HPE NFV Director

On-Boarding Guide Operations: Scale Up of a VNF

Release 4.1
Second Edition

Hewlett Packard Enterprise

Notices

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Preface

About this guide

This Guide is intended to explain and guide the user through the Scale Up operation of a VNF.

Audience

This document is targeting any user level of NFV Director: Domain users, Organization Users, Tenant Users, Group Users and Datacenter users.

Document history

Table 1: Document history

Edition	Date	Description
1.0	31 August 2016	First Edition

Chapter 1 Scale Up of a VNF.

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".

Chapter 2 Specific Elements of the TLD Deploy VNF.

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

2.1 SCALE_UP 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

Figure: 1: Stopping Monitor Task.

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 ==

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.

2.2 SCALE_UP INVENTORY TLD: Scale_Up Inventory Task.

Figure: 2: 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.

2.3 SCALE_UP INVENTORY TLD: Switch_Scale Task.

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

Figure: 3: Switching scales type
          UP/DOWN.

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.
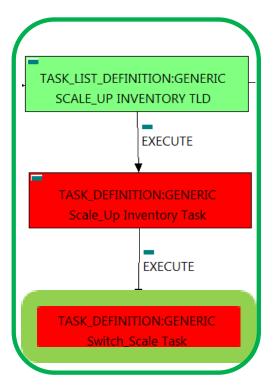
2.4 CHECK_SCALE_TLD: Check_Scale_Task

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

Figure: 4: Last check of the escalation operations.

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.
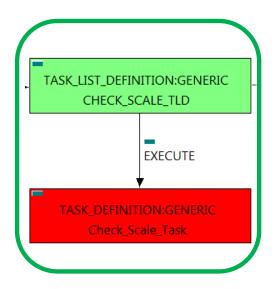
.

Figure: 5 applying escalation policy over the Virtual Machine's memory.

2.5 LIVE_SCALE TLD: Live_Scale_MEM Task

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.
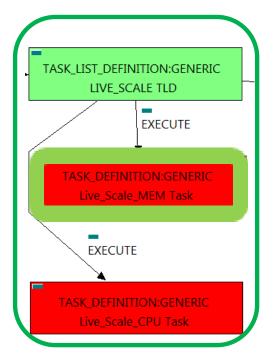
Figure: 6 : Applying escalation policy over the Virtual Machine's core.

2.6 LIVE_SCALE TLD: Live_Scale_CPU Task

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.
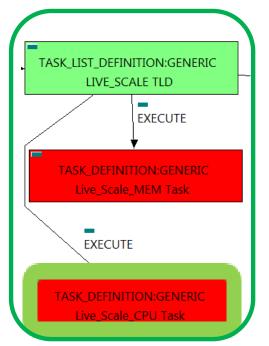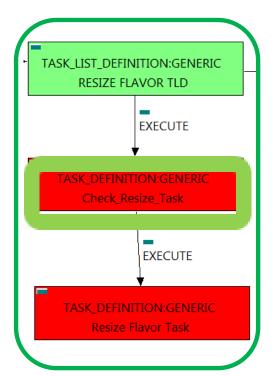
Figure: 7 : Checking the changes on the VM in order to create a new flavor for it.

2.7 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.
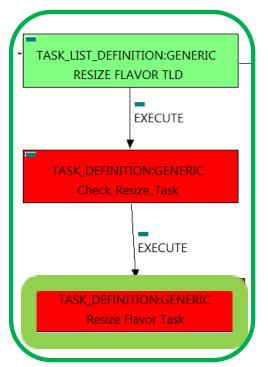
2.8 RESIZE FLAVOR TLD: Resize Flavor Task

Figure: 8: 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.

2.9 ACTIVATE_FLAVOR TLD: Activate Flavor Task

Figure: 9: 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=I
NSTANTIATED,
VIRTUAL_MEMORY<VIRTUAL_MACHINE>VIRTUAL_CORE<CORE<CPU<SERVER<AVAILABILITY_ZONE<REGION>COMPU
TE>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.

2.10 RESIZE TLD: Resize task

Figure: 10: Resizing the Flavor for the escalated Virtual Machine.

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.
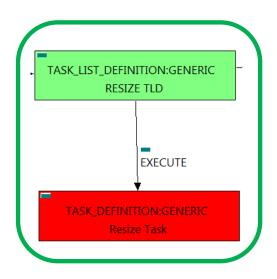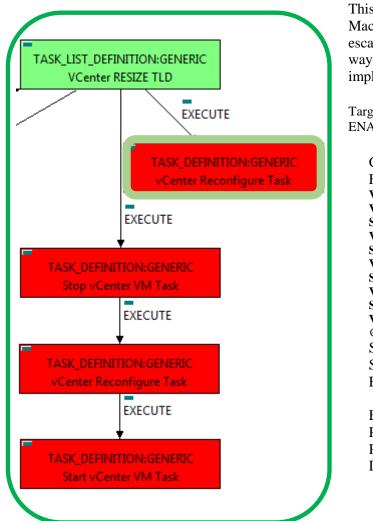
2.11 VCenter RESIZE TLD: vCenter Reconfigure Task

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
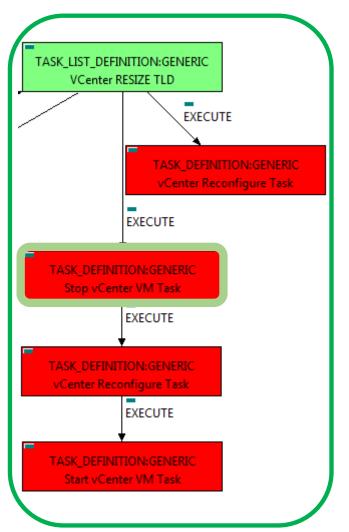DATA.Lock ==   false

Figure: 11: 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.

2.12 vCenter RESIZE TLD: Stop vCenter VM Task

Figure: 12 : 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
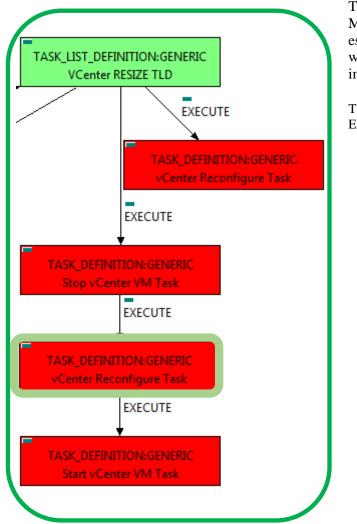
The Workflow present in EXECUTE.Workflow attribute it is going to seek a VIRTUAL_MACHINE in status ACTIVE, that matches the value "Scale_vCenter" with its attribute "SCALE.Info".

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.

2.13 VCenter RESIZE TLD: 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=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.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
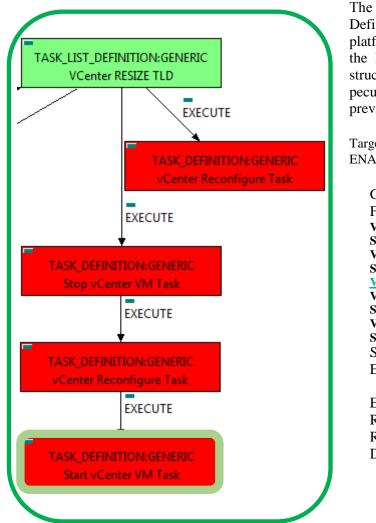DATA.Lock ==   false

Figure: 13: VCenter Reconfigure Task

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, 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.

2.14 VCenter RESIZE TLD: vCenter Reconfigure 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 ==   VCenter Resize 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 ==   ACTIVE
EXECUTE.Workflow ==
                     "**WF_TS_START_VM**"
EXECUTE.Inactive==   false
ROLLBACK.Behaviour_on_error ==   ROLLBACK
ROLLBACK.Number_of_retries ==   0
DATA.Lock ==   false

Figure: 14: Start vCenter VM Task

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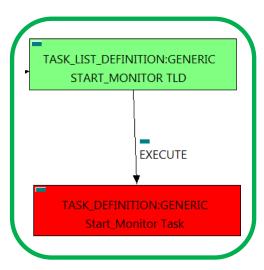
Due to that the value of the attribute DATA.Lock is false, when the Task Definition has finished the artifact that was used in the workflow executed will remain unlocked.

2.15 START_MONITOR TLD: Start_Monitor Task

Figure: 15: 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".