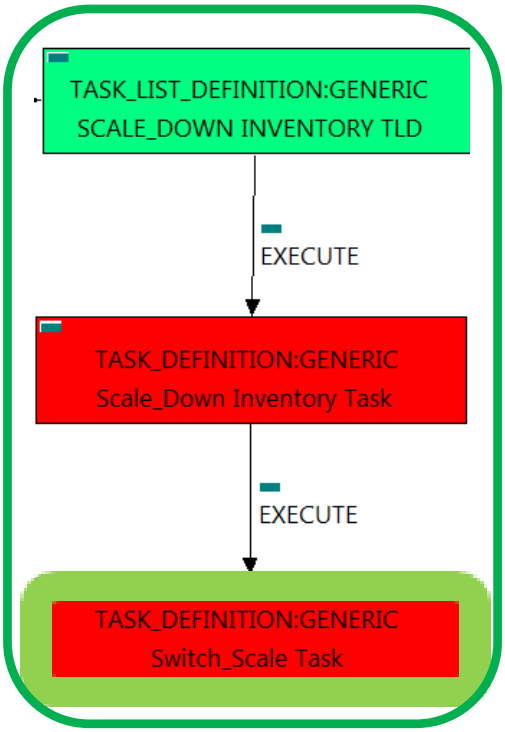


Figure 118 Switching scales type UP/DOWN.

Once the Scale Down process is validated this TD will recheck the escalation policies to manage the number and target of each policy related to each VNF's virtual machines, it will designate which entity is suited for each type of scale operation.

Targets of the TASK DEFINITION: ENABLED	STATUS of the TD:
GENERAL.Name ==	Scale_Down Inventory Task
FIND.MainArtifact == **POLICY<VIRTUAL_MEMORY< VIRTUAL_MACHINE@status=ACTIVE, POLICY<VIRTUAL_CORE< VIRTUAL_MACHINE@status=ACTIVE**	
EXECUTE.Workflow ==	**"WF_TS_SWITCH_SCALE"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	ROLLBACK
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow is going to seek a VIRTUAL_MACHINE in Status ACTIVE in the DDBB, when the WF find it, it will start. This workflow will execute the correct escalation operation over the adequate Virtual Machine of the VNF, once finished the escalation of the Core or of the Memory the VM will have a different value of these attributes depending in the configuration of the policy applied.

In case of error during the execution, the workflow jump to the ROLLBACK category, if the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. In this case, the TLD has not assigned a rollback workflow, in case of error the execution will stop in this step.

Due to that the value of the attribute DATA.Lock is true, once the TD has finished, the artifact recently assigned, will be blocked.

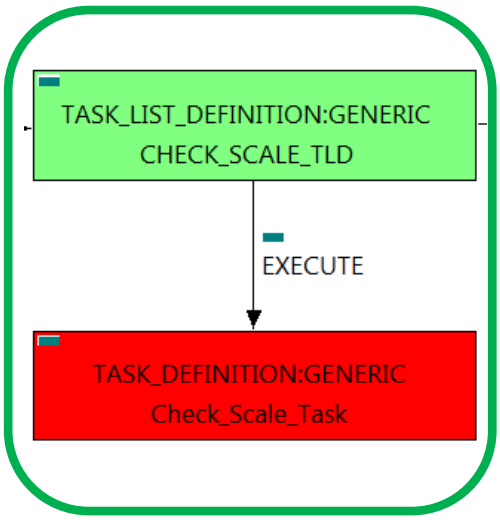


Figure 119 Last check of the escalation operations.

Once the Scale Out process is validated this TD will get the type of Scale for each Virtual Machine, these TD is the last checking necessary before the escalation over the specific component of the element take place, this means the modification of the number of cores or its size, or the modification of the virtual machine's memory.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	Check Scale Task
FIND.MainArtifact ==	**VNF, VNF_COMPONENT<VNF, VIRTUAL_MACHINE<VNF_COMPONENT<VNF, VIRTUAL_MEMORY<VIRTUAL_MACHINE<VNF_COMPONENT<VNF VIRTUAL_CORE<VIRTUAL_MACHINE<VNF_COMPONENT<VNF**
EXECUTE.Workflow ==	**"WF_TS_CHECK_SCALE_UPDOWN"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	ROLLBACK
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow it is going to seek a VNF in the DDBB and it will check all its Virtual Machines, looking for the operation to be applied, this workflow only checks the type of the escalation operation, also is the last checking of the operation before it take place.

In case of error during the execution, the workflow jump to the ROLLBACK category, if the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. If an error take place in this TD, no action will be taken, the execution of the TLD will try to start a rollback workflow but there is not a workflow to be executed in the attribute ROLLBACK.Workflow, so the execution will stop launching an error.

Due to that the value of the attribute DATA.Lock is true, once the TD has finished, the artifact recently created, will be blocked.

.

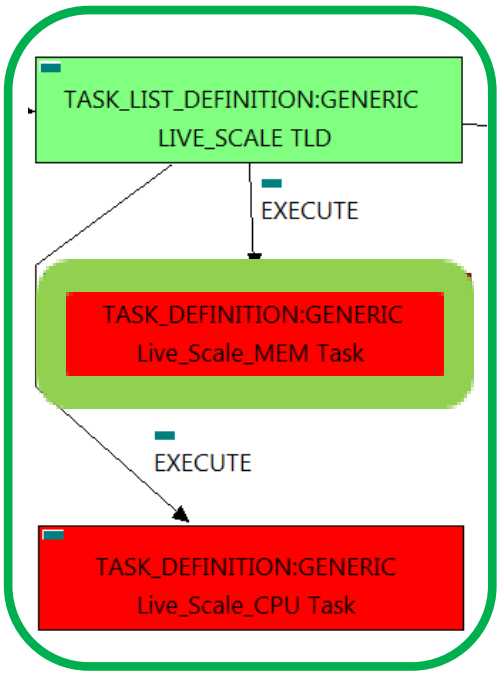


Figure 120 Applying escalation policy over the Virtual Machine's memory.

In this TD the operation of escalation is going to take place, in previous TD the execution has checked the type of escalation operation (UP/DOWN) to apply, also the execution has validated the viability of the escalation, so this TD will check the Virtual Machine and parent artifacts and it will develop a live escalation of the Virtual Machine's memory.

Targets of the TASK DEFINITION: STATUS of the TD:
ENABLED

GENERAL.Name == Live Scale Memory
FIND.MainArtifact ==
VNF>VNF_COMPONENT>
VIRTUAL_MACHINE@status=ACTIVE#SCALE.Info=Live_Memory,
VNF_COMPONENT>
VIRTUAL_MACHINE@status=ACTIVE#SCALE.Info=Live_Memory,
VIRTUAL_MACHINE@status=ACTIVE#SCALE.Info=Live_Memory,
VIRTUAL_MEMORY<
VIRTUAL_MACHINE@status=ACTIVE#SCALE.Info=Live_Memory,
VIRTUAL_CORE<
VIRTUAL_MACHINE@status=ACTIVE#SCALE.Info=Live_Memory
SET.Running_Status == ACTIVE.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_LIVE_SCALE"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
ROLLBACK.Status == ACTIVE
DATA.Lock == true

The Workflow present in EXECUTE.Workflow it is going to seek a VIRTUAL_MACHINE with Running_Status ACTIVE in the DDBB, if the WF find some artifact that fill all the conditions, it will start, notice that the execution of this TD will not change the status of the Virtual Machine, nor the VNF.

In case of error during the execution, the workflow jump to the ROLLBACK category, if the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. If an error take place in this TD, no action will be taken, the execution of the TLD will try to start a rollback workflow but there is not a workflow to be executed in the attribute ROLLBACK.Workflow, so the execution will continue without error.

Due to that the value of the attribute DATA.Lock is true, once the TD has finished, the artifact recently created, will be blocked.

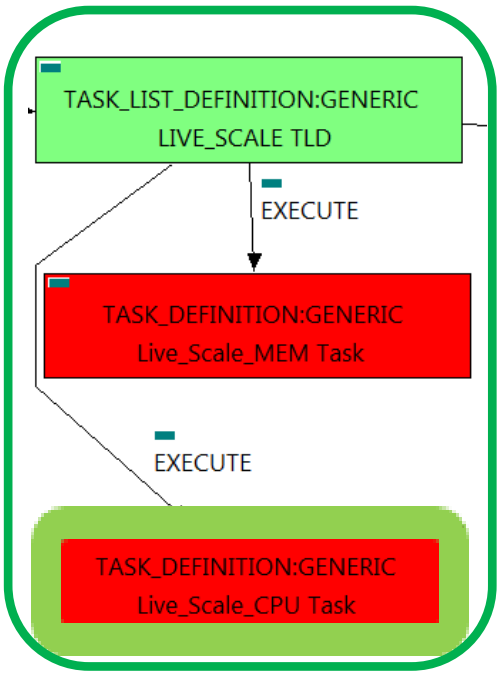


Figure 121 Applying escalation policy over the Virtual Machine's core.

In this TD the operation of escalation is going to take place, in previous TD the execution has checked the type of escalation operation (UP/DOWN) to apply, also the execution has validated the viability of the escalation, so this TD will check the Virtual Machine and parent artifacts and it will develop a live escalation of theVirtual Machine's core.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Live Scale CPU
FIND.MainArtifact ==
VNF>VNF_COMPONENT>
VIRTUAL_MACHINE@status=ACTIVE#SCALE.Info=Live_CPU,
VNF_COMPONENT>
VIRTUAL_MACHINE@status=ACTIVE#SCALE.Info=Live_CPU,
VIRTUAL_MACHINE@status=ACTIVE#SCALE.Info=Live_CPU,
VIRTUAL_MEMORY<
VIRTUAL_MACHINE@status=ACTIVE#SCALE.Info=Live_CPU,
VIRTUAL_CORE<
VIRTUAL_MACHINE@status=ACTIVE#SCALE.Info=Live_CPU
SET.Running_Status == ACTIVE.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_LIVE_SCALE"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
ROLLBACK.Status == ACTIVE
DATA.Lock == true

The Workflow present in EXECUTE.Workflow it is going to seek a VIRTUAL_MACHINE with Running_Status ACTIVE in the DDBB, if the WF find some artifact that fill all the conditions, it will start, notice that the execution of this TD will not change the status of the Virtual Machine, nor the VNF.

In case of error during the execution, the workflow jump to the ROLLBACK category, if the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. If an error take place in this TD, no action will be taken, the execution of the TLD will try to start a rollback workflow but there is not a workflow to be executed in the attribute ROLLBACK.Workflow, so the execution will continue without error.

Due to that the value of the attribute DATA.Lock is true, once the TD has finished, the artifact recently created, will be blocked.

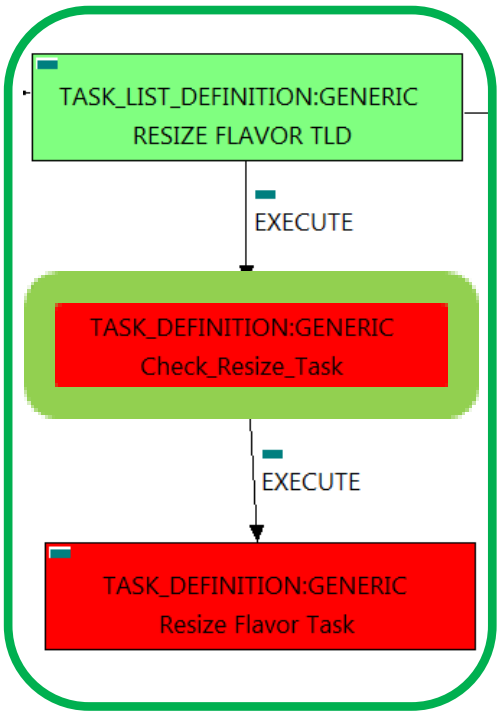


Figure 122 Checking the changes on the VM in order to create a new flavor for it.

7.8 RESIZE FLAVOR TLD: Check_Resize_Task

In this TD the execution will check for the changes in the size of the memory and core of a specific Virtual Machine, this means that the execution is going to detect the changes and if it is necessary will store the data necessary to configure in the next TD the new flavor that will match the Virtual Machine with the modifications after the escalation operation performed.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	Check_resize Task
FIND.MainArtifact ==	**VNF>VNF_COMPONENT> VIRTUAL_MACHINE#SCALE.Info=Resize, VNF_COMPONENT>VIRTUAL_MACHINE#SCALE.Info=Resize, VIRTUAL_MACHINE#SCALE.Info=Resize, VIRTUAL_MEMORY<VIRTUAL_MACHINE#SCALE.Info=Resize, VIRTUAL_CORE<VIRTUAL_MACHINE#SCALE.Info=Resize**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	ROLLBACK
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	false

The Workflow present in EXECUTE.Workflow it is going to seek a VIRTUAL_MACHINE with Running_Status ACTIVE in the DDBB, if the WF find some artifact that fill all the conditions, it will start, notice that the execution of this TD will not change the status of the Virtual Machine, nor the VNF.

In case of error during the execution, the workflow jump to the ROLLBACK category, if the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. If an error take place in this TD, no action will be taken, the execution of the TLD will try to start a rollback workflow but there is not a workflow to be executed in the attribute ROLLBACK.Workflow, so the execution will continue without error.

Due to that the value of the attribute DATA.Lock is false, once the TD has finished, the artifact recently created, will remain unlocked.

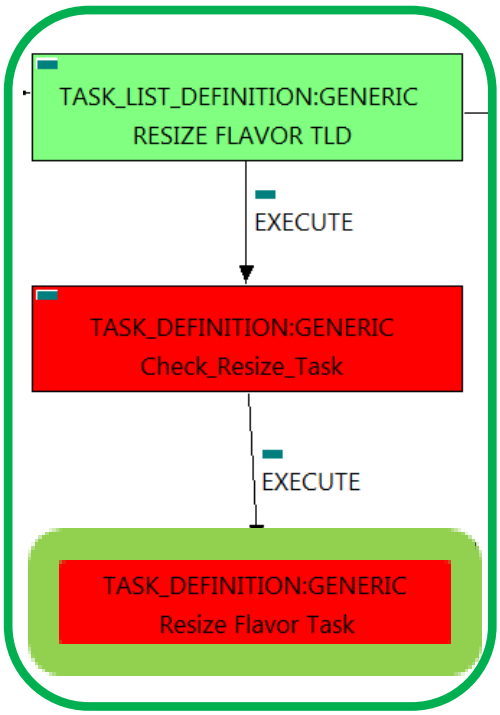


Figure 123 Resizing Flavor for the modified Virtual machine.

In this TD the execution will create a new instance of a FLAVOR artifact the matches the new attribute's values of the Virtual Machine, specifically the new values of memory and core, these TD acts together with the previous one. Notice that the new Flavor will be configured for the same Virtual Machine but with different value in some attributes.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Resize_Flavor_task
FIND.MainArtifact ==
VIRTUAL_MACHINE<VNF_COMPONENT<VNF@status=ACTIVE, VNF@status=ACTIVE,VNF_COMPONENT<VNF@status=ACTIVE, VIRTUAL_MEMORY<VIRTUAL_MACHINE<VNF_COMPONENT< VNF@status=ACTIVE, VIRTUAL_CORE<VIRTUAL_MACHINE< VNF_COMPONENT<VNF@status=ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
"**WF_NFVD_CREATE_FLAVOR_INSTANCES**"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
ROLLBACK.Status == ACTIVE
ROLLBACK.Workflow ==
"WF_NFVD_DELETE_FLAVORS"
DATA.Lock == false

The Workflow present in EXECUTE.Workflow it is going to seek a VNF with Running_Status ACTIVE in the DDBB, if the WF find some artifact that fill all the conditions, it will start, notice that the execution of this TD will not change the status of the VNF.

In case of error during the execution, the workflow jump to the ROLLBACK category, if the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. If an error take place in this TD, no action will be taken, the execution of the TLD will try to start a rollback workflow, in this case the workflow is "WF_NFVD_DELETE_FLAVORS", and if the flavor could not be created the rollback will delete the attempt of creation leaving the scenario as was at the beginning.

Due to that the value of the attribute DATA.Lock is false, once the TD has finished, the artifact recently created, will remain unlocked.

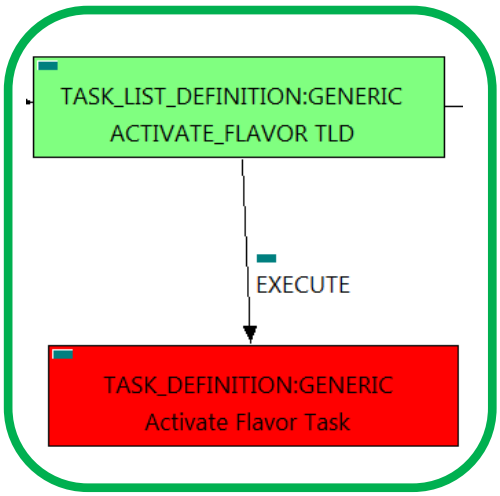


Figure 124 Activation of the recently created Flavor.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "FLAVOR", this means, when this workflow finish, we will have a FLAVOR with status ACTIVE associate to the VIRTUAL_MACHINE that it is going to use it in the activation.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	Activate_Flavor Task
FIND.MainArtifact ==	VNF>VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE<REGION>COMPUTE>FLAVOR@status=INSTANTIATED, VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE<REGION>COMPUTE>FLAVOR@status=INSTANTIATED, VIRTUAL_MACHINE>VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE<REGION>COMPUTE>FLAVOR@status=INSTANTIATED, VIRTUAL_MEMORY<VIRTUAL_MACHINE>VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE<REGION>COMPUTE>FLAVOR@status=INSTANTIATED, VIRTUAL_CORE<VIRTUAL_MACHINE>VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE<REGION>COMPUTE>FLAVOR@status=INSTANTIATED
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	ACTIVE.
EXECUTE.Workflow ==	**"WF_TS_ACTIVATE_FLAVOR"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	ROLLBACK
ROLLBACK.Number_of_retries ==	0
ROLLBACK.Status ==	INSTANTIATED
ROLLBACK.Workflow ==	**"WF_TS_ACTIVATE_FLAVOR_UNDO"**
DATA.Lock ==	false

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "FLAVOR" in Status INSTANTIATED in the DDBB. Notice that we are not trying to get a VIRTUAL_MACHINE or VNF in status INSTANTIATED. The query it is going to use the Path present in the category FIND.MainArtifact. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, in this case the workflow is "WF_TS_ACTIVATE_FLAVOR_UNDO", in case of error the rollback will launch this Wf, leaving the activation of the flavor like at the beginning.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

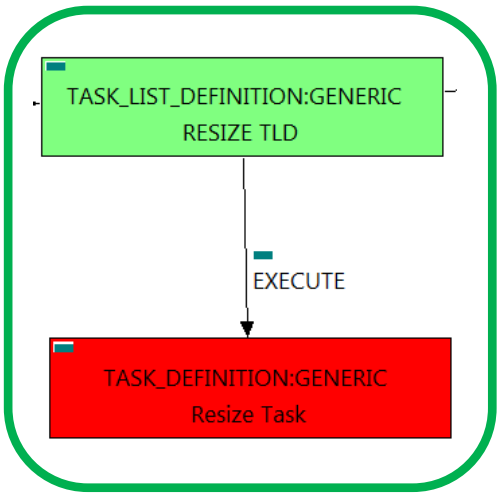


Figure 125 Resizing the Flavor for the escalated Virtual Machine.

7.11 **RESIZE** TLD: Resize task

This TD is the responsible to adapt and resize the flavor to match the specifications of the changes on the Virtual machine, this is a different configuration in the Memory and the core of the Virtual Machine. In Openstack platform the scale down operation is represented by a modification in a specific Flavor or in the creation of a new one to suits the needs of the Virtual machine.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Resize_task
FIND.MainArtifact ==
VNF>VNF_COMPONENT>
VIRTUAL_MACHINE@status=ACTIVE#SCALE.Info=Resize,
VNF_COMPONENT>
VIRTUAL_MACHINE@status=ACTIVE#SCALE.Info=Resize,
VIRTUAL_MACHINE@status=ACTIVE#SCALE.Info=Resize,
VIRTUAL_MEMORY<
VIRTUAL_MACHINE@status=ACTIVE#SCALE.Info=Resize,
VIRTUAL_CORE<
VIRTUAL_MACHINE@status=ACTIVE#SCALE.Info=Resize
SET.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_SCALE_UPDOWN"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
ROLLBACK.Status == INSTANTIATED
ROLLBACK.Workflow ==
"WF_TS_SCALE_UPDOWN_ROLLBACK"
DATA.Lock == false

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "VIRTUAL_MACHINE" in Status ACTIVE in the DDBB. Notice that we are not trying to get a VNF in status INSTANTIATED. The query it is going to use the Path present in the category FIND.MainArtifact. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, in this case the workflow is "WF_TS_SCALE_UPDOWN_ROLLBACK", in case of error the rollback will launch this Wf, leaving the scenario like it was at the beginning of the resizing.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

7.12 VCenter RESIZE TLD: vCenter Reconfigure Task

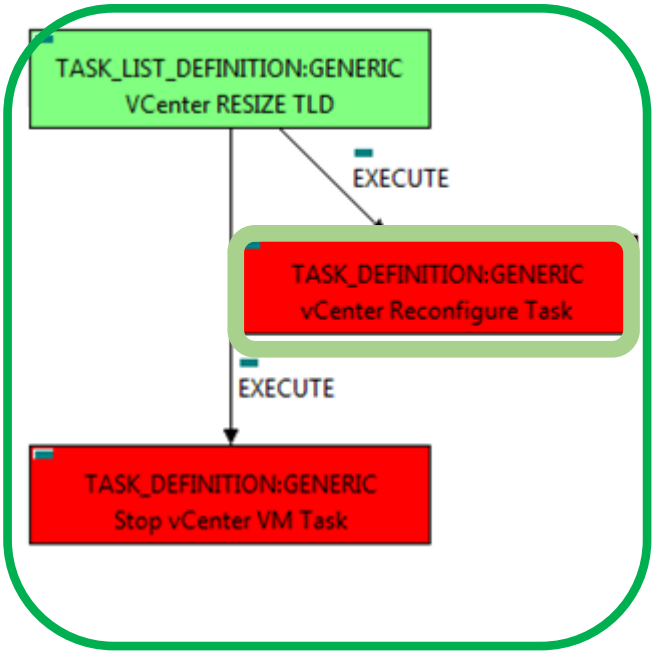


Figure 126 VCenter Regonfigure Task

This TD have a specific treatment of the VCenter Virtual Machines, it will check the CORES and Memory to execute an escalation of its features, in case of VCenter virtual machines, the way the machines are reconfigured need to be specifically implemented in a workflow.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == VCenter Resize Task
FIND.MainArtifact ==
VNF>VNF_COMPONENT>
VIRTUAL_MACHINE@status=STOPPED#
SCALE.Info=Scale_vCenter,
VNF_COMPONENT>VIRTUAL_MACHINE@status=STOPPED#
SCALE.Info=Scale_vCenter,
VIRTUAL_MACHINE@status=STOPPED#
SCALE.Info=Scale_vCenter,
VIRTUAL_MEMORY<VIRTUAL_MACHINE@status=STOPPED#
SCALE.Info=Scale_vCenter,
VIRTUAL_CORE<VIRTUAL_MACHINE
@status=STOPPED#SCALE.Info=Scale_vCenter
SET.Running_Status== RESIZING
SET.Status == STOPPED
EXECUTE.Workflow ==
"**WF_TS_SCALE_UPDOWN_VCENTER**"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

Figure: 1: VCenter Reconfigure Task

The Workflow present in EXECUTE.Workflow attribute it is going to seek a VIRTUAL_MACHINE in status STOPPED, that matches the value "Scale_vCenter" with its attribute "SCALE.Info".

Once found, the WF will start the escalation process, if the escalation is successful we set the status of the artifact as the SET.Status attribute dictates, in this case, the VM will be set as STOPPED, The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status, while the VM is being reconfigured its status will be "RESIZING".

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, in case there is no workflow assigned the execution will be stopped.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

7.13 vCenter RESIZE TLD: Stop vCenter VM Task

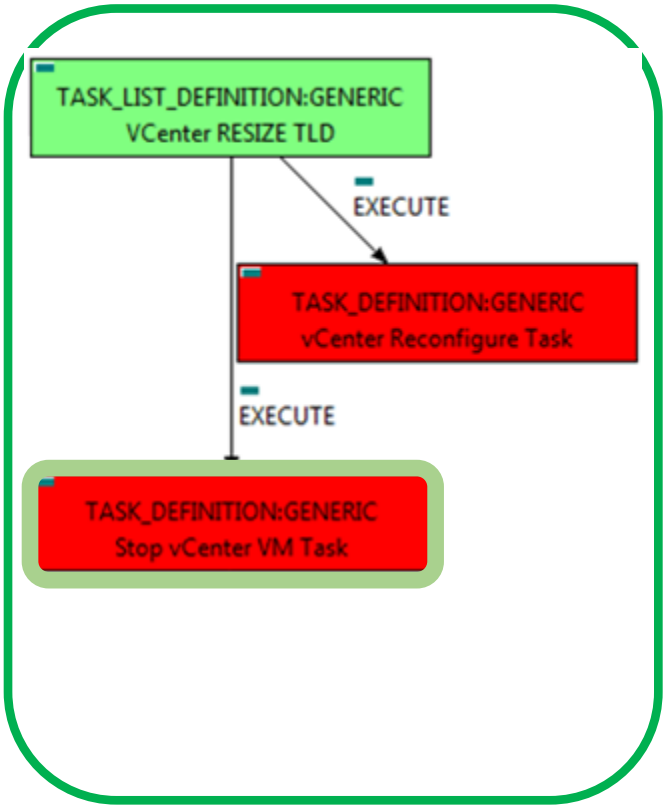


Figure 127 Stop VCenter Virtual machine.

This TD is the responsible to properly change the status of the VCenter Virtual Machines to be able to resize some of the its elements, the status that the Virtual Machines will have at the end it is not "STOPPED", it will be "VERIFY_SIZE", in this way, the following TD will be able to achieve the specific escalation of the Virtual Machine's elements.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name ==	Stop vCenter VM Task
FIND.MainArtifact ==	**VNF>VNF_COMPONENT>VIRTUAL_MACHINE@ status=ACTIVE#SCALE.Info=Scale_vCenter, VNF_COMPONENT>VIRTUAL_MACHINE@status=ACTIVE# SCALE.Info=Scale_vCenter, VIRTUAL_MACHINE@status=ACTIVE#SCALE.Info=Scale_vCenter, VIRTUAL_MEMORY<VIRTUAL_MACHINE@status=ACTIVE# SCALE.Info=Scale_vCenter, VIRTUAL_CORE<VIRTUAL_MACHINE@status=ACTIVE# SCALE.Info=Scale_vCenter**
SET.Status ==	VERIFY_RESIZE
EXECUTE.Workflow ==	"**WF_TS_STOP_VM**"
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	ROLLBACK
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	false

The Workflow present in EXECUTE.Workflow attribute it is going to seek a VIRTUAL_MACHINE in status ACTIVE that matches the value "Scale_vCenter" with its attribute "SCALE.Info".

Once found, the WF will start the escalation process, if the escalation is successful we set the status of the artifact as the SET.Status attribute dictates, in this case there is no status to be set, The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status, while the VM is being reconfigured its status will be "VERIFY_RESIZE".

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, in case there is no workflow assigned the execution will be stopped.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

7.14 VCenter RESIZE TLD 2: vCenter Reconfigure Task

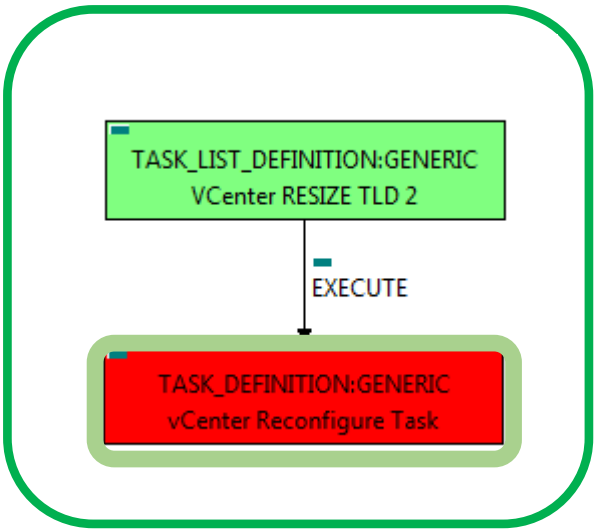


Figure 128 : VCenter Reconfigure Task

This TD have a specific treatment of the VCenter Virtual Machines, it will check the CORES and Memory to execute an escalation of its features, in case of VCenter virtual machines, the way the machines are reconfigured need to be specifically implemented in a workflow.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == VCenter Resize Task
FIND.MainArtifact ==
VNF>VNF_COMPONENT>VIRTUAL_MACHINE @status=VERIFY_RESIZE#SCALE.Info=Scale_vCenter, VNF_COMPONENT>VIRTUAL_MACHINE @status=VERIFY_RESIZE#SCALE.Info=Scale_vCenter, VIRTUAL_MACHINE@status=VERIFY_RESIZE #SCALE.Info=Scale_vCenter, VIRTUAL_MEMORY<VIRTUAL_MACHINE @status=VERIFY_RESIZE#SCALE.Info=Scale_vCenter, VIRTUAL_CORE<VIRTUAL_MACHINE @status=VERIFY_RESIZE#SCALE.Info=Scale_vCenter
SET.Running_Status== VERIFY_RESIZE
SET.Status ==
EXECUTE.Workflow ==
"**WF_TS_SCALE_UPDOWN_VCENTER**"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

The Workflow present in EXECUTE.Workflow attribute it is going to seek a VIRTUAL_MACHINE in status VERIFY_RESIZE that matches the value "Scale_vCenter" with its attribute "SCALE.Info".

Once found, the WF will start the escalation process, if the escalation is successful we set the status of the artifact as the SET.Status attribute dictates, in case there is not status to set, the running status will remain, the attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status, while the VM is being reconfigured its status will be "VERIFY_RESIZE**".**

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, in case there is no workflow assigned the execution will be stopped.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

7.15 VCenter Start TLD: Start vCenter VM Task

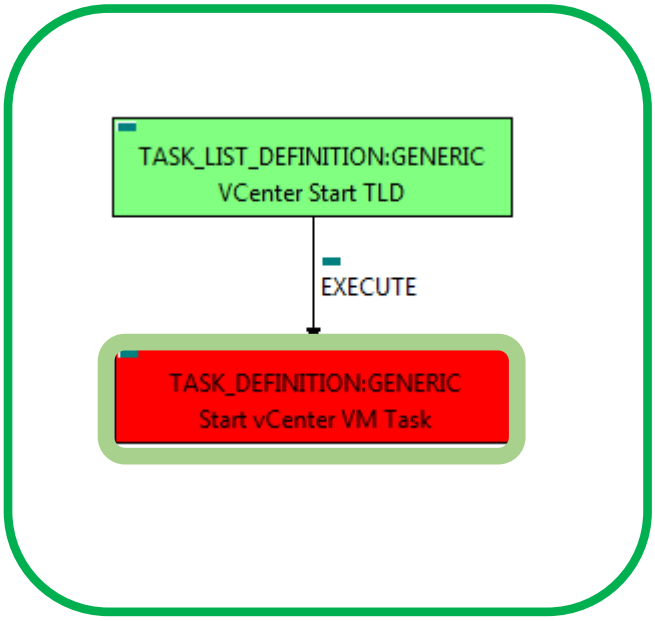


Figure 129Start vCenter VM Task

The TDs that have present in the their names "Start" are Task Definitions responsible of the activation of the component in the platform targeted and the updating of the status in the platform and the DDBB, in this case the VMs associated to the VCenter structure will be started, the start process of these machines have peculiarities that are covered by the workflow launched in previous steps of the TLD.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Start vCenter VM Task
FIND.MainArtifact ==
VNF>VNF_COMPONENT>VIRTUAL_MACHINE@status=RESIZING SCALE.Info=Scale_vCenter,
VNF_COMPONENT>VIRTUAL_MACHINE@status=RESIZING# SCALE.Info=Scale_vCenter,
VIRTUAL_MACHINE@status=RESIZING#SCALE.Info=Scale_vCente
VIRTUAL_MEMORY<VIRTUAL_MACHINE@status=RESIZING# SCALE.Info=Scale_vCenter,
VIRTUAL_CORE<VIRTUAL_MACHINE@status=RESIZING# SCALE.Info=Scale_vCenter
SET.Status ==
EXECUTE.Workflow ==
"**WF_TS_START_VM**"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

The Workflow present in EXECUTE.Workflow attribute it is going to seek a VIRTUAL_MACHINE in status RESIZING that matches the value "Scale_vCenter" with its attribute "SCALE.Info".

Once found the WF will start the escalation process, if the escalation is successful we set the status of the artifact as the SET.Status attribute dictates, in this case, the VM will be set as ACTIVE, the attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, to start a VM the workflow that will be called is "WF_TS_START_VM" in case there is no workflow assigned, the execution will be stopped.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

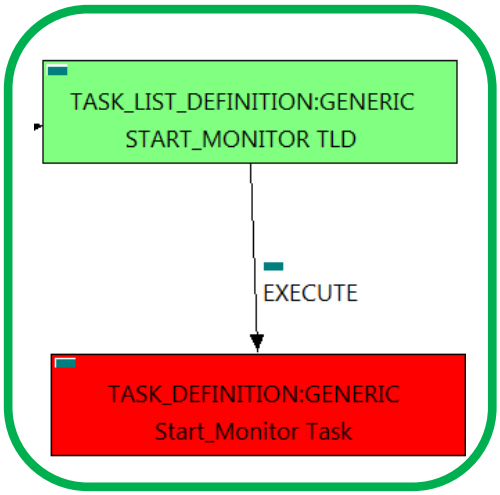


Figure 130 Starting of the monitors present.

7.16 **START_MONITOR TLD**: Start_Monitor Task

The TDs that have present in the their names "Start" are Task Definitions responsible of the launching of the component in the platform targeted and the updating of the status in the platform and the DDBB , these deployments are slightly different to the ones we launch for our entities, as a rule, they are small components as the MONITORs. In this case, the artifact that is going to be deployed is a "MONITOR", this means, when this workflow finish, we will have a MONITOR deployed with status STARTED ready to monitories.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	Start_Monitor Task
FIND.MainArtifact ==	MONITOR
FIND.Condition ==	**status==constant:STOPPED**
SET.Running_Status==	STOPPED.
SET.Status ==	STARTED.
EXECUTE.Workflow ==	**"WF_TS_MONITOR_START"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	ROLLBACK
ROLLBACK.Number_of_retries ==	0
ROLLBACK.Status ==	STOPPED
ROLLBACK.Workflow ==	**"WF_TS_MONITOR_STOP"**
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a MONITOR with Status DEPLOYED.

Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, in this case the workflow is "WF_TS_MONITOR_STOP", if the Monitor encounter some kind of problem during the activation,this workflow will leave the Monitor again in status "STOPPED".

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

Chapter 8 Scale Up of a VNF - Default.

From now on, and to make easier the understanding of the TLDs, we are going to explain the functionality of each set of TASK_LIST_DEFINITION:GENERIC, and the number of TASK_DEFINITION:GENERIC children of the previously mentioned TASK_LIST_DEFINITION:GENERIC.

Basically, the TASK_LIST_DEFINITION:GENERIC connect what we can consider “units of execution”, those are the TASK_DEFINITION:GENERIC, that have a WORKFLOW assigned to be executed when the execution of the TLD reach them.

If you like to have a more deep knowledge about the workflows mentioned through this document please refer to the specific document.

**

If in the category FIND, the attribute Path is present, the attribute FIND.ArtifactType will be the starting artifact for the Path, but the FIND.Status attribute refers to the last artifact on the Path.

FIND.ArtifactType == VIRTUAL_MACHINE
FIND.Status== INSTANTIATED
FIND.Path ==
VIRTUAL_MACHINE>VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE<REGION>COMPUTE>FLAVOR

In this example, we are looking for a FLAVOR in status INSTANTIATED, we do not expect to get a VIRTUAL_MACHINE, in status INSTANTIATED.

**

If during the use of the TLDs, the “Regenerate UUIDs” option is used, the user should check the Id of the tree that brings all the elements of the TLD, this “id” is specific and it will be the same for all the tree groups in all the TLDs.

**

The two modes available are “Default” and “Simulated”, the second one is only available if it is configured previously, by defect, and the mode that will be used is “Default”.

8.1 Specific Elements of the TLD Deploy VNF.

In this chapter the different elements of the specific TLD will be explained conscientiously.

8.2 SCALE_UP ROOT TLD: Quota Assignment Task.

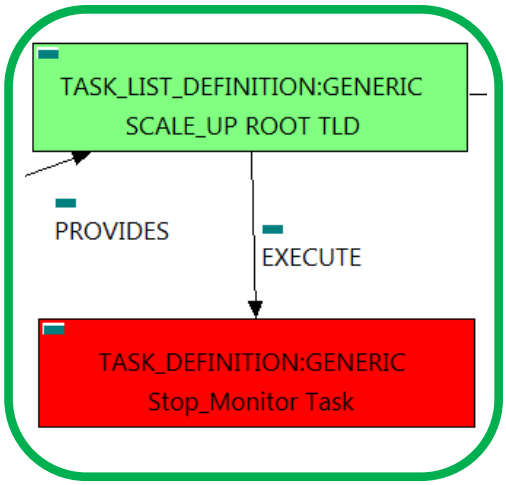


Figure 131 Stopping Monitor Task

The TDs that have present in the their names "Stop", are Task Definitions responsible of the stopping of an specific artifact or element, in this case of the MONITORs, the TLD it is going to stop the MONITOR element given.

Once finished, our VNF should have the MONITOR given in status DEPLOYED, having taken in consideration all the rules for the stopping.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name ==
Stop_Monitor Task
FIND.MainArtifact ==
MONITOR.

FIND.Condition==
status==constant:STARTED

SET.Running_Status ==
STARTED.

SET.Status ==
STOPPED.

EXECUTE.Workflow ==
"WF_TS_MONITOR_STOP"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error ==
ROLLBACK

The Workflow present in EXECUTE.Workflow it is going to seek a MONITOR in Status STARTED in the DDBB, when the WF find it, it will start. This workflow stop the given MONITOR needed by the VNF to get a successful Undeploy.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, in this case, the workflow that will be executed is "WF_TS_MONITOR_START", this Wf will re-initiate the monitor that the TD was trying to stop.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be locked.

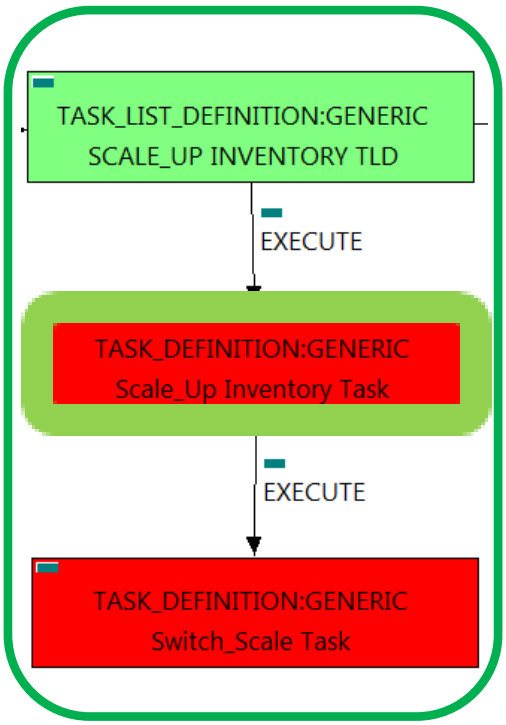


Figure 132 Checking inventory for the scale up.

This TD is the responsible to list and harvest all the artifacts and relationships of the Virtual Machine that is going to be escalated out, the main workflow will check the scale policies of the entity and apply the actions that these policies dictates, inside this TD another workflow will be thrown," WF_NFVD_INSTANCE_VALIDATION", it will be the responsible of the creation of the validation of the new instances related to the memory or core that are going to be enhanced in the Virtual Machine.

Once finished, our Scale out will be validated the new values of the memory or the core of the Virtual Machine.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Scale_Up Inventory Task
FIND.MainArtifact ==
VNF>VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_MEMORY>POLICY:ENTITY_SCALE@status=INSTANTIATED, VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_MEMORY>POLICY:ENTITY_SCALE@status=INSTANTIATED, VIRTUAL_MACHINE>VIRTUAL_MEMORY>POLICY:ENTITY_SCALE@status=INSTANTIATED, VIRTUAL_MEMORY>POLICY:ENTITY_SCALE@status=INSTANTIATED, VIRTUAL_CORE>POLICY:ENTITY_SCALE@status=INSTANTIATED
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_NFVD_SCALE_UP_INVENTORY"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow ==
"WF_NFVD_SCALE_DOWN_INVENTORY"
DATA.Lock == true

The Workflow present in EXECUTE.Workflow it is going to seek a POLICY:ENTITY_SCALE in Status INSTANTIATED in the DDBB, when the WF find it, it will start. This workflow assign all the resources needed by the VNF to get a successful Scale Out, it will check the available resources and decide which one should be assigned. The workflow responsible of this task is "" WF_NFVD_INSTANCE_VALIDATION", if its execution end successfully the TD has validated each element necessary.

In case of error during the execution, the workflow jump to the ROLLBACK category, if the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. In this case, the TLD has assigned a rollback workflow, "WF_NFVD_SCALE_DOWN_INVENTORY", it is plain to see that the rollback workflow is the opposite operation of the ScaleUp, in this way, in case of error the execution will recover the initial state of the scenario.

Due to that the value of the attribute DATA.Lock is true, once the TD has finished, the artifact recently assigned, will be blocked.

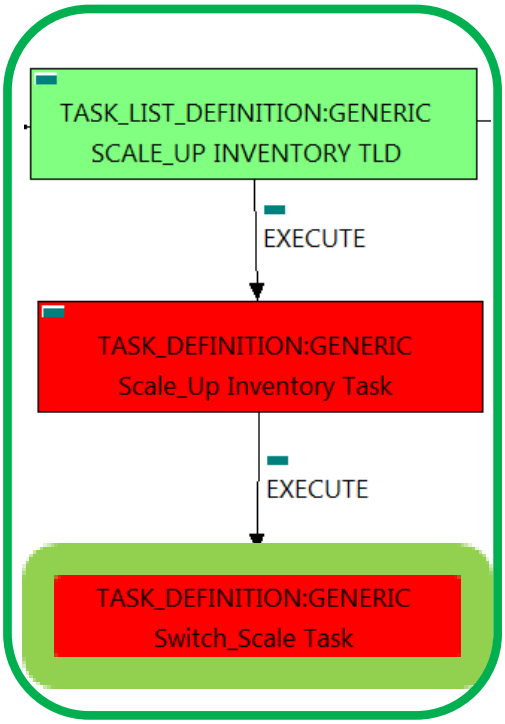


Figure 133 Switching scales type UP/DOWN.

Once the Scale Out process is validated this TD will recheck the escalation policies to manage the number and target of each policy related to each VNF's virtual machines, it will designate which entity is suited for each type of scale operation.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Scale_Up Inventory Task
FIND.MainArtifact ==
POLICY<VIRTUAL_MEMORY<
VIRTUAL_MACHINE@status=ACTIVE,
POLICY<VIRTUAL_CORE<
VIRTUAL_MACHINE@status=ACTIVE
EXECUTE.Workflow ==
"WF_TS_SWITCH_SCALE"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow is going to seek a VIRTUAL_MACHINE in Status ACTIVE in the DDBB, when the WF find it, it will start. This workflow will execute the correct escalation operation over the adequate Virtual Machine of the VNF, once finished the escalation of the Core or of the Memory the VM will have a different value of these attributes depending in the configuration of the policy applied.

In case of error during the execution, the workflow jump to the ROLLBACK category, if the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. In this case, the TLD has not assigned a rollback workflow, in case of error the execution will stop in this step.

Due to that the value of the attribute DATA.Lock is true, once the TD has finished, the artifact recently assigned, will be blocked.

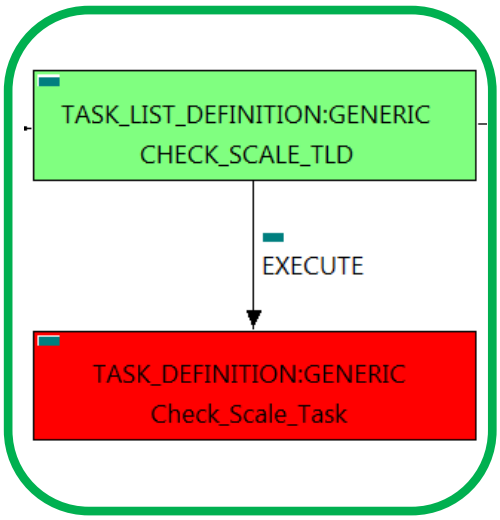


Figure 134 Last check of the escalation operations.

Once the Scale Out process is validated this TD will get the type of Scale for each Virtual Machine, these TD is the last checking necessary before the escalation over the specific component of the element take place, this means the modification of the number of cores or its size, or the modification of the virtual machine's memory.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Check Scale Task
FIND.MainArtifact ==
VNF,
VNF_COMPONENT<VNF,
VIRTUAL_MACHINE<VNF_COMPONENT<VNF,
VIRTUAL_MEMORY<VIRTUAL_MACHINE<VNF_COMPONENT<VNF
VIRTUAL_CORE<VIRTUAL_MACHINE<VNF_COMPONENT<VNF
EXECUTE.Workflow ==
"WF_TS_CHECK_SCALE_UPDOWN"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow it is going to seek a VNF in the DDBB and it will check all its Virtual Machines, looking for the operation to be applied, this workflow only checks the type of the escalation operation, also is the last checking of the operation before it take place.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. If an error take place in this TD, no action will be taken, the execution of the TLD will try to start a rollback workflow but there is not a workflow to be executed in the attribute ROLLBACK.Workflow, so the execution will stop launching an error.

Due to that the value of the attribute DATA.Lock is true, once the TD has finished, the artifact recently created, will be blocked.

.

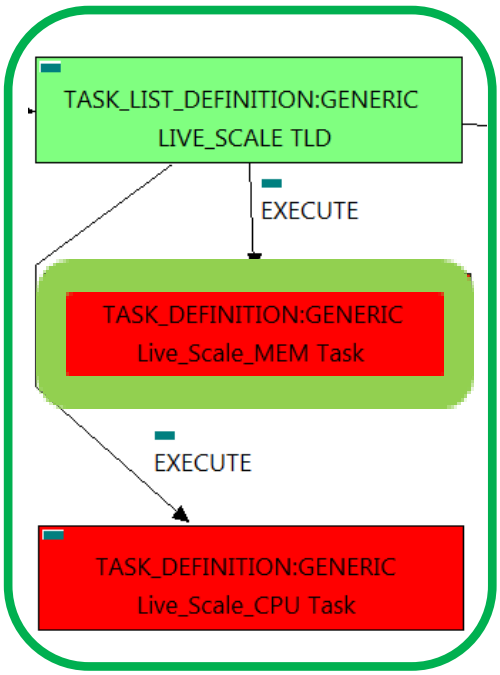


Figure 135 applying escalation policy over the Virtual Machine's memory

In this TD the operation of escalation is going to take place, in previous TD the execution has checked the type of escalation operation (UP/DOWN) to apply, also the execution has validated the viability of the escalation, so this TD will check the Virtual Machine and parent artifacts and it will develop a live escalation of theVirtual Machine's memory.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Live Scale Memory
FIND.MainArtifact ==
VNF>VNF_COMPONENT>
VIRTUAL_MACHINE@status=ACTIVE#SCALE.Info=Live_Memory,
VNF_COMPONENT>
VIRTUAL_MACHINE@status=ACTIVE#SCALE.Info=Live_Memory,
VIRTUAL_MACHINE@status=ACTIVE#SCALE.Info=Live_Memory,
VIRTUAL_MEMORY<
VIRTUAL_MACHINE@status=ACTIVE#SCALE.Info=Live_Memory,
VIRTUAL_CORE<
VIRTUAL_MACHINE@status=ACTIVE#SCALE.Info=Live_Memory
SET.Running_Status == ACTIVE.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_LIVE_SCALE"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
ROLLBACK.Status == ACTIVE
DATA.Lock == true

The Workflow present in EXECUTE.Workflow it is going to seek a VIRTUAL_MACHINE with Running_Status ACTIVE in the DDBB, if the WF find some artifact that fill all the conditions, it will start, notice that the execution of this TD will not change the status of the Virtual Machine, nor the VNF.

In case of error during the execution, the workflow jump to the ROLLBACK category, if the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. If an error take place in this TD, no action will be taken, the execution of the TLD will try to start a rollback workflow but there is not a workflow to be executed in the attribute ROLLBACK.Workflow, so the execution will continue without error.

Due to that the value of the attribute DATA.Lock is true, once the TD has finished, the artifact recently created, will be blocked.

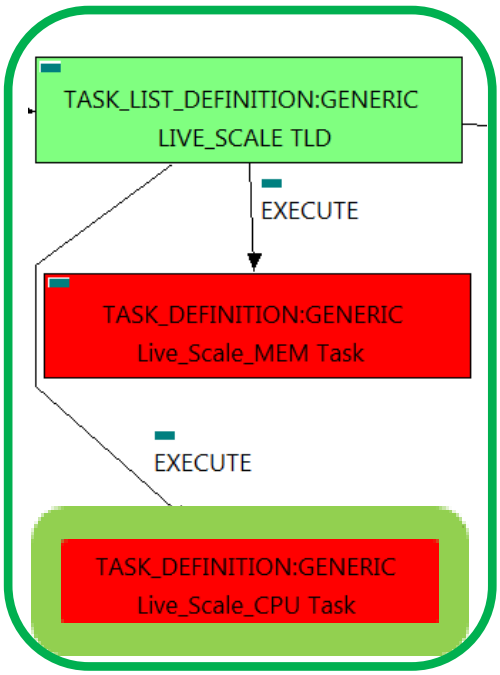


Figure 136 Applying escalation policy over the Virtual Machine's core.

In this TD the operation of escalation is going to take place, in previous TD the execution has checked the type of escalation operation (UP/DOWN) to apply, also the execution has validated the viability of the escalation, so this TD will check the Virtual Machine and parent artifacts and it will develop a live escalation of theVirtual Machine's core.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Live Scale CPU
FIND.MainArtifact ==
VNF>VNF_COMPONENT>
VIRTUAL_MACHINE@status=ACTIVE#SCALE.Info=Live_CPU,
VNF_COMPONENT>
VIRTUAL_MACHINE@status=ACTIVE#SCALE.Info=Live_CPU,
VIRTUAL_MACHINE@status=ACTIVE#SCALE.Info=Live_CPU,
VIRTUAL_MEMORY<
VIRTUAL_MACHINE@status=ACTIVE#SCALE.Info=Live_CPU,
VIRTUAL_CORE<
VIRTUAL_MACHINE@status=ACTIVE#SCALE.Info=Live_CPU
SET.Running_Status == ACTIVE.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_LIVE_SCALE"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
ROLLBACK.Status == ACTIVE
DATA.Lock == true

The Workflow present in EXECUTE.Workflow it is going to seek a VIRTUAL_MACHINE with Running_Status ACTIVE in the DDBB, if the WF find some artifact that fill all the conditions, it will start, notice that the execution of this TD will not change the status of the Virtual Machine, nor the VNF.

In case of error during the execution, the workflow jump to the ROLLBACK category, if the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. If an error take place in this TD, no action will be taken, the execution of the TLD will try to start a rollback workflow but there is not a workflow to be executed in the attribute ROLLBACK.Workflow, so the execution will continue without error.

Due to that the value of the attribute DATA.Lock is true, once the TD has finished, the artifact recently created, will be blocked.

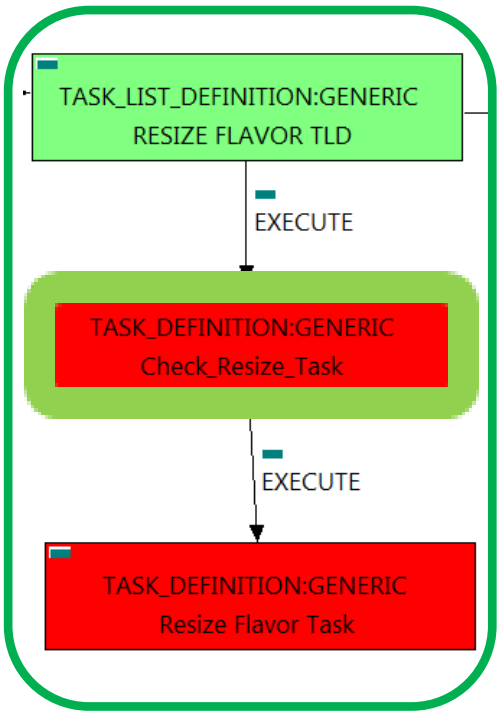


Figure 137 Checking the changes on the VM in order to create a new flavor for it.

8.8 RESIZE FLAVOR TLD: Check_Resize_Task

In this TD the execution will check for the changes in the size of the memory and core of a specific Virtual Machine, this means that the execution is going to detect the changes and if it is necessary will store the data necessary to configure in the next TD the new flavor that will match the Virtual Machine with the modifications after the escalation operation performed.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Check_resize Task
FIND.MainArtifact ==
VNF>VNF_COMPONENT>
VIRTUAL_MACHINE#SCALE.Info=Resize,
VNF_COMPONENT>VIRTUAL_MACHINE#SCALE.Info=Resize,
VIRTUAL_MACHINE#SCALE.Info=Resize,
VIRTUAL_MEMORY<VIRTUAL_MACHINE#SCALE.Info=Resize,
VIRTUAL_CORE<VIRTUAL_MACHINE#SCALE.Info=Resize
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

The Workflow present in EXECUTE.Workflow it is going to seek a VIRTUAL_MACHINE with Running_Status ACTIVE in the DDBB, if the WF find some artifact that fill all the conditions, it will start, notice that the execution of this TD will not change the status of the Virtual Machine, nor the VNF.

In case of error during the execution, the workflow jump to the ROLLBACK category, if the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. If an error take place in this TD, no action will be taken, the execution of the TLD will try to start a rollback workflow but there is not a workflow to be executed in the attribute ROLLBACK.Workflow, so the execution will continue without error.

Due to that the value of the attribute DATA.Lock is false, once the TD has finished, the artifact recently created, will remain unlocked.

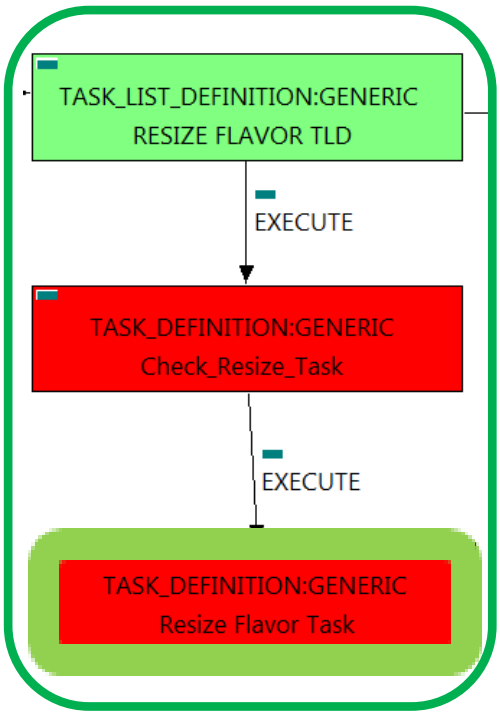


Figure 138 resizing Flavor for the modified Virtual machine.

8.9 RESIZE FLAVOR TLD: Resize Flavor Task

In this TD the execution will create a new instance of a FLAVOR artifact the matches the new attribute's values of the Virtual Machine, specifically the new values of memory and core, these TD acts together with the previous one. Notice that the new Flavor will be configured for the same Virtual Machine but with different value in some attributes.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Resize_Flavor_task
FIND.MainArtifact ==
VIRTUAL_MACHINE<VNF_COMPONENT<VNF@status=ACTIVE, VNF@status=ACTIVE,VNF_COMPONENT<VNF@status=ACTIVE, VIRTUAL_MEMORY<VIRTUAL_MACHINE<VNF_COMPONENT< VNF@status=ACTIVE, VIRTUAL_CORE<VIRTUAL_MACHINE< VNF_COMPONENT<VNF@status=ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
"**WF_NFVD_CREATE_FLAVOR_INSTANCES**"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
ROLLBACK.Status == ACTIVE
ROLLBACK.Workflow ==
"**WF_NFVD_DELETE_FLAVORS**"
DATA.Lock == false

The Workflow present in EXECUTE.Workflow it is going to seek a VNF with Running_Status ACTIVE in the DDBB, if the WF find some artifact that fill all the conditions, it will start, notice that the execution of this TD will not change the status of the VNF.

In case of error during the execution, the workflow jump to the ROLLBACK category, if the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. If an error take place in this TD, no action will be taken, the execution of the TLD will try to start a rollback workflow, in this case the workflow is "WF_NFVD_DELETE_FLAVORS", and if the flavor could not be created the rollback will delete the attempt of creation leaving the scenario as was at the beginning.

Due to that the value of the attribute DATA.Lock is false, once the TD has finished, the artifact recently created, will remain unlocked.

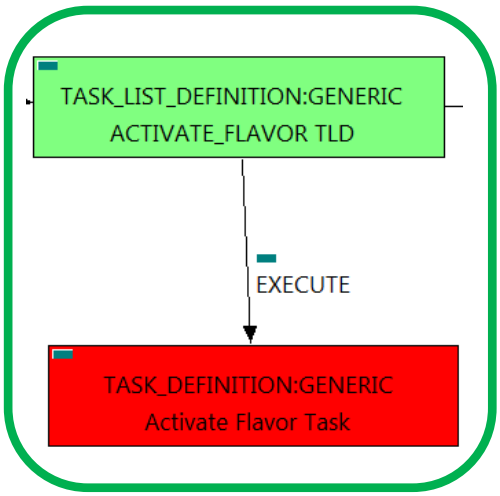


Figure 139Activation of the recently created Flavor.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "FLAVOR", this means, when this workflow finish, we will have a FLAVOR with status ACTIVE associate to the VIRTUAL_MACHINE that it is going to use it in the activation.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Activate_Flavor Task
FIND.MainArtifact ==

VNF>VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_CORE<CORE<CPU<SERVER<
AVAILABILITY_ZONE<REGION>COMPUTE>FLAVOR@status=INSTANTIATED,
VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE
<REGION>COMPUTE>FLAVOR@status=INSTANTIATED,
VIRTUAL_MACHINE>VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE<REGION>COMPUTE>FLAVOR@status=INSTANTIATED,
VIRTUAL_MEMORY<VIRTUAL_MACHINE>VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE<REGION>COMPUTE>FLAVOR@status=INSTANTIATE
D,
VIRTUAL_CORE<VIRTUAL_MACHINE>VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE<REGION>COMPUTE>FLAVOR@status=INSTANTIATED

SET.Running_Status == INSTANTIATED.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_ACTIVATE_FLAVOR"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
ROLLBACK.Status == INSTANTIATED
ROLLBACK.Workflow ==
"WF_TS_ACTIVATE_FLAVOR_UNDO"
DATA.Lock == false

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "FLAVOR" in Status INSTANTIATED in the DDBB. Notice that we are not trying to get a VIRTUAL_MACHINE or VNF in status INSTANTIATED. The query it is going to use the Path present in the category FIND.MainArtifact. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, in this case the workflow is "WF_TS_ACTIVATE_FLAVOR_UNDO", in case of error the rollback will launch this Wf, leaving the activation of the flavor like at the beginning.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

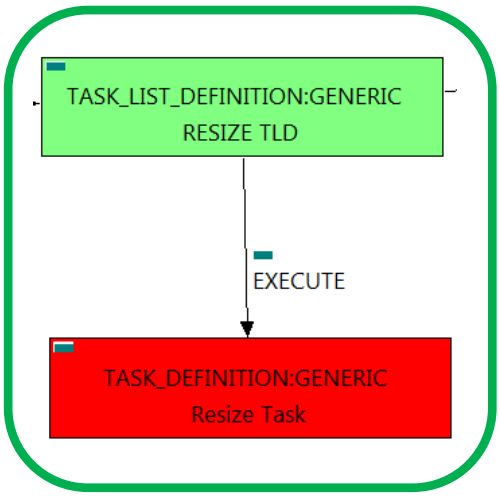


Figure 140 Resizing the Flavor for the escalated Virtual Machine.

8.11 **RESIZE** TLD: Resize task

This TD is the responsible to adapt and resize the flavor to match the specifications of the changes on the Virtual machine, this is a different configuration in the Memory and the core of the Virtual Machine. In Openstack platform the scale up operation is represented by a modification in a specific Flavor or in the creation of a new one to suits the needs of the Virtual machine.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Resize_task
FIND.MainArtifact ==
VNF>VNF_COMPONENT>
VIRTUAL_MACHINE@status=ACTIVE#SCALE.Info=Resize,
VNF_COMPONENT>
VIRTUAL_MACHINE@status=ACTIVE#SCALE.Info=Resize,
VIRTUAL_MACHINE@status=ACTIVE#SCALE.Info=Resize,
VIRTUAL_MEMORY<
VIRTUAL_MACHINE@status=ACTIVE#SCALE.Info=Resize,
VIRTUAL_CORE<
VIRTUAL_MACHINE@status=ACTIVE#SCALE.Info=Resize
SET.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_SCALE_UPDOWN"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
ROLLBACK.Status == INSTANTIATED
ROLLBACK.Workflow ==
"WF_TS_SCALE_UPDOWN_ROLLBACK"
DATA.Lock == false

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "VIRTUAL_MACHINE" in Status ACTIVE in the DDBB. Notice that we are not trying to get a VNF in status INSTANTIATED. The query it is going to use the Path present in the category FIND.MainArtifact. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, in this case the workflow is "WF_TS_SCALE_UPDOWN_ROLLBACK", in case of error the rollback will launch this Wf, leaving the scenario like it was at the beginning of the resizing.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

8.12 VCenter RESIZE TLD: vCenter Reconfigure Task

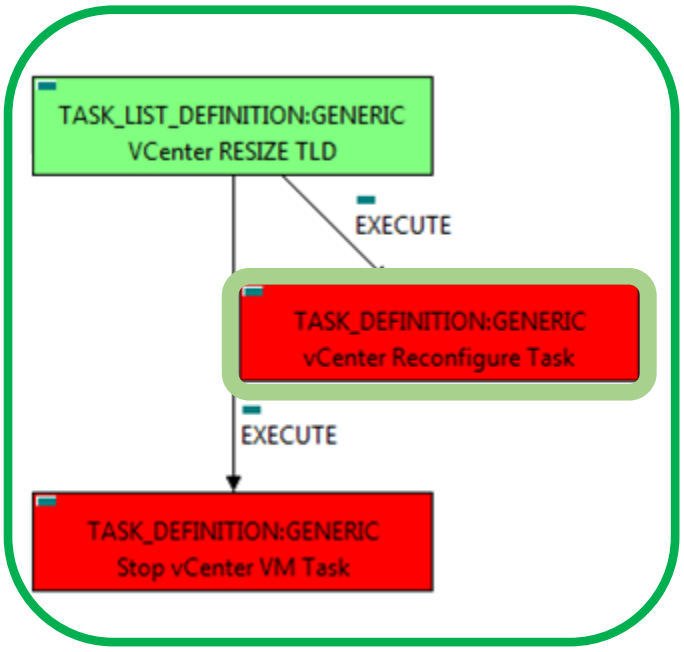


Figure 141 VCenter Reconfigure Task

This TD have a specific treatment of the VCenter Virtual Machines, it will check the COREs and Memory to execute an escalation of its features, in case of VCenter virtual machines, the way the machines are reconfigured need to be specifically implemented in a workflow.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == VCenter Resize Task
FIND.MainArtifact ==
VNF>VNF_COMPONENT>VIRTUAL_MACHINE@status=STOPPED#SCALE.Info=Scale_vCenter,
VNF_COMPONENT>VIRTUAL_MACHINE@status=STOPPED#SCALE.Info=Scale_vCenter,
VIRTUAL_MACHINE@status=STOPPED#SCALE.Info=Scale_vCenter,
VIRTUAL_MEMORY<VIRTUAL_MACHINE@status=STOPPED#SCALE.Info=Scale_vCenter,
VIRTUAL_CORE<VIRTUAL_MACHINE@status=STOPPED#SCALE.Info=Scale_vCenter
SET.Running_Status== RESIZING
SET.Status == STOPPED
EXECUTE.Workflow == "**WF_TS_SCALE_UPDOWN_VCENTER**"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

The Workflow present in EXECUTE.Workflow attribute it is going to seek a VIRTUAL_MACHINE in status STOPPED that matches the value "Scale_vCenter" with its attribute "SCALE.Info".

Once found, the WF will start the escalation process, if the escalation is successful we set the status of the artifact as the SET.Status attribute dictates, in this case, the VM will be set as STOPPED, The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status, while the VM is being reconfigured its status will be "RESIZING".

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, in case there is no workflow assigned the execution will be stopped.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

8.13 vCenter RESIZE TLD: Stop vCenter VM Task

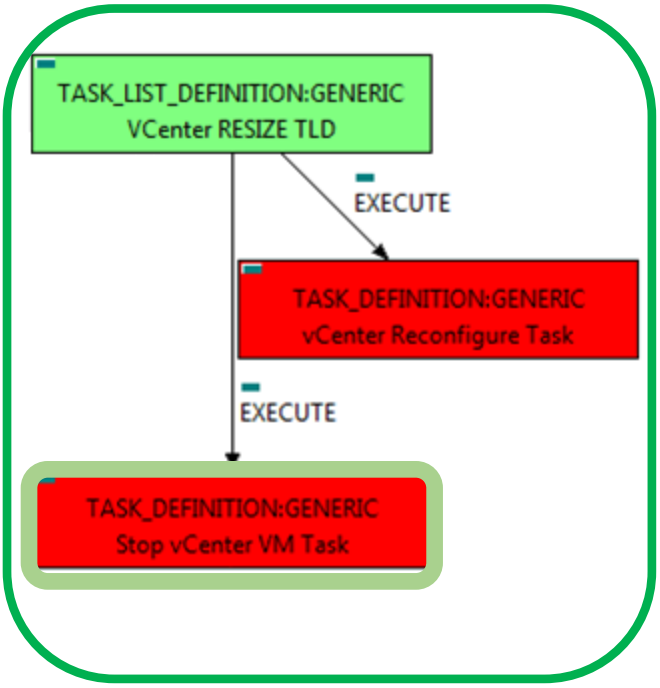


Figure 142 Stop VCenter Virtual machine.

This TD is the responsible to properly change the status of the VCenter Virtual Machines to be able to resize some of the its elements, the status that the Virtual Machines will have at the end it is not "STOPPED" , it will be "VERIFY_SIZE", in this way, the following TD will be able to achieve the specific escalation of the Virtual Machine's elements.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name ==	Stop vCenter VM Task
FIND.MainArtifact ==	**VNF>VNF_COMPONENT>VIRTUAL_MACHINE@ status=ACTIVE#SCALE.Info=Scale_vCenter, VNF_COMPONENT>VIRTUAL_MACHINE@status=ACTIVE# SCALE.Info=Scale_vCenter, VIRTUAL_MACHINE@status=ACTIVE#SCALE.Info=Scale_vCenter, VIRTUAL_MEMORY<VIRTUAL_MACHINE@status=ACTIVE# SCALE.Info=Scale_vCenter, VIRTUAL_CORE<VIRTUAL_MACHINE@status=ACTIVE# SCALE.Info=Scale_vCenter**
SET.Status ==	VERIFY_RESIZE
EXECUTE.Workflow ==	"**WF_TS_STOP_VM**"
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	ROLLBACK
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	false

The Workflow present in EXECUTE.Workflow attribute it is going to seek a VIRTUAL_MACHINE in status ACTIVE that matches the value "Scale_vCenter" with its attribute "SCALE.Info".

Once found, the WF will start the escalation process, if the escalation is successful we set the status of the artifact as the SET.Status attribute dictates, in this case there is no status to be set, The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status, while the VM is being reconfigured its status will be "VERIFY_RESIZE".

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, in case there is no workflow assigned the execution will be stopped.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

8.14 VCenter RESIZE TLD 2: vCenter Reconfigure Task

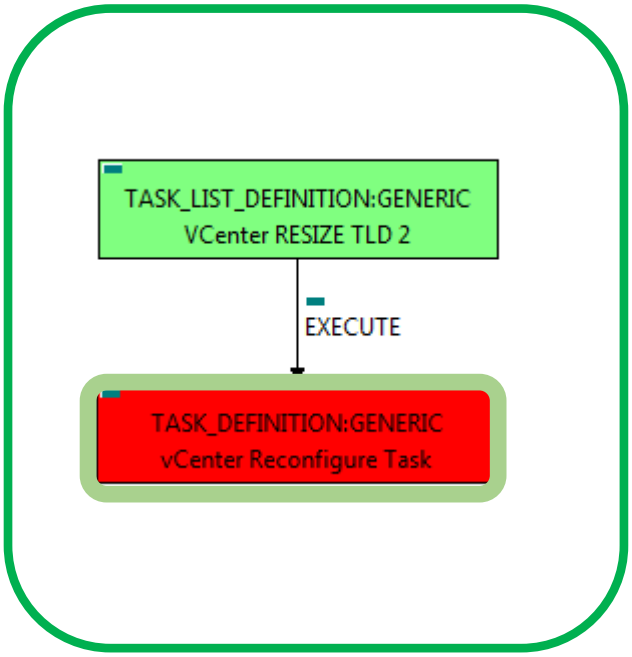


Figure 143 VCenter Reconfigure Task

This TD have a specific treatment of the VCenter Virtual Machines, it will check the CORES and Memory to execute an escalation of its features, in case of VCenter virtual machines, the way the machines are reconfigured need to be specifically implemented in a workflow.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == VCenter Resize Task
FIND.MainArtifact ==
VNF>VNF_COMPONENT>VIRTUAL_MACHINE@status=VERIFY_RESIZE# SCALE.Info=Scale_vCenter,
VNF_COMPONENT>VIRTUAL_MACHINE@status=VERIFY_RESIZE# SCALE.Info=Scale_vCenter,
VIRTUAL_MACHINE@status=VERIFY_RESIZE#SCALE.Info=Scale_vCenter,
VIRTUAL_MEMORY<VIRTUAL_MACHINE@status=VERIFY_RESIZE# SCALE.Info=Scale_vCenter,
VIRTUAL_CORE<VIRTUAL_MACHINE@status=VERIFY_RESIZE# SCALE.Info=Scale_vCenter
SET.Running_Status== VERIFY_RESIZE
SET.Status == RESIZING
EXECUTE.Workflow ==
"**WF_TS_SCALE_UPDOWN_VCENTER**"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

The Workflow present in EXECUTE.Workflow attribute it is going to seek a VIRTUAL_MACHINE in status VERIFY_RESIZE that matches the value "Scale_vCenter" with its attribute "SCALE.Info".

Once found, the WF will start the escalation process, if the escalation is successful we set the status of the artifact as the SET.Status attribute dictates, in this case, the VM will be set as RESIZING, The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status, while the VM is being reconfigured its status will be "VERIFY_RESIZE**".**

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, in case there is no workflow assigned the execution will be stopped.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

8.15 VCenter Start TLD: Start vCenter VM Task

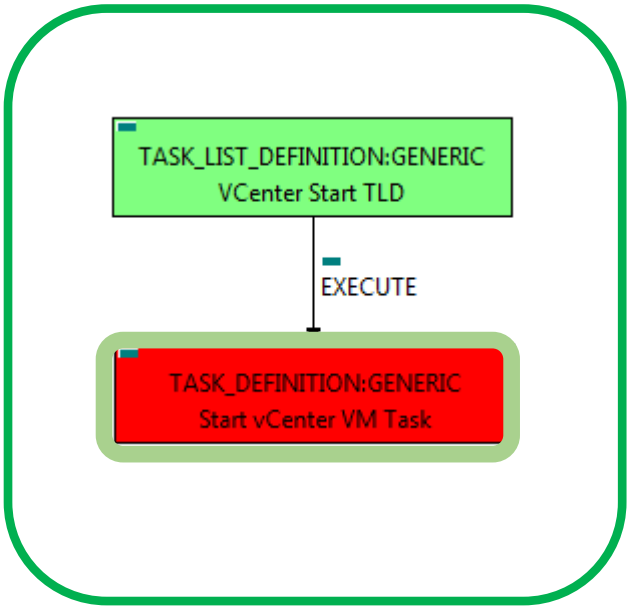


Figure 144 Start vCenter VM Task

The TDs that have present in the their names "Start" are Task Definitions responsible of the activation of the component in the platform targeted and the updating of the status in the platform and the DDBB, in this case the VMs associated to the VCenter structure will be started, the start process of these machines have peculiarities that are covered by the workflow launched in previous steps of the TLD.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Start vCenter VM Task
FIND.MainArtifact ==
VNF>VNF_COMPONENT>VIRTUAL_MACHINE@status=RESIZING SCALE.Info=Scale_vCenter,
VNF_COMPONENT>VIRTUAL_MACHINE@status=RESIZING# SCALE.Info=Scale_vCenter,
VIRTUAL_MACHINE@status=RESIZING#SCALE.Info=Scale_vCente
VIRTUAL_MEMORY<VIRTUAL_MACHINE@status=RESIZING# SCALE.Info=Scale_vCenter,
VIRTUAL_CORE<VIRTUAL_MACHINE@status=RESIZING# SCALE.Info=Scale_vCenter
SET.Status == ACTIVE
EXECUTE.Workflow ==
"**WF_TS_START_VM**"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

The Workflow present in EXECUTE.Workflow attribute it is going to seek a VIRTUAL_MACHINE in status RESIZING that matches the value "Scale_vCenter" with its attribute "SCALE.Info".

Once found, the WF will start the escalation process, if the escalation is successful we set the status of the artifact as the SET.Status attribute dictates, in this case, the VM will be set as ACTIVE, the attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, Ifthe "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the workflow for the starting of a VM is "WF_TS_START_VM", in case there is no workflow assigned, the execution will be stopped.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

8.16 **START_MONITOR TLD**: Start_Monitor Task

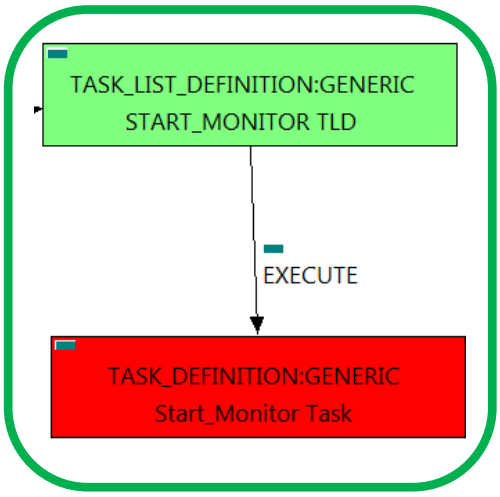


Figure 145 Starting of the monitors present.

The TDs that have present in the their names "Start" are Task Definitions responsible of the launching of the component in the platform targeted and the updating of the status in the platform and the DDBB , these deployments are slightly different to the ones we launch for our entities, as a rule, they are small components as the MONITORs. In this case, the artifact that is going to be deployed is a "MONITOR", this means, when this workflow finish, we will have a MONITOR deployed with status STARTED ready to monitories.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name ==	Start_Monitor Task
FIND.MainArtifact ==	MONITOR
FIND.Condition ==	**status==constant:STOPPED**
SET.Running_Status==	STOPPED.
SET.Status ==	STARTED.
EXECUTE.Workflow ==	**"WF_TS_MONITOR_START"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	ROLLBACK
ROLLBACK.Number_of_retries ==	0
ROLLBACK.Status ==	STOPPED
ROLLBACK.Workflow ==	**"WF_TS_MONITOR_STOP"**
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a MONITOR with Status DEPLOYED.

Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, in this case the workflow is "WF_TS_MONITOR_STOP", if the Monitor encounter some kind of problem during the activation,this workflow will leave the Monitor again in status "STOPPED".

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

Chapter 9 Scale In of a VNF - Default.

From now on, and to make easier the understanding of the TLDs, we are going to explain the functionality of each set of TASK_LIST_DEFINITION:GENERIC, and the number of TASK_DEFINITION:GENERIC children of the previously mentioned TASK_LIST_DEFINITION:GENERIC.

Basically, the TASK_LIST_DEFINITION:GENERIC connect what we can consider “units of execution”, those are the TASK_DEFINITION:GENERIC, that have a WORKFLOW assigned to be executed when the execution of the TLD reach them.

If you like to have a more deep knowledge about the workflows mentioned through this document please refer to the specific document.

**

If in the category FIND, the attribute Path is present, the attribute FIND.ArtifactType will be the starting artifact for the Path, but the FIND.Status attribute refers to the last artifact on the Path.

FIND.ArtifactType == VIRTUAL_MACHINE
FIND.Status== INSTANTIATED
FIND.Path ==
VIRTUAL_MACHINE>VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE<REGION>COMPUTE>FLAVOR

In this example, we are looking for a FLAVOR in status INSTANTIATED, we do not expect to get a VIRTUAL_MACHINE, in status INSTANTIATED.

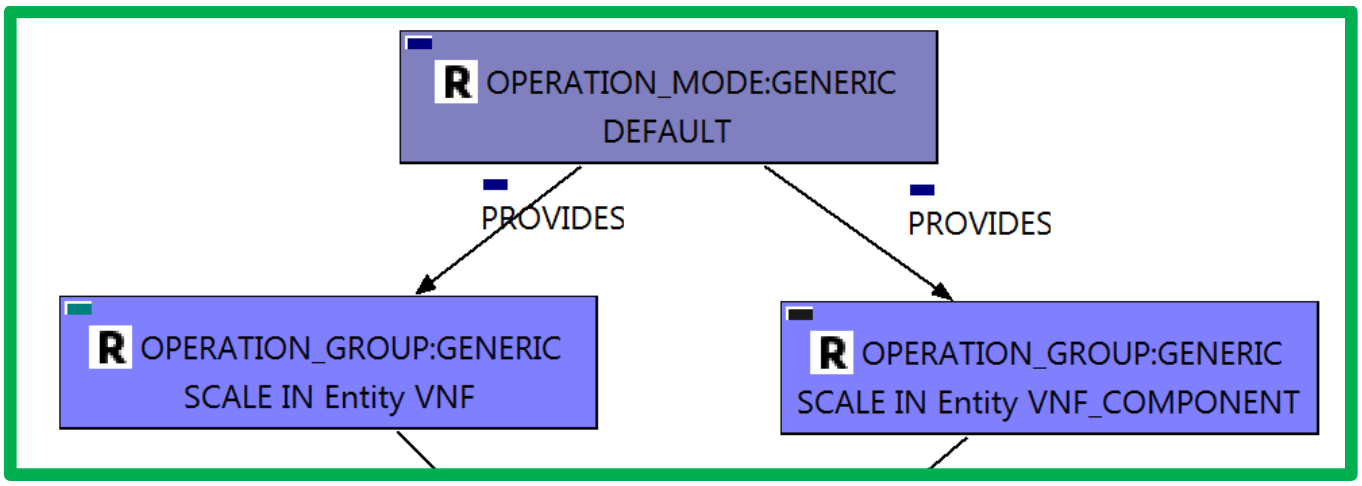
**

If during the use of the TLDs, the “Regenerate UUIDs” option is used, the user should check the Id of the tree that brings all the elements of the TLD, this “id” is specific and it will be the same for all the tree groups in all the TLDs.

**

The two modes available are “Default” and “Simulated”, the second one is only available if it is configured previously, by defect, and the mode that will be used is “Default”.

The Scale In TLD has some specifications that should be explained, when we open the TLD of the operation, the first we will see is the following:



This TLD starts with one Operation_Mode (as usual), but it has two Operation_Group, each one of the elements is "RootArtifact" of its own tree, this division of groups is justified in order to cover all the possible levels of the escalation policy, one group responds to the policies that has been set between the VNF and the VNF Component, and the second one respond to the policies set it in the level between the VNF Component and the Virtual Machine.

9.1 Specific Elements of the TLD Scale In VNF.

In this chapter the different elements of the specific TLD will be explained conscientiously.

9.2 TLD QUOTA ASSIGNMENT: Quota Assignment Task.

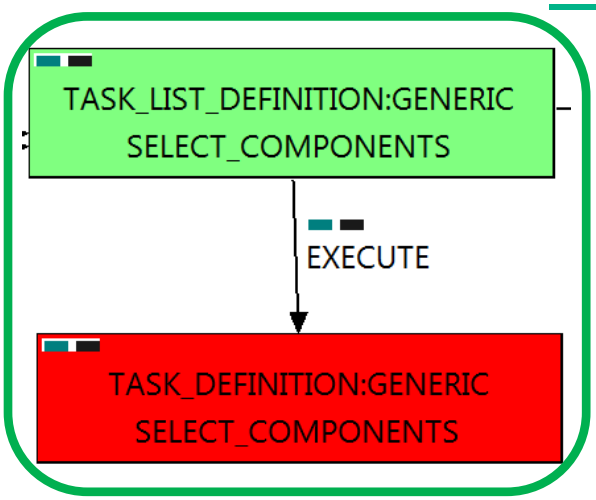


Figure 146 Selection of the components for the Scale In.

The Scale In over a VNF is a process that delete a number of Virtual Machines that were escalated previously over a specific VNF, this means that a Scale In is only applicable to a VNF that suffered a Scale Out before.

The WF present in this TD will check for all the artifacts and relationship created for the Virtual Machine that was scaled out also will manage to leave the components that are connected with the ones that are going to be deleted in an adequate state to be used.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	Select Components
FIND.MainArtifact ==	**VNF@status=ACTIVE,VNF_COMPONENT<VNF@status=ACTIVE**
SET.Running_Status ==	ACTIVE.
SET.Status ==	ACTIVE.
EXECUTE.Workflow ==	**"WF_TS_SCALE_IN_SELECTED"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Rollback_Status ==	ACTIVE.
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	false

The Workflow present in EXECUTE.Workflow it is going to seek a VNF in Status ACTIVE in the DDBB, when the WF find it, it will start. This workflow assign all the resources needed by the VNF to get a successful Deploy, it will check the available resources and decide which one should be assigned.

In case of error during the execution, the workflow jump to the ROLLBACK category, if the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. In this case, the behavior is set as "STOP" also the TLD has not have a rollback workflow assigned, in case of error the operation will stop without rollback.

Due to that the value of the attribute DATA.Lock is false, once the TD has finished, no artifact or element will be set as "locked".

9.3 SCALE IN PRE TLD: SCALE IN PRE.

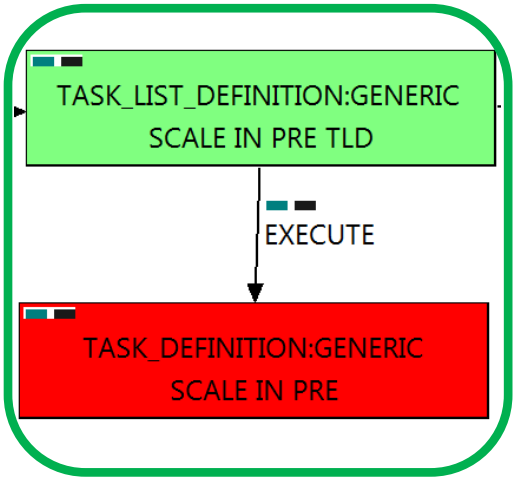


Figure 147 Deployment of Pre-Processing policies.

This TD is responsible of the provision in the right order of the artifacts referenced by the PreProcessing policies, these policies allow the user to set a number of elements that should be taken in consideration in a certain order, in other case, the execution will fail depending on the event occurred.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
FIND.MainArtifact ==	POLICY:POSTPRE_PROCESSING
FIND.Condition ==	**PROCESSING_JOB.Job_type==constant:PRE&& PROCESSING_JOB.Operation==constant:SCALEIN**
EXECUTE.OrderBy ==	PROCESSING_JOB.OrderBy
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	false

In this TD there is not a workflow to be executed, the target of this TD is process in the correct order the PreProcessing policies present in the VNF, these policies should be executed in a specific order to make the changes or configurations properly, in other case an error will be launched

If the TD ends successfully, the Pre-Processing policies will have been processed adequately.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

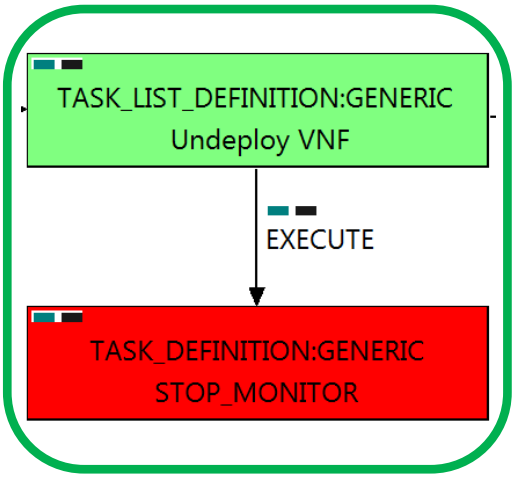


Figure 148 Stopping monitor.

The TDs that have present in the their names "Stop", are Task Definitions responsible of the stopping of an specific artifact or element, in this case of the MONITORs, the TLD it is going to stop the MONITOR element given.

Once finished, our VNF should have the MONITOR given in status DEPLOYED, having taken in consideration all the rules for the stopping.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Stop Monitor
FIND.MainArtifact== MONITOR
FIND.Condition== status==constant:TO_BE_STOPPED
SET.Running_Status == TO_BE_STOPPED
Set.Status == TO_BE_UNDEPLOYED
EXECUTE.Workflow == "WF_TS_MONITOR_STOP"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

The Workflow present in EXECUTE.Workflow it is going to seek a MONITOR in Status STARTED in the DDBB, when the WF find it, it will start. This workflow stop the given MONITOR needed by the VNF to get a successful Undeploy.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK,but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will stop.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

9.5 Deactivate VM : Deactivate_VM

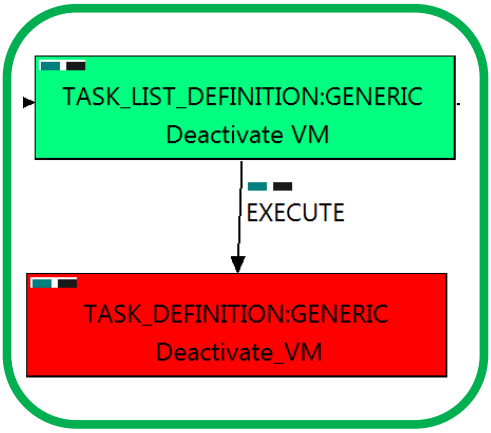


Figure 149 Deactivation of a VM.

The TDs that have present in the their names "Deactivate", are Task Definitions responsible of the deactivation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be deactivated is a "VIRTUAL_MACHINE with status "STOPPED", this means, when this workflow finish, we will have the VIRTUAL_MACNIHE given with a new status INSTANTIATED.

Targets of the TASK DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.MainArtifact ==
VNF>VNF_COMPONENT>
VIRTUAL_MACHINE@status=TO_BE_DEACTIVATED,
VNF_COMPONENT>
VIRTUAL_MACHINE@status=TO_BE_DEACTIVATED
SET.Running_Status == TO_BE_DEACTIVATED.
SET.Status == TO_BE_DELETED.
SET.OperationalStatus == TO_BE_DELETED
EXECUTE.Workflow == "WF_TS_DEACTIVATE_VM"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

The Workflow present in EXECUTE.Workflow attribute it is going to deactivate a "VIRTUAL_MACHINE" in Status TO_BE_DELETED in the DDBB . Once found , the WF will start the deactivation, if the deactivation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

This TD could launch different workflows depending on the type of the VM that it is going to be deactivated, the main kinds of our VIRTUAL_MACHINEs are HELION, and thereupon two of the WFs that could be used in this deactivation are: "WF_NFVD_DEACTIVATE_VM_HELION" and "WF_NFVD_DEACTIVATE_VM_OPENSTACK".

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, in this case it will be "WF_TS_ACTIVATE_VM", but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

9.6 SCALE IN POST TLD: SCALE IN POST

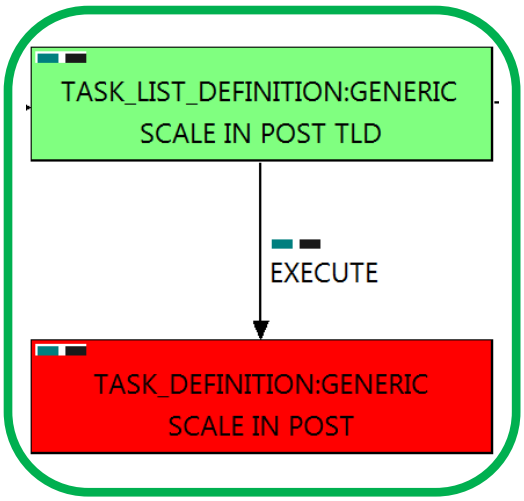


Figure 150 Deploying Post-Processing policies.

This TD is responsible of the provision in the right order of the artifacts referenced by the Post-Processing policies, these policies allow the user to treat a number of elements that should be taken in consideration after the execution of some TD in a specific order, in other case, the execution will fail depending on the event occurred.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
FIND.MainArtifact ==	POLICY:POSTPRE_PROCESSING
FIND.Condition ==	**PROCESSING_JOB.Job_type==constant:POST&& PROCESSING_JOB.Operation==constant:SCALEIN**
EXECUTE.OrderBy ==	PROCESSING_JOB.OrderBy
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	false

In this TD there is not a workflow to be executed, the target of this TD is process in the correct order the PostProcessing policies present in the VNF, these policies should be executed in a specific order to make the changes or configurations properly, in other case an error will be launched

If the TD ends successfully, the Post-Processing policies will have been applied adequately.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK,but in this case, we have a “STOP” as value set for behavior, so no Rollback it is going to be initiated, the execution will stop.

Due to that the value of the attribute DATA.Lock is fase, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

The TDs that have present in the their names "Deactivate", are Task Definitions responsible of the deactivation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be deactivated is a "PORT_GROUP:VCENTER", this means, when this workflow finish, we will have the artifact PORT_GROUP with status INSTANTIATED.

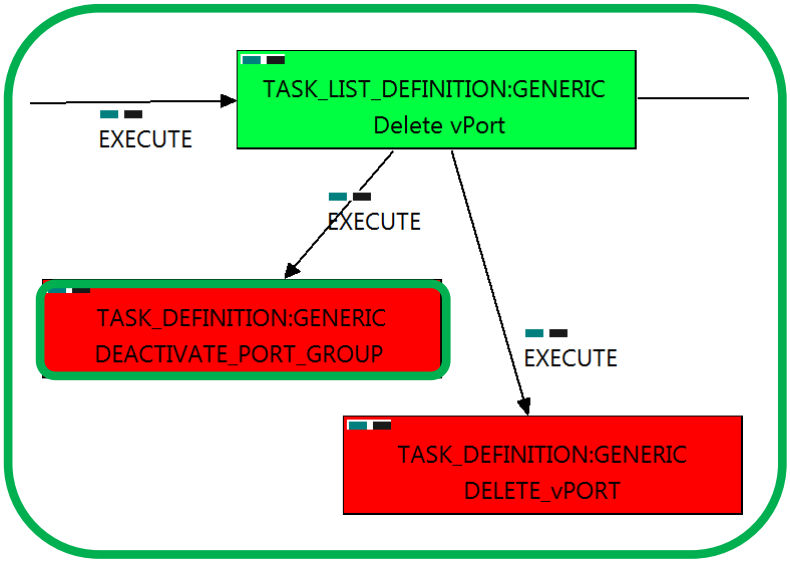


Figure 151 Deactivation of the Port Group associated.

Targets of the TASK:DEFINITION: STATUS of the TD: ENABLED
Categories:

FIND.MainArtifact== VNF>VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_PORT<PORT_GROUP, VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_PORT<PORT_GROUP
EXECUTE.Workflow == "WF_TS_DEACTIVATE_PORT_GROUP_VCENTER"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will stop.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

The TDs that have present in their names “Delete”, are Task Definitions that delete an artifact or element from the DDBB or from the platforms targeted, in this case, the artifact that it is going to be delated is the VIRTUAL_PORT given.

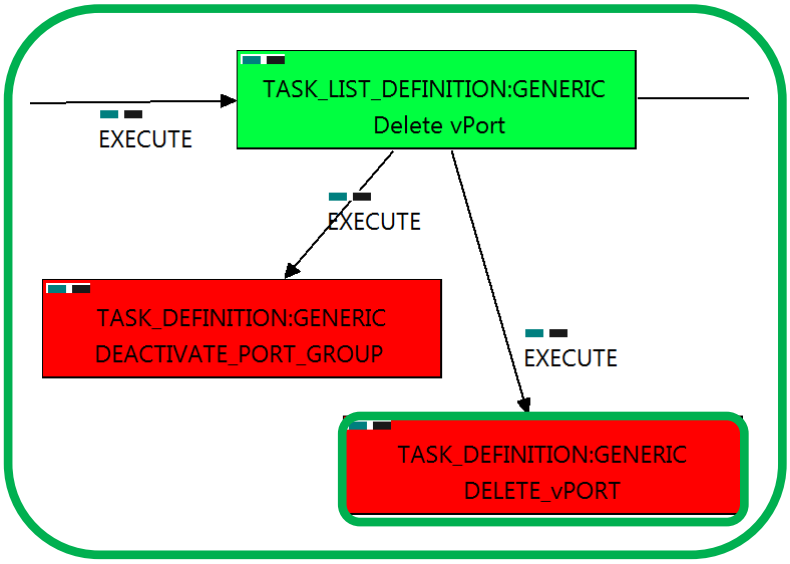


Figure 152 Deletion of a vPort.

Targets of the TASK:DEFINITION: STATUS of the TD: ENABLED
Categories:

FIND.MainArtifact==
VNF>VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_PORT@status=TO_BE_DELETED,VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_PORT@status=TO_BE_DELETED
EXECUTE.Workflow == “WF_TS_DEACTIVATE_PORT”
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow it is going to seek a VIRTUAL_PORT in Status ACTIVE in the DDBB, when the WF find it, it will start. This workflow will start one more, this last one, it is going to be named after the VIRTUAL_PORT that the TD it is trying to delete.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a “STOP” set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as “Locked”.

The TDs that have present in the their names "Delete", are Task Definitions responsible of the deletion of an artifact in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be deleted is a "VOLUME", this means, when this workflow finish, we are going to have a volume less.

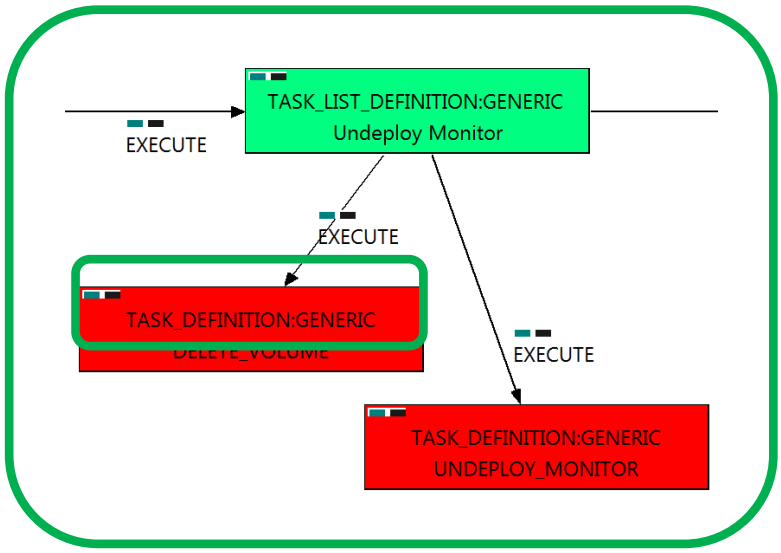


Figure 153 Deletion of the volume.

Targets of the TASK:DEFINITION: STATUS of the TD: ENABLED
Categories:

GENERAL.Name== Delete Volume
FIND.mainArtifact == VNF>VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_LUN@status=TO_BE_DELETED, VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_LUN@status=TO_BE_DELETED.
SET.Running_Status == TO_BE_DELETED.
SET.Status == TO_BE_DELETED
EXECUTE.Workflow == "WF_TS_DELETE_VOLUME"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

The Workflow present in EXECUTE.Workflow attribute it is going to seek a VIRTUAL_LUN in the DDBB . Once found , the WF will start the deleting, if the deletion it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, in this case it will be "WF_TS_CREATE_VOLUME". But in this case the behavior is set as CONTINUE, this means, that the execution is going to continue no matter which error could be.

The attribute DATA.Lock is set with a value of "false", this means no element will be locked at the of the TD's execution.

The TDs that have present in the their names "Undeploy" are Task Definitions responsible of the undeployment in the platform targeted and the updating of the status in the platform and the DDBB , these deployments are slightly different to the ones we launch for our entities, as a rule, they are small components as the MONITORs. In this case, the artifact that is going to be deployed is a "MONITOR", this means, when this workflow finish, we will have a MONITOR deployed with status DEPLOYED.

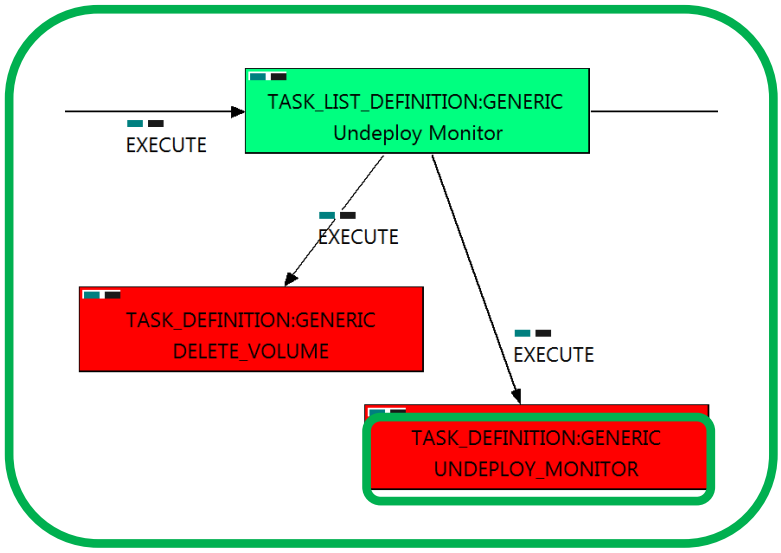


Figure 154 Undeployment of a monitor.

Targets of the TASK:DEFINITION: STATUS of the TD: ENABLED
Categories:

GENERAL.Name== UNDEPLOY MONITOR
FIND.ArtifactType == MONITOR.
FIND.Condition == status==constant:TO_BE_UNDEPLOYED
SET.Running_Status == TO_BE_UNDEPLOYED.
SET.Status == TO_BE_DELETED
EXECUTE.Workflow == "WF_TS_MONITOR_UNDEPLOY"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

The Workflow present in EXECUTE.Workflow attribute it is going to seek a MONITOR in Status DEPLOYED in the DDBB . Once found, the WF will start the deployment, if the deployment is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

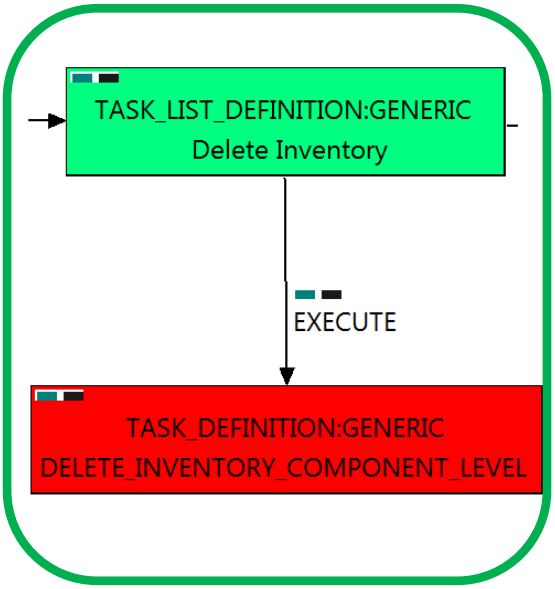


Figure 155 Deletion at component level.

The TDs that have present in their names "Status Change", are Task Definitions responsible of the change in the status of the entity associated, in this case responsible of the deletion of a specific entity by ID, these entities are the components related to the Virtual Machine that is going to be deleted during the Scale In process of the VNF. When the WF has finished we will have an VNF with status ACTIVE in case of successful execution, or status ERROR in case of error, or simply not any change in the status because a ROLLBACK during the execution.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	DELETE VNF
FIND.MainArtifact == **VNF>POLICY:ENTITY_RANGE> VNF_COMPONENT@status=TO_BE_DELETED**	
EXECUTE.Inactive==	false
EXECUTE.Workflow == **"WF_TS_DELETE_INSTANCE_TREE_BY_ARTIFACT_ID"**	
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	false

The TASK_DEFINITION do not execute any workflow, with the attributes present in the categories it is enough to change the status of the entity.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The TLD will finish correctly once the execution reaches this point, the VNF will change its status to "ACTIVE".

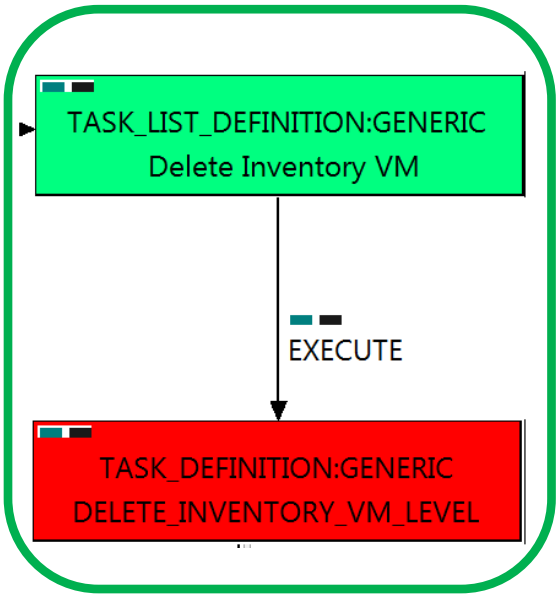


Figure 156 Delete Virtual Machine from scaled out VNF.

The TDs that have present in their names "Status Change", are Task Definitions responsible of the change in the status of the entity associated, in this case the Virtual Machine related to the VNF that is execution the Scale In. When the WF has finished we will have an VNF with status ACTIVE in case of successful execution, or status ERROR in case of error, or simply not any change in the status because a ROLLBACK during the execution.

Targets of the TASK DEFINITION: ENABLED	STATUS of the TD:
GENERAL.Name ==	DELETE_INVENTORY_VM
FIND.MainArtifact ==	**VNF>VNF_COMPONENT>POLICY:ENTITY_RANGE> VIRTUAL_MACHINE@status=TO_BE_DELETED, VNF_COMPONENT>POLICY:ENTITY_RANGE> VIRTUAL_MACHINE@status=TO_BE_DELETED**
FIND.Condition ==	**status==constant:INSTANTIATED**
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	ACTIVE.
EXECUTE.Workflow==	**"WF_TS_DELETE_INSTANCE_TREE_BY_ARTIFACT_ID"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The TASK_DEFINITION do not execute any workflow, with the attributes present in the categories it is enough to change the status of the entity.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The TLD will finish correctly once the execution reaches this point, the VNF will change its status to "ACTIVE".

Chapter 10 Scale Out of a VNF - Default.

From now on, and to make easier the understanding of the TLDs, we are going to explain the functionality of each set of TASK_LIST_DEFINITION:GENERIC, and the number of TASK_DEFINITION:GENERIC children of the previously mentioned TASK_LIST_DEFINITION:GENERIC.

Basically, the TASK_LIST_DEFINITION:GENERIC connect what we can consider “units of execution”, those are the TASK_DEFINITION:GENERIC, that have a WORKFLOW assigned to be executed when the execution of the TLD reach them.

If you like to have a more deep knowledge about the workflows mentioned through this document please refer to the specific document.

**

If in the category FIND, the attribute Path is present, the attribute FIND.ArtifactType will be the starting artifact for the Path, but the FIND.Status attribute refers to the last artifact on the Path.

FIND.ArtifactType == VIRTUAL_MACHINE
FIND.Status== INSTANTIATED
FIND.Path ==
VIRTUAL_MACHINE>VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE<REGION>COMPUTE>FLAVOR

In this example, we are looking for a FLAVOR in status INSTANTIATED, we do not expect to get a VIRTUAL_MACHINE, in status INSTANTIATED.

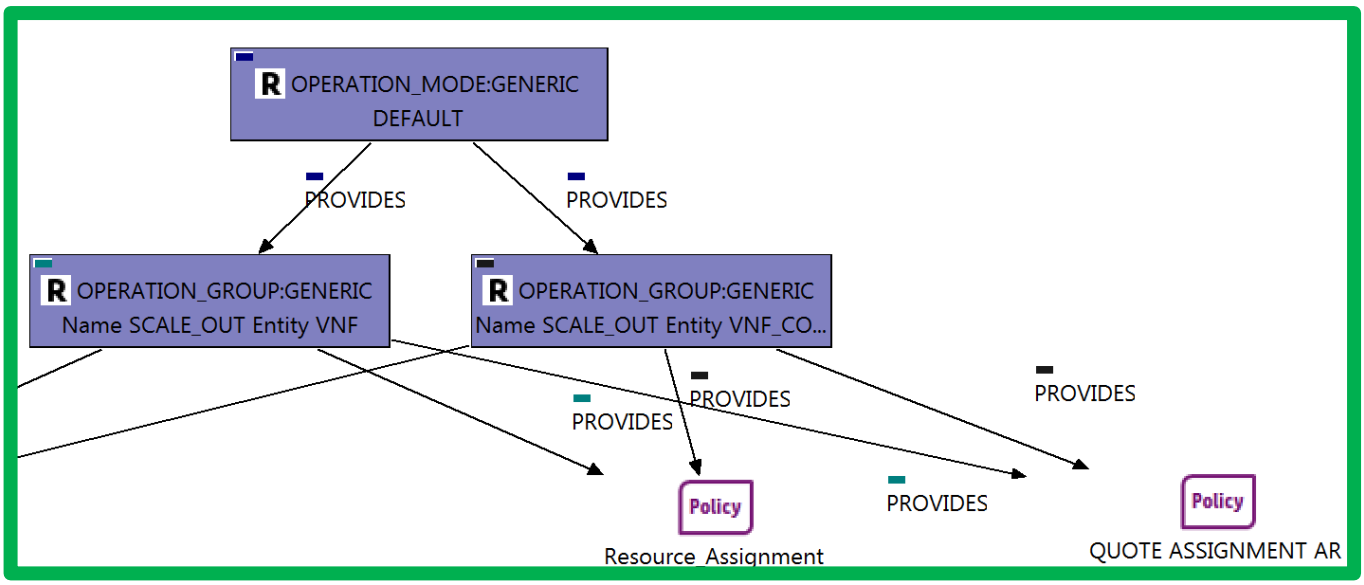
**

If during the use of the TLDs, the “Regenerate UUIDs” option is used, the user should check the Id of the tree that brings all the elements of the TLD, this “id” is specific and it will be the same for all the tree groups in all the TLDs.

**

The two modes available are “Default” and “Simulated”, the second one is only available if it is configured previously, by defect, and the mode that will be used is “Default”.

The Scale Out TLD has some specifications that should be explained, when we open the TLD of the operation , the first we will see is the following:



This TLD starts with one Operation_Mode (as usual), but it has two Operation_Group, each one of the elements is "RootArtifact" of its own tree, the assignation of resources and quotas is equal for both of them, this division of groups is justified in order to cover all the possible levels of the escalation policy, one group responds to the policies that has been set between the VNF and the VNF Component, and the second one respond to the policies set it in the level between the VNF Component and the Virtual Machine.

10.1 Specific Elements of the TLD Scale Out of a VNF.

In this chapter the different elements of the specific TLD will be explained conscientiously.

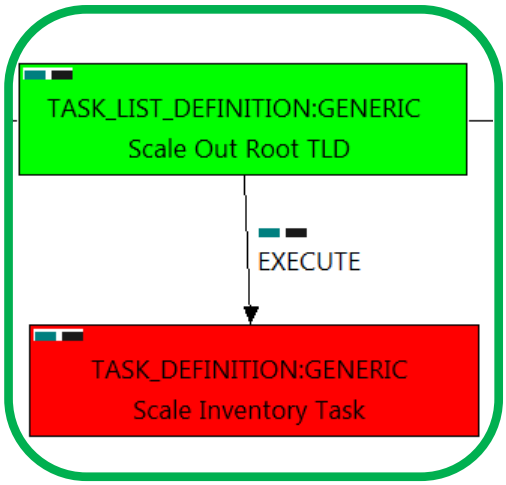


Figure 157 scale Inventory task.

10.2 Scale Out Root TLD: Scale Inventory Task.

This TD is the responsible to list and harvest all the artifacts and realtionships of the Virtual Machine that is going to be escalated, inside this TD another workflow will be thrown," WF_NFVD_CREATE_INSTANCES_FROM_TEMPLATE_ROOT", it will be the responsible of the creation of the new instances related to the new Virtual Machine as from the templates.

Once finished, our Scale should have the template to start the creation and deployment processes of the newly escalated Virtual Machine.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Scale Inventory Task
FIND.MainArtifact ==
VNF>POLICY:ENTITY_RANGE,
VNF>VNF_COMPONENT>POLICY:ENTITY_RANGE,
VNF_COMPONENT>POLICY:ENTITY_RANGE
EXECUTE.Workflow ==
"WF_TS_SCALE_OUT_COMPONENT"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

The Workflow present in EXECUTE.Workflow it is going to seek an ENTITY_RANGE in Status INSTANTIATED in the DDBB, when the WF find it, it will start. This workflow assign all the resources needed by the newly instantiated Virtual Machine to get a successful Deploy, it will check the available resources and decide which one should be assigned.

The creation of instances for the newly created Virutal Machine it uses another WF that it is called from our workflow, "WF_NFVD_CREATE_INSTANCES_FROM_TEMPLATE_ROOT".

In case of error during the execution, the workflow jump to the ROLLBACK category, if the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. In this case, the TLD has not assigned a rollback workflow, so in this case the TD will only change the status of the artifact which is being used.

Due to that the value of the attribute DATA.Lock is false, once the TD has finished, no element used in the previous execution will be set as "Locked".

.

10.3 TLD QUOTA ASSIGNMENT: Quota Assignment Task.

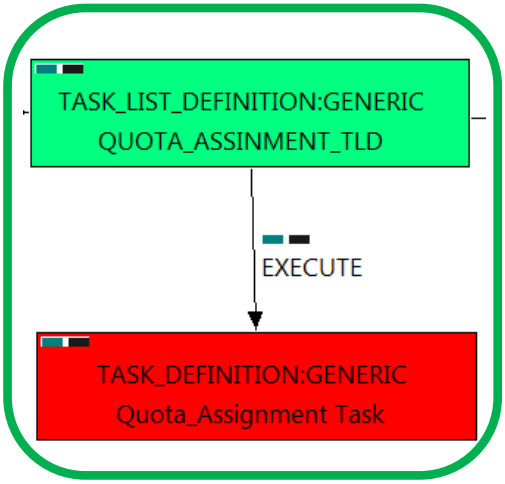


Figure 158 Quota Assignment task.

The TDs that have present in the their names "Assignment", are Task Definitions responsible of the assignation of resources for an specific artifact, in the case of the quotas, the TLD it is going to assign an amount of each resource needed for the correct execution of the deployment.

Once finished, our VNF should have every quota needed for a successful deployment assigned, having taken in consideration all the rules for the assignment. This is crucial, because our component consume quotas during the execution of the TLD.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Quota_Assignment Task
FIND.MainArtifact == **VNF,VNF_COMPONENT<VNF**
EXECUTE.Workflow == **"WF_NFVD_ASSIGNMENT_QUOTA"**
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
DATA.Lock == true
INPUT_MAPPING.MAPPING_LIST ==
assignmentRelationshipID=Quota_Assignment;
resourceTreeID=nfvd#quotaResourceID;
cacheLevel=full

The Workflow present in EXECUTE.Workflow it is going to seek a VNF in Status INSTANTIATED in the DDBB, when the WF find it, it will start. This workflow assign all the resources needed by the VNF to get a successful Deploy, it will check the available resources and decide which one should be assigned.

The Workflow also check the affinity policies , in case our TLD has it, the way the assignation it is going to behave depends also of this policies, once checked, we launch the assignation of resources.

The assignation of resources it uses another WF that it is called from our workflow, "WF_NFVD_ASSIGN_RESOURCES".

In case of error during the execution, the workflow jump to the ROLLBACK category, if the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. In this case, the TLD has not assigned a rollback workflow, so in this case the TD will only change the status of the artifact which is being used.

Due to that the value of the attribute DATA.Lock is true, once the TD has finished, the Quota recently assigned, will be blocked.

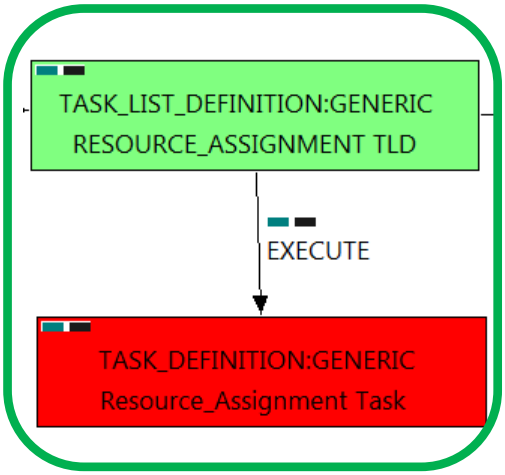


Figure 159 Assignment of the resources

The TDs that have present in their names "Assignment", are Task Definitions responsible of the assignation of resources for a specific artifact or deploy, in this case, we are looking for a VNF to assign the resources needed for the future deployment. In order to have a successful assignation we must have in our TLD Deploy VNF an artifact POLICY: ASSIGMENT_RELATIONSHIP, with a GENERAL.Name=="Resource_Assigment", also this artifact must be related with the OPERATION_GROUP: GENERIC of our TLD with a relationship of type PROVIDES and status ENABLED.

Once finished, our VNF should have every resources needed for a successful deployment assigned, having taken in consideration all the rules for the assignment.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == RESOURCE_ASSIGNMENT
FIND.MainArtifact == **VNF,VNF_COMPONENT<VNF.**
EXECUTE.Workflow == **"WF_NFVD_ASSIGNMENT_WITHOUTCACHE"**
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
DATA.Lock == true
INPUT_MAPPING.MAPPING_LIST ==
assignmentRelationshipID=Resource_Assignment;
resourceTreeID=resourceArtifactID;
def_exclusion_list=TENANT:OPENSTACK,NETWORKING, COMPUTE,IMAGE_STORAGE

The Workflow present in EXECUTE.Workflow it is going to seek a VNF in the DDBB with the path given by the FIND.MainArtifact attribute, when the WF find it, it will start. This workflow assign all the resources needed by the VNF to get a successful Deploy, it will check the available resources and decide which one should be assigned.

The Workflow also check the affinity policies , in case our TLD has it, the way the assignation it is going to behave depends also of this policies, once checked, we launch the assignation of resources.The assignation of resources it uses another WF that it is called from our workflow, "WF_NFVD_ASSIGN_RESOURCES".

In case of error during the execution, the workflow jump to the ROLLBACK category, if the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. In this case, the TLD has not assigned a rollback workflow, so in this case the TD will only change the status of the artifact which is being used.

Due to that the value of the attribute DATA.Lock is true, once the TD has finished, the artifact recently assigned, will be blocked.

10.5 TLD IMAGE PERMISSION: CHECK_IMAGE_PERMISSION.

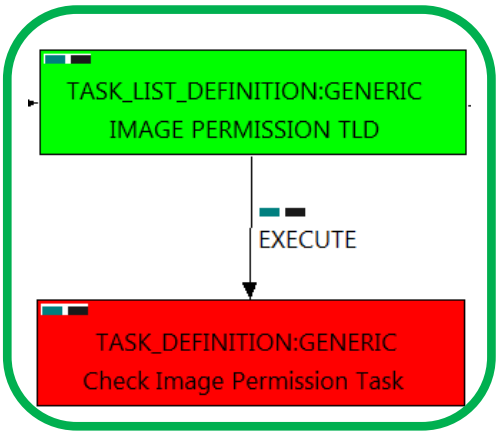


Figure 160 checking the image permissions.

The TDs that have present in the their names "Provision", are Task Definitions responsible of the creation and store of an artifact in DDBB, in this case, the artifact that it is going to be provisioned it is an "TENANT:OPENSTACK", this means, when this workflow finish, we will have a new artifact "TENANT:OPENSTACK" in our DDBB, as well, due to the nature of the artifact, the artifact will be prepared to be activated in the platform Openstack when will be required.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	CHECK_IMAGE_PERMISSION
FIND.MainArtifact ==	**VNF>VNF_COMPONENT> VIRTUAL_MACHINE@status=INSTANTIATED, VNF_COMPONENT> VIRTUAL_MACHINE@status=INSTANTIATED**
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	INSTANTIATED.
EXECUTE.Workflow ==	**"WF_TS_CHECK_VM_IMAGE"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	ROLLBACK
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow it is going to seek a VIRTUAL_MACHINE in Status INSTANTIATED in the DDBB, when the WF find it, it will start. This workflow will start another two more, the one that check the permissions of the IMAGE, "WF_TS_CHECK_IMAGE_PERMISSIONS", and the one that will deploy our IMAGE if it is not deployed, "WF_TS_DEPLOY_IMAGE".

In case of IMAGE managed by VIM, "WF_TS_CHECK_IMAGE_PERMISSIONS will work the same way, however in that case "WF_TS_DEPLOY_IMAGE" couldn't work the same way, the image can be reused it previously has been deployed in the VIM, but can not generate a new deployed IMAGE.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. If an error take place in this TD , no action will be taken, the execution of the TLD will try to start a rollback workflow but there is not a workflow to be executed in the attribute ROLLBACK.Workflow, so the execution will continue.

Due to that the value of the attribute DATA.Lock is true, once the TD has finished, the artifact recently checked, will be blocked.

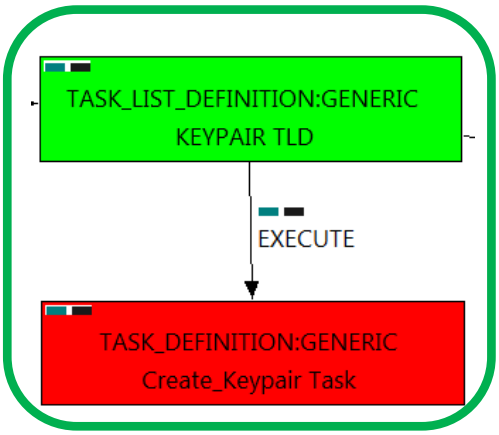


Figure 161 Creation the Keypair element.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "TENANT:OPENSTACK", this means, when this workflow finish, we will have a TENANT:OPENSTACK with status ACTIVE in our Openstack platform, also the TD will update the status and other attributes of the instance that represents the artifact TENANT:OS in the DDBB and in the platform, creating all the relationships needed for a correct activation.

Targets of the TASK DEFINITION: STATUS of the TD:
ENABLED

GENERAL.Name == CREATE_KEYPAIR
FIND.MainArtifact ==
VNF>VNF_COMPONENT>VIRTUAL_MACHINE@status=INSTANTIATED, VNF_COMPONENT>VIRTUAL_MACHINE@status=INSTANTIATED
FIND.Condition ==
KEYPAIR.Pubkey_Data != null || KEYPAIR.Pubkey_Path != null
SET.Running_Status == INSTANTIATED.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_NFVD_CREATE_KEY_PAIR_INVENTORY"
EXECUTE.Inactive== false
EXECUTE.OrderBy ==
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow it is going to seek a VIRTUAL_MACHINE in Status INSTANTIATED in the DDBB, also the artifact which we are looking for have to match the FIND.Condition, means, that our VM must have as KEYPAIR.Pubkey_Data a not null value, neither can be null the value in KEYPAIR.Pubkey_Path, if the TD find some artifact that fill all the conditions, the WF will start the creation of the KEY_PAIR.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts.

In this case, there is not a workflow designated for the Rollback process, so in case of error the TD will change the status of the artifact identified by the specific ID which it is been used during the execution of the Workflow.

The attribute "DATA.Lock" is set with a true value, so when the WF has finished its execution, the TLD will lock the artifact identified by the ID used in the execution of the workflow.

10.7 TLD INVENTORY: Create_Flavor Task

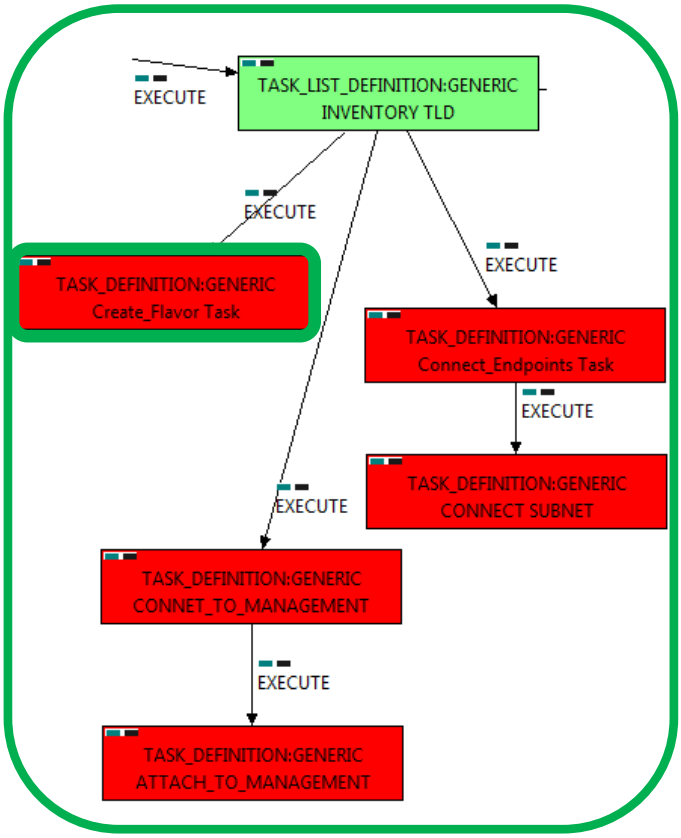


Figure 162 Creation of a Flavor

This TD it is going to create the FLAVORS needed for each VMs to be activated later on**, this means, the WFs implied in this TLD are going to check each element of our VMs to gather all the information needed to create a specific FLAVOR artifact, during the execution of the TD, the ENTITY_SCALE Policies are going to be consulted, the situation of these policies are required for the correct creation of the FLAVOR.**

Once finished, we will have a number of FLAVORS bonded to a VM or VMs, prepare to be activated with these FLAVORS.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	CREATE_FLAVOR
FIND.MainArtifact ==	**VNF,VNF_COMPONENT<VNF**
EXECUTE.Workflow ==	**"WF_NFVD_CREATE_FLAVOR_INSTANCES"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	ROLLBACK
ROLLBACK.Number_of_retries==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow it is going to seek a VNF with Running_Status INSTANTIATED in the DDBB, if the WF find some artifact that fill all the conditions, it will start.

This workflow will start another two more, the one that check if the FLAVOR needs Extra_Specs, a special set of configurations for the FLAVOR, "WF_NFVD_CREATE_FLAVOR_EXTRA_INVENTORY", and the one that will create the Flavor Instance in OPENSTACK platform, "WF_NFVD_CREATE_FLAVOR_OS_INSTANCE".

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. If an error take place in this TD , no action will be taken, the execution of the TLD will try to start a rollback workflow but there is not a workflow to be executed in the attribute ROLLBACK.Workflow, so the execution will continue without error.

Due to that the value of the attribute DATA.Lock is true, once the TD has finished, the artifact recently created, will be blocked.

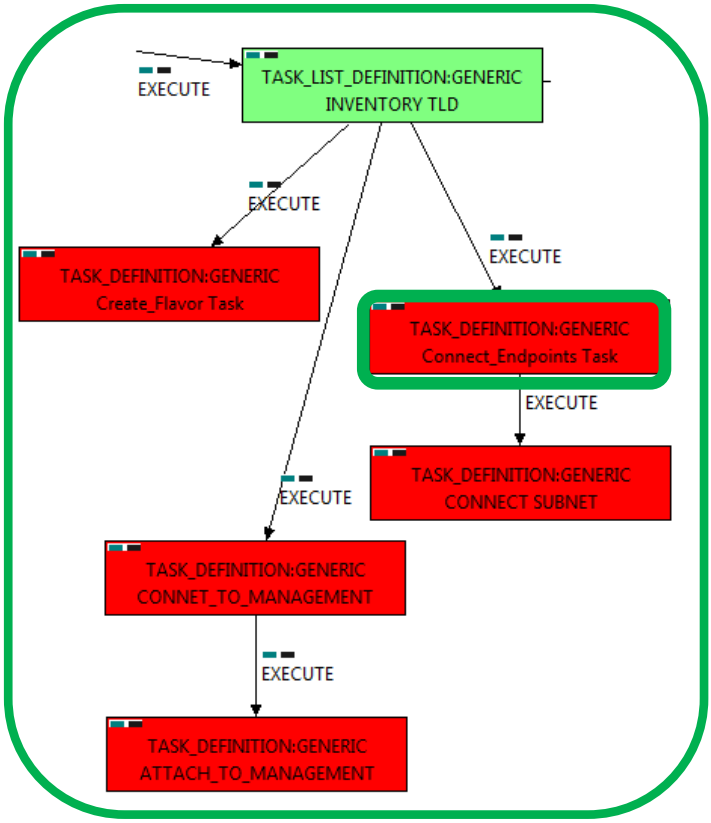


Figure 163 Connection of the Endpoints.

This TD it is going to check and manage all the new EndPoints needed by the newly created Virtual Machine, during the Scale Out Process the Virtual Machine origin will be harvested to know how much End Points exist, and where they are connected. This TD is the responsible of this specific task.

Once finished, we will have a number of End-Points correctly set and connected to the adequate elements and artifacts.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Connect_Endpoint
FIND.MainArtifact == **VNF, VNF_COMPONENT<VNF**
EXECUTE.Workflow == **"WF_NFVD_CONNECT_VNF_ENDPOINT"**
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow it is going to take the specific End Point origin in the artifact origin, if the WF find some artifact that fill all the conditions, it will start.

The workflow will check and create all the artifacts and relationship needed in order to make the new Virtual Machien accessible from the other components. Once finished, the Escalated Virtual Machine will have all the Eps of the old machine cloned, properly configurated in the new machine.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. If an error take place in this TD , no action will be taken, the execution of the TLD will try to start a rollback workflow but there is not a workflow to be executed in the attribute ROLLBACK.Workflow, so the execution will continue without error.

Due to that the value of the attribute DATA.Lock is true, once the TD has finished, the artifact recently created, will be blocked.

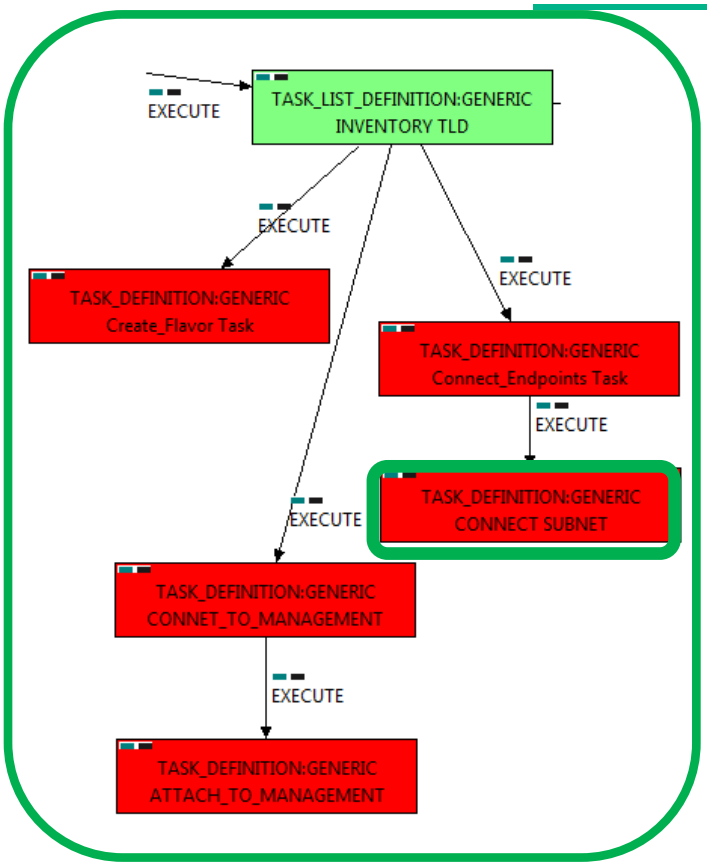


Figure 164 Connection of the Subnetwork to the VPort.

The TDs that have present in the their names "Connect", are Task Definitions responsible of the connection between artifacts, this means, this TDs will create relationship of specific kind between concrete artifacts, in this case, the WF it is going to query the DDBB looking for all the VIRTUAL_LINK:END_POINTS with Status "TO_BE_CONNECTED", once the WF has the VL:EP, it will query for all the SUBNETWORKS, NETWORKS and IPADDRESS of the VL, when the WF reach this point, it will query for the VPORTS related to these artifacts, after that, it is going to evaluate the relationships between the previously mentioned artifacts and the VPORTS, creating VPORTs and new relationships of type ALLOCATED and USES depending on the artifacts which are going to be related, mainly, SUBNETWORKs and VPORTs. The last thing this WF will do is change the status of the relationship between VL:EPs and the VNF:EP to CONNECTED.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	CONNECT SUBNET
FIND.MainArtifact ==	**VNF>VNF_ENDPOINT, VNF_COMPONENT<VNF>VNF_ENDPOINT**
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	INSTANTIATED.
EXECUTE.Workflow ==	**"WF_TS_CONNECT_VM_SUBNET"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	ROLLBACK
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow it is going to seek a VNF_ENDPOINT with Running_Status INSTANTIATED in the DDBB, if the WF find some artifact that fill all the conditions, it will start.

In case of error during the execution, the workflow jump to the ROLLBACK category, if the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. If an error take place in this TD, no action will be taken, the execution of the TLD will try to start a rollback workflow but there is not a workflow to be executed in the attribute ROLLBACK.Workflow, so the execution will continue without error.

Due to that the value of the attribute DATA.Lock is true, once the TD has finished, the artifact recently created, will be blocked.

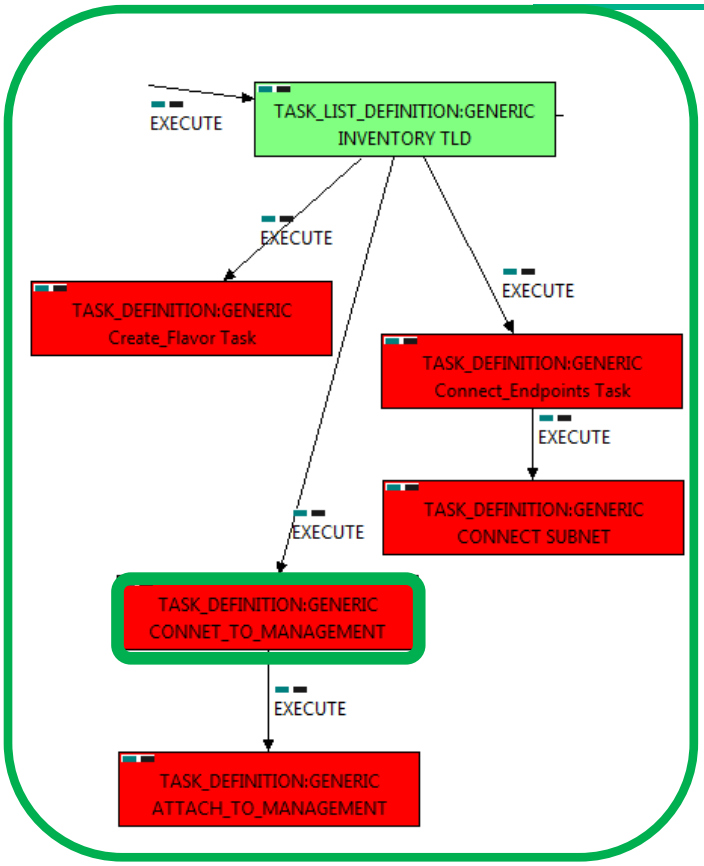


Figure 165 Connection to the management network.

The TDs that have present in the their names "Connect", are Task Definitions responsible of the connection between artifacts, this means, this TDs will create relationship of specific kind between concrete artifacts, in this case, it will create relationships of type USES and status ENABLED between a specific VIRTUAL_PORT, and the SUBNETWORKS (or the subnetworks's IPADDRESS:GENERIC) related as children of our VIRTUAL_LINK:MANAGEMENT that we are using.

Once finished, we should have all SUBNETWORKs related as children of our VL:MANAGEMENT bonded with a relationship of type USES and status ENABLED with the VIRTUAL_PORT found by the conditions of the TD.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	CONNET_TO_MANAGEMENT
FIND.MainArtifact ==	**VNF>VNF_COMPONENT> VIRTUAL_MACHINE@status=INSTANTIATED> VIRTUAL_PORT@status=INSTANTIATED# INFO.NetworkType=MANAGEMENT, VNF_COMPONENT> VIRTUAL_MACHINE@status=INSTANTIATED> VIRTUAL_PORT@status=INSTANTIATED# INFO.NetworkType=MANAGEMENT**
EXECUTE.Workflow ==	**"WF_TS_CONNECT_MANAGEMENT_NETWORK"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	ROLLBACK
ROLLBACK.Number_of_retries =	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow it is going to seek a VIRTUAL_PORT with Running_Status INSTANTIATED in the DDBB, if the WF find some artifact that fill all the conditions, it will start.

This workflow it is going to create a relationship of type USES and status INSTANTIATED between the VIRTUAL_PORT found and each SUBNETWORK of our VL:MANAGEMENT, in case that the SUBNETWORKS have IPADDRESS as children, the relationship would be created between these IPs and the VP.

In case of error during the execution, the workflow jump to the ROLLBACK category, if the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. If an error take place in this TD, no action will be taken, the execution of the TLD will try to start a rollback workflow but there is not a workflow to be executed in the attribute ROLLBACK.Workflow, so the execution will continue without error.

Due to that the value of the attribute DATA.Lock is true, once the TD has finished, the artifact recently created, will be blocked.

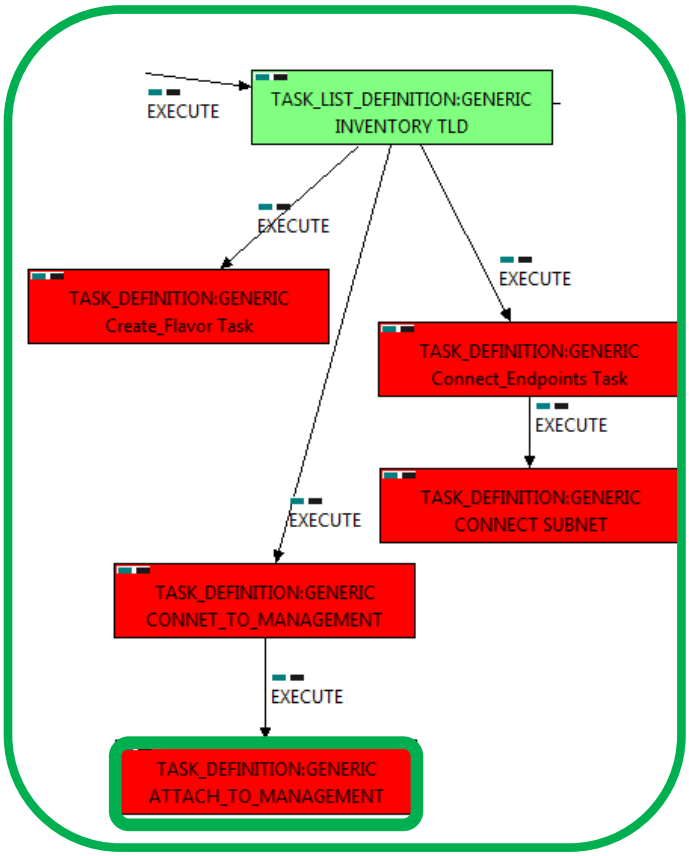


Figure 166 Attaching the Management Network.

The TDs that have present in the their names "Attach", are Task Definitions responsible of the connection between artifacts, this means, this TDs will create relationship of specific kind between concrete artifacts, in this case, it will create relationships of type ALLOCATED and status ENABLED between a specific VIRTUAL_PORT, and the SUBNETWORKS:DCN (or the subnetworks's IPADDRESS:GENERIC) related as children of our NETWORK:DCN that belongs to the VIRTUAL_LINK:MANAGEMENT that we are using, and the SUBNETWORK:OS of Management.

Once finished, we should have all SUBNETWORK: DCN and SUBNETWORK: OS related as children of our VL:MANAGEMENT bonded with a relationship of type ALLOCATED and status ENABLED with the VIRTUAL_PORT found by the conditions of the TD.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == ATTACH_TO_MANAGEMENT
EXECUTE.Workflow == **"WF_TS_CONNECT_MGMT_NET_VPORT"**
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

This TD is going to use the attributes of the previous TD to be executed, if the WF find some artifact that fill the conditions, it will start. If the activation it is successful we set the status of the artifact as the SET.Status attribute dictates.

This workflow it is going to create a relationship of type ALLOCATED and status INSTANTIATED between the VIRTUAL_PORT found and each SUBNETWORK:DCN and SUBNETWORK:OS of our VL:MANAGEMENT, in case that the SUBNETWORKS have IPADDRESS as children, the relationship would be created between these IPs and the VP.

In case of error during the execution, the workflow jump to the ROLLBACK category, if the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. If an error take place in this TD, no action will be taken, the execution of the TLD will try to start a rollback workflow but there is not a workflow to be executed in the attribute ROLLBACK.Workflow, so the execution will continue without error.

Due to that the value of the attribute DATA.Lock is true, once the TD has finished, the artifact recently created, will be blocked.

10.12 SCALE OUT PRE TLD: SCALE OUT PRE

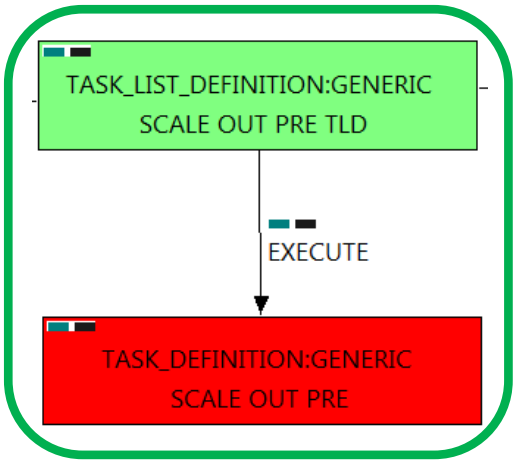


Figure 167 Deploying Pre-Process policies.

This TD is responsible of the provision in the right order of the artifacts referenced by the PreProcessing policies, these policies allow the user to set a number of elements that should be taken in consideration in a certain order, in other case, the execution will fail depending on the event occurred.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
FIND.MainArtifact ==	POLICY:POSTPRE_PROCESSING
FIND.Condition ==	**PROCESSING_JOB.Job_type==constant:PRE&& PROCESSING_JOB.Operation==constant:SCALEOUT**
EXECUTE.OrderBy ==	PROCESSING_JOB.OrderBy
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	false

In this TD there is not a workflow to be executed, the target of this TD is process in the correct order the PreProcessing policies present in the VNF, these policies should be executed in a specific order to make the changes or configurations properly, in other case an error will be launched

If the TD ends successfully, the Pre-Processing policies will have been processed adequately.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK,but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will stop.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "KEYPAIR", this means, when this workflow finish, we will have a KEYPAIR with status ACTIVE.

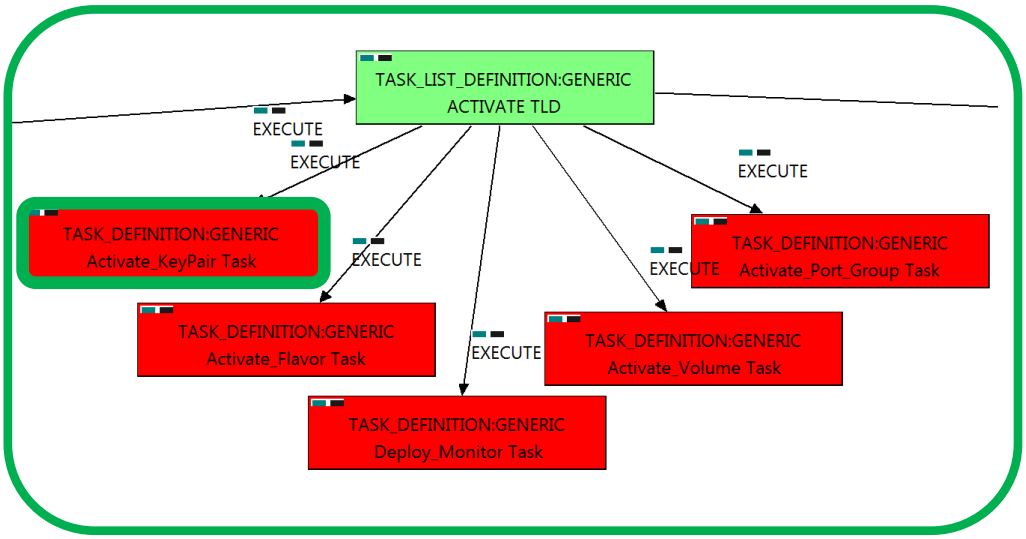


Figure 168 Activation of the Keypair.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == Deploy Monitor
FIND.MainArtifact==
VNF>VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE<REGION>COMPUTE>KEY_PAIR,
VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE<REGION>COMPUTE>KEY_PAIR
FIND.Condition== **status==constant:INSTANTIATED**
SET.Running_Status == INSTANTIATED.
SET.Status == ACTIVE.
EXECUTE.OrderBy == **GENERAL.order**
EXECUTE.Workflow== **"WF_TS_CREATE_KEY_PAIR"**
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute is going to seek a KEYPAIR that match the FIND.Condition attribute with value "KEYPAIR.Pubkey_Data==%GENERAL.Pubkey_Data%" also given by the path represented by the attribute FIND.Path : "VNF>VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE<REGION>COMPUTE>KEY_PAIR@status=INSTANTIATED,VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE<REGION>COMPUTE>KEY_PAIR@status=INSTANTIATED" in Status INSTANTIATED in the DDBB, notice that we are not trying to get a VNF or VNF_COMPONENT in status INSTANTIATED.

Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, in this case, we have a "ROLLBACK" set as behavior, so the rollback process will start when the TD reaches this point, it will throw an error due there is no workflow assigned to be executed during the rollback.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "FLAVOR", this means, when this workflow finish, we will have a FLAVOR with status ACTIVE associated to the VIRTUAL_MACHINE that it is going to use it in the activation.

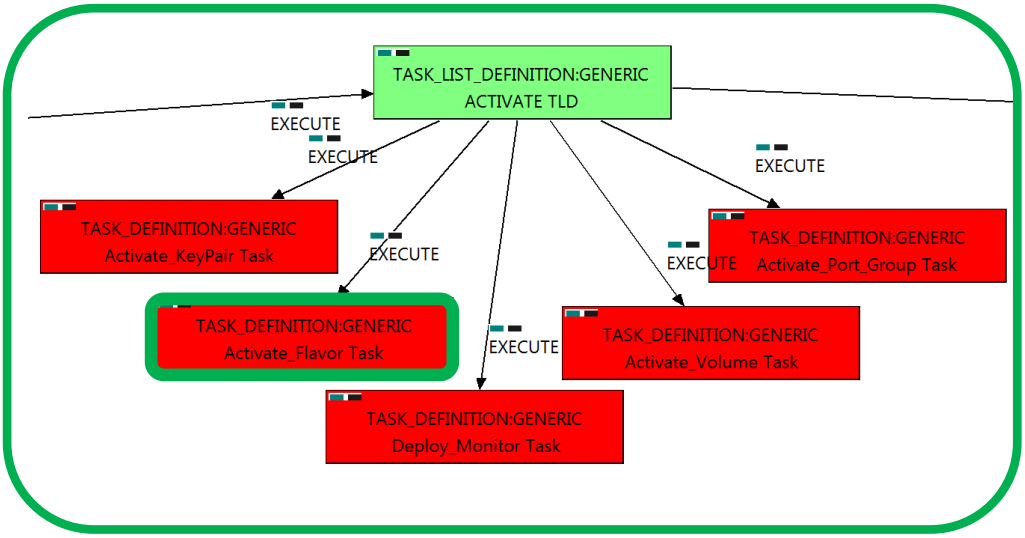


Figure 169 Activation of the Flavor

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == ACTIVATE_FLAVOR
FIND.MainArtifact==
VNF>VNF_COMPONENT>VIRTUAL_MACHINE>
VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE<REGION>COMPUTE>FLAVOR,
VNF_COMPONENT>VIRTUAL_MACHINE>
VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE<REGION>COMPUTE>FLAVOR
SET.Running_Status == INSTANTIATED.
SET.Status == ACTIVE.
EXECUTE.Workflow == **"WF_TS_ACTIVATE_FLAVOR"**
EXECUTE.Inactive == false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a FLAVOR in Status INSTANTIATED in the DDBB . Notice that we are not trying to get a VIRTUAL_MACHINE in status INSTANTIATED. The query it is going to use the Path present in the category FIND. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, in this case, we have a "ROLLBACK" set as behavior, so the rollback process will start when the TD reaches this point, it will throw an error due there is no workflow assigned to be executed during the rollback.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

The TDs that have present in the their names "Deploy" are Task Definitions responsible of the deployment in the platform targeted and the updating of the status in the platform and the DDBB , these deployments are slightly different to the ones we launch for our entities, as a rule, they are small components as the MONITORs. In this case, the artifact that is going to be deployed is a "MONITOR", this means, when this workflow finish, we will have a MONITOR deployed with status DEPLOYED.

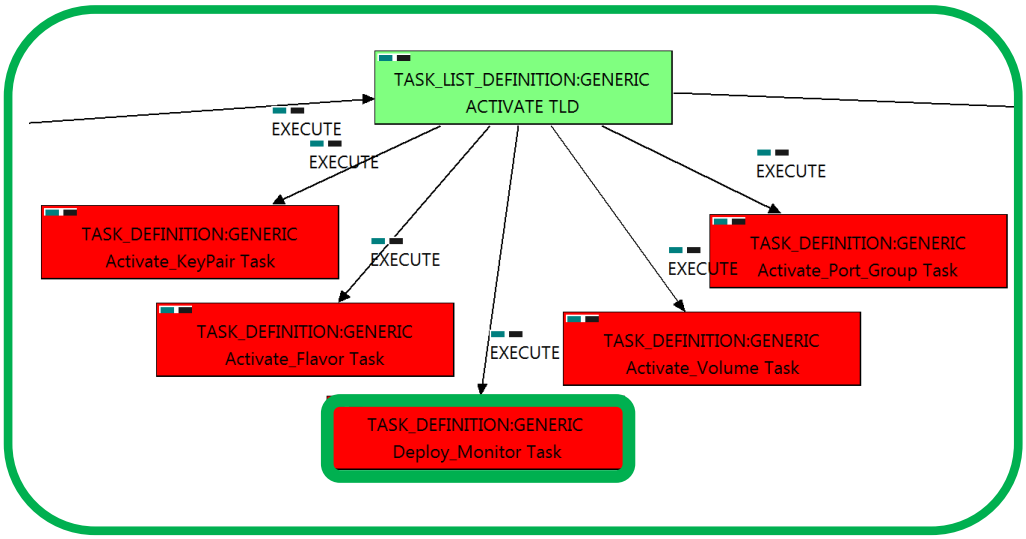


Figure 170 Deployment of a Monitor

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name ==	Deploy Monitor
FIND.Condition==	**status==constant:INSTANTIATED**
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	DEPLOYED.
EXECUTE.OrderBy ==	**GENERAL.order**
EXECUTE.Workflow==	**"WF_TS_MONITOR_DEPLOY"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	ROLLBACK
ROLLBACK.Number_of_retries ==	0
ROLLBACK.Workflow ==	**"WF_TS_MONITOR_UNDEPLOY"**
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a MONITOR in Status INSTANTIATED in the DDBB . Once found , the WF will start the deployment, if the deployment is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, in this case the workflow will be **"WF_TS_MONITOR_UNDEPLOY"** the TD will initiate the rollback process launching the previous workflow.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "FLAVOR", this means, when this workflow finish, we will have a FLAVOR with status ACTIVE associated to the VIRTUAL_MACHINE that it is going to use it in the activation.

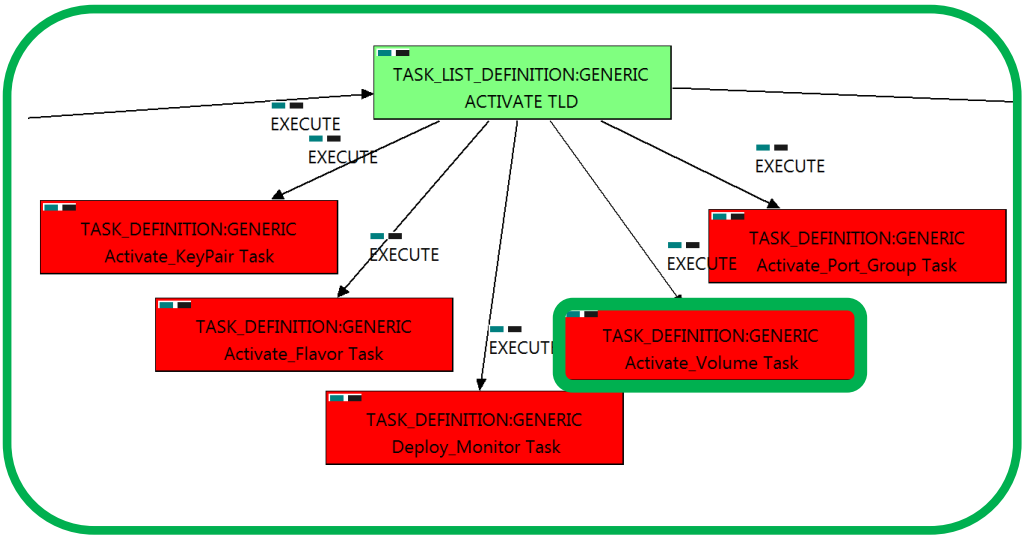


Figure 171 Activation of the Volume.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name ==	Activate_Volume Task
FIND.MainArtifact==	**VNF>VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_LUN@status=INSTANTIATED, VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_LUN@status=INSTANTIATED**
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	CREATED.
EXECUTE.Workflow ==	**"WF_TS_CREATE_VOLUME"**
EXECUTE.Inactive ==	false
ROLLBACK.Behaviour_on_error ==	ROLLBACK
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a VIRTUAL_LUN in Status INSTANTIATED in the DDBB . Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, in this case, we have a "ROLLBACK" set as behavior, so the rollback process will start when the TD reaches this point, it will throw an error due there is no workflow assigned to be executed during the rollback.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "PORT_GROUP:VCENTER", this means, when this workflow finish, we will have a PORT_GROUP with status ACTIVE associated to the VSWITCH:VCENTER that it is going to be used in the activation.

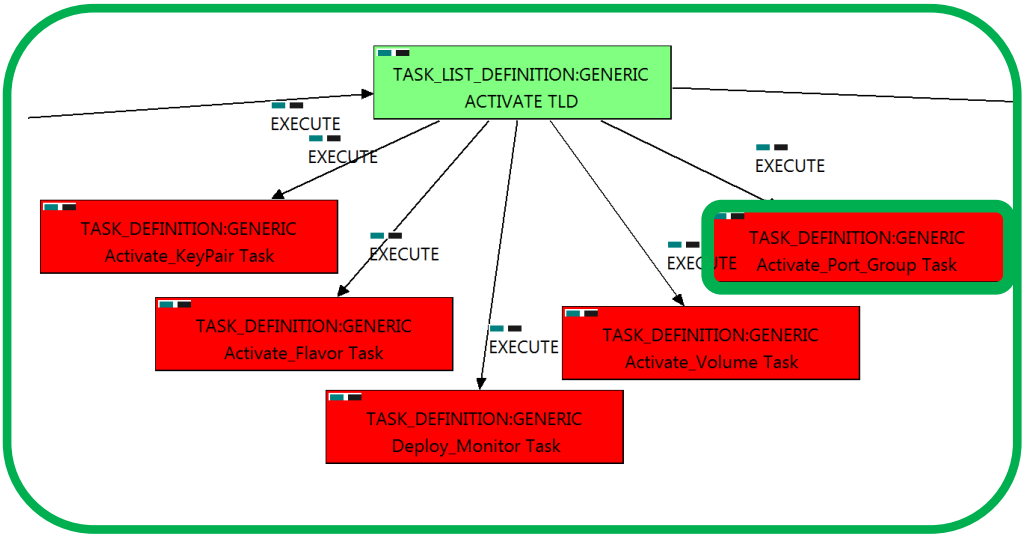


Figure 172 Activation of the Port Group associated.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name ==	ACTIVATE_FLAVOR
FIND.MainArtifact==	**VNF>VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_PORT<PORT_GROUP, VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_PORT<PORT_GROUP**
SET.Status ==	ACTIVE.
EXECUTE.Workflow ==	**"WF_TS_ACTIVATE_PORT_GROUP_VCENTER"**
EXECUTE.Inactive ==	false
ROLLBACK.Behaviour_on_error ==	ROLLBACK
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to find a PORT_GROUP in Status INSTANTIATED in the DDBB. Notice that we are not trying to get a VNF in status INSTANTIATED. The query it is going to use the Path present in the category FIND.MainArtifact. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. If the TD ends properly the user will have a fully activated PORT_GROUP, related to a VSWITCH:VCENTER as children.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, in this case, we have a "ROLLBACK" set as behavior, so the rollback process will start when the TD reaches this point, it will throw an error due there is no workflow assigned to be executed during the rollback.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

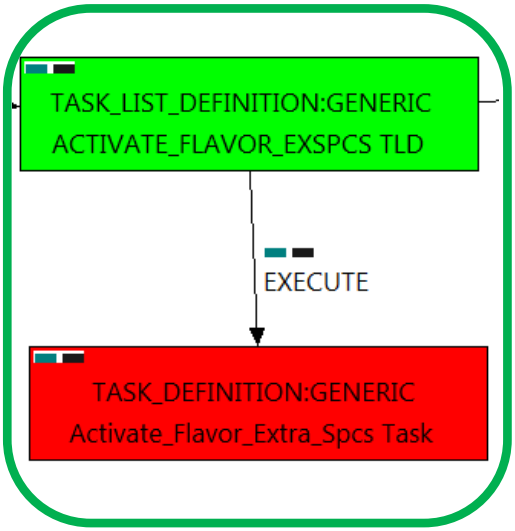


Figure 173 : Activation of the Flavor Extra Specs.

10.18 TLD ACTIVATE Flavor ES: **ACTIVATE**_FLAVOR_EXTRA_SPECS.

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "FLAVOR" with EXTRA_SPECS, this means, when this workflow finish, we will have a FLAVOR with EXTRA_SPECS with status ACTIVE associate to the VIRTUAL_MACHINE that it is going to use it in the activation.

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED

GENERAL.Name == ACTIVATE_FLAVOR_EXTRA_SPECS
FIND.MainArtifact ==
VNF>VNF_COMPONENT>VIRTUAL_MACHINE> VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE<REGION> COMPUTE>FLAVOR>EXTRA_SPECS:HELION_CG@status=INSTANTIATED, VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_CORE<CORE <CPU<SERVER<AVAILABILITY_ZONE<REGION>COMPUTE> FLAVOR>EXTRA_SPECS:HELION_CG@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
Set.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_ACTIVATE_ATTACH_EXTRA_SPECS"
EXECUTE.Inactive== false
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "HELION_CG" in Status INSTANTIATED in the DDBB . Notice that we are not trying to get a VIRTUAL_MACHINE in status INSTANTIATED. The query it is going to use the Path present in the attribute FIND.MainArtifact. Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, in this case, we have a "ROLLBACK" set as behavior, so the rollback process will start when the TD reaches this point, it will throw an error due there is no workflow assigned to be executed during the rollback.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

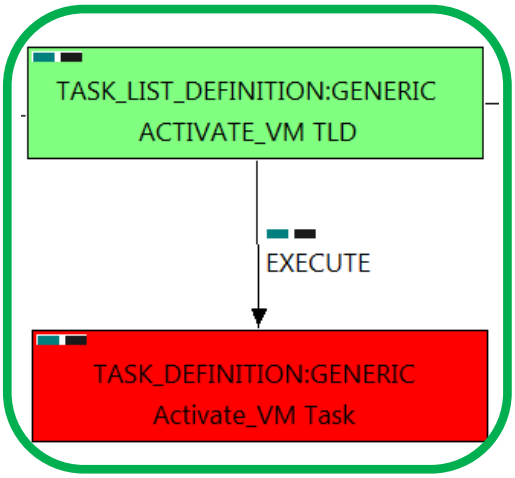


Figure 174 : Activation of Virtual Machine related to the VNF.

10.19 TLD ACTIVATE VM: ACTIVATE_VM

The TDs that have present in the their names "Activate", are Task Definitions responsible of the activation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be activated is a "VIRTUAL_MACHINE, this means, when this workflow finish, we will have a VIRTUAL_MACNIHE with status ACTIVE.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	ACTIVATE_VM
FIND.MainArtifact==	**VNF>VNF_COMPONENT> VIRTUAL_MACHINE@status=INSTANTIATED, VNF_COMPONENT> VIRTUAL_MACHINE@status=INSTANTIATED**
SET.Running_Status ==	INSTANTIATED.
Set.Status ==	ACTIVE.
EXECUTE.OrderBy ==	**GENERAL.order**
EXECUTE.Workflow ==	**"WF_TS_ACTIVATE_VM"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	ROLLBACK
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "VIRTUAL_MACHINE" in Status INSTANTIATED in the DDBB. Once found, the WF will start the activation of the Virtual Machine, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

This TD could launch different workflows depending on the type of the VM that it is going to be activated, the main kinds of our VIRTUAL_MACHINEs are CG and HELION, and so two of the WFs that are going to be used in this activation are: "WF_TS_ACTIVATE_VM_CARRIER_GRADE" and "WF_TS_ACTIVATE_VM_HELION". In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, in this case, we have a "ROLLBACK" set as behavior, so the rollback process will start when the TD reaches this point, it will throw an error due there is no workflow assigned to be executed during the rollback.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

10.20 TLD DEPLOY POST: DEPLOY POST.

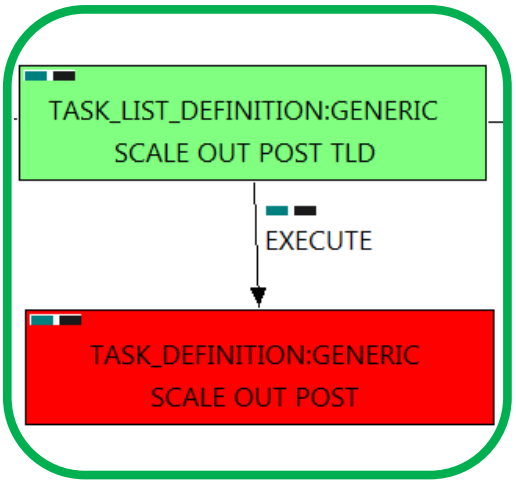


Figure 175 Deploying Post-Processing policies.

This TD is responsible of the provision in the right order of the artifacts referenced by the Post-Processing policies, these policies allow the user to treat a number of elements that should be taken in consideration after the execution of some TD in a specific order, in other case, the execution will fail depending on the event occurred.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
FIND.MainArtifact ==	POLICY:POSTPRE_PROCESSING
FIND.Condition ==	**PROCESSING_JOB.Job_type==constant:POST&& PROCESSING_JOB.Operation==constant:SCALEOUT**
EXECUTE.OrderBy ==	PROCESSING_JOB.OrderBy
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	false

In this TD there is not a workflow to be executed, the target of this TD is process in the correct order the PostProcessing policies present in the VNF, these policies should be executed in a specific order to make the changes or configurations properly, in other case an error will be launched

If the TD ends successfully, the Post-Processing policies will have been applied adequately.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK.

Due to that the value of the attribute DATA.Lock is fase, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

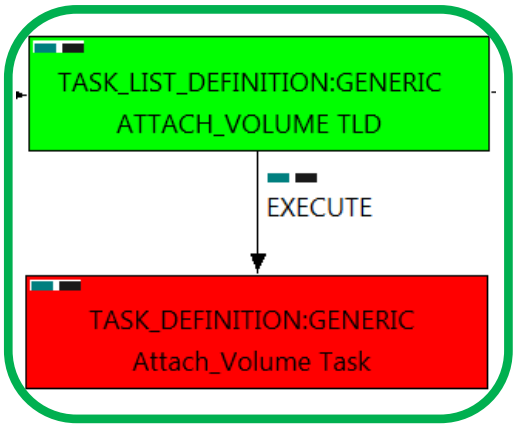


Figure 176 Attaching of the Volume used.

The TDs that have present in the their names "Attach", are Task Definitions responsible of the connection between artifacts, this means, this TDs will attach a VOLUME to a specific VIM, this specific VIM could change, so the workflow implied in this TD it will launch a custom WF for each kind of VIM. The VOLUMEs that are activated by this TD have two final uses, directly linked with a VIM, or used as External Storage.

Once finished, we should have a number of VOLUMEs activated, liable to a VIM or acting as external Storage.

Targets of the TASK DEFINITION:	STATUS of the TD: ENABLED
GENERAL.Name ==	ATTACH_VOLUME
FIND.MainArtifact==	**VNF>VNF_COMPONENT>VIRTUAL_MACHINE> VIRTUAL_LUN@status=CREATED,VNF_COMPONENT> VIRTUAL_MACHINE>VIRTUAL_LUN@status=CREATED**
SET.Running_Status ==	ACTIVE.
Set.Status ==	ACTIVE.
EXECUTE.Workflow ==	**"WF_TS_ATTACH_VOLUME"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	ROLLBACK
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, in this case, we have a "ROLLBACK" set as behavior, so the rollback process will start when the TD reaches this point, it will throw an error due there is no workflow assigned to be executed during the rollback.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

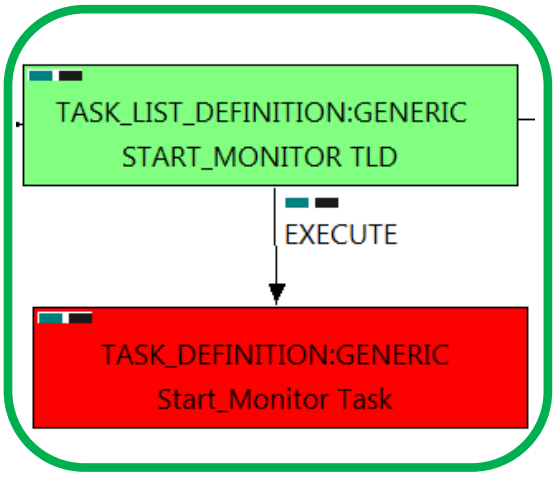


Figure 177 Starting Monitor.

The TDs that have present in the their names "Start" are Task Definitions responsible of the launching of the component in the platform targeted and the updating of the status in the platform and the DDBB , these deployments are slightly different to the ones we launch for our entities, as a rule, they are small components as the MONITORs. In this case, the artifact that is going to be deployed is a "MONITOR", this means, when this workflow finish, we will have a MONITOR deployed with status STARTED ready to monitories.

Targets of the TASK DEFINITION: ENABLED	STATUS of the TD:
GENERAL.Name ==	START_MONITOR
FIND.MainArtifact ==	**MONITOR**
FIND.Condition ==	**status==constant:DEPLOYED**
SET.Running_Status ==	DEPLOYED
SET.Status ==	STARTED.
EXECUTE.OrderBy ==	**GENERAL.order**
EXECUTE.Workflow ==	**"WF_TS_MONITOR_START"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	ROLLBACK
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a MONITOR with Status DEPLOYED.

Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, in this case, we have a "ROLLBACK" set as behavior, so the rollback process will start when the TD reaches this point, it will throw an error due there is no workflow assigned to be executed during the rollback.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

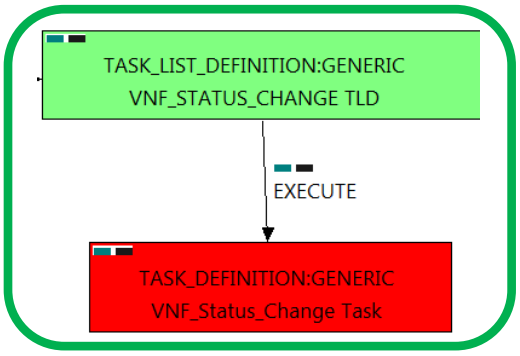


Figure 178 changing the status of the VNF.

The TDs that have present in their names "Status Change", are Task Definitions responsible of the change in the status of the entity associated, in this case a VNF. When the WF has finished we will have an VNF with status ACTIVE in case of successful execution, or status ERROR in case of error, or simply not any change in the status because a ROLLBACK during the execution.

Targets of the TASK DEFINITION: ENABLED	STATUS of the TD:
GENERAL.Name ==	VNF STATUS CHANGE
SET.Running_Status ==	INSTANTIATED.
SET.Status ==	ACTIVE.
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The TASK_DEFINITION do not execute any workflow, with the attributes present in the categories it is enough to change the status of the entity.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The TLD will finish correctly once the execution reaches this point, the VNF will change its status to "ACTIVE".

Chapter 11 Undeploy of a VNF - Default.

From now on, and to make easier the understanding of the TLDs, we are going to explain the functionality of each set of TASK_LIST_DEFINITION:GENERIC, and the number of TASK_DEFINITION:GENERIC children of the previously mentioned TASK_LIST_DEFINITION:GENERIC.

Basically, the TASK_LIST_DEFINITION:GENERIC connect what we can consider “units of execution”, those are the TASK_DEFINITION:GENERIC, that have a WORKFLOW assigned to be executed when the execution of the TLD reach them.

If you like to have a more deep knowledge about the workflows mentioned through this document please refer to the specific document.

**

If in the category FIND, the attribute Path is present, the attribute FIND.ArtifactType will be the starting artifact for the Path, but the FIND.Status attribute refers to the last artifact on the Path.

FIND.ArtifactType == VIRTUAL_MACHINE
FIND.Status== INSTANTIATED
FIND.Path ==
VIRTUAL_MACHINE>VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE<REGION>COMPUTE>FLAVOR

In this example, we are looking for a FLAVOR in status INSTANTIATED, we do not expect to get a VIRTUAL_MACHINE, in status INSTANTIATED.

** If during the use of the TLDs, the “Regenerate UUIDs” option is used, the user should check the Id of the tree that brings all the elements of the TLD, this “id” is specific and it will be the same for all the tree groups in all the TLDs.

** The two modes available are “Default” and “Simulated”, the second one is only available if it is configured previously, by defect, the mode that will be used is “Default”.

11.1 Specific Elements of the TLD Undeploy VNF

In this chapter the different elements of the specific TLD will be explained conscientiously.

11.2 TLD Undeploy PRE VNF: Undeploy PRE.

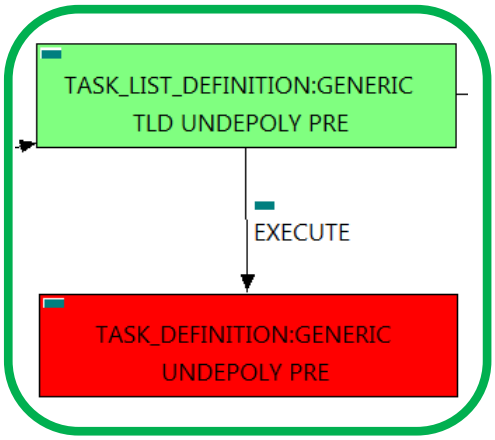


Figure 179: Undeploy Preprocessing policies

This TD is responsible of the deletion in the right order PreProcessing policies, these policies allow the user to set a number of elements that should be taken in consideration in a certain order, during the Undeploy process this policies should be taken down in the right order, in other way the Undeploy could be unsuccessful.

Targets of the TASK DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.MainArtifact == POLICY:POSTPRE_PROCESSING.
FIND.Condition ==
PROCESSING_JOB.Job_type==constant:PRE&&
PROCESSING_JOB.Operation==constant:UNDEPLOY
EXECUTE.OrderBy == *PROCESSING_JOB.OrderBy*

In this TD there is not a workflow to be executed, the target of this TD is process in the correct order the PreProcessing policies present in the VNF, these policies should be executed in a specific order to make the changes or configurations properly, in other case an error will be launched

If the TD ends successfully, the Pre-Processing policies will have been deleted adequately.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK,but in this case, we have a “STOP” as value set for behavior, so no Rollback it is going to be initiated, the execution will stop.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

11.3 TLD Undeploy VNF: STOP_MONITOR.

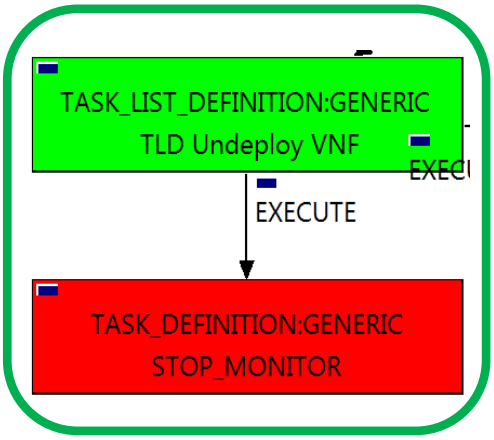


Figure 180: Stop Monitor.

The TDs that have present in the their names "Stop", are Task Definitions responsible of the stopping of an specific artifact or element, in this case of the MONITORs, the TLD it is going to stop the MONITOR element given.

Once finished, our VNF should have the MONITOR given in status DEPLOYED, having taken in consideration all the rules for the stopping.

Targets of the TASK DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.MainArtifact == MONITOR.
FIND.Condition== status==constant:STARTED
SET.Running_Status == STARTED.
SET.Status == DEPLOYED.
EXECUTE.OrderBy == GENERAL.order
EXECUTE.Workflow == *"WF_TS_MONITOR_STOP"*
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

The Workflow present in EXECUTE.Workflow it is going to seek a MONITOR in Status STARTED in the DDBB, when the WF find it, it will start. This workflow stop the given MONITOR needed by the VNF to get a successful Undeploy.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK,but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will stop.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

11.4 TLD Deactivate VM : Deactivate_VM.

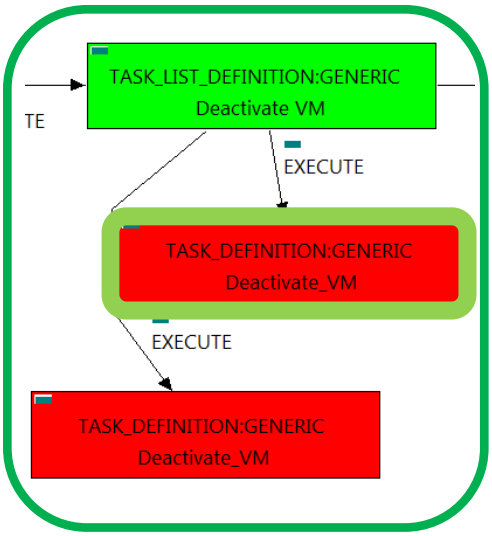


Figure 181: Deactivation of a stopped VM.

The TDs that have present in the their names "Deactivate", are Task Definitions responsible of the deactivation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be deactivated is a "VIRTUAL_MACHINE with status "STOPPED", this means, when this workflow finish, we will have the VIRTUAL_MACNIHE given with a new status INSTANTIATED.

Targets of the TASK DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.MainArtifact ==
VNF>VNF_COMPONENT>
VIRTUAL_MACHINE@status=STOPPED.
SET.Running_Status == ACTIVE.
SET.Status == TERMINATED.
EXECUTE.OrderBy = GENERAL.order
EXECUTE.Workflow == *"WF_TS_DEACTIVATE_VM"*
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
ROLLBACK.Workflow== *"WF_TS_ACTIVATE_VM"*
DATA.Lock == false

The Workflow present in EXECUTE.Workflow attribute it is going to deactivate a "VIRTUAL_MACHINE" in Status ACTIVE in the DDBB . Once found , the WF will start the deactivation, if the deactivation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

This TD could launch different workflows depending on the type of the VM that it is going to be deactivated, the main kinds of our VIRTUAL_MACHINEs are HELION, and thereupon two of the WFs that could be used in this deactivation are: "WF_NFVD_DEACTIVATE_VM_HELION" and "WF_NFVD_DEACTIVATE_VM_OPENSTACK".

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, in this case it will be "WF_TS_ACTIVATE_VM", but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

11.5 TLD Deactivate VM : Deactivate_VM.

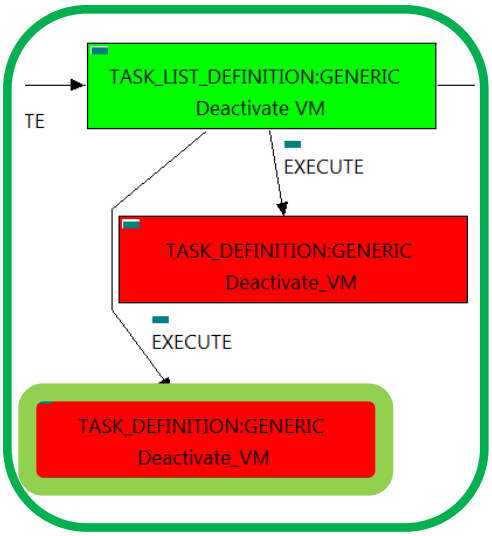


Figure 182: Deactivation of an active VM

The TDs that have present in the their names "Deactivate", are Task Definitions responsible of the deactivation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be deactivated is a "VIRTUAL_MACHINE with status "ACTIVE", this means, when this workflow finish, we will have the VIRTUAL_MACNIHE given with a new status INSTANTIATED.

Targets of the TASK DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.MainArtifact ==
VNF>VNF_COMPONENT>
VIRTUAL_MACHINE@status=ACTIVE.
SET.Running_Status == ACTIVE.
SET.Status == TERMINATED.
EXECUTE.OrderBy = GENERAL.order
EXECUTE.Workflow == *"WF_TS_DEACTIVATE_VM"*
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

The Workflow present in EXECUTE.Workflow attribute it is going to deactivate a "VIRTUAL_MACHINE" in Status ACTIVE in the DDBB . Once found , the WF will start the deactivation, if the deactivation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

This TD could launch different workflows depending on the type of the VM that it is going to be deactivated, the main kinds of our VIRTUAL_MACHINEs are HELION, and thereupon two of the WFs that could be used in this deactivation are: "WF_NFVD_DEACTIVATE_VM_HELION" and "WF_NFVD_DEACTIVATE_VM_OPENSTACK".

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, in this case it will be "WF_TS_ACTIVATE_VM", but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

11.6 TLD Undeploy POST VNF: Undeploy POST.

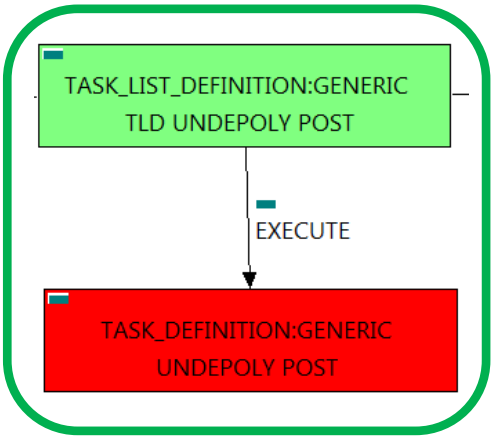


Figure 183: Undeploy Post-processing policies

This TD is responsible of the deletion in the right order Post-processing policies, these policies allow the user to set a number of elements that should be taken in consideration in a certain order after the execution of the component referenced by the policy, during the Undeploy process this policies should be taken down in the right order, in other way the Undeploy could be unsuccessful.

Targets of the TASK DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.MainArtifact == POLICY:POSTPRE_PROCESSING.
FIND.Condition ==
PROCESSING_JOB.Job_type==constant:POST&&
PROCESSING_JOB.Operation==constant:UNDEPLOY
EXECUTE.OrderBy == *PROCESSING_JOB.OrderBy*
EXECUTE.Inactive == false
DATA.Lock == false

In this TD there is not workflow to be executed, the target of this TD is process in the correct order the Post-Processing policies present in the VNF, these policies should be executed in a specific order to make the changes or configurations properly, in other case an error will be launched

If the TD ends successfully, the Pre-Processing policies will have been deleted adequately.

In case of error during the execution, the TD will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK,but in this case, we have a "STOP" as value set for behavior, so no Rollback it is going to be initiated, the execution will stop.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

11.7 TLD Delete vPort: delete vport.

The TDs that have present in their names “Delete”, are Task Definitions that delete an artifact or element from the DDBB or from the platforms targeted, in this case, the artifact that it is going to be delated is the VIRTUAL_PORT given.

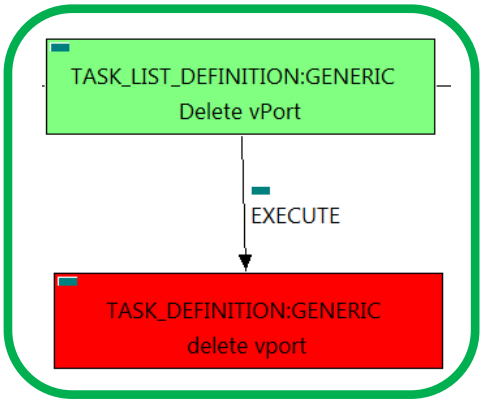


Figure 184: Delete vPort.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.MainArtifact ==
VNF>VNF_COMPONENT>
VIRTUAL_MACHINE>VIRTUAL_PORT@status=ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == ENABLED.
EXECUTE.Workflow == *“WF_TS_DEACTIVATE_PORT”*
EXECUTE.Inactive == false
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

The Workflow present in EXECUTE.Workflow it is going to seek a VIRTUAL_PORT in Status ACTIVE in the DDBB, when the WF find it, it will start. This workflow will start one more, this last one, it is going to be named after the VIRTUAL_PORT that the TD it is trying to delete.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a “STOP” set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

11.8 TLD DEACTIVATE BRIDGE VPORT: DEACTIVATE_PORT_GROUP.

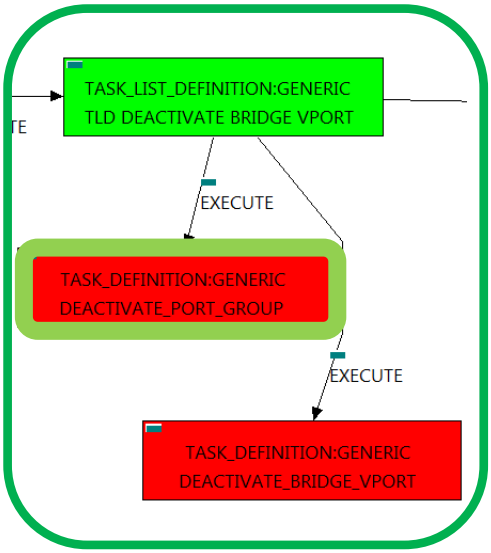


Figure 185: Deactivation of the Port Group element.

The TDs that have present in the their names "Deactivate", are Task Definitions responsible of the deactivation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be deactivated is a "PORT_GROUP:VCENTER", this means, when this workflow finish, we will have the artifact PORT_GROUP with status INSTANTIATED.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.MainArtifact ==
VNF>VNF_COMPONENT>
VIRTUAL_MACHINE>VIRTUAL_PORT<PORT_GROUP
EXECUTE.Workflow ==
"WF_TS_DEACTIVATE_PORT_GROUP_VCENTER"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a VIRTUAL_PORT that match the FIND.Condition attribute with value "INFO.Type=pci-sriov" with Status ACTIVE.

Once found, the WF will start the deactivation, if the deactivation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact PORT_GROUP that was used in the workflow executed will be assigned a state of "locked".

11.9 TLD DEACTIVATE BRIDGE VPORT: DEACTIVATE_BRIDGE_VPORT.

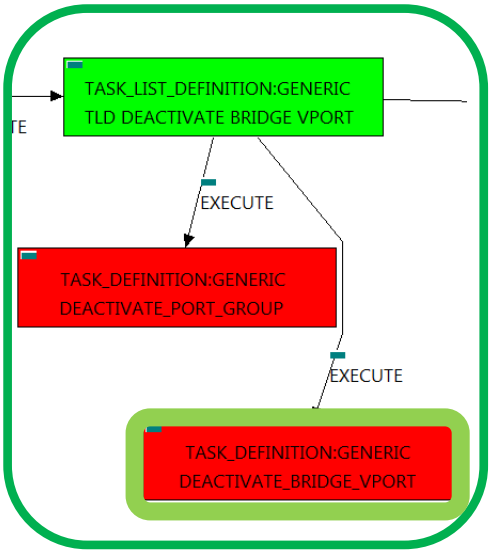


Figure 186 : Deactivation of the BRIDGE Virtual Port.

This TD it is going to deactivate our BRIDGE VPORT**, this means, the WF implied in this TLD is going to find and deactivate a BRIDGE PORT in status ENABLED that fills the conditions present in the TD.**

Once finished, we will have a BRIDGE PORT deactivated with status ENABLED with all the relationship needed for the correct behavior of the artifact still present, prepare to be deleted when required.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.MainArtifact ==
VNF>VNF_COMPONENT>
VIRTUAL_MACHINE>
VIRTUAL_PORT@status=ACTIVE#INFO.Type==pci-sriov.
SET.Running_Status == ACTIVE.
EXECUTE.Workflow ==
“WF_TS_DEACTIVATE_SDN_BRIDGE_VPORT”
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

The Workflow present in EXECUTE.Workflow attribute it is going to seek a VIRTUAL_PORT that match the condition and path given by the attribute FIND.MainArtifact with value “VNF>VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_PORT@status=ACTIVE#INFO.Type==pci-sriov” with Status ACTIVE.

Once found, the WF will start the deactivation, if the deactivation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a “STOP” set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

11.10 TLD DEACTIVATE SECURITY GROUP: DEACTIVATE_SECURITY_GROUP

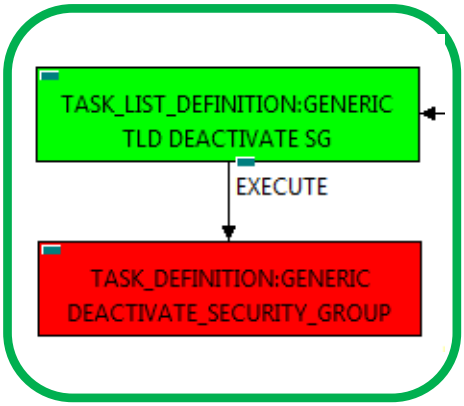


Figure 187: Deactivate security group.

This TD is going to deactivate all the SECURITY GROUP artifacts that fills the conditions present in the TD.

Once finished, we will have the SECURITY GROUPs deactivated with status INSTANTIATED with all the relationship needed for the correct behavior of the artifact still present, prepare to be deleted when required.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.MainArtifact==
VNF>VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_PORT>SECURITY_GROUP#GENERAL.Discovery=no>SECURITY_GROUP:OPENSTACK

FIND.Condition ==
status==constant:ACTIVE
SET.Running_Status == ACTIVE
EXECUTE.Workflow ==
"WF_TS_DEACTIVATE_SECURITY_GROUP"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

The Workflow present in EXECUTE Workflow attribute is going to deactivate a "SECURITY_GROUP" with Status ACTIVE in the DB. Once found, the WF will start the deactivation. If this deactivation is successful we will set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category. If the "Behaviour_on_error" attribute is set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK. In this case we have a "STOP" set as behavior, so no Rollback is going to be initiated, so the execution is going to end here in case of error.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

11.11 TLD DELETE SECURITY GROUP: DELETE_SG

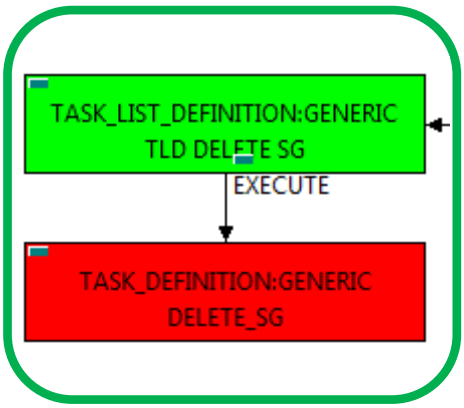


Figure 188: Delete security group.

This TD is going to delete the SECURITY_GROUPs that have been previously deactivated. This means, the WF implied in this TLD is going to query all the SECURITY_GROUP:OPENSTACK artifacts related to the VNF in order to delete them.

Once finished, we will have deleted a VLAN:DCN with all its relationships.

Targets of the TASK:DEFINITION:

STATUS of the TD: ENABLED

Categories:

FIND.Condition == status==constant:ACTIVE
SET.Running_Status == INSTANTIATED.
EXECUTE.Workflow == *"WF_TS_DELETE_SECURITY_GROUP"*
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

The Workflow present in EXECUTE.Workflow attribute it is going to search the VNF in the DB. Once found, the WF will start searching for the SECURITY GROUPs related to it, check that they are not shared by other VNF, and if so it is, delete them.

In case of error during the execution, the workflow will jump to the ROLLBACK category, If the "Behaviour_on_error" attribute is set to "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK. In this case, we have a "STOP" set as behavior, so no Rollback is going to be initiated and the execution is going to end here.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

11.12 TLD DEACTIVTE VLAN: DEACTIVATE_VLAN

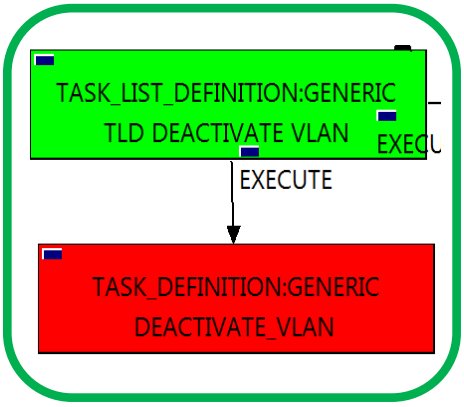


Figure 189: Deactivate vLAN.

This TD it is going to deprovision a VLAN:DCN**, this means, the WF implied in this TLD is going to query the SRIOV and SWITCH VIRTUAL_PORTs that are related with our VIRTUAL_LINK:PHYSICAL to get the NETWORKS:GENERIC of type "vlan" and NETWORKS:OS related to these NETWORK "vlan" of the VL specified, in order to deprovision our VLAN:DCN.**

Once finished, we will have deprovision a VLAN:DCN with all the relationship needed for the correct behavior of the artifact still present, prepare to be deleted when required.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.MainArtifact== VNF>VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_PORT:GENERIC#INFO.Type=pci-sriov>VLAN@status=ACTIVE
SET.Running_Status == ACTIVE.
EXECUTE.Workflow == *"WF_TS_DEACTIVATE_SDN_VLAN"*
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

The Workflow present in EXECUTE.Workflow attribute it is going to seek a VIRTUAL_PORT:GENERIC that match the FIND.MainArtifact attribute with value : "VNF>VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_PORT:GENERIC#INFO.Type=pci-sriov>VLAN@status=ACTIVE" in Status ACTIVE in the DDBB.

Once found , the WF will start the activation, if the activation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

11.13 TLD DELETE VLAN: DELETE_VLAN.

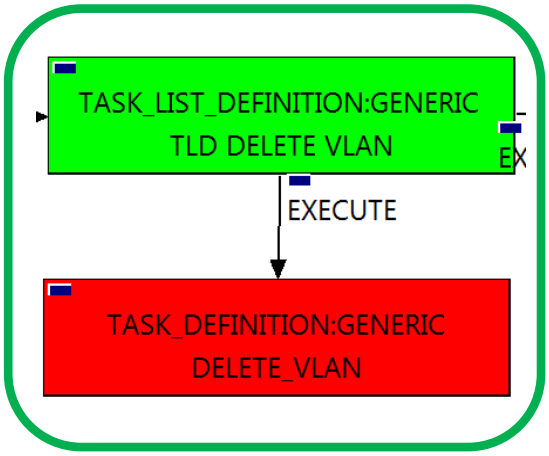


Figure 190: Delete vLAN.

This TD it is going to delete the VLAN:DCN previously deactivated**, this means, the WF implied in this TLD is going to query the SRIOV and SWITCH VIRTUAL_PORTs that are related with our VIRTUAL_LINK:PHYSICAL to get the proper artifact, in order to delete our VLAN:DCN.**

Once finished, we will have deleted a VLAN:DCN with all the its relationship.

Targets of the TASK:DEFINITION:

STATUS of the TD: ENABLED

Categories:

FIND.MainArtifact ==
VNF>VNF_COMPONENT>VIRTUAL_MACHINE>
VIRTUAL_PORT:GENERIC#INFO.Type=pci-sriov>
VLAN@status=ACTIVE.
SET.Running_Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_DEPROVISION_SDN_VLAN"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

The Workflow present in EXECUTE.Workflow attribute it is going to seek a VIRTUAL_PORT:GENERIC that match the FIND.MainArtifact attribute with value "VNF>VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_PORT:GENERIC#INFO.Type=pci-sriov>VLAN@status=ACTIVE" in Status ENABLED in the DDBB.

Once found , the WF will start the deleting, if the deletion it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

11.14 TLD Undeploy Monitor, Volume: UNDEPLOY_MONITOR

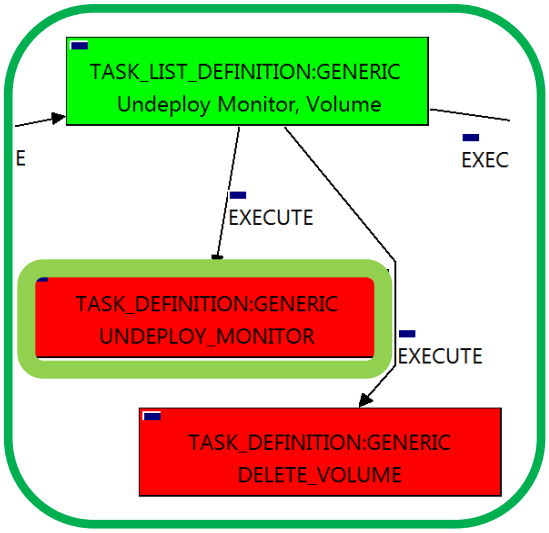


Figure 191: Undeploy Monitor

The TDs that have present in the their names "Deploy" are Task Definitions responsible of the deployment in the platform targeted and the updating of the status in the platform and the DDBB , these deployments are slightly different to the ones we launch for our entities, as a rule, they are small components as the MONITORs. In this case, the artifact that is going to be deployed is a "MONITOR", this means, when this workflow finish, we will have a MONITOR deployed with status DEPLOYED.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

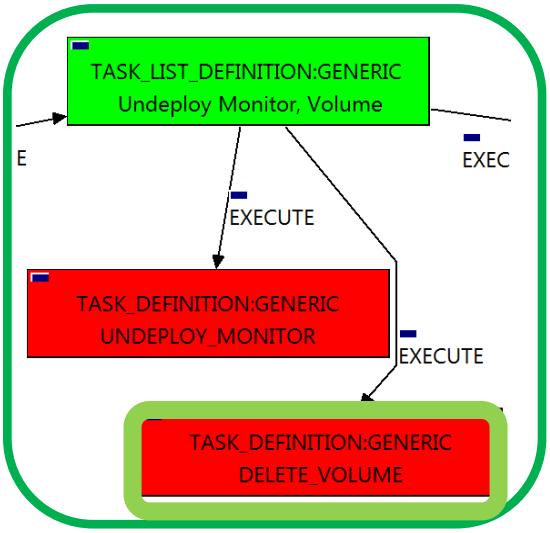
FIND.ArtifactType == MONITOR.
FIND.Condition == status==constant:DEPLOYED
SET.Running_Status == DEPLOYED.
SET.Status == INSTANTIATED
EXECUTE.Workflow ==
"WF_TS_MONITOR_UNDEPLOY"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

The Workflow present in EXECUTE.Workflow attribute it is going to seek a MONITOR in Status DEPLOYED in the DDBB . Once found , the WF will start the deployment, if the deployment is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

11.15 TLD Undeploy Monitor, Volume: DELETE_VOLUME



The TDs that have present in the their names "Delete", are Task Definitions responsible of the deletion of an artifact in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be deleted is a "VOLUME", this means, when this workflow finish, we are going to have a volume less.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.MainArtifact ==
VNF>VNF_COMPONENT>
VIRTUAL_MACHINE>VIRTUAL_LUN.
EXECUTE.Workflow ==
"WF_TS_DELETE_VOLUME"
ROLLBACK.Behaviour_on_error == CONTINUE
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

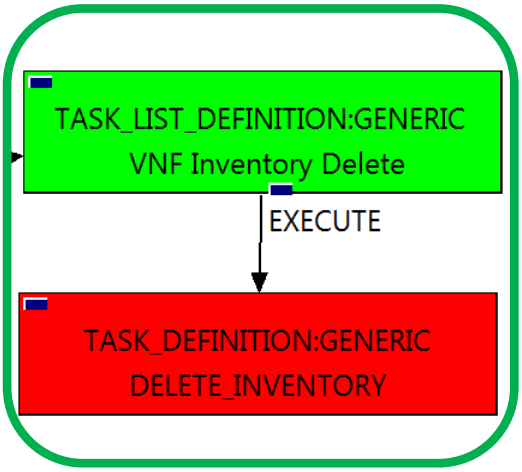
Figure 192: Delete Volume.

The Workflow present in EXECUTE.Workflow attribute it is going to seek a VIRTUAL_LUN in the DDBB . Once found , the WF will start the deleting, if the deletion it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, in this case the behavior is set as CONTINUE, this means, that the execution is going to continue no matter which error could be.

Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

11.16 TLD VNF Inventory Delete: DELETE_INVENTORY.



The TDs that have present in their names "Delete Inventory", are Task Definitions responsible of the deletion of the artifact given, in this case, this TD it is going to delete a VNF, notice the workflow used in this TD, "WF_TS_DELETE_INSTANCE_TREE", all the components and elements below the entity that it is going to be deleted , are going to be eliminated as well.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:
EXECUTE.Workflow ==
"WF_TS_DELETE_INSTANCE_TREE"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0

Figure 193: Delete Inventory.

The Workflow present in EXECUTE.Workflow attribute it is going to seek a VNF in the DDBB . Once found , the WF will start the deleting.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Chapter 12 Undeploy of a Virtual Link - Default.

From now on, and to make easier the understanding of the TLDs, we are going to explain the functionality of each set of TASK_LIST_DEFINITION:GENERIC, and the number of TASK_DEFINITION:GENERIC children of the previously mentioned TASK_LIST_DEFINITION:GENERIC.

Basically, the TASK_LIST_DEFINITION:GENERIC connect what we can consider "units of execution", those are the TASK_DEFINITION:GENERIC, that have a WORKFLOW assigned to be executed when the execution of the TLD reach them.

If you like to have a more deep knowledge about the workflows mentioned through this document please refer to the specific document.

**

If in the category FIND, the attribute Path is present, the attribute FIND.ArtifactType will be the starting artifact for the Path, but the FIND.Status attribute refers to the last artifact on the Path.

FIND.ArtifactType == VIRTUAL_MACHINE
FIND.Status== INSTANTIATED
FIND.Path ==
VIRTUAL_MACHINE>VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE<REGION>COMPUTE>FLAVOR

In this example, we are looking for a FLAVOR in status INSTANTIATED, we do not expect to get a VIRTUAL_MACHINE, in status INSTANTIATED.

** If during the use of the TLDs, the "Regenerate UUIDs" option is used, the user should check the Id of the tree that brings all the elements of the TLD, this "id" is specific and it will be the same for all the tree groups in all the TLDs.

** The two modes available are "Default" and "Simulated", the second one is only available if it is configured previously, by defect, the mode that will be used is "Default".

12.1 Specific Elements of the TLD Undeploy Virtual Link.

In this chapter the different elements of the specific TLD will be explained conscientiously.

12.2 TLD UNDEPLOY_VIRTUAL_LINK : Undeploy_Check

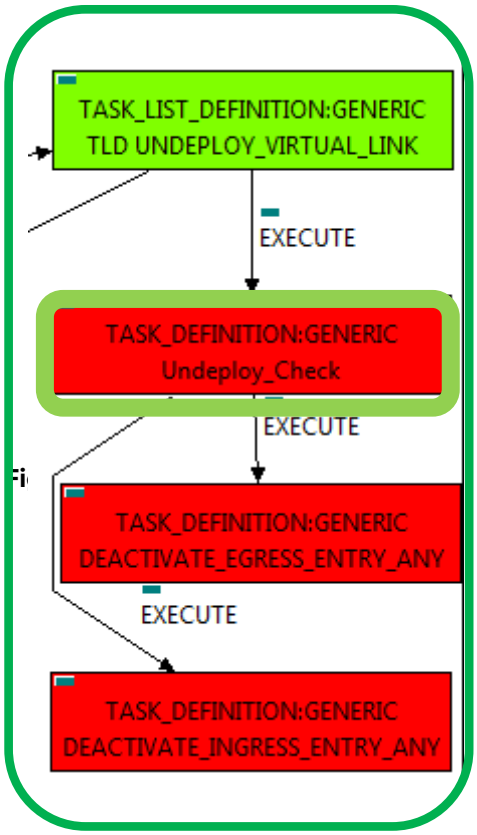


Figure 194: Check children for Undeploy.

This TD it is going to assure the scenario in order to delete a specific Organization, this means that during the execution the TD is going to check if all the children of the Organization are still or were properly deleted before launch the undeploy of an Organization.

Targets of the TASK DEFINITION:
STATUS of the TD: ENABLED

Categories:

GENERAL.Name ==	Undeploy check
FIND.Condition ==	**status==constant:ACTIVE**
EXECUTE.Workflow ==	**"WF_TS_UNDEPLOY_CHECK_CHILDREN"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	ROLLBACK
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek for the children entities of the Virtual Link, in case the TD find some the execution of the TD will fail, the goal of this TD is to guarantee that the Virtual Link has no children and also is in the proper conditions to be set as an entity with status INSTANTIATED.

Once found, the TD would execute the WF present in EXECUTE.Workflow, in this case, the Wf is "WF_TS_UNDEPLOY_CHECK_CHILDREN**", the workflow will develop the task previously explained.**

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with the value "true", this means once the TD ends its execution the element which is being used by the TD will be locked.

12.3 TLD UNDEPLOY_VIRTUAL_LINK : Deactivate_Ingress Entry to Any.

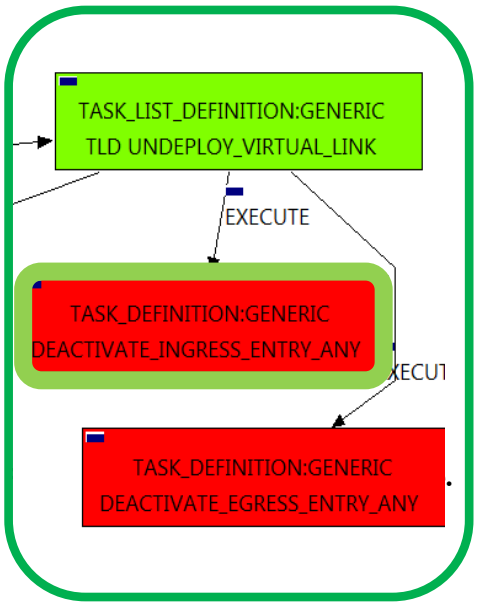


Figure 195: Deactivate Ingress Entry to any.

This TD it is going to deactivate our INGRESSACLENTRY:TEMPLATE:DCN**, this means, the WF implied in this TLD is going to find and deactivate an IN**GRESSACLENTRY **in status ACTIVE that fills the conditions present in the TD.**

Once finished, we will have an INGRESSACLENTRY **POLICY deactivated with all the relationship needed for the correct behavior of the artifact still present, prepare to be deleted when required.**

Targets of the TASK DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.MainArtifact == VIRTUAL_LINK>NETWORK:GENERIC.
FIND.Condition==
GENERAL.Name==EGRESSACL_%GENERAL.Name%_ANY&&
ACLENTRY.LocationType==constant:ZONE&&
ACLENTRY.NetworkType==constant:ANY
FIND.Path==
VIRTUAL_LINK>NETWORK:GENERIC>ZONE:TEMPLATE>
ZONE:DCN<L3DOMAIN:DCN>EGRESSACL>
EGRESSACLENTRY@status=ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == INSTANTIATED.
EXECUTE.Workflow==
"WF_TS_DEACTIVATE_SDN_EGRESSACLENTRY_POLICY"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Numbre_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a INGRESSACLENTRY that match the FIND.Condition attribute with value ***:"INGRESSACL_%GENERAL.Name%_PolicyBase&&ACLENTRY.LocationType==constant:ZONE&&ACLENTRY.NetworkType==constant:ANY"*** **with Status ACTIVE, by the Path given,** ***"VIRTUAL_LINK>NETWORK:GENERIC>ZONE:TEMPLATE>ZONE:DCN<L3DOMAIN:DCN>EGRESSACL>EGRESSACLENTRY@status=ACTIVE".***

Once found , the WF will start the deactivation, if the deactivation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with the value "true", this means once the TD ends its execution the element which is being used by the TD will be locked.

12.4 UNDEPLOY_VIRTUAL_LINK : Deactivate_Egress Entry to Any.

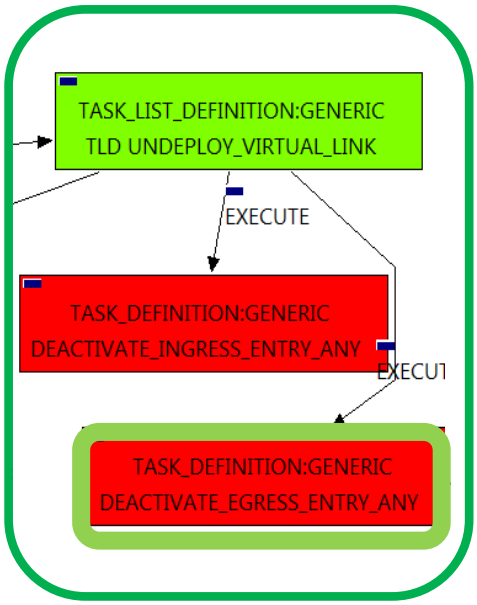


Figure 196: Deactivate Egress entry to any.

This TD it is going to deactivate our EGRESSACLENTRY:TEMPLATE:DCN**, this means, the WF implied in this TLD is going to find and deactivate an** EGRESSACLENTRY **in status ACTIVE that fills the conditions present in the TD.**

Once finished, we will have an EGRESSACLENTRY **POLICY deactivated with all the relationship needed for the correct behavior of the artifact still present, prepare to be deleted when required.**

Targets of the TASK DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.MainArtifact == VIRTUAL_LINK>NETWORK:GENERIC.
FIND.Condition==
GENERAL.Name==INGRESSACL_%GENERAL.Name%_ANY&&
ACLENTRY.LocationType==constant:ZONE&&
ACLENTRY.NetworkType==constant:ANY
FIND.Path==
VIRTUAL_LINK>NETWORK:GENERIC>ZONE:TEMPLATE>
ZONE:DCN<L3DOMAIN:DCN>INGRESSACL>
INGRESSACLENTRY@status=ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == INSTANTIATED.
EXECUTE.Workflow==
"WF_TS_DEACTIVATE_SDN_INGRESSACLENTRY_POLICY"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Numbre_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a INGRESSACLENTRY that match the FIND.Condition attribute with value
:"EGRESSACL_%GENERAL.Name%_PolicyBase&&ACLENTRY.LocationType==constant:ZONE&&ACLENTRY.NetworkType==constant:ANY" **with Status ACTIVE, by the Path given,**
"VIRTUAL_LINK>NETWORK:GENERIC>ZONE:TEMPLATE>ZONE:DCN<L3DOMAIN:DCN>EGRESSACL>EGRESSACLENTRY @status=ACTIVE ".

Once found , the WF will start the deactivation, if the deactivation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with the value "true", this means once the TD ends its execution the element which is being used by the TD will be locked.

12.5 TLD UNDEPLOY_VIRTUAL_LINK : Deactivate_Egress Entry.

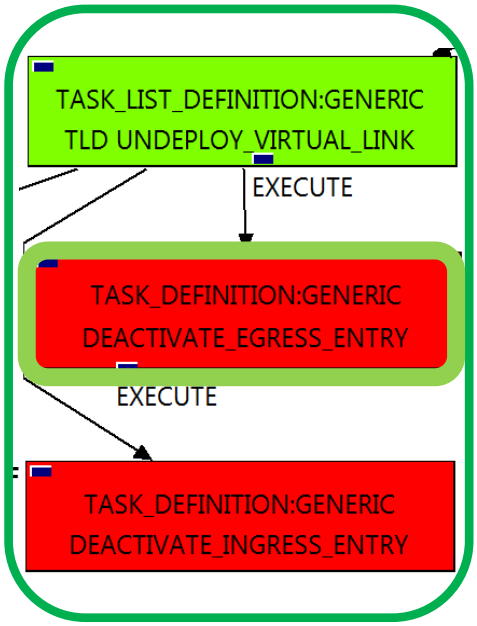


Figure 197: Deactivate Egress entry.

This TD it is going to deactivate our EGRESSACLENTRY:TEMPLATE:DCN**, this means, the WF implied in this TLD is going to find and deactivate an E**GRESSACLENTRY **in status ACTIVE that fills the conditions present in the TD.**

Once finished, we will have an EGRESSACLENTRY **POLICY deactivated with all the relationship needed for the correct behavior of the artifact still present, prepare to be deleted when required.**

Targets of the TASK DEFINITION:
STATUS of the TD: ENABLED
Categories:
FIND.MainArtifact == VIRTUAL_LINK>NETWORK:GENERIC
FIND.Condition==
GENERAL.Name==EGRESSACL_%GENERAL.Name%_PolicyBase&&
ACLENTRY.LocationType==constant:ZONE&&
ACLENTRY.NetworkType==constant:ZONE
FIND.Path==
VIRTUAL_LINK>NETWORK:GENERIC>ZONE:TEMPLATE>
ZONE:DCN<L3DOMAIN:DCN>EGRESSACL>
EGRESSACLENTRY@status=ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == INSTANTIATED.
EXECUTE.Workflow== *"WF_TS_DEACTIVATE_SDN_EGRESSACLENTRY_POLICY"*
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Numbre_of_retries == 0

The Workflow present in EXECUTE.Workflow attribute it is going to seek a EGRESSACLENTRY that match the FIND.Condition attribute with value :"EGRESSACL_%GENERAL.Name%_PolicyBase&&ACLENTRY.LocationType==constant:ZONE&&ACLENTRY.NetworkType== constant:ZONE" with Status ACTIVE, by the Path given, *"VIRTUAL_LINK>NETWORK:GENERIC>ZONE:TEMPLATE>ZONE:DCN<L3DOMAIN:DCN>EGRESSACL>EGRESSACLENTRY@status=ACTIVE ".*

Once found , the WF will start the deactivation, if the deactivation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

12.6 TLD UNDEPLOY_VIRTUAL_LINK : Deactivate_Ingress Entry.

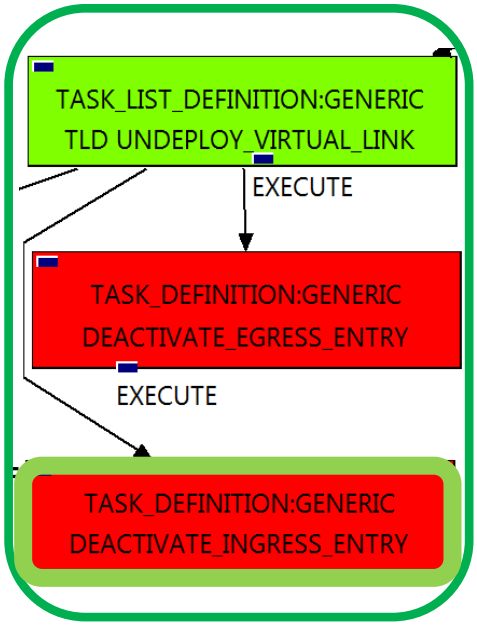


Figure 198: Deactivate Ingress entry.

This TD it is going to deactivate our INGRESSACLENTRY:TEMPLATE:DCN**, this means, the WF implied in this TLD is going to find and deactivate an IN**GRESSACLENTRY **in status ACTIVE that fills the conditions present in the TD.**

Once finished, we will have an INGRESSACLENTRY **POLICY deactivated with all the relationship needed for the correct behavior of the artifact still present, prepare to be deleted when required.**

Targets of the TASK DEFINITION:
STATUS of the TD: ENABLED
Categories:
FIND.MainArtifact == VIRTUAL_LINK>NETWORK:GENERIC
FIND.Condition==
GENERAL.Name==INGRESSACL_%GENERAL.Name%_PolicyBase&&
ACLENTRY.LocationType==constant:ZONE&&
ACLENTRY.NetworkType==constant:ZONE
FIND.Path==
VIRTUAL_LINK>NETWORK:GENERIC>ZONE:TEMPLATE>
ZONE:DCN<L3DOMAIN:DCN>INGRESSACL>
INGRESSACLENTRY@status=ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == INSTANTIATED.
EXECUTE.Workflow== *"WF_TS_DEACTIVATE_SDN_EGRESSACLENTRY_POLICY"*
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Numbre_of_retries == 0

The Workflow present in EXECUTE.Workflow attribute it is going to seek a EGRESSACLENTRY that match the FIND.Condition attribute with value :"INGRESSACL_%GENERAL.Name%_PolicyBase&&ACLENTRY.LocationType==constant:ZONE&&ACLENTRY.NetworkType==constant:ZONE" with Status ACTIVE, by the Path given,
"VIRTUAL_LINK>NETWORK:GENERIC>ZONE:TEMPLATE>ZONE:DCN<L3DOMAIN:DCN>INGRESSACL>INGRESSACLENTRY @status=ACTIVE ".

Once found , the WF will start the deactivation, if the deactivation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

12.7 TLD DEACTIVATE OPENSTACK SUBNET: DEACTIVATE_SUBNETWORK_OPENSTACK.

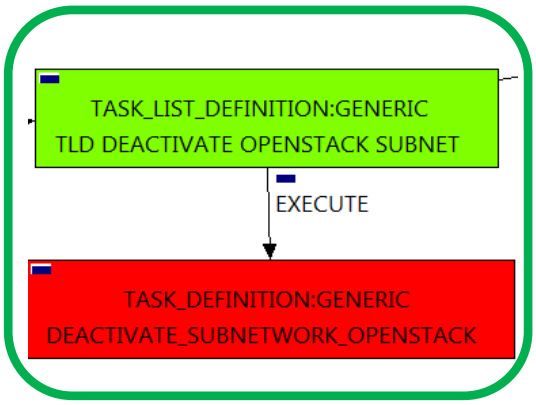


Figure 199: Deactivate S/N OS.

The TDs that have present in the their names "Deactivate", are Task Definitions responsible of the deactivation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be deactivated is a "SUBNETWORK:OPENSTACK", this means, when this workflow finish, we will have a SUBNETWORK:OPENSTACK with status INSTANTIATED, still present in the DDBB..

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.MainArtifact==
VIRTUAL_LINK>NETWORK:GENERIC>
NETWORK:OPENSTACK>
SUBNETWORK:OPENSTACK@status=ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_DEACTIVATE_SUBNETWORK"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "SUBNETWORK:OPENSTACK" policy with Status ACTIVE, reachable by the Path given,
"VIRTUAL_LINK>NETWORK:GENERIC>NETWORK:OPENSTACK>SUBNETWORK:OPENSTACK*@status=ACTIVE *".

Once found, the WF will start the deactivating, if deactivation is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

12.8 TLD DEACTIVATE OPENSTACK NET: DEACTIVATE_NETWORK_OPENSTACK

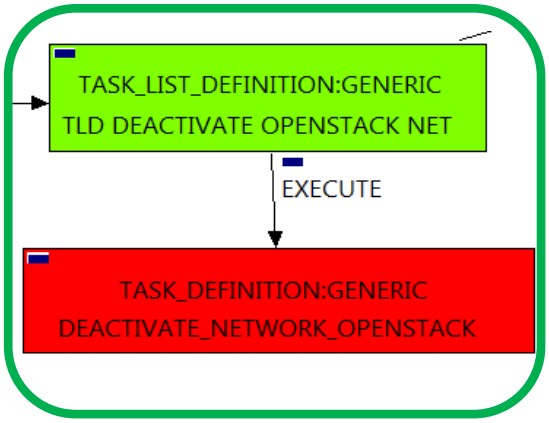


Figure 200: Deactivate N/W OS.

The TDs that have present in the their names "Deactivate", are Task Definitions responsible of the deactivation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be deactivated is a "NETWORK:OPENSTACK", this means, when this workflow finish, we will have a NETWORK:OPENSTACK with status INSTANTIATED, still present in the DDBB.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.MainArtifact==
VIRTUAL_LINK>NETWORK:GENERIC>
NETWORK:OPENSTACK@status=ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_DEACTIVATE_NETWORK"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "NETWORK:OPENSTACK" policy with Status ACTIVE, reachable by the Path given,
"*VIRTUAL_LINK>NETWORK:GENERIC>NETWORK:OPENSTACK@status=ACTIVE ".*

Once found, the WF will start the deactivating, if deactivation is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

12.9 TLD DEACTIVATE DCN SUBNET: DEACTIVATE _SUBNETWORK_DCN

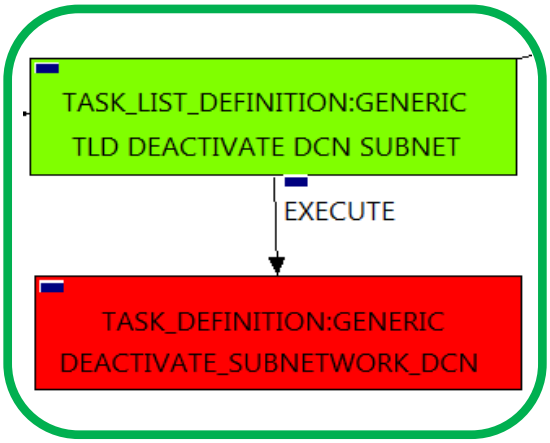


Figure 201: Deactivate S/N DCN.

The TDs that have present in the their names "Deactivate", are Task Definitions responsible of the deactivation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be deactivated is a "SUBNETWORK:DCN", this means, when this workflow finish, we will have a SUBNETWORK:DCN with status INSTANTIATED, still present in the DDBB.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:
FIND.MainArtifact ==
VIRTUAL_LINK>NETWORK:GENERIC>ZONE:TEMPLATE>
SUBNETWORK:TEMPLATE:DCN>
SUBNETWORK:DCN@status=ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_DEACTIVATE_SDN_SUBNETWORK"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "SUBNETWORK:DCN" policy with Status ACTIVE, reachable by the Path given,
"VIRTUAL_LINK>NETWORK:GENERIC>NETWORK:OPENSTACK>SUBNETWORK:OPENSTACK@status=ACTIVE ".

Once found, the WF will start the deactivating, if deactivation is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

12.10 TLD DEACTIVATE DCN ZONE: DEACTIVATE_ZONE_DCN.

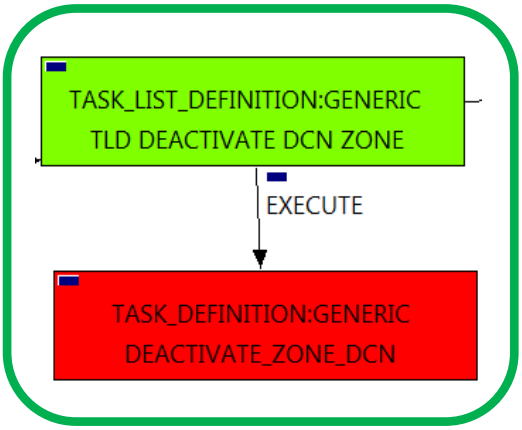


Figure 202: Deactivate Zone DCN.

The TDs that have present in the their names "Deactivate", are Task Definitions responsible of the deactivation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be deactivated is a "ZONE:DCN", this means, when this workflow finish, we will have a ZONE:DCN with status INSTANTIATED, still present in the DDBB.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

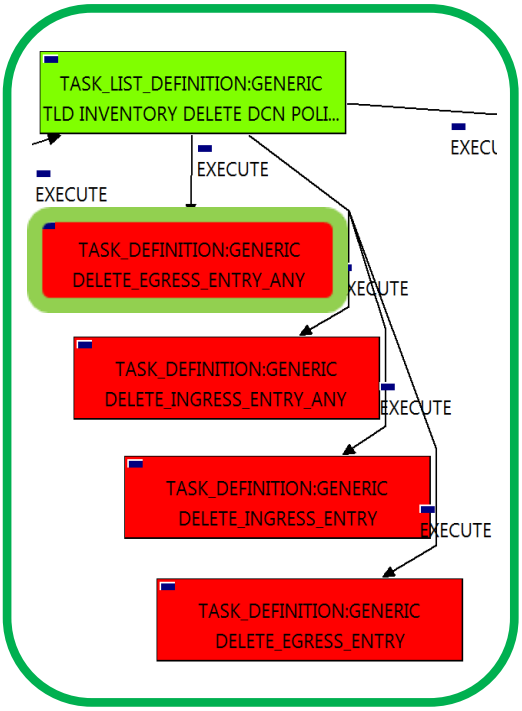
FIND.MainArtifact ==
VIRTUAL_LINK>NETWORK:GENERIC>ZONE:TEMPLATE>ZONE:DCN@status=ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_DEACTIVATE_SDN_ZONE"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "ZONE:DCN" policy with Status ACTIVE, reachable by the Path given, "VIRTUAL_LINK>NETWORK:GENERIC>ZONE:TEMPLATE>ZONE:DCN*@status=ACTIVE*".

Once found, the WF will start the deactivating, if deactivation is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

12.11 TLD INVENTORY DELETE DCN POLICIES: DELETE EGRESS ENTRY ANY.



This TD it is going to delete our EGRESSACLENTRY:TEMPLATE:DCN**, this means, the WF implied in this TLD is going to find and delete an E**GRESSACLENTRY **in status INSTANTIATED that fills the conditions present in the TD.**

Once finished, we will not have any EGRESSACLENTRY:TEMPLATE:DCN in our platforms or DDBB. The TD should erase all of this kind of policies.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.MainArtifact==
VIRTUAL_LINK>
NETWORK@status=INSTANTIATED#SDN.Access_level=ANY
SET.Running_Status == INSTANTIATED.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_PROVISION_SDN_ZONE_ANY_EGRESSACL_ENTRY_UNDO"
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0

Figure 203: Delete Egress entry any.

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "NETWORK" in Status INSTANTIATED in the DDBB, that matches the FIND.MainArtifact:" VIRTUAL_LINK>NETWORK@status=INSTANTIATED#SDN.Access_level=ANY" .

Once found, the WF will start the deprovisioning, if the deprovision it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

12.12 TLD INVENTORY DELETE DCN POLICIES: DELETE INGRESS ANY.

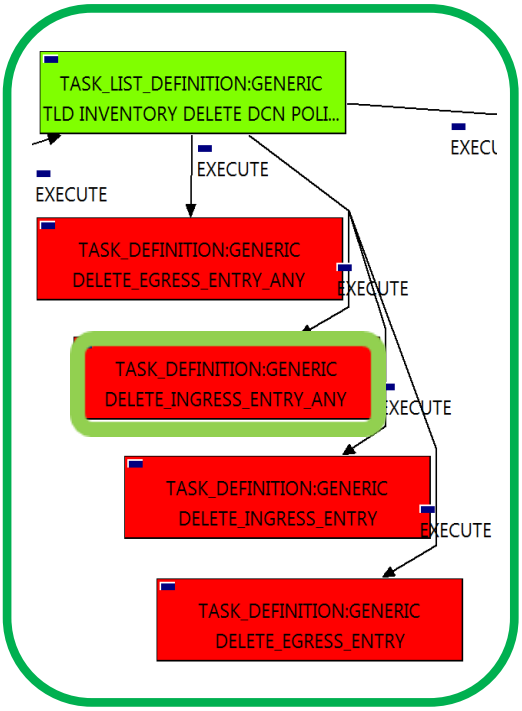


Figure 204: Delete Ingress Any

This TD it is going to delete our INGRESSACLENTRY:TEMPLATE:DCN**, this means, the WF implied in this TLD is going to find and delete an IN**GRESSACLENTRY **in status INSTANTIATED that fills the conditions present in the TD.**

Once finished, we will not have any INGRESSACLENTRY:TEMPLATE:DCN in our platforms or DDBB. The TD should erase all of this kind of policies.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.MainArtifact==
VIRTUAL_LINK>
NETWORK@status=INSTANTIATED#SDN.Access_level=ANY
SET.Running_Status == INSTANTIATED.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_PROVISION_SDN_ZONE_ANY_INGRESSACL_ENTRY_UNDO"
ROLLBACK.Behaviour_on_error == ROLLBACK
ROLLBACK.Number_of_retries == 0

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "NETWORK" in Status INSTANTIATED in the DDBB, that matches the FIND.MainArtifact:" VIRTUAL_LINK>NETWORK@status=INSTANTIATED#SDN.Access_level=ANY".

Once found, the WF will start the deprovisioning, if the deprovision it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

12.13 TLD INVENTORY DELETE DCN POLICIES: DELETE INGRESS ENTRY.

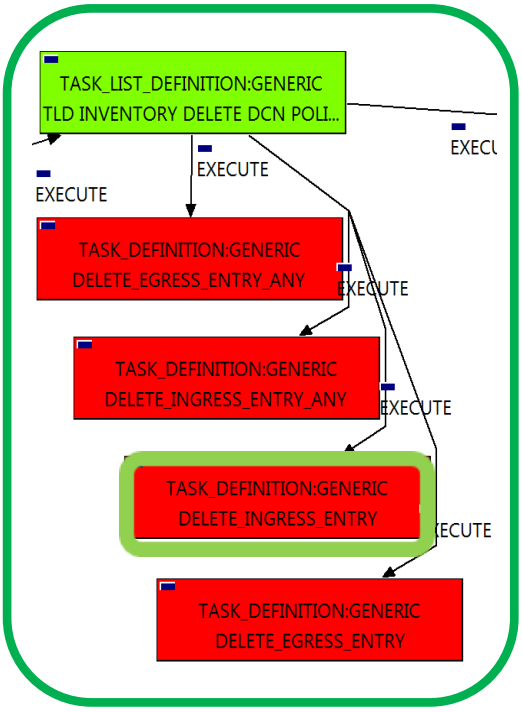


Figure 205: Delete Ingress Entry.

This TD it is going to delete our INGRESSACLENTRY:TEMPLATE:DCN**, this means, the WF implied in this TLD is going to find and delete an IN**GRESSACLENTRY **in status INSTANTIATED that fills the conditions present in the TD.**

Once finished, we will not have any INGRESSACLENTRY:TEMPLATE:DCN in our platforms or DDBB. The TD should erase all of this kind of policies.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.Condition == status==constant:ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_PROVISION_SDN_INGRESSACLENTRIES_POLICIES_UNDO"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Numbre_of_retries == 0

Notice that the TD is using the VIRTUAL_LINK to locate the policies needed, but the TD will not change the status of the VIRTUAL_LINK.

The Workflow present in EXECUTE.Workflow attribute it is going to seek all the "INGRESSACLENTRY**" in Status INSTANTIATED in the DDBB . Once found , the WF will start the deleting, if deletion is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.**

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

12.14 TLD INVENTORY DELETE DCN POLICIES: DELETE EGRESS ENTRY.

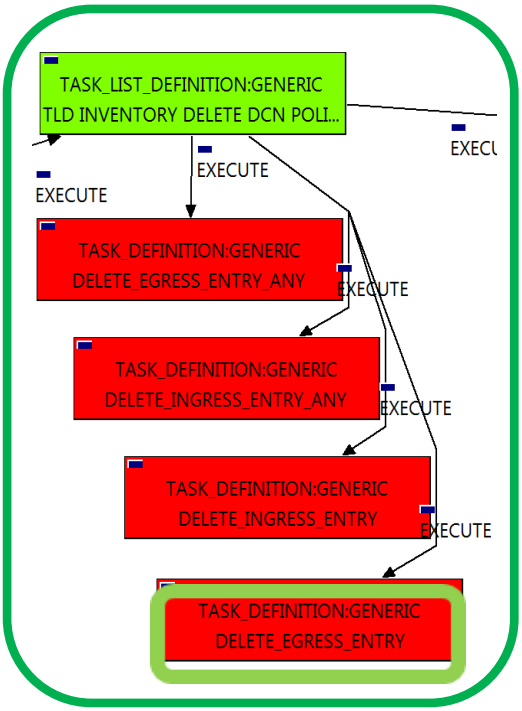


Figure 206: Delete Egress Entry.

This TD it is going to delete our EGRESSACLENTRY:TEMPLATE:DCN**, this means, the WF implied in this TLD is going to find and delete an E**GRESSACLENTRY **in status INSTANTIATED that fills the conditions present in the TD.**

Once finished, we will not have any EGRESSACLENTRY:TEMPLATE:DCN in our platforms or DDBB. The TD should erase all of this kind of policies.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:
FIND.Condition == status==constant:ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_PROVISION_SDN_EGRESSACLENTRIES_POLICIES_UNDO"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Numbre_of_retries == 0

Notice that the TD is using the VIRTUAL_LINK to locate the policies needed, but the TD will not change the status of the VIRTUAL_LINK.

The Workflow present in EXECUTE.Workflow attribute it is going to seek all the "EGRESSACLENTRY**" in Status INSTANTIATED in the DDBB . Once found , the WF will start the deleting, if deletion is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.**

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

12.15 TLD INVENTORY DELETE NETWORKS: DELETE NETWORK.

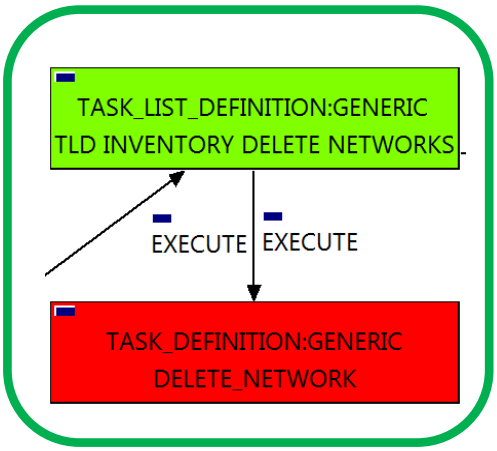


Figure 207: Delete Network.

The TDs that have present in the their names "Delete", are Task Definitions responsible of the deletion in the platform targeted and in the DDBB, in this case, the artifacts that are going to be deleted are NETWORKs.

Once finished, the TD should have been deleted the NETWORKs artifacts mentioned above, this means, all NETWORKs both DCN and OPENSTACK from the DDBB.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.Condition ==	**status==constant:ACTIVE**
SET.Running_Status ==	**ACTIVE.**
SET.Status ==	**INSTANTIATED.**
EXECUTE.Workflow ==	***"WF_TS_DEPROVISION_NETWORK"***
ROLLBACK.Behaviour_on_error ==	**STOP**
ROLLBACK.Numbre_of_retries ==	**0**

The Workflow present in EXECUTE.Workflow attribute it is going to seek a VIRTUAL_LINK in Status ACTIVE in the DDBB . Once found , the WF will start the deleting, if deletion is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status. Notice that the TD is not going to change the status of the entity used for the deletion.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts.

12.16 TLD INVENTORY DELETE VIRTUAL LINK: VIRTUAL LINK INVENTORY DELETE.

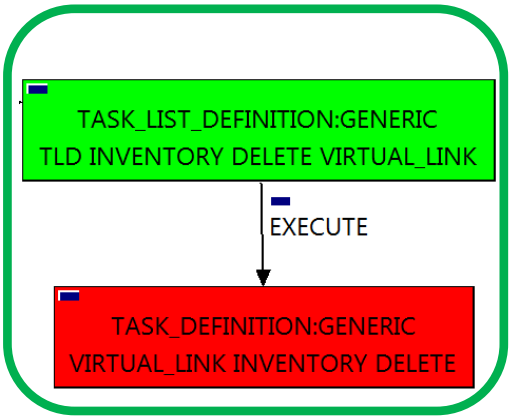


Figure 208: Delete VL inventory.

The TDs that have present in their names "Delete Inventory", are Task Definitions responsible of the deletion of the artifact given, in this case, this TD it is going to delete a VNF:FW, notice the workflow used in this TD, "WF_TS_DELETE_INSTANCE_TREE", all the components and elements below the entity that it is going to be deleted , are going to be eliminated as well.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.ArtifactType == VIRTUAL_LINK.
EXECUTE.Workflow ==
"WF_TS_DELETE_INSTANCE_TREE"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Numbre_of_retries == 0

The Workflow present in EXECUTE.Workflow attribute it is going to seek a VIRTUAL_LINK in the DDBB . Once found, the WF will start the deleting.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Chapter 13 Undeploy of a Tenant - Default.

From now on, and to make easier the understanding of the TLDs, we are going to explain the functionality of each set of TASK_LIST_DEFINITION:GENERIC, and the number of TASK_DEFINITION:GENERIC children of the previously mentioned TASK_LIST_DEFINITION:GENERIC.

Basically, the TASK_LIST_DEFINITION:GENERIC connect what we can consider “units of execution”, those are the TASK_DEFINITION:GENERIC, that have a WORKFLOW assigned to be executed when the execution of the TLD reach them.

If you like to have a more deep knowledge about the workflows mentioned through this document please refer to the specific document.

**

If in the category FIND, the attribute Path is present, the attribute FIND.ArtifactType will be the starting artifact for the Path, but the FIND.Status attribute refers to the last artifact on the Path.

FIND.ArtifactType == VIRTUAL_MACHINE
FIND.Status== INSTANTIATED
FIND.Path ==
VIRTUAL_MACHINE>VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE<REGION>COMPUTE>FLAVOR

In this example, we are looking for a FLAVOR in status INSTANTIATED, we do not expect to get a VIRTUAL_MACHINE, in status INSTANTIATED.

** If during the use of the TLDs, the “Regenerate UUIDs” option is used, the user should check the Id of the tree that brings all the elements of the TLD, this “id” is specific and it will be the same for all the tree groups in all the TLDs.

** The two modes available are “Default” and “Simulated”, the second one is only available if it is configured previously, by defect, the mode that will be used is “Default”.

13.1 Specific Elements of the TLD Undeploy Tenant.

In this chapter the different elements of the specific TLD will be explained conscientiously.

13.2 TLD DEACTIVATE ENTRIES: Undeploy_Check.

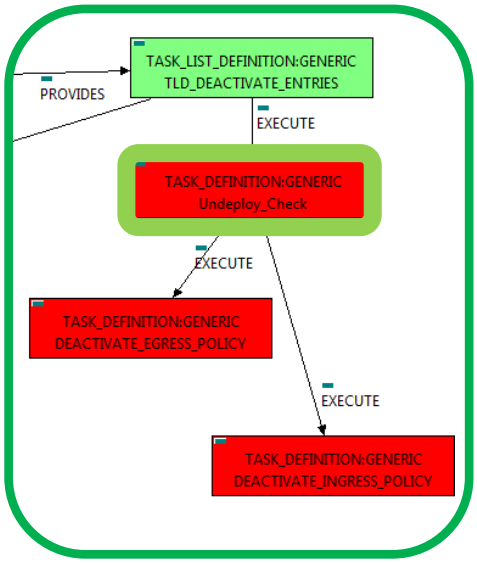


Figure 209: Checking for the undeployment of a firewall.

This TD it is going to assure the scenario in order to delete a specific Tenant, this means that during the execution the TD is going to check if all the children of the Tenant were properly deleted before launch the undeploy of the Tenant.

Targets of the TASK DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.Condition ==	**status==constant:ACTIVE**
FIND.Status==	**ACTIVE.**
EXECUTE.Workflow==	***"WF_TS_UNDEPLOY_CHECK_CHILDREN"***
ROLLBACK.Behaviour_on_error ==	**STOP**
ROLLBACK.Numbre_of_retries ==	**0**
DATA.Lock ==	**true**

The Workflow present in EXECUTE.Workflow attribute it is going to seek for the children entities of the Tenant, in case the TD find some the execution of the TD will fail, the goal of this TD is to guarantee that the Organization has no children and also is in the proper conditions to be set as an entity with status INSTANTIATED.

Once found, the TD would execute the WF present in EXECUTE.Workflow, in this case, the Wf is "WF_TS_UNDEPLOY_CHECK_CHILDREN**", the workflow will develop the task previously explained.**

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with the value "true", this means once the TD ends its execution the element which is being used by the TD will be locked.

13.3 TLD DEACTIVATE ENTRIES: DEACTIVATE_EGRESS_POLICY.

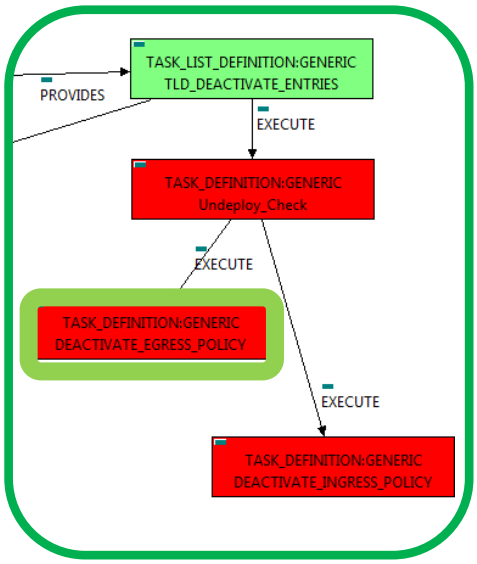


Figure 210: Deactivating Egress Entry policies for the Tenant.

This TD it is going to deactivate our EGRESSACLENTRY:TEMPLATE:DCN**, this means, the WF implied in this TLD is going to find and deactivate an** EGRESSACLENTRY **in status ACTIVE that fills the conditions present in the TD.**

Once finished, we will have an EGRESSACLENTRY **POLICY deactivated with all the relationship needed for the correct behavior of the artifact still present, prepare to be deleted when required.**

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED
Categories:
FIND.MainArtifact==
TENANT:GENERIC>VIRTUAL_LINK:MANAGEMENT>
NETWORK:GENERIC>ZONE:TEMPLATE>ZONE:DCN<L3DOMAIN:DCN>
EGRESSACL>EGRESSACLENTRY@status=ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == INSTANTIATED.
EXECUTE.Workflow== *"WF_TS_DEACTIVATE_SDN_EGRESSACLENTRY_POLICY"*
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Numbre_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a " EGRESSACLENTRY"with Status ACTIVE, by the Path given in the attribute FIND.MainArtifact: *"*TENANT:GENERIC>VIRTUAL_LINK:MANAGEMENT>NETWORK:GENERIC>ZONE:TEMPLATE>ZONE:DCN<L3DOMAIN:DCN>EGRESSACL>EGRESSACLENTRY*".*

Once found , the WF will start the deactivation, if the deactivation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with the value "true", this means once the TD ends its execution the element which is being used by the TD will be locked.

13.4 TLD DEACTIVATE ENTRIES: DEACTIVATE INGRESS POLICY.

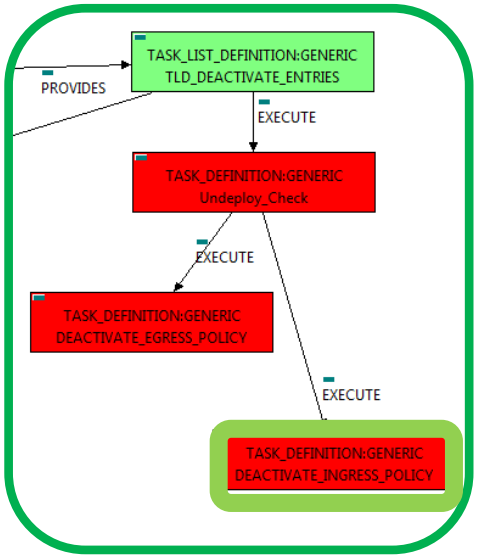


Figure 211: Deactivating Ingress Entry policies for the Tenant.

This TD it is going to deactivate our INGRESSACLENTRY:TEMPLATE:DCN**, this means, the WF implied in this TLD is going to find and deactivate an** INGRESSACLENTRY **in status ACTIVE that fills the conditions present in the TD.**

Once finished, we will have an INGRESSACLENTRY **POLICY deactivated with all the relationship needed for the correct behavior of the artifact still present, prepare to be deleted when required.**

Targets of the TASK DEFINITION: STATUS of the TD: ENABLED
Categories:
FIND.MainArtifact==
TENANT:GENERIC>VIRTUAL_LINK:MANAGEMENT>
NETWORK:GENERIC>ZONE:TEMPLATE>ZONE:DCN<L3DOMAIN:DCN>
EGRESSACL>INGRESSACLENTRY@status=ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == INSTANTIATED.
EXECUTE.Workflow== *"WF_TS_DEACTIVATE_SDN_INGRESSACLENTRY_POLICY"*
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Numbre_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a with Status ACTIVE, by the Path given in the attribute FIND.MainArtifact: *"*TENANT:GENERIC>VIRTUAL_LINK:MANAGEMENT>NETWORK:GENERIC>ZONE:TEMPLATE>ZONE:DCN<L3DOMAIN:DCN>EGRESSACL>INGRESSACLENTRY@status=ACTIVE*".*

Once found , the WF will start the deactivation, if the deactivation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with the value "true", this means once the TD ends its execution the element which is being used by the TD will be locked.

13.5 TLD DELETE POLICIES: Deactivate Egress Policy.

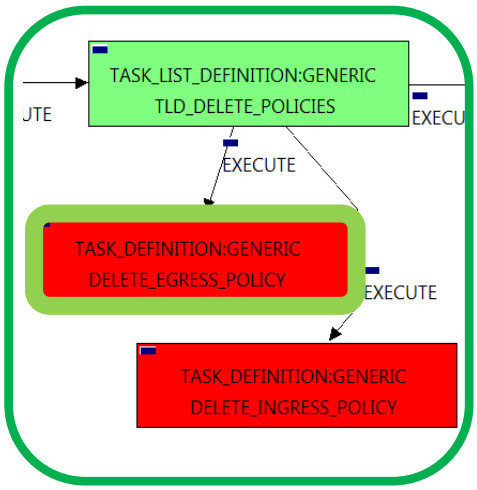


Figure 212: Deactivating Egress policies for the Tenant.

This TD it is going to delete our EGRESSACLENTRY:TEMPLATE:DCN**, this means, the WF implied in this TLD is going to find and delete an E**GRESSACLENTRY **in status INSTANTIATED that fills the conditions present in the TD.**

Once finished, we will not have any EGRESSACLENTRY:TEMPLATE:DCN in our platforms or DDBB. The TD should erase all of this kind of policies.

Targets of the TASK DEFINITION:
STATUS of the TD: ENABLED
Categories:
FIND.MainArtifact ==
TENANT:GENERIC>VIRTUAL_LINK:MANAGEMENT@status=ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == ACTIVE.
EXECUTE.Workflow==
"WF_TS_PROVISION_SDN_EGRESSACLENTRIES_POLICIES_UNDO"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Numbre_of_retries == 0
DATA.Lock== true

Notice that the TD is using the TENANT to locate the policies needed, but the TD will not change the status of the TENANT.

The Workflow present in EXECUTE.Workflow attribute it is going to seek all the "EGRESSACLENTRY**" in Status INSTANTIATED in the DDBB . Once found, the WF will start the deleting, if deletion is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.**

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with the value "true", this means once the TD ends its execution the element which is being used by the TD will be locked.

13.6 TLD DELETE POLICIES: Deactivate Ingress Policy.

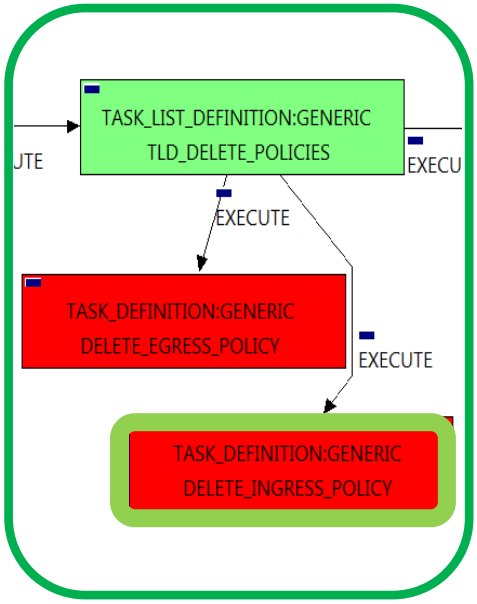


Figure 213: Deactivating Ingress Entry policies for the Tenant.

This TD it is going to deactivate our INGRESSACLENTRY:TEMPLATE:DCN**, this means, the WF implied in this TLD is going to find and deactivate an** INGRESSACLENTRY **in status ACTIVE that fills the conditions present in the TD.**

Once finished, we will have an INGRESSACLENTRY **POLICY deactivated with all the relationship needed for the correct behavior of the artifact still present, prepare to be deleted when required.**

Targets of the TASK DEFINITION:
STATUS of the TD: ENABLED
Categories:
FIND.MainArtifact ==
TENANT:GENERIC>VIRTUAL_LINK:MANAGEMENT@status=ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == ACTIVE.
EXECUTE.Workflow==
"WF_TS_PROVISION_SDN_INGRESSACLENTRIES_POLICIES_UNDO"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Numbre_of_retries == 0
DATA.Lock== true

Notice that the TD is using the TENANT to locate the policies needed, but the TD will not change the status of the TENANT.

The Workflow present in EXECUTE.Workflow attribute it is going to seek all the "INGRESSACLENTRY**" in Status INSTANTIATED in the DDBB . Once found, the WF will start the deleting, if deletion is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.**

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with the value "true", this means once the TD ends its execution the element which is being used by the TD will be locked.

13.7 TLD DEACTIVATE OPENSTACK SUBNET: DEACTIVATE_SUBNETWORK_OPENSTACK.

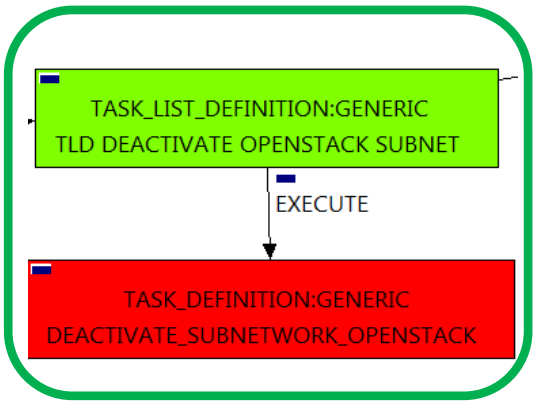


Figure 214: Deactivate Subnetwork OS

The TDs that have present in the their names "Deactivate", are Task Definitions responsible of the deactivation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be deactivated is a "SUBNETWORK:OPENSTACK", this means, when this workflow finish, we will have a SUBNETWORK:OPENSTACK with status INSTANTIATED, still present in the DDBB.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:
FIND.ArtifactType == TENANT:GENERIC
FIND.Status== ACTIVE.
FIND.Path==
TENANT:GENERIC>VIRTUAL_LINK:MANAGEMENT>
NETWORK:GENERIC>NETWORK:OPENSTACK>
SUBNETWORK:OPENSTACK@status=ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == INSTANTIATED.
EXECUTE.Workflow == *"WF_TS_DEACTIVATE_SUBNETWORK"*
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "SUBNETWORK:OPENSTACK" with Status ACTIVE, reachable by the Path given,
"TENANT:GENERIC>VIRTUAL_LINK:MANAGEMENT>NETWORK:GENERIC>NETWORK:OPENSTACK>SUBNETWORK:OPENSTACK@status=ACTIVE".

Once found, the WF will start the deactivating, if deactivation is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact is going to have during the execution.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with the value "true", this means once the TD ends its execution the element which is being used by the TD will be locked.

13.8 TLD DEACTIVATE OPENSTACK NET: DEACTIVATE_NETWORK_OPENSTACK

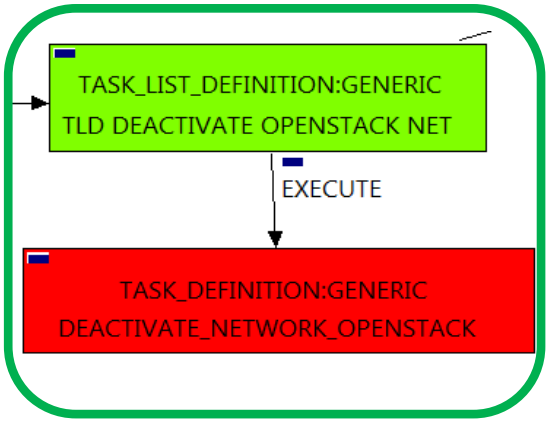


Figure 215: Deactivate Network Openstack.

The TDs that have present in the their names "Deactivate", are Task Definitions responsible of the deactivation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be deactivated is a "NETWORK:OPENSTACK", this means, when this workflow finish, we will have a NETWORK:OPENSTACK with status INSTANTIATED, still present in the DDBB.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:
FIND.MainArtifact == TENANT:GENERIC>VIRTUAL_LINK:MANAGEMENT>NETWORK:GENERIC>NETWORK:OPENSTACK@status=ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == INSTANTIATED.
EXECUTE.Workflow == *"WF_TS_DEACTIVATE_NETWORK"*
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "NETWORK:OPENSTACK" with Status ACTIVE, reachable by the Path given,
" *TENANT:GENERIC>VIRTUAL_LINK:MANAGEMENT>NETWORK:GENERIC>NETWORK:OPENSTACK@status=ACTIVE".*

Once found, the WF will start the deactivating, if deactivation is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with the value "true", this means once the TD ends its execution the element which is being used by the TD will be locked.

13.9 TLD DEACTIVATE DCN SUBNET: DEACTIVATE _SUBNETWORK_DCN

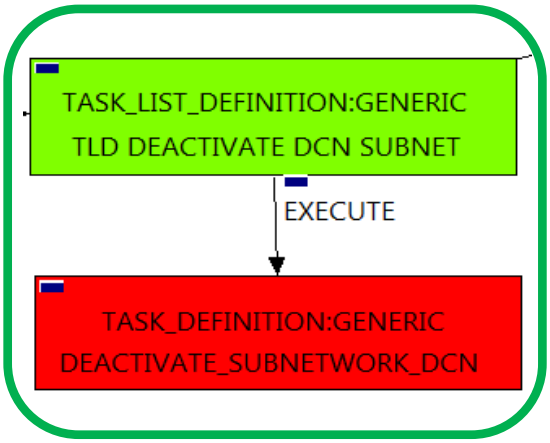


Figure 216: Deactivating Subnetwork DCN.

The TDs that have present in the their names "Deactivate", are Task Definitions responsible of the deactivation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be deactivated is a "SUBNETWORK:DCN", this means, when this workflow finish, we will have a SUBNETWORK:DCN with status INSTANTIATED, still present in the DDBB.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:
FIND.MainArtifact == TENANT:GENERIC>VIRTUAL_LINK:MANAGEMENT>NETWORK:GENERIC>ZONE:TEMPLATE>SUBNETWORK:TEMPLATE:DCN>SUBNETWORK:DCN@status=ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_DEACTIVATE_SDN_SUBNETWORK"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "SUBNETWORK:DCN" with Status ACTIVE, reachable by the Path given,
"TENANT:GENERIC>VIRTUAL_LINK:MANAGEMENT>NETWORK:GENERIC>ZONE:TEMPLATE>SUBNETWORK:TEMPLATE:DCN>SUBNETWORK:DCN@status=ACTIVE ".

Once found, the WF will start the deactivating, if deactivation is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with the value "true", this means once the TD ends its execution the element which is being used by the TD will be locked.

13.10 TLD DEACTIVATE DCN ZONE: DEACTIVATE_ZONE_DCN.

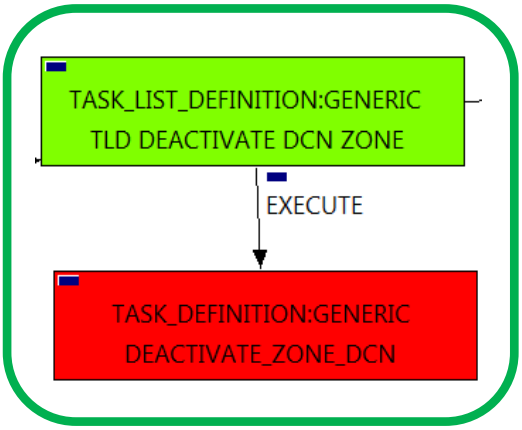


Figure 217: Deactivate Zone DCN.

The TDs that have present in the their names "Deactivate", are Task Definitions responsible of the deactivation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be deactivated is a "ZONE:DCN", this means, when this workflow finish, we will have a ZONE:DCN with status INSTANTIATED, still present in the DDBB.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.MainArtifact == TENANT:GENERIC>VIRTUAL_LINK:MANAGEMENT>NETWORK:GENERIC>ZONE:TEMPLATE>ZONE:DCN@status=ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_DEACTIVATE_SDN_SUBNETWORK"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "ZONE:DCN" policy with Status ACTIVE, reachable by the Path given, "TENANT:GENERIC>VIRTUAL_LINK:MANAGEMENT>NETWORK:GENERIC>ZONE:TEMPLATE>ZONE:DCN@status=ACTIVE".

Once found, the WF will start the deactivating, if deactivation is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with the value "true", this means once the TD ends its execution the element which is being used by the TD will be locked.

13.11 TLD INVENTORY DELETE VIRTUAL LINK: DELETE NETWORK.

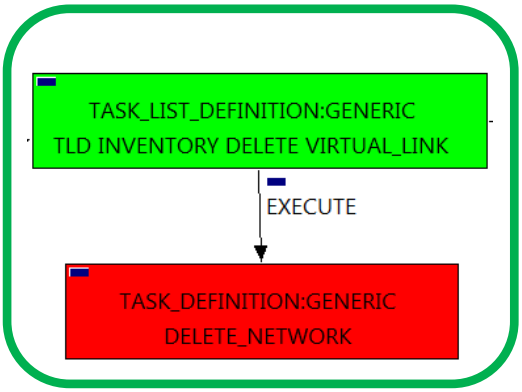


Figure 218: Delete Network.

The TDs that have present in the their names "Delete", are Task Definitions responsible of the deletion in the platform targeted and in the DDBB, in this case, the artifacts that are going to be deleted are NETWORKs.

Once finished, the TD should have been deleted the NETWORKs artifacts mentioned above, this means, all NETWORKs both DCN and OPENSTACK from the DDBB.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.MainArtifact ==
TENANT:GENERIC>
VIRTUAL_LINK:MANAGEMENT@status=ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_DEACTIVATE_SDN_SUBNETWORK"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "VIRTUAL_LINK:MANAGEMENT" with Status ACTIVE, reachable by the Path given, *"TENANT:GENERIC>VIRTUAL_LINK:MANAGEMENT@status=ACTIVE".*

Once found , the WF will start the deleting, if deletion is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status. Notice that the TD is not going to change the status of the entity used for the deletion.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts.

The attribute DATA.Lock is set with the value "true", this means once the TD ends its execution the element which is being used by the TD will be locked.

13.12 TLD UNDEPLOY POLICY GROUPS: Getting L3Domain.

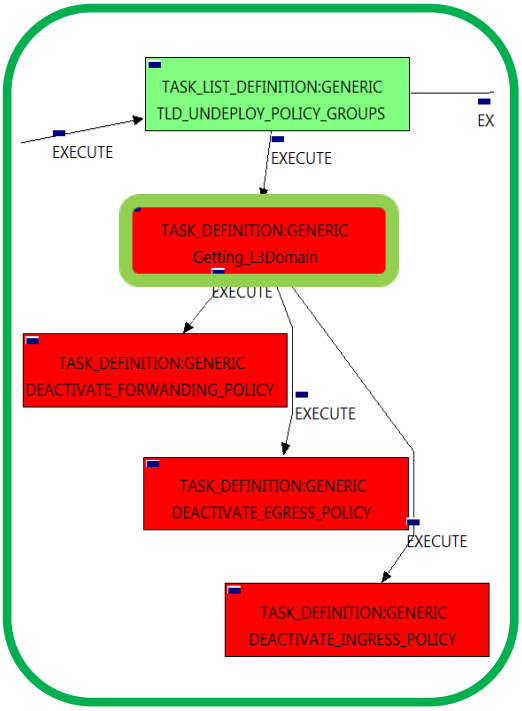


Figure 219: Getting L3Domain

This TD it is going to assure the selection of the correct artifact that later on will be deactivated by the workflow executed. **Once finished, we will have assured that all the policies of types INGRESSACL, EGRESSACL and INGRESSADVFORWARD are prepared to be deleted when required.**

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:
FIND.Condition==*GENERAL.VDC_id==%Id%*
FIND.Path==
TENANT:GENERIC>RESOURCE_POOL>VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE>L3DOMAIN:DCN @status=ACTIVE
TENANT:GENERIC>RESOURCE_POOL>LOCATION>VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE>L3DOMAIN:DCN @status=ACTIVE
TENANT:GENERIC>RESOURCE_POOL>DATACENTER>VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE>L3DOMAIN:DCN @status=ACTIVE
TENANT:GENERIC>RESOURCE_POOL>SERVER<HYPERVISOR<VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE>L3DOMAIN:DCN@status=ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

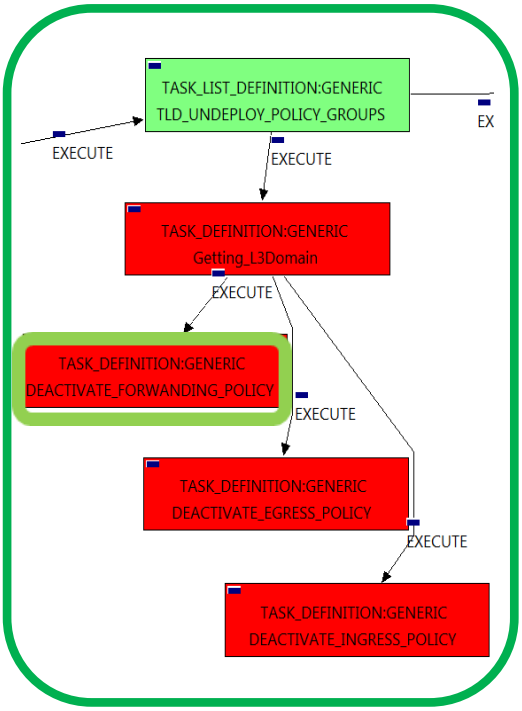
The Workflow present in EXECUTE.Workflow attribute it is going to seek a “L3DOMAIN:DCN” that matches the value of the attribute FIND.Condition, and reachable from some of the paths in the Multiple Path given with Status ACTIVE in the DDBB . Notice that we are not trying to get a TENANT:GENERIC in status ACTIVE. The query it is going to use the Path present in the category FIND.Path.

Once found, the TD would execute the WF present in EXECUTE.Workflow, in this case, the Wf is “WF_TS_DO_NOTHING_STATUS_CHANGE”, this one is identified as a dummy workflow with no changes associated to its execution, neither exists change in the status of the artifact targeted by the TD, remains as “ENABLED”.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a “STOP” set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with the value “true”, this means once the TD ends its execution the element which is being used by the TD will be locked.

13.13 TLD UNDEPLOY POLICY GROUPS: Deactivate Forwarding Policy.



This TD it is going to deactivate our INGRESSADVFWD:TEMPLATE:DCN**, this means, the WF implied in this TLD is going to find and deactivate a** INGRESSADVFWD **in status ACTIVE that fills the conditions present in the TD.**

Once finished, we will have a INGRESSADVFWD **POLICY deactivated with status INSTANTIATED.**

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.MainArtifact ==
L3DOMAIN:DCN>
INGRESSADVFORWARD:TEMPLATE:DCN@status=ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_DEACTIVATE_SDN_INGRESS_ADVANCED_FORWARDING"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

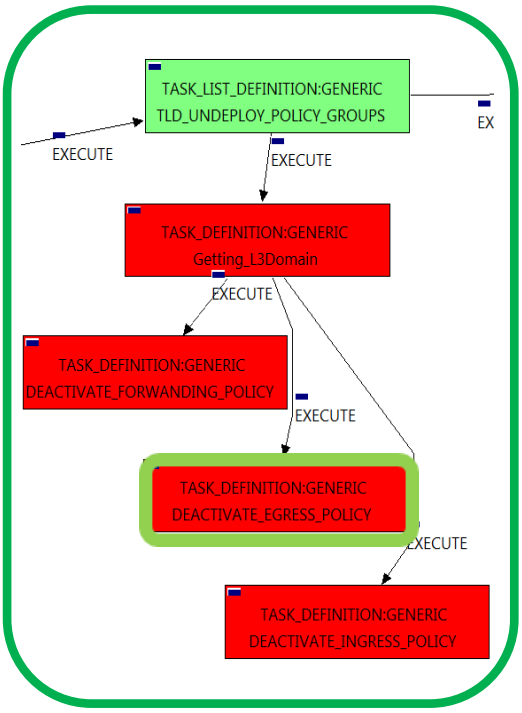
Figure 220: Delete Forwarding policy.

The Workflow present in EXECUTE.Workflow attribute it is going to seek a INGRESSADVFORWARD:TEMPLATE:DCN with Status ACTIVE, once found , the WF will start the deactivation, if the deactivation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with the value "true", this means once the TD ends its execution the element which is being used by the TD will be locked.

13.14 TLD UNDEPLOY POLICY GROUPS: Deactivate Egress Policy.



This TD it is going to deactivate our **EGRESSACL:TEMPLATE:DCN, this means, the WF implied in this TLD is going to find and deactivate a EGRESSACL:TEMPLATE:DCN policy in status ACTIVE that fills the conditions present in the TD.**

Once finished, we will have a EGRESSADVFWDENTRY **POLICY deactivated with status INSTANTIATED.**

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.MainArtifact ==
L3DOMAIN:DCN>
EGRESSACL:TEMPLATE:DCN@status=ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == INSTANTIATED.
EXECUTE.Workflow == *"WF_TS_DEACTIVATE_SDN_EGRESSACL_POLICY"*
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

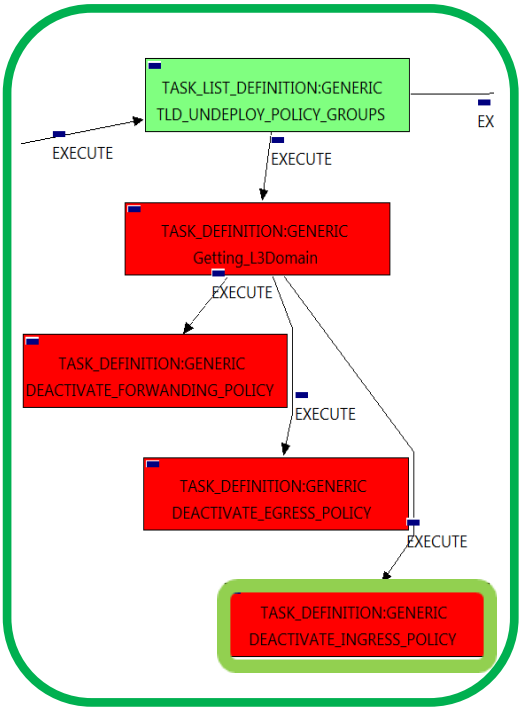
Figure 221: Deactivate Egress policy.

The Workflow present in EXECUTE.Workflow attribute it is going to seek an EGRESSACL:TEMPLATE:DCN with status ACTIVE, once found , the WF will start the deactivation, if the deactivation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with the value "true", this means once the TD ends its execution the element which is being used by the TD will be locked.

13.15 TLD UNDEPLOY POLICY GROUPS: Deactivate Ingress Policy.



This TD it is going to deactivate our **INGRESSACL:TEMPLATE:DCN, this means, the WF implied in this TLD is going to find and deactivate a INGRESSACL:TEMPLATE:DCN policy in status ACTIVE that fills the conditions present in the TD.**

Once finished, we will have a INGRESSACL:TEMPLATE:DCN deactivated with status INSTANTIATED.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.MainArtifact ==
L3DOMAIN:DCN>
INGRESSACL:TEMPLATE:DCN@status=ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == INSTANTIATED.
EXECUTE.Workflow == *"WF_TS_DEACTIVATE_SDN_INGRESSACL_POLICY"*
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

Figure 222: Deactivate Ingress policy

The Workflow present in EXECUTE.Workflow attribute it is going to seek an INGRESSACL:TEMPLATE:DCN with status ACTIVE, once found , the WF will start the deactivation, if the deactivation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with the value "true", this means once the TD ends its execution the element which is being used by the TD will be locked.

13.16 TLD DEACTIVATE: DEACTIVATE L3DOMAIN

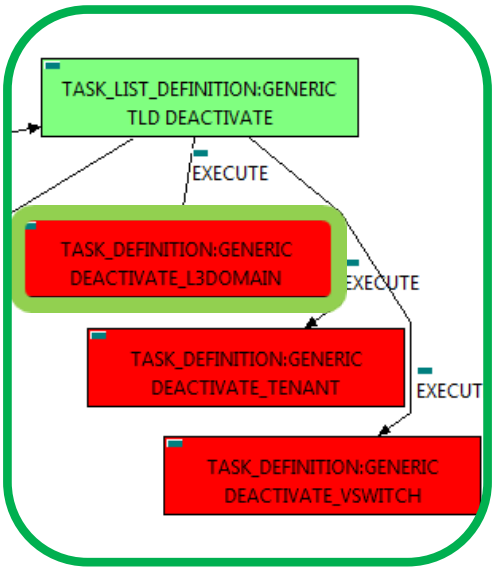


Figure 223: Deactivate L3Domain.

This TD it is going to deactivate our **L3DOMAIN:DCN, this means, the WF implied in this TLD is going to find and deactivate a L3DOMAIN:DCN in status ACTIVE that fills the conditions present in the TD.**

Once finished, we will have the L3DOMAIN:DCN given deactivated with status INSTANTIATED.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:
FIND.Condition==
GENERAL.VDC_id==%Id%
FIND.Path==
TENANT:GENERIC>RESOURCE_POOL>VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE:DCN>L3DOMAIN:DCN@status=ACTIVE
TENANT:GENERIC>RESOURCE_POOL>LOCATION>VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE:DCN>L3DOMAIN:DCN@status=ACTIVE
TENANT:GENERIC>RESOURCE_POOL>DATACENTER>VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE:DCN>L3DOMAIN:DCN@status=ACTIVE
TENANT:GENERIC>RESOURCE_POOL>SERVER<HYPERVISOR<VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE:DCN>L3DOMAIN:DCN@status=ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_DEACTIVATE_SDN_L3DOMAIN"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Numbre_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek an L3DOMAIN:DCN with status ACTIVE, that matches the condition present in the attribute "FIND.Condition", and reachable from the some of the paths present in the multiple Path.

Once found , the WF will start the deactivation, if the deactivation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

At the end of the execution of this TD, we should have the L3DOMAIN:DCN given with status INSTANTIATED, with all the relationship needed for a correct behavior of the artifact still present.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with the value "true", this means once the TD ends its execution the element which is being used by the TD will be locked.

13.17 TLD DEACTIVATE: DEACTIVATE TENANT

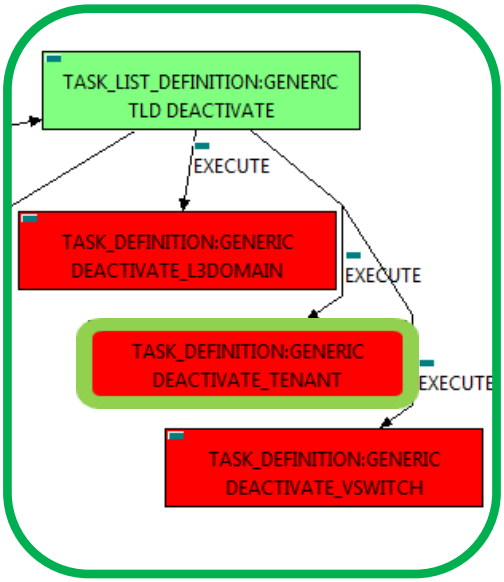


Figure 224: Deactivate Tenant.

This TD it is going to deactivate our **TENANT:OPENSTACK, this means, the WF implied in this TLD is going to find and deactivate a TENANT:OPENSTACK in status ACTIVE that fills the conditions present in the TD.**

Once finished, we will have the TENANT:OPENSTACK given deactivated with status INSTANTIATED.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:
FIND.Condition== *GENERAL.VDC_id==%Id%*
FIND.Path==
TENANT:GENERIC>RESOURCE_POOL>VIM>
TENANT:OPENSTACK@status=ACTIVE
TENANT:GENERIC>RESOURCE_POOL>LOCATION>VIM>
TENANT:OPENSTACK@status=ACTIVE
TENANT:GENERIC>RESOURCE_POOL>DATACENTER>VIM>
TENANT:OPENSTACK@status=ACTIVE
TENANT:GENERIC>RESOURCE_POOL>SERVER<HYPERVISOR<VIM>
TENANT:OPENSTACK@status=ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_DEACTIVATE_TENANT"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Numbre_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek an TENANT:OPENSTACK with status ACTIVE, that matches the condition present in FIND.Condition, and reachable from the some of the paths present in the multiple Path.

Once found , the WF will start the deactivation, if the deactivation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

At the end of the execution of this TD, we should have the TENANT:OPENSTACK given with status INSTANTIATED, with all the relationship needed for a correct behavior of the artifact still present.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with the value "true", this means once the TD ends its execution the element which is being used by the TD will be locked.

13.18 TLD DEACTIVATE: DEACTIVATE VSWITCH

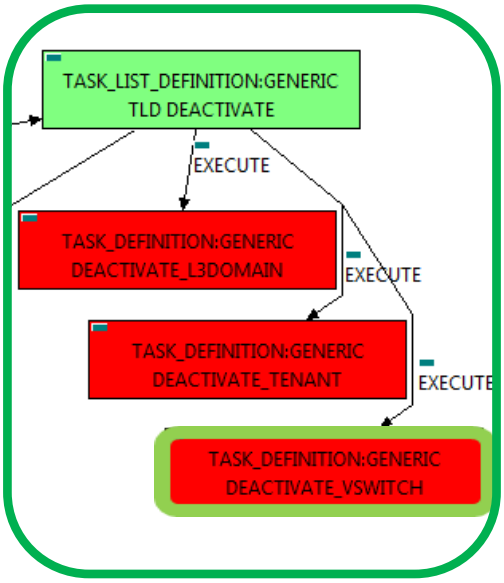


Figure 225: Deactivate Virtual Switch.

This TD it is going to deactivate our VSWITCH:VCENTER, this means, the WF implied in this TLD is going to find and deactivate a VSWITCH:VCENTER, in status ACTIVE that fills the conditions present in the TD.

Once finished, we will have the VSWITCH:VCENTER, given deactivated with status INSTANTIATED.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.MainArtifact ==
TENANT>RESOURCE_POOL>DATACENTER>
HYPERVISOR>SERVER>
VSWITCH:VCENTER#GENERAL.Name=NFVD
SET.Running_Status == ACTIVE.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_DEACTIVATE_VSWITCH_VCENTER"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Numbre_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a VSWITCH:VCENTER with status ACTIVE, that matches the condition present in FIND.MainArtifact, and reachable from the path given in the same attribute.

Once found , the WF will start the deactivation, if the deactivation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

At the end of the execution of this TD, we should have the VSWITCH:VCENTER given with status INSTANTIATED, with all the relationship needed for a correct behavior of the artifact still present.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with the value "true", this means once the TD ends its execution the element which is being used by the TD will be locked.

13.19 TLD DEACTIVATE OO: DEACTIVATE L3DOMAIN TEMPLATE

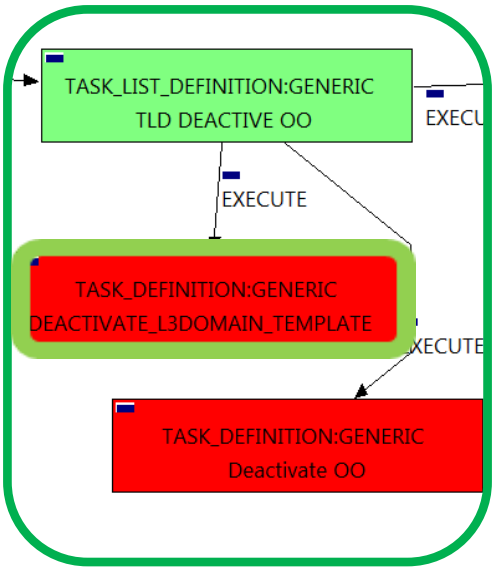


Figure 226: Deactivate L3Domain.

This TD it is going to deactivate our **L3DOMAIN:DCN, this means, the WF implied in this TLD is going to find and deactivate a L3DOMAIN:DCN in status ACTIVE that fills the conditions present in the TD.**

Once finished, we will have the L3DOMAIN:DCN given deactivated with status INSTANTIATED.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:
FIND.Condition==
GENERAL.VDC_id==%Id%
FIND.Path==
TENANT:GENERIC>RESOURCE_POOL>VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE:DCN>L3DOMAIN:DCN @status=ACTIVE
TENANT:GENERIC>RESOURCE_POOL>LOCATION>VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE:DCN>L3DOMAIN:DCN @status=ACTIVE
TENANT:GENERIC>RESOURCE_POOL>DATACENTER>VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE:DCN>L3DOMAIN:TEMPLATE @status=ACTIVE
TENANT:GENERIC>RESOURCE_POOL>SERVER<HYPERVISOR<VIM>AUTHENTICATION>REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE:DCN>L3DOMAIN:TEMPLATE @status=ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_DEACTIVATE_SDN_L3DOMAIN_TEMPLATE"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Numbre_of_retries == 0

The Workflow present in EXECUTE.Workflow attribute it is going to seek an L3DOMAIN:TEMPLATE:DCN with status ACTIVE, that matches the condition present in the attribute "FIND.Condition", and reachable from the some of the paths present in the multiple Path.

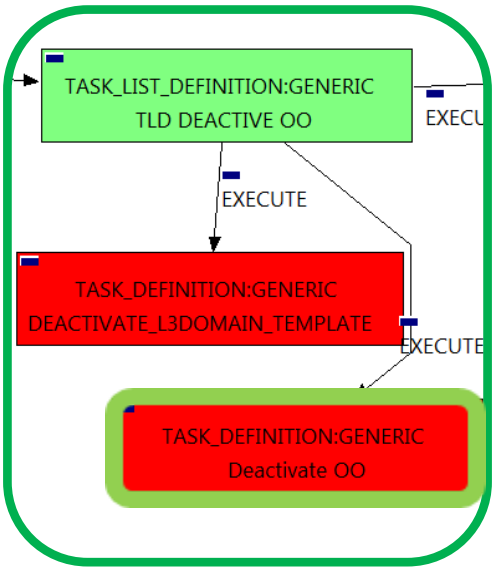
Once found , the WF will start the deactivation, if the deactivation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

At the end of the execution of this TD, we should have the L3DOMAIN:TEMPLATE:DCN given with status INSTANTIATED, with all the relationship needed for a correct behavior of the artifact still present.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with the value "true", this means once the TD ends its execution the element which is being used by the TD will be locked.

13.20 TLD DEACTIVATE OO: Deactivate OO.



The TDs that have present in the their names "Deactivate", are Task Definitions responsible of the deactivation in the platform targeted and the updating of the status in the platform and the DDBB , in this case, we are not going to deactivate any artifact, this TD associates the entity given with the LDAP group that it is corresponded to, to make the user's reference clear between entities.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.Condition == status==constant:ACTIVE
EXECUTE.Workflow ==
"WF_TS_DEACTIVATE_OO_TENANT"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Numbre_of_retries == 0
DATA.Lock == true

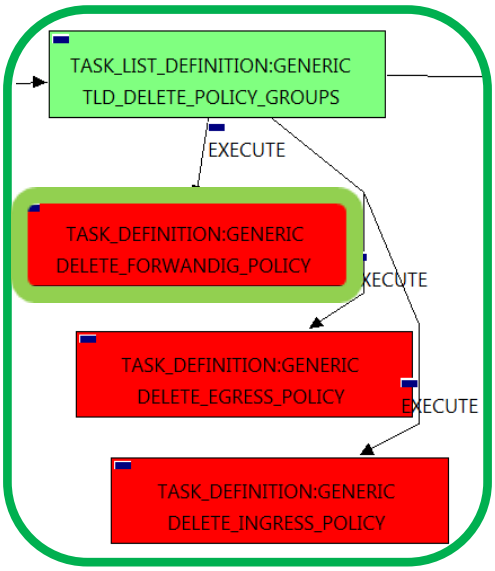
Figure 227: Deactivate OO.

The WorkFlow present in EXECUTE.Workflow it is going to seek an TENANT:GENERIC in Status ACTIVE in the DDBB, when the TD find it, it will start. This workflow it is going to query and update the entity given, in this case, Tenant, with the values needed for the correct behavior of the users with the specific entity.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with the value "true", this means once the TD ends its execution the element which is being used by the TD will be locked.

13.21 TLD DELETE POLICY GROUPS: Delete Forwarding Policy.



The TDs that have present in the their names "Delete", are Task Definitions responsible of the erased in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifacts that are going to be deleted are a "INGRESSADVFORWARD:TEMPLATE:DCN**", this means, when this workflow finish, we will not have any** INGRESSADVFORWARD:TEMPLATE:DCN in our platforms or DDBB. The TD should erase all of this kind of policies.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.Condition == status==constant:ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_PROVISION_SDN_FORWARD_POLICIES_UNDO"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Numbre_of_retries == 0
DATA.Lock == true

Figure 228: Delete Fwd policy.

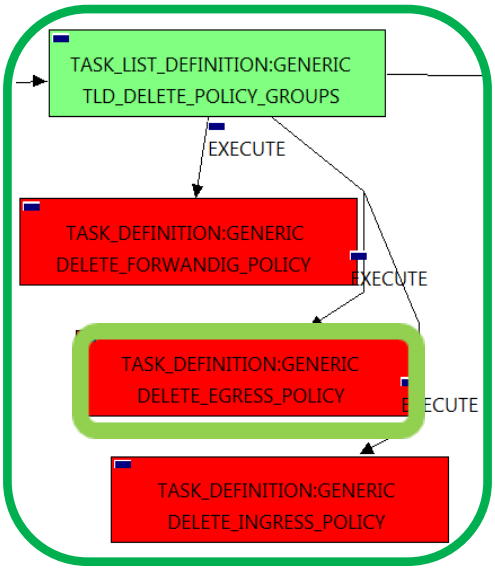
Notice that the TD is using the TENANT:GENERIC to locate the policies needed, but the TD will not change the status of the artifact.

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "TENANT:GENERIC**" in Status ACTIVE in the DDBB . Once found , the WF will start the deleting, if deletion is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.**

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with the value "true", this means once the TD ends its execution the element which is being used by the TD will be locked.

13.22 TLD DELETE POLICY GROUPS: Delete Egress Policy.



This TD it is going to delete our **EGRESSACL**:TEMPLATE:DCN**, this means, the WF implied in this TLD is going to find and delete a EGRESSACL policy in status ACTIVE that fills the conditions present in the TD.**

Once finished, the EGRESSACL POLICY given will have been deleted from the inventory.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.Condition == status==constant:ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_PROVISION_SDN_EGRESSACL_POLICIES_UNDO"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Numbre_of_retries == 0
DATA.Lock== true

Figure 229: Delete Egress policy.

Notice that the TD is using the TENANT:GENERIC to locate the policies needed, but the TD will not change the status of the artifact.

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "TENANT:GENERIC**" in Status ACTIVE in the DDBB , in order to delete all the policies related of the type specified. Once found , the WF will start the deleting, if deletion is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.**

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with the value "true", this means once the TD ends its execution the element which is being used by the TD will be locked.

13.23 TLD DELETE POLICY GROUPS: Delete Ingress Policy.

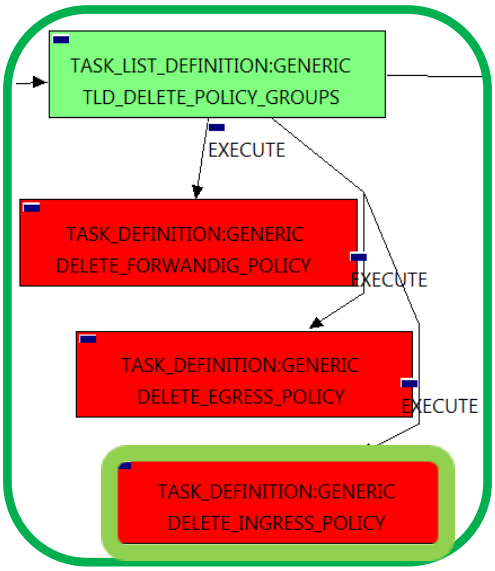


Figure 230: Delete Ingress policy.

This TD it is going to delete our **INGRESSACL**:TEMPLATE:DCN**, this means, the WF implied in this TLD is going to find and delete a INGRESSACL policy in status ACTIVE that fills the conditions present in the TD.**

Once finished, the INGRESSACL POLICY given will have been deleted from the inventory.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.Condition == status==constant:ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_PROVISION_SDN_INGRESSACL_POLICIES_UNDO"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Numbre_of_retries == 0
DATA.Lock== true

Notice that the TD is using the TENANT:GENERIC to locate the policies needed, but the TD will not change the status of the artifact.

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "TENANT:GENERIC**" in Status ACTIVE in the DDBB , in order to delete all the policies related of the type specified. Once found , the WF will start the deleting, if deletion is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.**

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with the value "true", this means once the TD ends its execution the element which is being used by the TD will be locked.

13.24 TLD DELETE DOMAIN: Delete L3Domain.

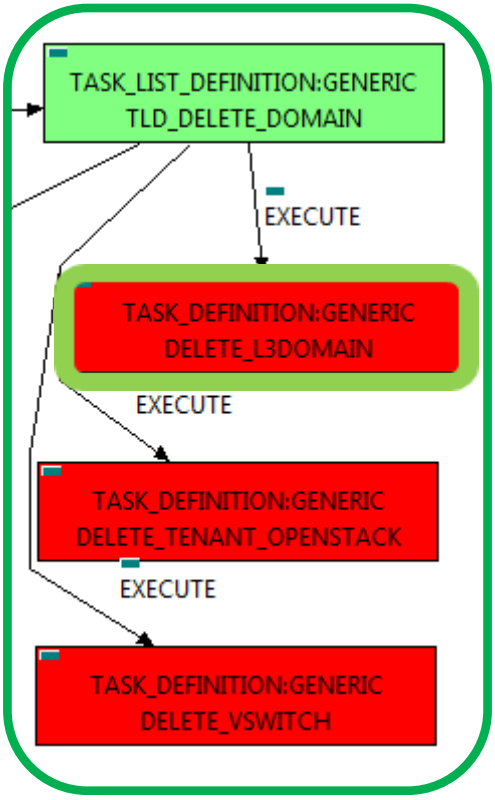


Figure 231 :Deletion L3Domain artifact.

This TD it is going to delete the L3DOMAiN:DCN and L3DOMAIN:TEMPLATE:DCN artifacts previously deactivated**, this means, the WF implied in this TLD is going to query from TENANT:GENERIC to the artifacts given to get the proper value of the attributes in order to delete the previously mentioned artifacts.**

Once finished, we will have deleted a L3DOMAIN:DCN and L3DOMAIN:TEMPLATE:DCN with all the its relationship.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.Condition == status==constant:ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_PROVISION_SDN_DOMAIN"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Numbre_of_retries == 0
DATA.Lock == true

Notice that the TD is using the TENANT:GENERIC to locate the policies needed, in this case, the TD will change the status of the artifact to INSTANTIATED.

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "TENANT:GENERIC**" in Status ACTIVE in the DDBB , in order to delete all the artifacts related of the type specified. Once found , the WF will start the deleting, if deletion is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.**

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with the value "true", this means once the TD ends its execution the element which is being used by the TD will be locked.

13.25 TLD DELETE DOMAIN: Delete Tenant Openstack.

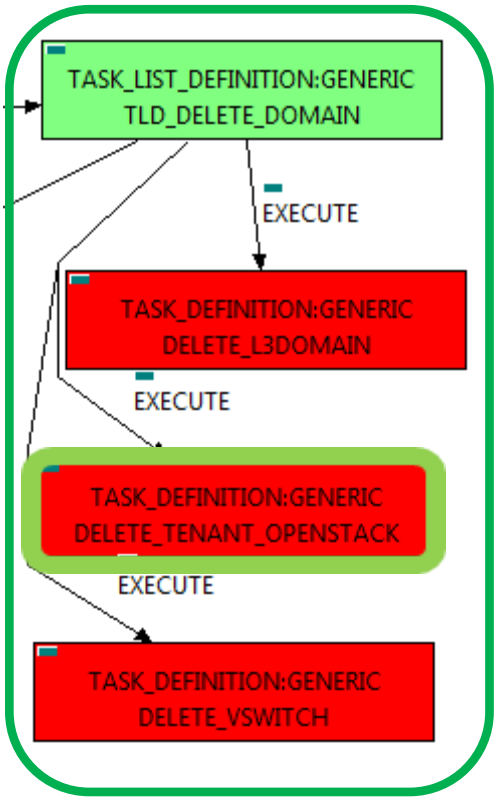


Figure 232: Deleting Openstack tenant.

This TD it is going to delete the TENANT:OPENSTACK artifact previously deactivated**, this means, the WF implied in this TLD is going to query from TENANT:GENERIC to the artifacts given to get the proper value of the attributes in order to delete the previously mentioned artifacts.**

Once finished, we will have deleted a TENANT:OPENSTACK **with all the its relationship.**

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:
FIND.ArtifactType == TENANT:GENERIC.
FIND.Status== INSTANTIATED.
FIND.Condition==GENERAL.VDC_id==%Id%
FIND.Path==
TENANT:GENERIC>RESOURCE_POOL>VIM>
TENANT:OPENSTACK@status=INSTANTIATED,
TENANT:GENERIC>RESOURCE_POOL>LOCATION>VIM>
TENANT:OPENSTACK@status=INSTANTIATED,
TENANT:GENERIC>RESOURCE_POOL>DATACENTER>VIM>
TENANT:OPENSTACK@status=INSTANTIATED,
TENANT:GENERIC>RESOURCE_POOL>SERVER<HYPERVISOR<VIM>
TENANT:OPENSTACK@status=INSTANTIATED,
EXECUTE.Workflow == *"WF_TS_DEPROVISION_TENANT"*
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == true

Notice that the TD is using the TENANT:GENERIC to locate the policies needed, but the TD will not change the status of the artifact to INSTANTIATED.

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "TENANT:GENERIC**" in Status ACTIVE in the DDBB , in order to delete all the artifact related "**TENANT:OPENSTACK"**.**

Once found , the WF will start the deleting, if deletion is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with the value "true", this means once the TD ends its execution the element which is being used by the TD will be locked.

13.26 TLD DELETE DOMAIN: Delete_VSWITCH

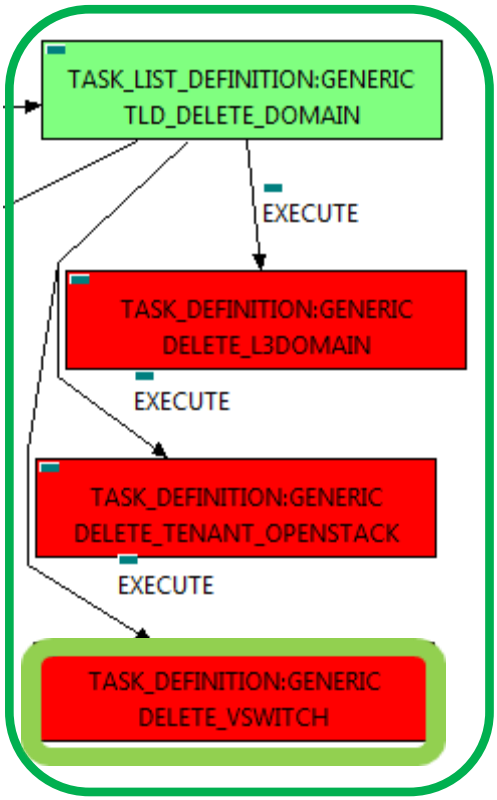


Figure 233: Delete Virtual Switch.

This TD it is going to delete the VSWITCH:VCENTER artifact previously deactivated**, this means, the WF implied in this TLD is going to query from** VSWITCH:VCENTER **to the artifacts given to get the proper value of the attributes in order to delete the previously mentioned artifacts.**

Once finished, we will have deleted a VSWITCH:VCENTER **with all the its relationship.**

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

EXECUTE.Workflow ==	***"WF_TS_DELETE_VSWITCH"***
ROLLBACK.Behaviour_on_error ==	**STOP**
ROLLBACK.Number_of_retries ==	**0**
DATA.Lock ==	**true**

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "WF_TS_DELETE_VSWITCH**" in Status ACTIVE in the DDBB , in order to delete all the artifact related "**WF_TS_DELETE_VSWITCH".

Once found , the WF will start the deleting, if deletion is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with the value "true", this means once the TD ends its execution the element which is being used by the TD will be locked.

13.27 TLD DELETE: Delete Tenant.

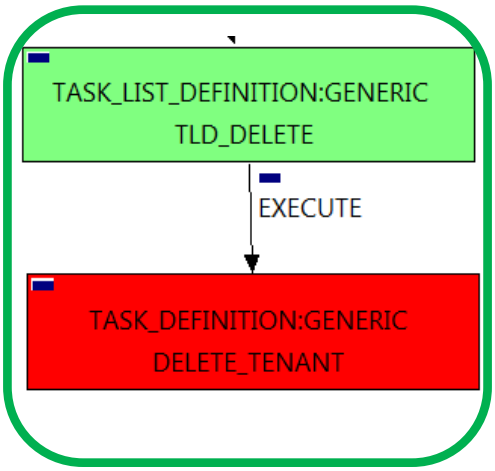


Figure 234: Delete Tenant.

The TDs that have present in their names "Delete Inventory", are Task Definitions responsible of the deletion of the artifact given, in this case, this TD it is going to delete a TENANT:GENERIC, notice the workflow used in this TD, "WF_TS_DELETE_INSTANCE_TREE", all the components and elements below the entity that it is going to be deleted , are going to be eliminated as well, in other case, this elements will remain unreachable, that is not desirable.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.ArtifactType == TENANT:GENERIC.
EXECUTE.Workflow ==
"WF_TS_DELETE_INSTANCE_TREE"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0

The Workflow present in EXECUTE.Workflow attribute it is going to seek a TENANT:GENERIC in the DDBB . Once found , the WF will start the deleting.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Chapter 14 Undeploy of an Organization - Default.

From now on, and to make easier the understanding of the TLDs, we are going to explain the functionality of each set of TASK_LIST_DEFINITION:GENERIC, and the number of TASK_DEFINITION:GENERIC children of the previously mentioned TASK_LIST_DEFINITION:GENERIC.

Basically, the TASK_LIST_DEFINITION:GENERIC connect what we can consider "units of execution", those are the TASK_DEFINITION:GENERIC, that have a WORKFLOW assigned to be executed when the execution of the TLD reach them.

If you like to have a more deep knowledge about the workflows mentioned through this document please refer to the specific document.

**

If in the category FIND, the attribute Path is present, the attribute FIND.ArtifactType will be the starting artifact for the Path, but the FIND.Status attribute refers to the last artifact on the Path.

FIND.ArtifactType == VIRTUAL_MACHINE
FIND.Status== INSTANTIATED
FIND.Path ==
VIRTUAL_MACHINE>VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE<REGION>COMPUTE>FLAVOR

In this example, we are looking for a FLAVOR in status INSTANTIATED, we do not expect to get a VIRTUAL_MACHINE, in status INSTANTIATED.

** If during the use of the TLDs, the "Regenerate UUIDs" option is used, the user should check the Id of the tree that brings all the elements of the TLD, this "id" is specific and it will be the same for all the tree groups in all the TLDs.

** The two modes available are "Default" and "Simulated", the second one is only available if it is configured previously, by defect, the mode that will be used is "Default".

14.1 Specific Elements of the TLD Undeploy Organization.

In this chapter the different elements of the specific TLD will be explained conscientiously.

14.2 TLD CHECK UNDEPLOY AND DEACTIVATE: Undeploy_Check

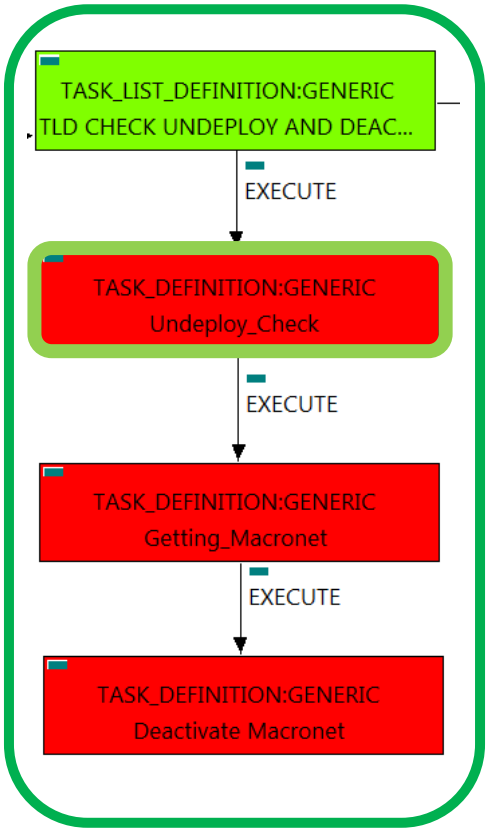


Figure 235: Undeploy check.

This TD it is going to assure the scenario in order to delete a specific Organization, this means that during the execution the TD is going to check if all the children of the Organization are still or were properly deleted before launch the undeploy of an Organization.

Targets of the TASK DEFINITION:
STATUS of the TD: ENABLED

Categories:

GENERAL.Name ==	Undeploy check
FIND.Condition ==	**status==constant:ACTIVE**
EXECUTE.Workflow ==	**"WF_TS_UNDEPLOY_CHECK_CHILDREN"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	ROLLBACK
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek for the children entities of the Organization, in case the TD find some the execution of the TD will fail, the goal of this TD is to guarantee that the Organization has no children and also is in the proper conditions to be set as an entity with status INSTANTIATED.

Once found, the TD would execute the WF present in EXECUTE.Workflow, in this case, the Wf is "WF_TS_UNDEPLOY_CHECK_CHILDREN**", the workflow will develop the task previously explained.**

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with the value "true", this means once the TD ends its execution the element which is being used by the TD will be locked.

14.3 TLD CHECK UNDEPLOY AND DEACTIVATE: Getting_Macronet

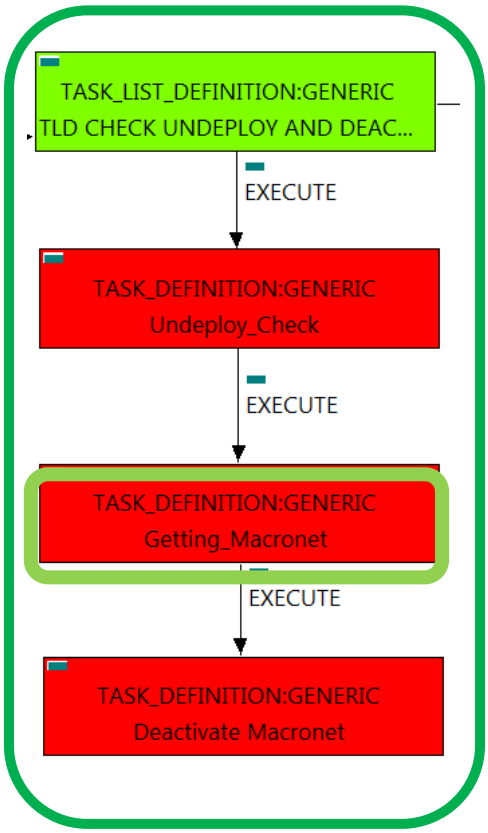


Figure 236: Selecting the adequate Macronet to be deleted.

This TD it is going to assure the selection of the correct artifact that later on will be deactivated by the workflow executed. **Once finished, we will have assured that all the MACRONETs artifacts are prepared to be deleted when required.**

Targets of the TASK DEFINITION:
STATUS of the TD: ENABLED

Categories:

GENERAL.Name ==	Getting_Macronet
SET.Running_Status ==	ACTIVE
SET.Status ==	ACTIVE
FIND.Condition ==	**GENERAL.Name==%GENERAL.Name%**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a MACRONET:DCN with Status ACTIVE, once found , the WF will start the deactivation, if the deactivation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with the value "true", this means once the TD ends its execution the element which is being used by the TD will be locked.

14.4 TLD CHECK UNDEPLOY AND DEACTIVATE: Deactivate Macronet

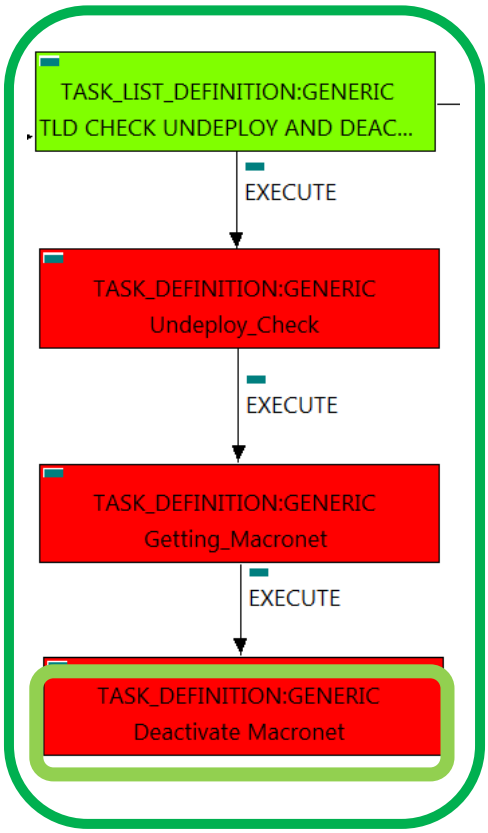


Figure 237: Deactivating the specific Macronet.

This TD it is going to deactivate our ENTERPRISE:DCN**, this means, the WF implied in this TLD is going to find and deactivate an** ENTERPRISE **in status ACTIVE that fills the conditions present in the TD.**

Once finished, we will have an ENTERPRISE:DCN **deactivated with all the relationship needed for the correct behavior of the artifact still present, prepare to be deleted when required.**

Targets of the TASK DEFINITION:
STATUS of the TD: ENABLED

Categories:

GENERAL.Name ==	Deactivate Macronet
SET.Running_Status ==	ACTIVE
SET.Status ==	INSTANTIATED.
FIND.Condition ==	**GENERAL.Name==%GENERAL.Name%**
EXECUTE.Workflow ==	**"WF_TS_DEACTIVATE_SDN_MACRONET"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek a MACRONET:DCN with Status ACTIVE, once found , the WF will start the deactivation, if the deactivation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with the value "true", this means once the TD ends its execution the element which is being used by the TD will be locked.

14.5 TLD DEACTIVATE ENTRIES: Deactivate Enterprise.

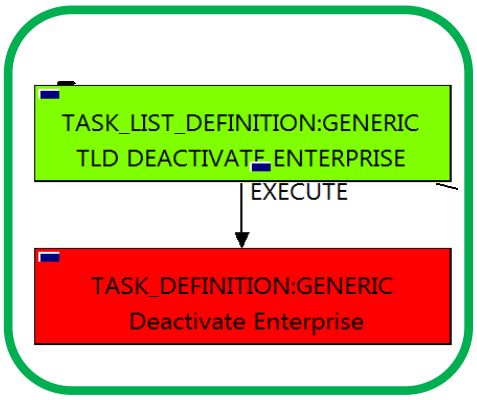


Figure 238: Deactivate Enterprise

This TD it is going to deactivate our ENTERPRISE:DCN**, this means, the WF implied in this TLD is going to find and deactivate an** ENTERPRISE **in status ACTIVE that fills the conditions present in the TD.**

Once finished, we will have an ENTERPRISE:DCN **deactivated with all the relationship needed for the correct behavior of the artifact still present, prepare to be deleted when required.**

Targets of the TASK DEFINITION:
STATUS of the TD: ENABLED

Categories:

GENERAL.Name ==	Getting_L3Domain Task
SET.Running_Status ==	ACTIVE
SET.Status ==	INSTANTIATED

ORGANIZATION>RESOURCE_POOL>VIM>AUTHENTICATION>REGION>NETWORKING
<SDN_CONTROLLER>ENTERPRISE:DCN@status=ACTIVE,
ORGANIZATION>RESOURCE_POOL>LOCATION>VIM>AUTHENTICATION>REGION>
NETWORKING<SDN_CONTROLLER>ENTERPRISE:DCN@status=ACTIVE,
ORGANIZATION>RESOURCE_POOL>DATACENTER>VIM>AUTHENTICATION>
REGION>NETWORKING<SDN_CONTROLLER>ENTERPRISE:DCN@status=ACTIVE,
ORGANIZATION>RESOURCE_POOL>SERVER<HYPERVISOR<VIM>AUTHENTICATION>REGION>
NETWORKING<SDN_CONTROLLER>ENTERPRISE:DCN@status=ACTIVE

EXECUTE.Workflow ==	**"WF_TS_DEACTIVATE_SDN_ENTERPRISE_DCN"**
EXECUTE.Inactive==	false
ROLLBACK.Behaviour_on_error ==	STOP
ROLLBACK.Number_of_retries ==	0
DATA.Lock ==	true

The Workflow present in EXECUTE.Workflow attribute it is going to seek an ENTERPRISE:DCN that match the FIND.Condition attribute with value :" GENERAL.Name==%GENERAL.Name%" with Status ACTIVE, by the MultiplePath given by the attribute FIND.Path.

Once found , the WF will start the deactivation, if the deactivation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

14.6 TLD DEACTIVATE ENTERPRISE Profile: Deactivate Enterprise Profile.

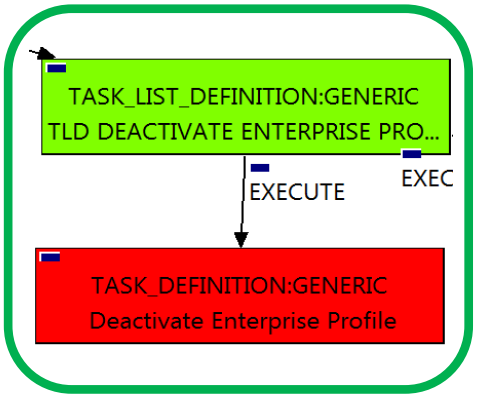


Figure 239: Deactivate Enterprise profile.

This TD it is going to deactivate our ENTERPRISE:PROFILE:DCN**, this means, the WF implied in this TLD is going to find and deactivate an ENTERPRISE:PROFILE in status ACTIVE that fills the conditions present in the TD.**

Once finished, we will have an ENTERPRISE:PROFILE:DCN **deactivated with all the relationship needed for the correct behavior of the artifact still present, prepare to be deleted when required.**

Targets of the TASK DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.ArtifactType == ORGANIZATION
FIND.Status== ACTIVE.
FIND.Condition== GENERAL.Name==%GENERAL.Name%_Profile
FIND.Path==

ORGANIZATION>RESOURCE_POOL>VIM>AUTHENTICATION>REGION>NETWORKING
<SDN_CONTROLLER>ENTERPRISE:PROFILE:DCN@status=ACTIVE,
ORGANIZATION>RESOURCE_POOL>LOCATION>VIM>AUTHENTICATION>REGION>NETWORKING
<SDN_CONTROLLER>ENTERPRISE:PROFILE:DCN@status=ACTIVE,
ORGANIZATION>RESOURCE_POOL>DATACENTER>VIM>AUTHENTICATION>REGION>NETWORKING
<SDN_CONTROLLER>ENTERPRISE:PROFILE:DCN@status=ACTIVE,
ORGANIZATION>RESOURCE_POOL>SERVER<HYPERVISOR<VIM>AUTHENTICATION>REGION>
NETWORKING<SDN_CONTROLLER>ENTERPRISE:PROFILE:DCN@status=ACTIVE

SET.Running_Status == ACTIVE.
SET.Status == INSTANTIATED.
EXECUTE.Workflow== *"WF_TS_DEACTIVATE_SDN_PROFILE"*
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Numbre_of_retries == 0
DATA.Lock == true

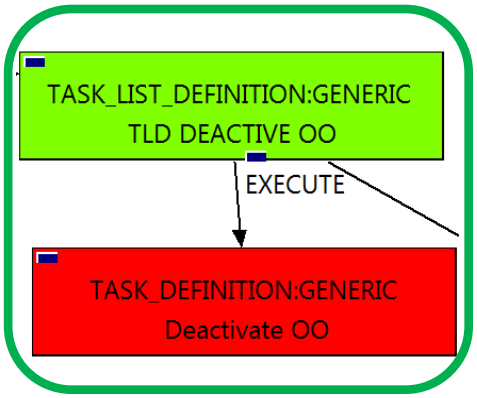
The Workflow present in EXECUTE.Workflow attribute it is going to seek an ENTERPRISE:PROFILE:DCN that match the FIND.Condition attribute with value :" GENERAL.Name==%GENERAL.Name%_Profile" with Status ACTIVE, by the MultiplePath given by the attribute FIND.Path.

Once found , the WF will start the deactivation, if the deactivation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

14.7 TLD DEACTIVATE OO: Deactivate OO.



The TDs that have present in the their names "Deactivate", are Task Definitions responsible of the deactivation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, we are not going to deactivate any artifact, this TD associates the entity given with the LDAP group that it is corresponded to, to make the user's reference clear between entities.

Targets of the TASK DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.Condition == status==constant:ACTIVE
EXECUTE.Workflow== *"WF_TS_DEACTIVATE_OO_ORGANIZATION"*
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Numbre_of_retries == 0
DATA.Lock == true

Figure 240: Deactivate OO.

The WorkFlow present in EXECUTE.Workflow it is going to seek an ORGANIZATION:GENERIC in Status ACTIVE in the DDBB, when the TD find it, it will start. This workflow it is going to query and update the entity given, in this case, Tenant, with the values needed for the correct behavior of the users with the specific entity.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

14.8 TLD INVENTORY MACRONET DELETE: Deprovision Macronet.

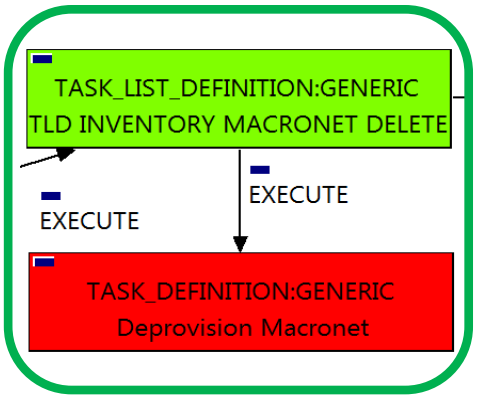


Figure 241: Deprovision Macronet.

The TDs that have present in the their names "Deprovision", are Task Definitions responsible of the deletion in the platform targeted and in the DDBB, in this case, the artifacts that are going to be deleted are MACRONETs.

Once finished, the TD should have been deleted the MACRONETs artifacts mentioned above, this means, all MACRONETs artifact related to the ORGANIZATION given.

Targets of the TASK DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.Condition == status==constant:ACTIVE
EXECUTE.Workflow== *"WF_TS_DEPROVISION_SDN_MACRONET"*
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Numbre_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek an ORGANIZATION in Status ACTIVE in the DDBB . Once found , the WF will start the deleting, if deletion is successful no MACRONET artifacts should remain related to the ORGANIZATION given. Notice that the TD is not going to change the status of the entity used for the deletion.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

14.9 TLD INVENTORY ORGANIZATION DELETE: Deprovision Enterprise.

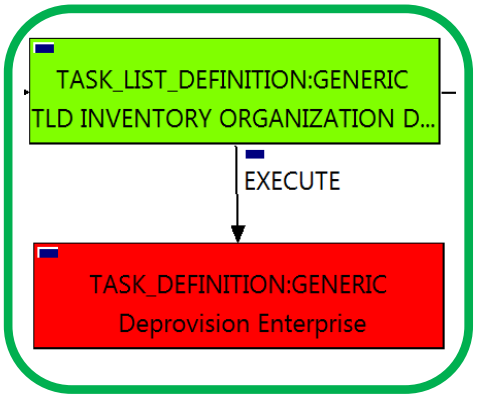


Figure 242: Deprovision Enterprise.

The TDs that have present in the their names "Deprovision", are Task Definitions responsible of the deletion in the platform targeted and in the DDBB, in this case, the artifact that is going to be deleted is ENTERPRISE:DCN.

Once finished, the TD should have been deleted the ENTERPRISE artifact given, this means, all the relationships of the artifact and the changing of the artifact's status to INSTANTIATED.

Targets of the TASK DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.Condition == status==constant:ACTIVE
SET.Status == INSTANTIATED.
EXECUTE.Workflow== *"WF_TS_DEPROVISION_SDN_ENTERPRISE"*
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Numbre_of_retries == 0
DATA.Lock == true

The Workflow present in EXECUTE.Workflow attribute it is going to seek an ORGANIZATION in Status ACTIVE in the DDBB . Once found , the WF will start the deleting, if deletion is successful the ENTERPRISE artifact given should has changed its status to the status reflect in the attribute SET.Status, this would be "INSTANTIATED".

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Due to that the value of the attribute DATA.Lock is true, when the Task Definition has finished the artifact that was used in the workflow executed will be set as "Locked".

14.10 TLD DELETE ORGANIZATION: Organization Delete.

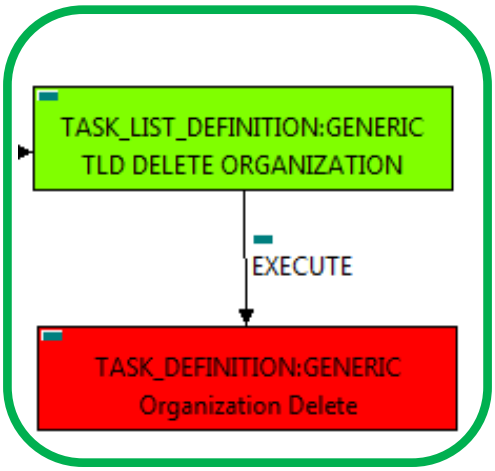


Figure 243: Organization Delete.

The TDs that have present in their names "Delete", are Task Definitions responsible of the deletion of the artifact given, in this case, this TD it is going to delete an ORGANIZATION, notice the workflow used in this TD, "WF_TS_DELETE_INSTANCE_TREE", all the components and elements below the entity that it is going to be deleted , are going to be eliminated as well, in other case, this elements will remain unreachable, that is not desirable.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.ArtifactType ==	**ORGANIZATION.**
EXECUTE.Workflow ==	
"WF_TS_DELETE_INSTANCE_TREE"	
ROLLBACK.Behaviour_on_error ==	**STOP**
ROLLBACK.Number_of_retries ==	**0**
DATA.Lock ==	**true**

The Workflow present in EXECUTE.Workflow attribute it is going to seek an ORGANIZATION in the DDBB . Once found, the WF will start the deleting.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

Chapter 15 Undeploy of a Firewall - Default.

From now on, and to make easier the understanding of the TLDs, we are going to explain the functionality of each set of TASK_LIST_DEFINITION:GENERIC, and the number of TASK_DEFINITION:GENERIC children of the previously mentioned TASK_LIST_DEFINITION:GENERIC.

Basically, the TASK_LIST_DEFINITION:GENERIC connect what we can consider “units of execution”, those are the TASK_DEFINITION:GENERIC, that have a WORKFLOW assigned to be executed when the execution of the TLD reach them.

If you like to have a more deep knowledge about the workflows mentioned through this document please refer to the specific document.

**

If in the category FIND, the attribute Path is present, the attribute FIND.ArtifactType will be the starting artifact for the Path, but the FIND.Status attribute refers to the last artifact on the Path.

FIND.ArtifactType == VIRTUAL_MACHINE
FIND.Status== INSTANTIATED
FIND.Path ==
VIRTUAL_MACHINE>VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE<REGION>COMPUTE>FLAVOR

In this example, we are looking for a FLAVOR in status INSTANTIATED, we do not expect to get a VIRTUAL_MACHINE, in status INSTANTIATED.

** If during the use of the TLDs, the “Regenerate UUIDs” option is used, the user should check the Id of the tree that brings all the elements of the TLD, this “id” is specific and it will be the same for all the tree groups in all the TLDs.

** The two modes available are “Default” and “Simulated”, the second one is only available if it is configured previously, by defect, the mode that will be used is “Default”.

15.1 Specific Elements of the TLD Undeploy Firewall

In this chapter the different elements of the specific TLD will be explained conscientiously.

15.2 TLD STOP MONITOR : Stop Monitor.

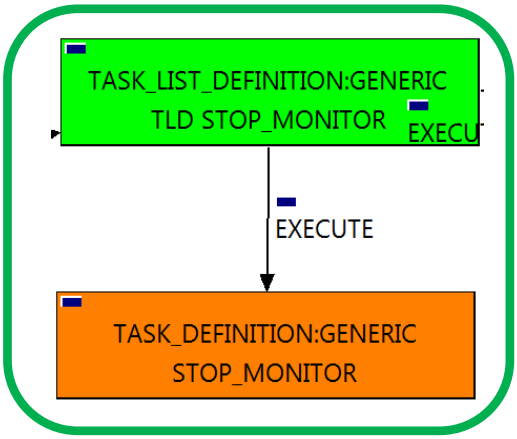


Figure 244: Stop monitor.

The TDs that have present in the their names "Stop", are Task Definitions responsible of the stopping of an specific artifact or element, in this case of the MONITORs, the TLD it is going to stop the MONITOR element given.

Once finished, our VNF should have the MONITOR given in status DEPLOYED, having taken in consideration all the rules for the stopping.

Targets of the TASK DEFINITION:

STATUS of the TD: ENABLED

Categories:

FIND.MainArtifact ==	**MONITOR.**
FIND.Condition==	**status==constant:STARTED.**
SET.Running_Status ==	**STARTED.**
SET.Status ==	**DEPLOYED.**
EXECUTE.Workflow ==	***"WF_TS_MONITOR_STOP"***
ROLLBACK.Behaviour_on_error ==	**STOP**
ROLLBACK.Number_of_retries ==	**0**
ROLBACK.Workflow== ***"WF_TS_MONITOR_START"***	
DATA.Lock ==	**false**

The Workflow present in EXECUTE.Workflow it is going to seek a MONITOR in Status STARTED in the DDBB, when the WF find it, it will start. This workflow stop the given MONITOR needed by the VNF to get a successful Undeploy.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts. In this case, the TLD has assigned as rollback workflow "WF_TS_MONITOR_START". When a TD of an Undeploy fails, the way to leave the scenario in the same situation is execute the "opposite" workflow. Due the value of the attribute DATA.Lock is ser as "false", no element will be locked at the end of the execution.

15.3 TLD DEACTIVATE VM : Deactivate VM.

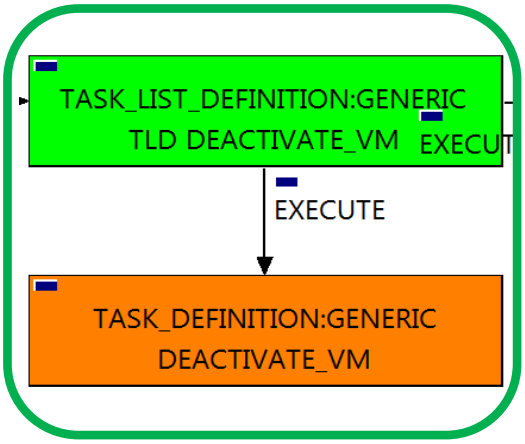


Figure 245: Deactivate Virtual Machine.

The TDs that have present in the their names "Deactivate", are Task Definitions responsible of the deactivation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be deactivated is a "VIRTUAL_MACHINE, this means, when this workflow finish, we will have the VIRTUAL_MACNIHE given with a new status INSTANTIATED.

Targets of the TASK DEFINITION:

STATUS of the TD: ENABLED

Categories:

FIND.mAINArtifact ==
VNF>VNF_COMPONENT>
VIRTUAL_MACHINE@status=ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == INSTANTIATED
EXECUTE.Workflow == *"WF_TS_DEACTIVATE_VM"*
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

The Workflow present in EXECUTE.Workflow attribute it is going to deactivate a "VIRTUAL_MACHINE" in Status ACTIVE in the DDBB . Once found , the WF will start the deactivation, if the deactivation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

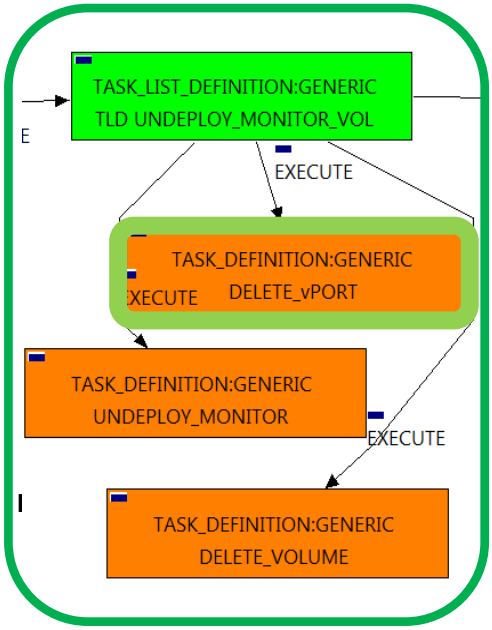
This TD could launch different workflows depending on the type of the VM that it is going to be deactivated, the main kinds of our VIRTUAL_MACHINEs are HELION, thereupon two of the WFs that could be used in this deactivation are: "WF_NFVD_DEACTIVATE_VM_HELION" and "WF_NFVD_DEACTIVATE_VM_OPENSTACK".

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with a value of "false", this means no element will be locked at the of the TD's execution.

15.4 TLD UNDEPLOY MONITOR VOL: Delete vPort.

The TDs that have present in their names “Delete”, are Task Definitions that delete an artifact or element from the DDBB or from the platforms targeted, in this case, the artifact that it is going to be delated is the VIRTUAL_PORT given.



Targets of the TASK:DEFINITION:

STATUS of the TD: ENABLED

Categories:

FIND.MainArtifact== VNF>VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_PORT@status=ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == ENABLED.
EXECUTE.Workflow== “WF_TS_DEACTIVATE_PORT”
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

Figure 246: Delete Virtual Port.

The Workflow present in EXECUTE.Workflow it is going to seek a VIRTUAL_PORT in Status ACTIVE in the DDBB, when the WF find it, it will start. This workflow will start one more, this last one, it is going to be named after the VIRTUAL_PORT that the TD it is trying to delete.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the “Behaviour_on_error” attribute its set on “ROLLBACK” the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a “STOP” set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with a value of “false”, this means no element will be locked at the of the TD’s execution.

15.5 TLD UNDEPLOY MONITOR VOL: Undeploy Monitor

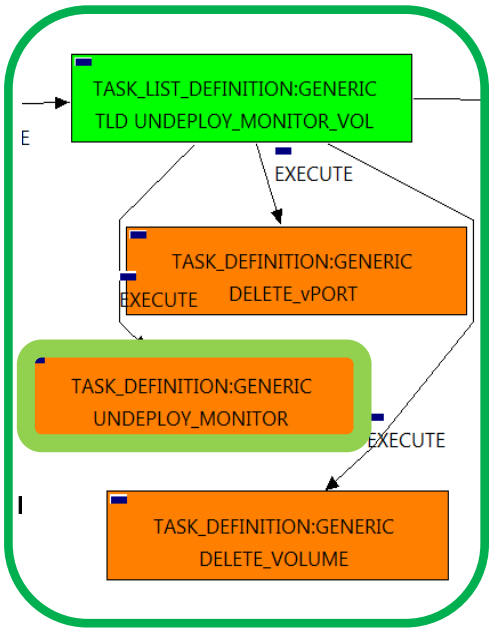


Figure 247: Undeploy Monitor.

The TDs that have present in the their names "Deploy" are Task Definitions responsible of the deployment in the platform targeted and the updating of the status in the platform and the DDBB , these deployments are slightly different to the ones we launch for our entities, as a rule, they are small components as the MONITORs. In this case, the artifact that is going to be deployed is a "MONITOR", this means, when this workflow finish, we will have a MONITOR deployed with status DEPLOYED.

Targets of the TASK:DEFINITION:

STATUS of the TD: ENABLED

Categories:

FIND.MainArtifact == MONITOR.
FIND.Condition== status==constant:DEPLOYED
SET.Running_Status == DEPLOYED.
SET.Status == INSTANTIATED
EXECUTE.Workflow ==
"WF_TS_MONITOR_UNDEPLOY"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0

The Workflow present in EXECUTE.Workflow attribute it is going to seek a MONITOR in Status DEPLOYED in the DDBB . Once found , the WF will start the deployment, if the deployment is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK.

The attribute DATA.Lock is set with a value of "false", this means no element will be locked at the of the TD's execution.

15.6 TLD UNDEPLOY MONITOR VOL: Delete Volume

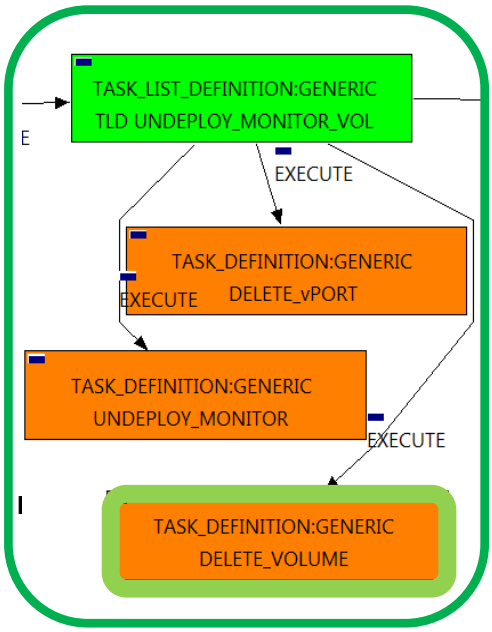


Figure 248: Delete Volume.

The TDs that have present in the their names "Delete", are Task Definitions responsible of the deletion of an artifact in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be deleted is a "VOLUME", this means, when this workflow finish, we are going to have a volume less.

Targets of the TASK:DEFINITION:

STATUS of the TD: ENABLED

Categories:

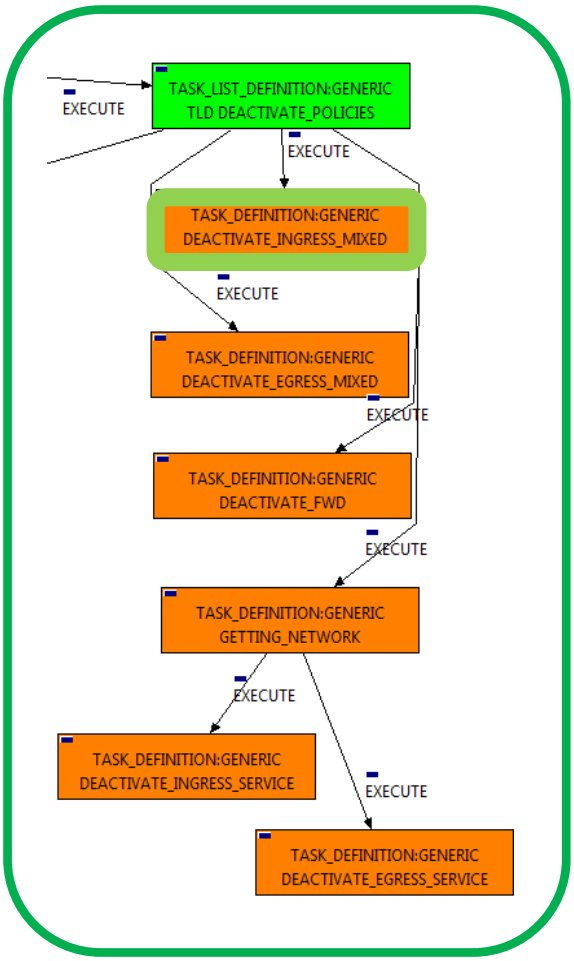
FIND.MainArtifact==
VNF>VNF_COMPONENT>
VIRTUAL_MACHINE>VIRTUAL_LUN@status=ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == INSTANTIATED
EXECUTE.Workflow == *"WF_TS_DELETE_VOLUME"*
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

The Workflow present in EXECUTE.Workflow attribute it is going to seek a VIRTUAL_LUN in the DDBB . Once found , the WF will start the deleting, if the deletion it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, in this case it will be "WF_TS_CREATE_VOLUME". But in this case the behavior is set as CONTINUE, this means, that the execution is going to continue no matter which error could be.

The attribute DATA.Lock is set with a value of "false", this means no element will be locked at the of the TD's execution.

15.7 TLD DEACTIVATE POLICIES: Deactivate Ingress Mixed.



This TD it is going to deactivate our INGRESSACLENTRY:TEMPLATE:DCN**, this means, the WF implied in this TLD is going to find and deactivate a** INGRESSACLENTRY **in status ACTIVE that fills the conditions present in the TD.**

Once finished, we will have a INGRESSACLENTRY **POLICY deactivated with status INSTANTIATED with all the relationship needed for the correct behavior of the artifact still present, prepare to be deleted when required.**

Targets of the TASK:DEFINITION:

STATUS of the TD: ENABLED

Categories:

FIND.MainArtifact ==
VNF:FW>NETWORK:GENERIC>ZONE:TEMPLATE>
ZONE:DCN<L3DOMAIN:DCN>INGRESSACL>
INGRESSACLENTRY@status=ACTIVE
FIND.Condition ==
ACLENTRY.NetworkType==ACLENTRY.LocationType &&
ACLENTRY.NetworkID!=ACLENTRY.LocationID
SET.Running_Status == ACTIVE
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_DEACTIVATE_SDN_INGRESSACLENTRY_POLICY"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Numbre_of_retries == 0

Figure 249: Deactivate Ingress Mixed.

The Workflow present in EXECUTE.Workflow attribute it is going to seek a VNF:FW that match the FIND.MainArtifact attribute with value "VNF:FW>NETWORK:GENERIC>ZONE:TEMPLATE>ZONE:DCN<L3DOMAIN:DCN>INGRESSACL>INGRESSACLENTRY@status=ACTIVE" with Status ACTIVE, also the elemenet should macth the condition present in the attribute FIND.Condition with value "ACLENTRY.NetworkType==ACLENTRY.LocationType&&ACLENTRY.NetworkID!=ACLENTRY.LocationID ".

Once found , the WF will start the deactivation, if the deactivation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with a value of "false", this means no element will be locked at the of the TD's execution.

15.8 TLD DEACTIVATE POLICIES: Deactivate Egress Mixed.

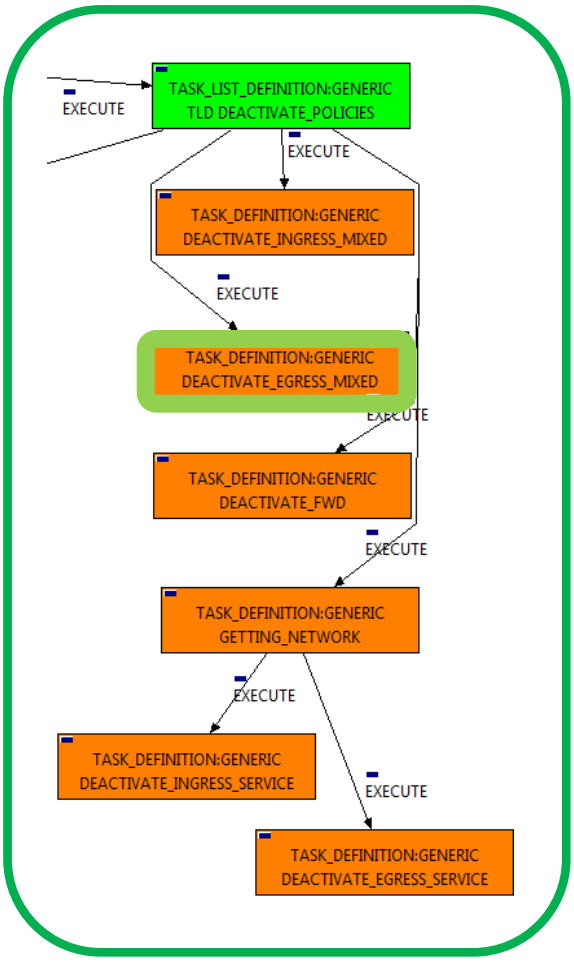


Figure 250: Deactivate Egress Mixed.

This TD it is going to deactivate our EGRESSACLENTRY:TEMPLATE:DCN**, this means, the WF implied in this TLD is going to find and deactivate a** EGRESSACLENTRY **in status ACTIVE that fills the conditions present in the TD.**

Once finished, we will have a EGRESSACLENTRY **POLICY deactivated with status INSTANTIATED with all the relationship needed for the correct behavior of the artifact still present, prepare to be deleted when required.**

Targets of the TASK:DEFINITION:

STATUS of the TD: ENABLED

Categories:

FIND.MainArtifact ==
VNF:FW>NETWORK:GENERIC>ZONE:TEMPLATE>
ZONE:DCN<L3DOMAIN:DCN>EGRESSACL>
EGRESSACLENTRY@status=ACTIVE
FIND.Condition ==
ACLENTRY.NetworkType==ACLENTRY.LocationType && ACLENTRY.NetworkID!=ACLENTRY.LocationID
SET.Running_Status == ACTIVE
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_DEACTIVATE_SDN_EGRESSACLENTRY_POLICY"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Numbre_of_retries == 0

The Workflow present in EXECUTE.Workflow attribute it is going to seek a VNF:FW that match the FIND.MainArtifact attribute with value "VNF:FW>NETWORK:GENERIC>ZONE:TEMPLATE>ZONE:DCN<L3DOMAIN:DCN>EGRESSACL>EGRESSACLENTRY @status=ACTIVE" with Status ACTIVE, also the elemenet should macth the condition present in the attribute FIND.Condition with value "ACLENTRY.NetworkType==ACLENTRY.LocationType&&ACLENTRY.NetworkID!=ACLENTRY.LocationID ".

Once found , the WF will start the deactivation, if the deactivation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with a value of "false", this means no element will be locked at the of the TD's execution.

15.9 TLD DEACTIVATE POLICIES: Deactivate FWD.

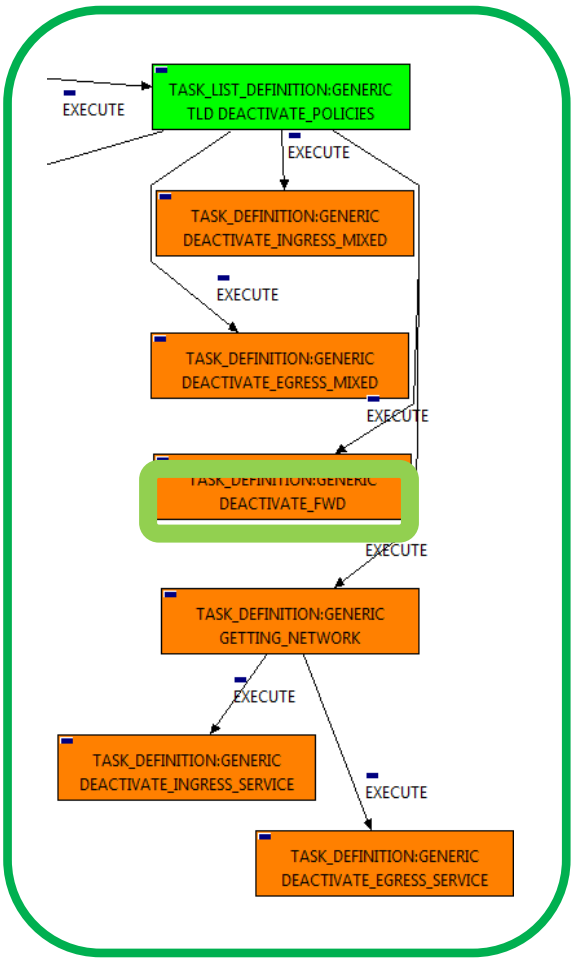


Figure 251: Deactivate Forwarding policies.

This TD it is going to deactivate our INGRESSADVFWDENTRY:TEMPLATE:DCN, **this means, the WF implied in this TLD is going to find and deactivate a** INGRESSADVFWDENTRY **in status ACTIVE that fills the conditions present in the TD.**

Once finished, we will have a INGRESSADVFWDENTRY **POLICY deactivated with status TERMINATED.**

Targets of the TASK:DEFINITION:

STATUS of the TD: ENABLED

Categories:

FIND.MainArtifact == VIRTUAL_MACHINE>VIRTUAL_PORT <REDIRECTION_TARGET> INGRESSADVFORWARDENTRY@status=ACTIVE
FIND.Condition == INGRESSADVFWDENTRY.NetworkType==INGRESSADVFWDENTRY.LocationType&&INGRESSADVFWDENTRY.NetworkID!=INGRESSADVFWDENTRY.LocationID
SET.Running_Status == ACTIVE
SET.Status == INSTANTIATED.
EXECUTE.Workflow == ***"WF_TS_DEACTIVATE_SDN_INGRESS_ADVANCED_FORWARDING_ENTRY"***
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Numbre_of_retries == 0
DATA.Lock == false

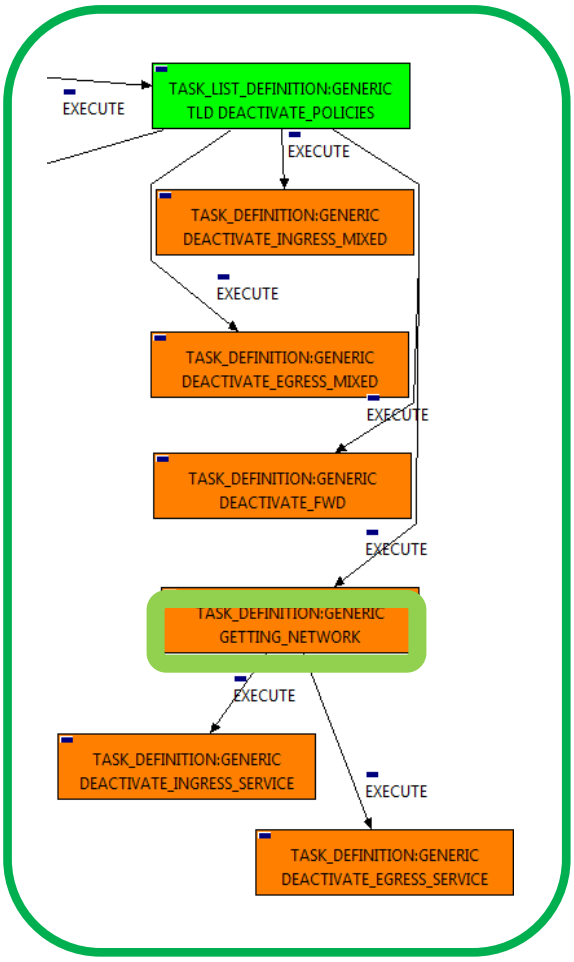
The Workflow present in EXECUTE.Workflow attribute it is going to seek a VNF:FW that match the FIND.MainArtifact attribute with value : "VIRTUAL_MACHINE>VIRTUAL_PORT<REDIRECTION_TARGET>INGRESSADVFORWARDENTRY@status=ACTIVE" with Status ACTIVE, by the Path given, ***" INGRESSADVFWDENTRY.NetworkType==INGRESSADVFWDENTRY.LocationType && INGRESSADVFWDENTRY.NetworkID!=INGRESSADVFWDENTRY.LocationID ".***

Once found , the WF will start the deactivation, if the deactivation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with a value of "false", this means no element will be locked at the of the TD's execution.

15.10 TLD DEACTIVATE POLICIES: Getting Networks.



This TD it is going to assure the selection of the correct artifact that later on will be used by the workflow executed.

Once finished, we will have assured that all ENTRY policies below the level of the VNF:FW will be accessible from our a NETWORK:GENERIC and only this kind of artifact.

Targets of the TASK:DEFINITION:

STATUS of the TD: ENABLED

Categories:

FIND.MainArtifact == VNF:FW>NETWORK:GENERIC@status=INSTANTIATED
SET.Running_Status == INSTANTIATED.
SET.Status == INSTANTIATED.
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

Figure 252: getting Network.

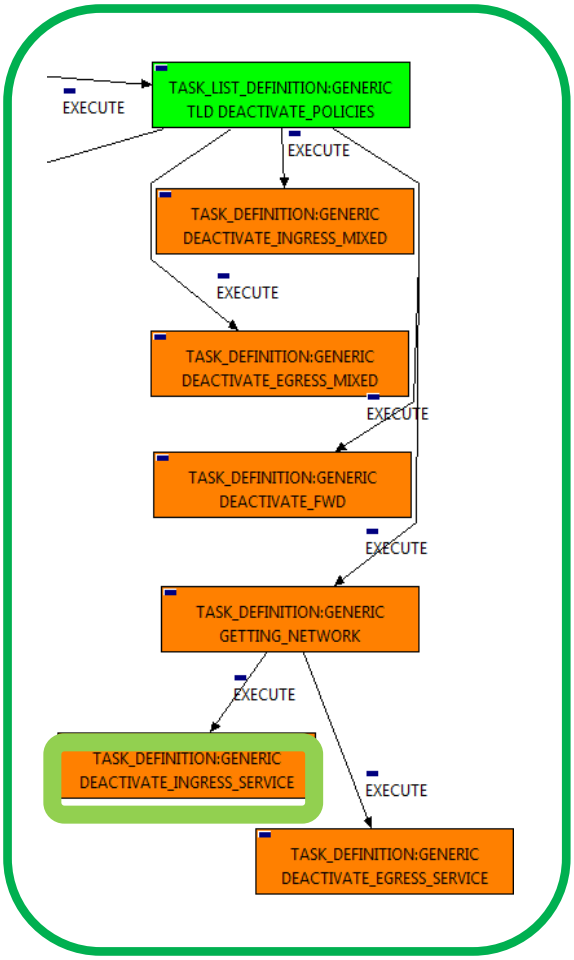
The Workflow present in EXECUTE.Workflow attribute it is going to seek a VNF:FW that match the FIND.MainArtifact attribute with value "VNF:FW>NETWORK:GENERIC@status=INSTANTIATED" in the DDBB.

Once found, the TD would execute the WF present in EXECUTE.Workflow, in this case, the Wf is "WF_TS_DO_NOTHING_STATUS_CHANGE", this one is identified as a dummy workflow with no changes associated to its execution, neither exists change in the status of the artifact targeted by the TD, remains as "ENABLED".

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with a value of "false", this means no element will be locked at the of the TD's execution.

15.11 TLD DEACTIVATE POLICIES: Deactivate Ingress Service



This TD it is going to deactivate our **INGRESSACLENTRY**:TEMPLATE:DCN**, this means, the WF implied in this TLD is going to find and deactivate a in status ACTIVE that fills the conditions present in the TD.**

Once finished, we will have a INGRESSADVFWDENTRY **POLICY deactivated with status INSTANTIATED.**

Targets of the TASK:DEFINITION:

STATUS of the TD: ENABLED

Categories:

FIND.MainArtifact == NETWORK:GENERIC
FIND.Condition ==
GENERAL.Name==INGRESSACL_%GENERAL.Name%_ANY&&ACLE
NTRY.LocationType==constant:ZONE
FIND.Path ==
NETWORK:GENERIC>ZONE:TEMPLATE>ZONE:DCN
<L3DOMAIN:DCN>INGRESSACL>
INGRESSACLENTRY@status=ACTIVE
SET.Running_Status == ACTIVE
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_DEACTIVATE_SDN_INGRESSACLENTRY_POLICY"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Numbre_of_retries == 0
DATA.Lock == false

Figure 253: Deactivate Ingress Service.

The Workflow present in EXECUTE.Workflow attribute it is going to seek a INGRESSACLENTRY that match the FIND.Condition attribute with value :
"GENERAL.Name==INGRESSACL_%GENERAL.Name%_ANY&ACLENTRY.LocationType==constant:ZONE" **with Status ACTIVE, acesiblle by the path given in the attribute FIND.Path with value :**
"NETWORK:GENERIC>ZONE:TEMPLATE>ZONE:DCN<L3DOMAIN:DCN>INGRESSACL>INGRESSACLENTRY@status =ACTIVE".

Once found , the WF will start the deactivation, if the deactivation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with a value of "false", this means no element will be locked at the of the TD's execution.

15.12 TLD DEACTIVATE POLICIES: Deactivate Egress Service

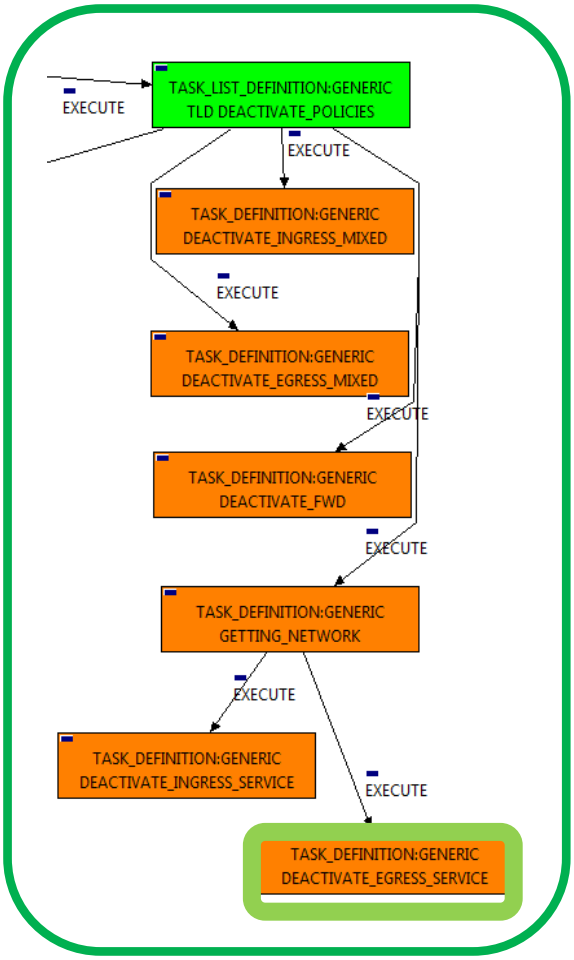


Figure 254: Deactivate Egress Service.

This TD it is going to deactivate our **EGRESSACLENTRY**:TEMPLATE:DCN**, this means, the WF implied in this TLD is going to find and deactivate a in status ACTIVE that fills the conditions present in the TD.**

Once finished, we will have a EGRESSADVFWDENTRY **POLICY deactivated with status INSTANTIATED.**

Targets of the TASK:DEFINITION:

STATUS of the TD: ENABLED

Categories:

FIND.MainArtifact == NETWORK:GENERIC
FIND.Condition ==
GENERAL.Name==EGRESSACL_%GENERAL.Name%_ANY&&ACLENTRY.LocationType==constant:ZONE
FIND.Path ==
NETWORK:GENERIC>ZONE:TEMPLATE>ZONE:DCN<L3DOMAIN:DCN>EGRESSACL>EGRESSACLENTRY@status=ACTIVE
SET.Running_Status == ACTIVE
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_DEACTIVATE_SDN_EGRESSACLENTRY_POLICY"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Numbre_of_retries == 0
DATA.Lock == false

The Workflow present in EXECUTE.Workflow attribute it is going to seek a EGRESSACLENTRY that match the FIND.Condition attribute with value :
***"GENERAL.Name==EGRESSACL_%GENERAL.Name%_ANY&ACLENTRY.LocationType==constant:ZONE"* with Status ACTIVE, acesiblle by the path given in the attribute FIND.Path with value : "NETWORK:GENERIC>ZONE:TEMPLATE>ZONE:DCN<L3DOMAIN:DCN>EGRESSACL>EGRESSACLENTRY@status=ACTIVE".**

Once found , the WF will start the deactivation, if the deactivation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with a value of "false", this means no element will be locked at the of the TD's execution.

15.13 TLD DEACTIVATE RT: Deactivate Redirection Target.

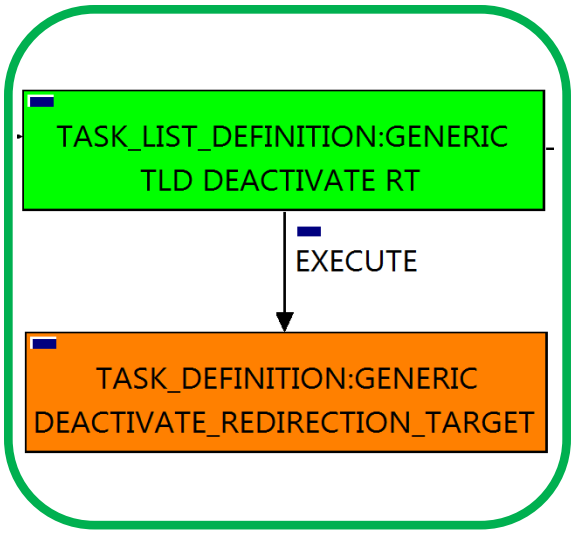


Figure 255: Deactivate Redirection Target.

The TDs that have present in the their names "Deactivate", are Task Definitions responsible of the deactivation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be deactivated is the "REDIRECTION_TARGET:DCN", this means, when this workflow finish, we will have our instance of the artifact REDIRECTION_TARGET with status TERMINATED.

Targets of the TASK:DEFINITION:

STATUS of the TD: ENABLED

Categories:

FIND.MainArtifact ==
VNF:FW>NETWORK:GENERIC>ZONE:TEMPLATE>
ZONE:DCN<L3DOMAIN:DCN>INGRESSADVFORWARD>
INGRESSADVFORWARDENTRY<
REDIRECTION_TARGET@status=ACTIVE
SET.Running_Status == ACTIVE
SET.Status == TERMINATED
EXECUTE.Workflow ==
"WF_TS_DEACTIVATE_SDN_REDIRECTION_TARGET"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "REDIRECTION_TARGET" in Status ACTIVE in the DDBB . Notice that we are not trying to get a VIRTUAL_MACHINE in status ACTIVE. The query it is going to use the Path present in the category FIND.Path. Once found , the WF will start the deactivating, if the deactivation it is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with a value of "false", this means no element will be locked at the of the TD's execution.

15.14 TLD DEACTIVATE OS SUBNET: Deactivate Subnetwork.

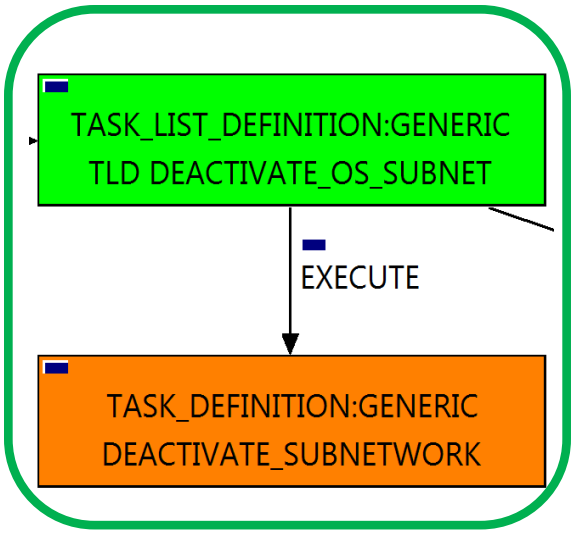


Figure 256: Deactivate Subnetwork.

The TDs that have present in the their names "Deactivate", are Task Definitions responsible of the deactivation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be deactivated is a "SUBNETWORK:OPENSTACK", this means, when this workflow finish, we will have a SUBNETWORK:OPENSTACK with status INSTANTIATED, still present in the DDBB..

Targets of the TASK:DEFINITION:

STATUS of the TD: ENABLED

Categories:

FIND.MainArtifact ==
VNF:FW>VNF_COMPONENT>
VIRTUAL_MACHINE>VIRTUAL_PORT<
SUBNETWORK:OPENSTACK@status=ACTIVE.
SET.Running_Status == ACTIVE.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_DEACTIVATE_SUBNETWORK"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "SUBNETWORK:OPENSTACK" that matches with the path and condition present in the attribute FIND.MainArtifact with value "VNF:FW>VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_PORT<SUBNETWORK:OPENSTACK@status=ACTIVE" . Once found , the WF will start the deactivating, if deactivation is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with a value of "false", this means no element will be locked at the of the TD's execution.

15.15 TLD DEACTIVATE OS NET: Deactivate Network

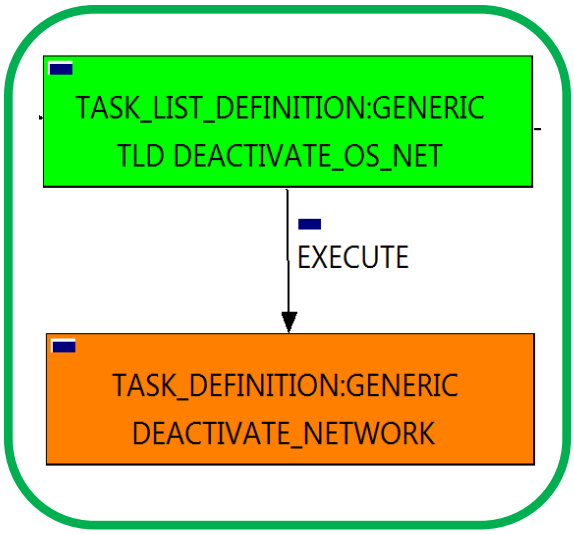


Figure 257: Deactivate Network.

The TDs that have present in the their names "Deactivate", are Task Definitions responsible of the deactivation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be deactivated is a "NETWORK:OPENSTACK", this means, when this workflow finish, we will have a NETWORK:OPENSTACK with status INSTANTIATED, still present in the DDBB..

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.MainArtifact ==
VNF:FW>VNF_COMPONENT>
VIRTUAL_MACHINE>VIRTUAL_PORT<
SUBNETWORK:OPENSTACK<
NETWORK:OPENSTACK@status=ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_DEACTIVATE_NETWORK"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "NETWORK:OPENSTACK" that matches with the path and condition present in the attribute FIND.MainArtifact with value "VNF:FW>VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_PORT<SUBNETWORK:OPENSTACK<NETWORK:OPENSTACK@status=ACTIVE" . Once found , the WF will start the deactivating, if deactivation is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with a value of "false", this means no element will be locked at the of the TD's execution.

15.16 TLD DEACTIVATE DCN SUBNET: Deactivate Network

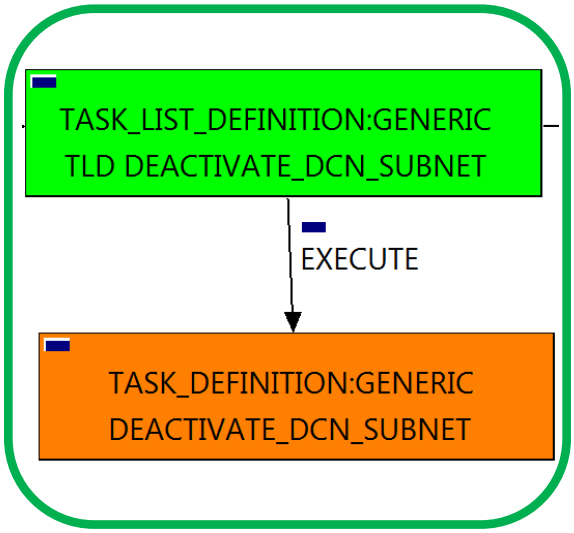


Figure 258: Deactivate DCN Subnetwork.

The TDs that have present in the their names "Deactivate", are Task Definitions responsible of the deactivation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be deactivated is a "SUBNETWORK:DCN", this means, when this workflow finish, we will have a SUBNETWORK:DCN with status INSTANTIATED, still present in the DDBB.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.MainArtifact ==
VNF:FW>VNF_COMPONENT>
VIRTUAL_MACHINE>VIRTUAL_PORT<
SUBNETWORK:GENERIC>SUBNETWORK:TEMPLATE>SUBNETWORK@status=ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_DEACTIVATE_SDN_SUBNETWORK"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "SUBENTWORK:GENERIC" that matches with the path and condition present in the attribute FIND.MainArtifact with value "VNF:FW>VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_PORT<SUBNETWORK:GENERIC>SUBNETWORK:TEMPLATE>SUBNETWORK@status=ACTIVE" . Once found , the WF will start the deactivating, if deactivation is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with a value of "false", this means no element will be locked at the of the TD's execution.

15.17 TLD Activate Flavor ES: Activate Flavor Extra Specs.

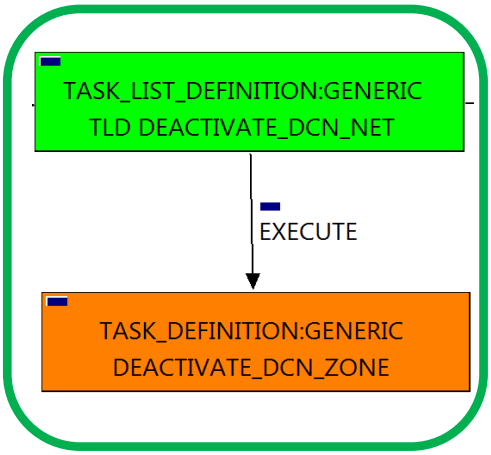


Figure 259: Deactivate DCN Zone.

The TDs that have present in the their names "Deactivate", are Task Definitions responsible of the deactivation in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifact that is going to be deactivated is a "ZONE:DCN", this means, when this workflow finish, we will have a ZONE(Network) with status INSTANTIATED still present in the DDBB.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.MainArtifact ==
VNF:FW>VNF_COMPONENT>VIRTUAL_MACHINE>
VIRTUAL_PORT<SUBNETWORK:GENERIC>
SUBNETWORK:TEMPLATE>
SUBNETWORK<ZONE@status=ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == INSTANTIATED.
EXECUTE.Workflow == *"WF_TS_DEACTIVATE_SDN_ZONE"*
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "ZONE" that matches with the path and condition present in the attribute FIND.MainArtifact with value "VNF:FW>VNF_COMPONENT>VIRTUAL_MACHINE>VIRTUAL_PORT<SUBNETWORK:GENERIC>SUBNETWORK:TEMPLATE>SUBNETWORK<ZONE@status=ACTIVE" . Once found , the WF will start the deactivating, if deactivation is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with a value of "false", this means no element will be locked at the of the TD's execution.

15.18 TLD Delete FW Policy Entries: Delete FW Policy Entries.

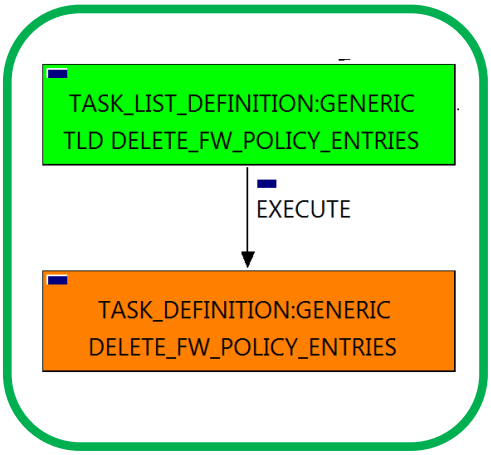


Figure 260: Delete Forwarding entry policies.

The TDs that have present in the their names "Delete", are Task Definitions responsible of the erased in the platform targeted and the updating of the status in the platform and the DDBB, in this case, the artifacts that are going to be deleted are a "INGRESSADVFORWARDENTRY:TEMPLATE:DCN**", this means, when this workflow finish, we will not have any** INGRESSADVFORWARDENTRY:TEMPLATE:DCN in our platforms or DDBB. The TD should erase all of this kind of policies.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.Condition == status==constant:ACTIVE.
SET.Running_Status == ACTIVE.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_DEPROVISION_SDN_FORWARDING_ENTRIES"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

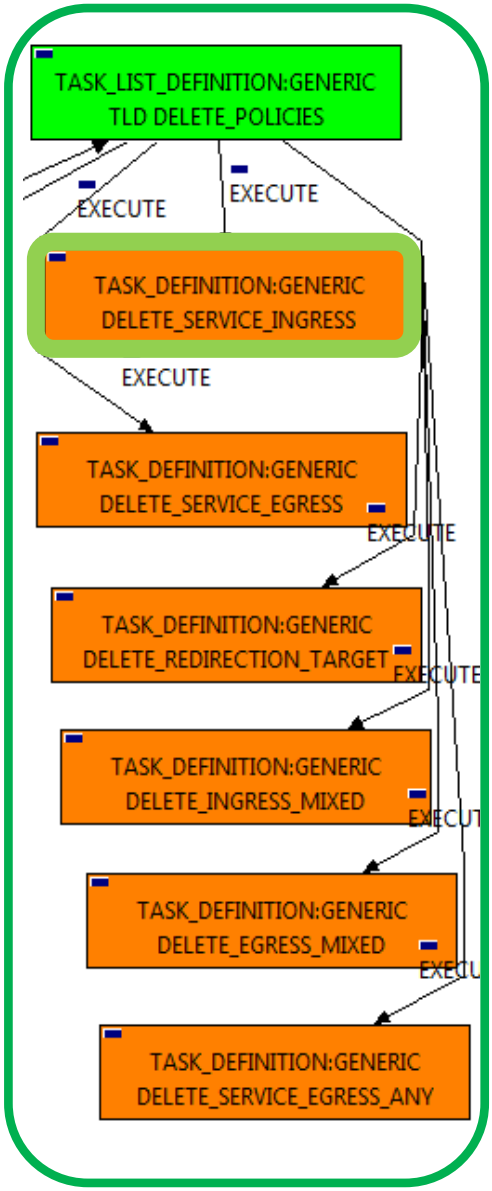
Notice that the TD is using the VNF:FW to locate the policies needed, but the TD will not change the status of the VNF:FW.

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "INGRESSADVFORWARDENTRY**" in Status ACTIVE in the DDBB . Once found , the WF will start the deleting, if deactivation is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.**

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with a value of "false", this means no element will be locked at the of the TD's execution.

15.19 TLD DELETE POLICIES : Delete Service Ingress.



This TD it is going to delete our **INGRESSACLENTRY**:TEMPLATE:DCN**, this means, the WF implied in this TLD is going to find and deactivate a in status ACTIVE that fills the conditions present in the TD.**

Once finished, the INGRESSACLENTRY POLICY given will have been deleted from the inventory.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.MainArtifact == VNF:FW>NETWORK:GENERIC
SET.Running_Status == INSTANTIATED.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_PROVISION_SDN_ZONE_ANY_INGRESSACL_ENTRY_UNDO"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

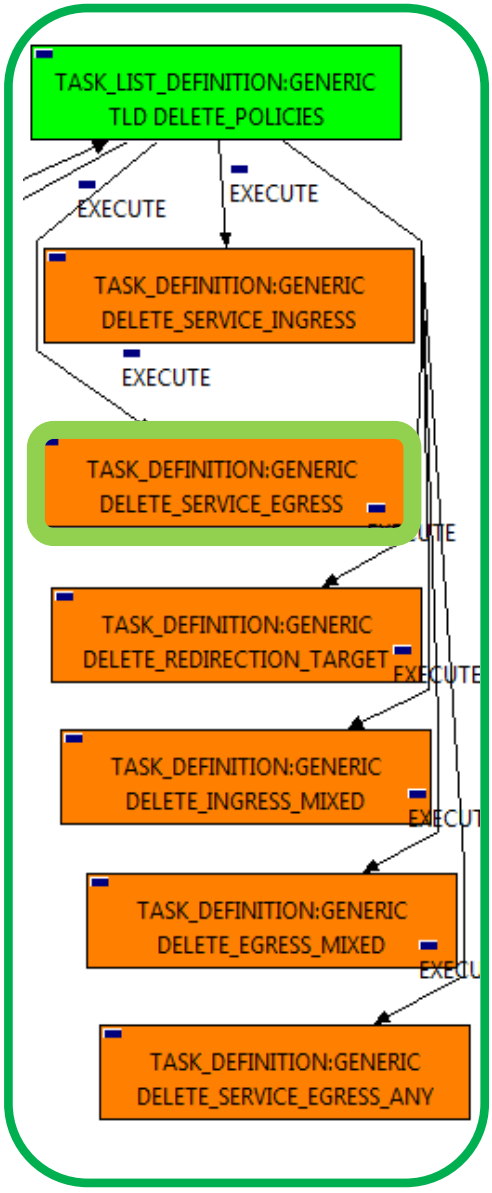
Figure 261: Delete service Ingress

The Workflow present in EXECUTE.Workflow attribute it is going to seek a NETWORK:GENERIC , once found , the WF will start the deleting, if deletion is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with a value of "false", this means no element will be locked at the of the TD's execution.

15.20 TLD DELETE POLICIES : Delete Service Egress.



This TD it is going to delete our **EGRESSACLENTRY**:TEMPLATE:DCN**, this means, the WF implied in this TLD is going to find and deactivate a in status ACTIVE that fills the conditions present in the TD.**

Once finished, the EGRESSACLENTRY POLICY given will have been deleted from the inventory.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.ArtifactType == VNF:FW>NETWORK:GENERIC
SET.Running_Status == INSTANTIATED.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_PROVISION_SDN_SERVICE_EGRESSACL_ENTRY_UNDO"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0

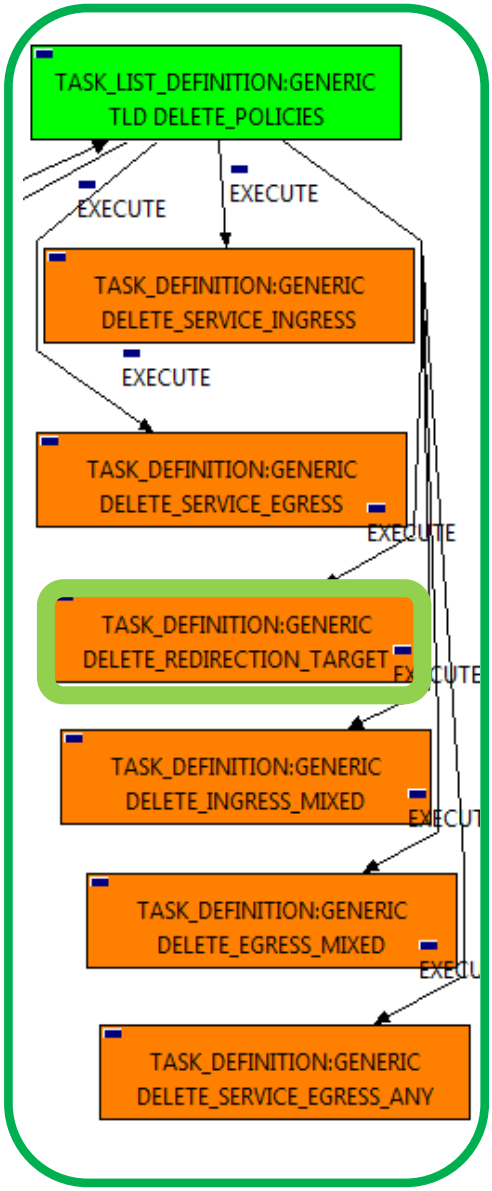
Figure 262: Delete Service Egress.

The Workflow present in EXECUTE.Workflow attribute it is going to seek a NETWORK:GENERIC , once found , the WF will start the deletingn, if deletion is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with a value of "false", this means no element will be locked at the of the TD's execution.

15.21 TLD DELETE POLICIES : Delete Redirection Target.



This TD it is going to delete our **REDIRECTION:TARGET, this means, the WF implied in this TLD is going to find and deactivate a Redirection Targer related to our L3DOMAIN, in status ACTIVE that fills the conditions present in the TD.**

Once finished, the EGRESSACLENTRY POLICY given will have been deleted from the inventory.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.Condition == status==constant:ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_DEPROVISION_SDN_REDIRECTION_TARGET"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

Figure 263: Delete Redirection Target.

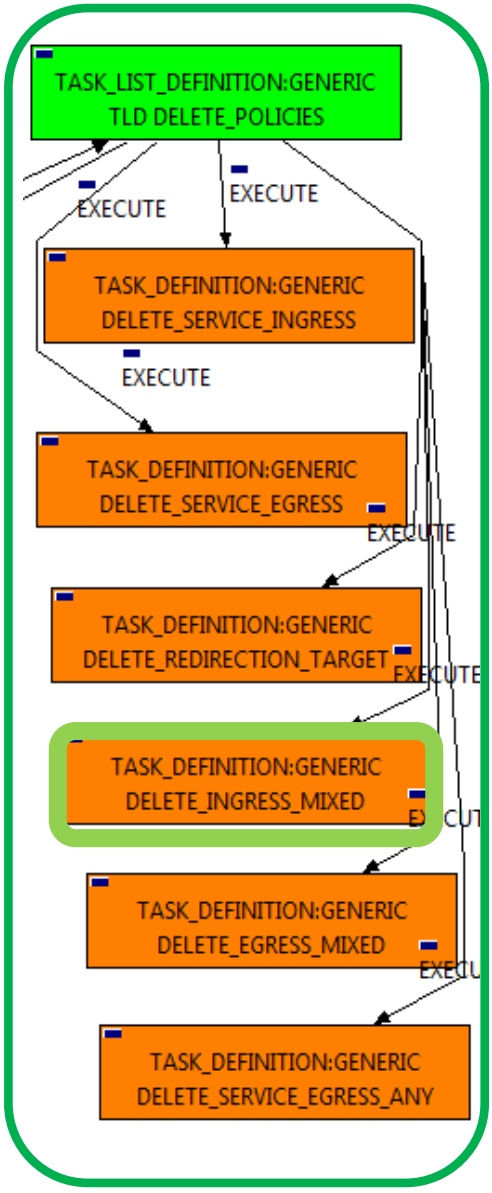
The Workflow present in EXECUTE.Workflow attribute it is going to seek a "VNF:FW" in Status ACTIVE in the DDBB, notice that the Wf will not modify the status of the artifact.

Once found , the WF will start the deleting, if deletion is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with a value of "false", this means no element will be locked at the of the TD's execution.

15.22 TLD DELETE POLICIES : Delete Ingress Mixed.



This TD it is going to delete our **INGRESSACLENTRY**:TEMPLATE:DCN of type Mixed**, this means, the WF implied in this TLD is going to find and deactivate a in status ACTIVE that fills the conditions present in the TD.**

Once finished, the INGRESSACLENTRY POLICY given will have been deleted from the inventory.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.MainArtifact == VNF:FW>FW_ENDPOINT
SET.Running_Status == INSTANTIATED.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_PROVISION_SDN_INGRESSACLENTRIES_POLICIES_MIXED_UNDO"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

Figure 264: Deletion of the Ingres Mixed Policies.

The Workflow present in EXECUTE.Workflow attribute it is going to seek the End_Point of the Firewall with the path given by the attribute FIND.MainArtifact, once found , the WF will start the deleting, if deletion is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with a value of "false", this means no element will be locked at the of the TD's execution.

15.23 TLD DELETE POLICIES : Delete Egress Mixed.

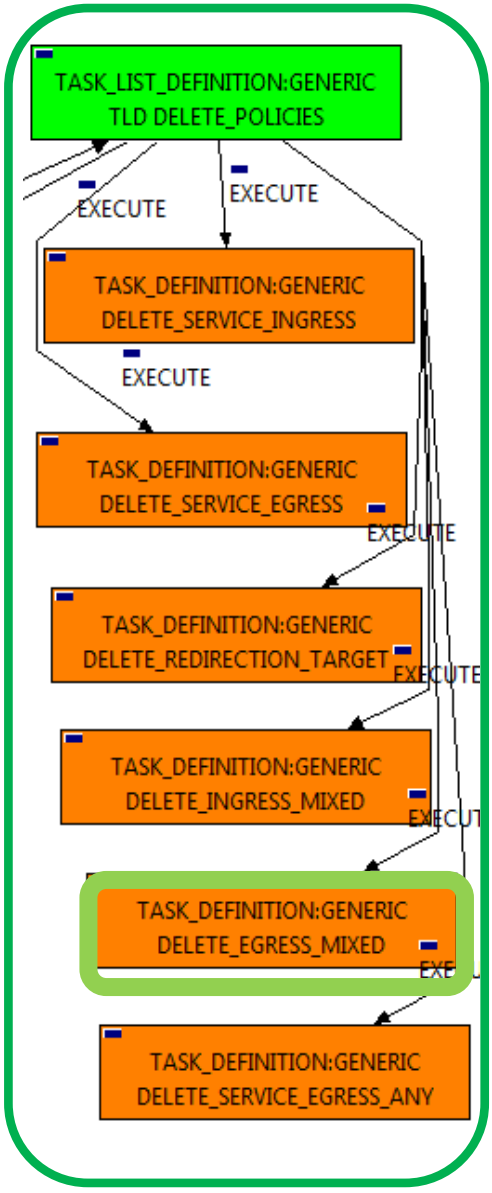


Figure 265: Deletion of the Egress Mixed policies.

This TD it is going to delete our **EGRESSACLENTRY**:TEMPLATE:DCN of type Mixed**, this means, the WF implied in this TLD is going to find and deactivate a in status ACTIVE that fills the conditions present in the TD.**

Once finished, the EGRESSACLENTRY POLICY given will have been deleted from the inventory.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

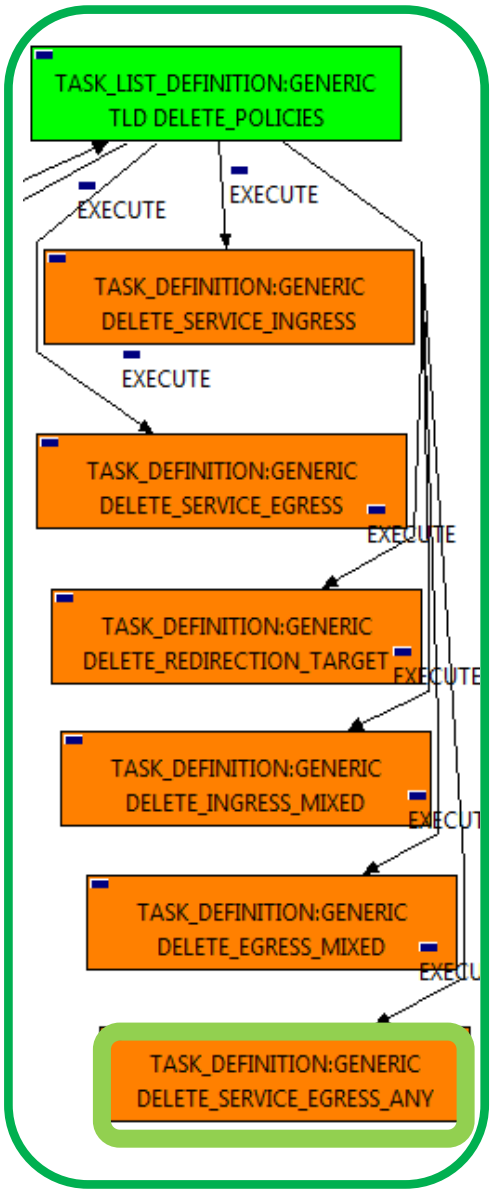
FIND.MainArtifact == VNF:FW>FW_ENDPOINT
SET.Running_Status == INSTANTIATED.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_PROVISION_SDN_INGRESSACLENTRIES_POLICIES_MIXED_UNDO"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

The Workflow present in EXECUTE.Workflow attribute it is going to seek the End_Point of the Firewall with the path given by the attribute FIND.MainArtifact, once found , the WF will start the deleting, if deletion is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with a value of "false", this means no element will be locked at the of the TD's execution.

15.24 TLD DELETE POLICIES : Delete Service Egress To Any.



The TDs that have present in the their names "Delete", are Task Definitions responsible of the deletion in the platform targeted and in the DDBB, in this case, the artifact that is going to be deleted is the "", this means, when this workflow finish, the EGRESSACLENTRY:TEMPLATE:DCN (Any) **given will have been deleted** from the inventory

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.MainArtifact == VNF:FW>NETWORK:GENERIC
SET.Running_Status == INSTANTIATED.
SET.Status == INSTANTIATED.
EXECUTE.Workflow ==
"WF_TS_PROVISION_SDN_ZONE_ANY_EGRESSACL_ENTRY_UNDO"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

Figure 266: Delete Service Egress to Any.

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "NETWORK:GENERIC" in the DDBB . Once found , the WF will start the deleting, if deletion is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with a value of "false", this means no element will be locked at the of the TD's execution.

15.25 TLD DELETE SERVICE NET: Deattach Service Net.

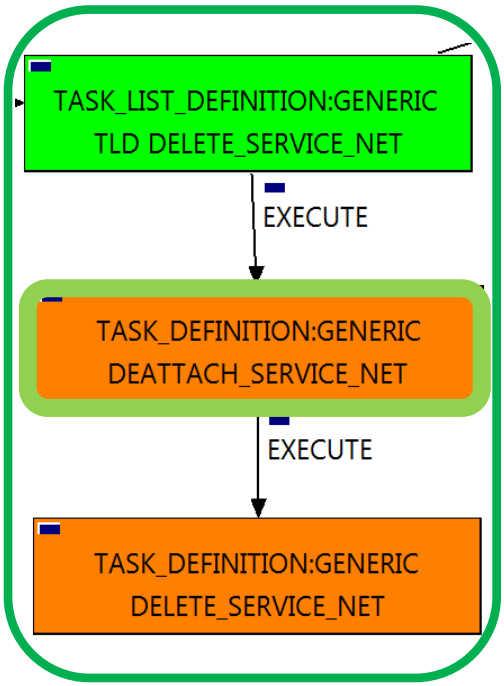


Figure 267: Deattach Service Network.

The TDs that have present in the their names "Deattach", are Task Definitions responsible of the desconnection between artifacts, this means, this TDs will delete the existent relationship of specific kind between concrete artifacts, in this case, it will delete relationships of type ALLOCATED between a specific VIRTUAL_PORT, and the SUBNETWORKS:DCN (or the subnetworks's IPADDRESS:GENERIC) related as children of our NETWORK:DCN that belongs to the VIRTUAL_LINK:MANAGEMENT that we are using, and the SUBNETWORK:OS of Management.

Once finished, the TD should have been deleted the relationships of type ALLOCATED between the artifacts mentioned above.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.Condition == status==constant:ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_DISCONNECT_FW_VPORT"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

The Workflow present in EXECUTE.Workflow attribute it is going to seek a "VNF:FW" in Status ACTIVE in the DDBB . Once found , the WF will start the deleting, if deletion is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status. Notice that the TD is not going to change the status of the entity used for the detachment.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with a value of "false", this means no element will be locked at the of the TD's execution.

15.26 TLD DELETE SERVICE NET: Delete Service Net.

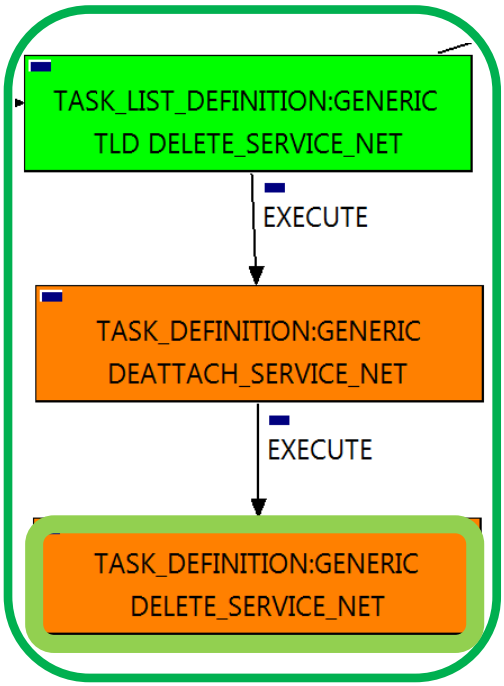


Figure 268: Delete Service Net.

The TDs that have present in the their names "Delete", are Task Definitions responsible of the deletion in the platform targeted and in the DDBB, in this case, the artifacts that are going to be deleted are NETWORKs, part of the Service Network.

Once finished, the TD should have been deleted the NETWORKs artifacts mentioned above, this means, all NETWORKs both DCN and OPENSTACK from the DDBB.

Targets of the TASK:DEFINITION:
STATUS of the TD: ENABLED
Categories:

FIND.MainArtifact == status==constant:ACTIVE
SET.Running_Status == ACTIVE.
SET.Status == ACTIVE.
EXECUTE.Workflow ==
"WF_TS_DEPROVISION_NETWORK_FW"
ROLLBACK.Behaviour_on_error == STOP
ROLLBACK.Number_of_retries == 0
DATA.Lock == false

The Workflow present in EXECUTE.Workflow attribute it is going to seek a VNF:FW in Status ACTIVE in the DDBB . Once found , the WF will start the deleting, if deletion is successful we set the status of the artifact as the SET.Status attribute dictates. The attribute SET.Running_Status concern about the temporal status that the artifact it is going to maintain until the final change of status that comes from SET.Status. . Notice that the TD is not going to change the status of the entity used for the deletion.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, the attribute "number_of_retries" set the number of rollback attempts.

The attribute DATA.Lock is set with a value of "false", this means no element will be locked at the of the TD's execution.

15.27 TLD VNF Inventory Delete: Delete Inventory

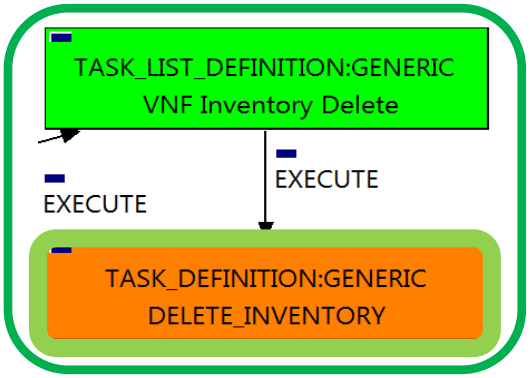


Figure 269: Delete Inventory.

The TDs that have present in their names "Delete Inventory", are Task Definitions responsible of the deletion of the artifact given, in this case, this TD it is going to delete a VNF:FW, notice the workflow used in this TD, "WF_TS_DELETE_INSTANCE_TREE", all the components and elements below the entity that it is going to be deleted , are going to be eliminated as well.

STATUS:TD: ENABLED
Targets of the TASK:DEFINITION:

Categories:

FIND.Condition ==	**status==constant:ACTIVE**
EXECUTE.Workflow ==	**"WF_TS_DELETE_INSTANCE_TREE"**
ROLLBACK.Behaviour_on_error ==	**STOP**
ROLLBACK.Number_of_retries ==	**0**
DATA.Lock ==	**true**

The Workflow present in EXECUTE.Workflow attribute it is going to seek a VNF in the DDBB . Once found , the WF will start the deleting.

In case of error during the execution, the workflow jump to the ROLLBACK category, If the "Behaviour_on_error" attribute its set on "ROLLBACK" the WF will start the execution of the Workflow present in the attribute with the same name in the category ROLLBACK, but in this case, we have a "STOP" set as behavior, so no Rollback it is going to be initiated, so the execution it is going to end here in case of error.

The attribute DATA.Lock is set with a value of "true", this means the artifact used in the execution will be locked at the end of it.

Abbreviations

Abbreviation	Definition
VM	Virtual Machine; virtualized computation environment that behaves very much like a physical computer/server
VNF	Virtual Network Function; the "application" that provides the functionality currently provided by devices
NS	Network Service; a composition of network functions (VNF or PNF) and defined by its functional and behavioral specification
NFV	Network Function Virtualization; the approach to building telecom services using virtualization approaches
VNFC	VNF Component; each VNF is composed of one or more components, often mapping to a VM
MANO	Management and Orchestration; addressing the functionality required to deal with the new abstractions; consists of NFVO, VNFM and VIM
NFVO	NFV Orchestrator; In charge of the orchestration and management of NFV Infrastructure and software resources, and realizing NS on NFVI.
VNFM	VNF Manager; responsible for VNF lifecycle management (such as Instantiation, update, query, scaling, termination). Can be implemented as part of the NFVO or supplied by the VNF provider.
VIM	Virtualized Infrastructure Manager; think OpenStack or Cloud OS
NFVI	NFV Infrastructure; the totality of all hardware and software components which build up the environment in which VNFs are deployed, managed and executed
EMS	Element Management System; performs the typical management functionality for one or several VNFs.
PNF	Physical Network Function; think today's devices.
CPU	Central Processing Unit; device in the compute node that provide the primary container interface
NF	Network Function; functional block within a network infrastructure that has well-defined external interfaces and well defined functional behavior
NIC	Network Interface Controller; device in a compute node that provides physical interface with the infrastructure network
SLA	Service Level Agreement; negotiated agreement between two or more parties, recording a common understanding about the service and/or service behavior.
CPE	Customer Premises Equipment
ETSI	European Telecoms Standards Institute
HA	High Availability
SDN	Software Defined Network
HPSA	HPE Service Activator
UCA EBC	Unified Correlation Analyzer for Event Based Correlation
JSON	JavaScript Object Notation
XML	Extensible Markup Language
API	Application Programmatic Interface
DNS	Domain Name System
DHCP	Dynamic Host Configuration Protocol
IaaS	Infrastructure-as-a-Service