



Hewlett Packard
Enterprise

HPE Storage Operations Manager

Software Version: 10.20
Windows® and Linux® operating systems

HPE Universal CMDB Integration Guide

Document Release Date: August 2016
Software Release Date: August 2016

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Acknowledgements

This product includes software developed by the Apache Software Foundation.
(<http://www.apache.org>)

This product includes software developed by the Indiana University Extreme! Lab.
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This product uses the j-Interop library to interoperate with COM servers.
(<http://www.j-interop.org>)

Documentation Updates

The title page of this document contains the following identifying information:

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Chapter 1: HPE Storage Operations Manager (SOM) Integration

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Overview

Integration involves synchronizing devices, topology, and the hierarchy of a customer storage infrastructure in the HP Universal CMDB (UCMDB). This enables Change Management and Impact Analysis across all business services mapped in UCMDB from a storage point of view.

Storage Operations Manager (SOM) communicates with UCMDB using Rest APIs via HTTPS protocols.

When you activate the SOM integration, HTTPS protocols retrieve data and saves CIs to UCMDB. Users can then view SOM storage infrastructure in UCMDB.

The data includes information on storage arrays, fibre channel switches, hosts (servers), storage fabrics, logical volumes, host bus adapters, storage controllers, and fibre channel ports. Integration also synchronizes physical relationships between the hardware, and logical relationships between logical volumes, storage pools, storage fabrics, and hardware devices.

Supported Versions

The integration procedure supports SOM version 10.10.

How to Perform the SOM Integration

This section includes the steps to perform SOM-UCMDB integration.

- [Install the Integration](#) 7
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Install the Integration

The SOM-UCMDB integration is delivered as the **HP_SOM_Integration.zip** file. The integration depends on the contents of the **Storage_Basic.zip** file. Both packages must be on your local system in order to deploy their resources.

Note: Obtain both files from the SOM HP Live Network web site (<https://hpln.hpe.com/node/23692/cc>), not the UCMDB server.

1. Log in to UCMDB as an administrator.
2. Go to **Administration > Package Manager**.
3. Click the **Deploy packages to server (from local disk)** button.
4. In the Deploy Packages to Server dialog box, click the **Add** button.

5. Select the **HP_SOM_Integration.zip** package and click **Open**.
6. Select the resources from the package that you want to deploy. All resources are selected by default.
7. Select the **Storage_Basic.zip** package and click **Open**.
8. Select the resources from the package that you want to deploy. All resources are selected by default.
9. Click **Deploy** to install the **HP_SOM_Integration.zip** and **Storage_Basic.zip** packages.

Enable the Integration

This task includes the steps to perform the SOM-UCMDB integration.

This integration uses an external JAR and runs in a separate Java virtual machine (JVM) than other UCMDB integrations.

If the new data flow probe will be on the UCMDB server, ensure that UCMDB services have started completely before beginning the integration enablement procedures. To determine the status of the UCMDB services, open the URL <http://localhost:8080/status> in a web browser on the UCMDB server system.

Basic Setup

1. Go to **Data Flow Management > Data Flow Probe Setup**.
In the UCMDB system services, the UCMDB_Probe service must be up and the UCMDB_Integration_Service must be down.
2. In the **Domains and Probes** pane > **Data Flow Probes** tree, click the probe you want to use.
3. Under **Ranges**, click the ***New** icon to create a new range, and then enter the SOM management server details.
4. Click **OK** to create the range.
You can create more than one range on this page.
5. In the **Domains and Probes** pane > **Credentials** tree,
 - a. Choose **WMI Protocol** for SOM servers running Windows.
 - b. Choose **SSH Protocol** for SOM servers running Linux.
6. Click the ***New** icon in the protocol pane to set protocol parameters.
 - a. Click the **Edit** button to edit the network scope.
 - b. In the Scope Definition dialog box, click the **Selected Range** option button, and then click the ***New** icon to create a new range. Fill in the SOM server information and then click **OK** to add the network scope.
 - c. Enter the SOM server log in credentials.
 - d. Click **OK** to save the protocol.

7. Select the **HTTP Protocol**, then the ***New** icon to set protocol parameters.
 - Follow the same setup procedure as WMI and SSH above.
 - The user name must be part of the web services client role.
To view what role the user belongs to, in the SOM console go to Configurations > Security > User Account Mappings.
 - The timeout must be set to a minimum of 60,000 msec. (60 seconds)
 - Trust store information is optional.
8. Go to **Universal Discovery > Discovery Modules/Jobs tab > Discovery Modules tree > Network Infrastructure > Basic**.
 - a. Right-click one of the ICMP discovery jobs and select **Activate**.
 - b. Expand **Host Connection** in the file tree
 - For SOM servers running the Windows operating system, right-click **Host Connection by WMI** and select **Activate**.
 - For SOM servers running Linux operating system, right-click **Host Connection by Shell** and select **Activate**.
9. In Integration Jobs, right-click the job that was created and select run all-data sync to perform the job.

Create the Integration

1. Add the SOM management server IP address to the Data Flow Probe IP ranges.
Go to **Data Flow Management > Data Flow Probe Setup**. Choose the probe corresponding to the UCMDB server.
2. Enter user name and password credentials to access SOM from UCMDB.
Certificate based authentication is optional.
3. Create a new Integration Point.
 - a. In the Integration Studio, click the ***New** icon to create a new integration.
 - b. Set Integration Properties.
 - i. Click the **Select Adapter** button next to the **Adapter** field to select an adapter.
“HP SOM Integration” for SOM
 - c. Set the adapter properties under the Integration Properties.
For more information, see ["Adapter Properties" on the next page](#).
 - i. Set the credentials ID to the HTTPS protocol credential. This is the only option supported for SOM.

- ii. Select the Data Flow Probe from the drop-down menu.
 - iii. Click the cube next to the trigger CI instance field and choose a CI.
The CI should be set to the IP of the SOM server.
4. Run the integration created in step 3.

Note: For information about running integration jobs, see "Integration Studio" in the *HP Universal CMDB Data Flow Management Guide*.

Optional Configuration

For large SOM data sets, adjust the `appilog.agent.local.max.worker.runtime` value in the `<DataFlowProbeInstallDir>/conf/DataFlowProbe.properties` file to match your environment. For example, with a SOM data set of approximately 15,000 elements, setting the argument to 3600000 resulted in acceptable behavior.

After modifying the `DataFlowProbe.properties` file, restart the `DataFlowProbe` service.

Adapter Properties

This job uses a database CI as the trigger.

A switch or server in SOM inherits from a Node CIT in UCMDB based on the following adapter properties:

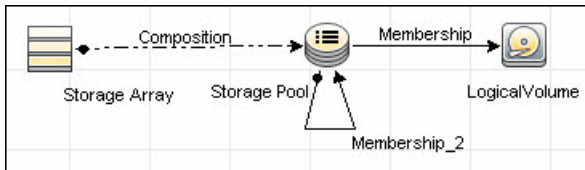
Parameter	Description
Allow DNS Lookup	<p>If a node in the SOM database does not have an IP address but has a DNS name, it is possible to resolve the IP address by the DNS name.</p> <p>True: If a node does not have an IP address, an attempt is made to resolve the IP address by DNS name (if a DNS name is available).</p> <p>Default: False</p>
Credentials ID	<p>The HTTP Protocol Credentials of the SOM management server configured in UCMDB.</p>
Ignore Nodes Without IP	<p>Defines whether or not nodes in SOM without IP addresses should be pulled into UCMDB.</p> <ul style="list-style-type: none">• True. Nodes without IPs are ignored.• False. A Node CI is created with a SOM ID as the node key attribute. <p>Note: Setting this parameter to False may result in duplicate</p>

Parameter	Description
	<p data-bbox="634 268 1406 359">CIs in the CMDB.</p> <p data-bbox="613 384 769 411">Default: True</p>
Ignore Ports Without WWN	<p data-bbox="613 449 1377 516">If set to true, the integration ignores Fiber Channel Ports that do not have a WWN.</p> <p data-bbox="613 548 769 575">Default: True</p>
Remote JVM Arguments	<p data-bbox="613 613 1219 640">JVM parameters that are passed to the external JVM.</p> <p data-bbox="613 669 1003 697">Default: -Xms1024m -Xmx2560m</p> <p data-bbox="613 726 1354 884">Adjust the value of this argument to match your environment. For example, with a SOM data set of approximately 15,000 elements, setting the argument to -Xms25G -Xmx25G -XX:-UseGCOverheadLimit resulted in acceptable behavior.</p>
Remote JVM Class Path	<p data-bbox="613 919 984 947">Set the external JVM class path.</p> <p data-bbox="634 976 1406 1066">Note: Do not change %minimal_classpath%.</p>
Remote Process Timeout	<p data-bbox="613 1100 1117 1127">Timeout for remote process in external JVM.</p> <p data-bbox="613 1157 1175 1184">Set to a minimum of 60,000 m. sec. (60 seconds).</p> <p data-bbox="613 1213 1354 1371">Adjust the value of this argument to match your environment. For example, with a SOM data set of approximately 15,000 elements, setting the argument to 5400000 (m. sec.) resulted in acceptable behavior.</p>
Run In Separate Process	<p data-bbox="613 1407 1208 1434">If set to true, the adapter will run in the external JVM.</p> <p data-bbox="613 1463 769 1491">Default: True</p> <p data-bbox="634 1520 1406 1610">Note: Currently, this value must remain set to True.</p>
Data Flow Probe	<p data-bbox="613 1642 1214 1669">Name of the data flow probe for collecting SOM data.</p>
Trigger CI Instance	<p data-bbox="613 1709 1114 1736">IP address of the SOM management server.</p>

Discovered CITs and Relationships

This section describes SOM storage entities in UCMDB:

- **Fibre Channel Connect.** Represents a fibre channel connection between fibre channel ports.
- **Fibre Channel Port.** Has change monitoring enabled on parameters such as state, status, WWN, and trunked state. Since a Fibre Channel Port is a physical port on a switch, it inherits from the Physical Port CIT under the NodeElement Resource CIT.
- **Fibre Channel Switch.** Falls under the Node CIT because SOM maintains an IP address for each switch. Parameters such as status, state, total/free/available ports, and version are change monitored.
- **Logical Volume.** Represents volumes on storage arrays with change monitoring on availability, total/free/available space, and storage capabilities.
- **Storage Array.** Represents a storage array with change monitoring on details such as serial number, version, and status. Since a storage array may not have a discoverable IP address, it inherits from the Network Device CIT.
- **Storage Fabric.** Inherits from the Network Resource CIT and represents a storage fabric. This CIT has no change monitoring enabled.
- **Storage Processor.** Represents other storage devices such as SCSI controllers, and inherits from the Host Resource CIT. A Storage Processor CIT monitors change on parameters such as state, status, version, WWN, roles, power management, and serial number.
- **Storage Pool.** Storage Pool information is also collected from each storage array. This data collection populates a map as shown here:

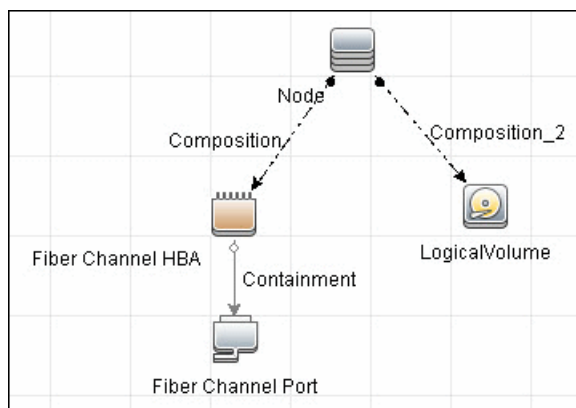


Node Details

SOM maintains information on Operating Systems, IP address, and DNS name on each host. DFM uses this information to create Node CIs (UNIX or Windows) and IPAddress CIs.

Because UCMDB uses the IP address of a node as part of its primary key, DFM attempts to use the IP address from SOM for this purpose. If an IP address is not available, DFM then attempts to resolve the host's IP address using a DNS name. If neither an IP address nor a DNS name is available, DFM ignores the host (see "[Adapter Properties](#)" on page 10).

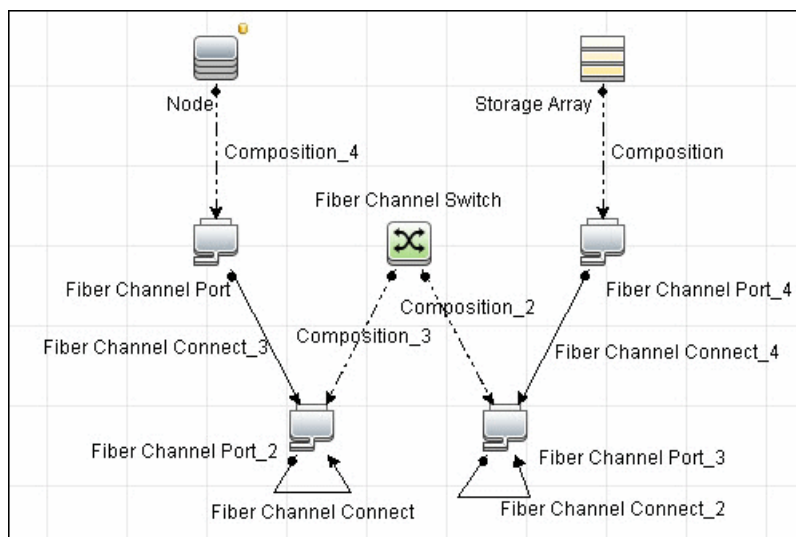
Node details populate a map as shown here:



SAN Topology

SAN Topology consists of the Fibre Channel network topology and includes (fibre channel) connections between Fibre Channel Switches, Hosts, and Storage Arrays. SOM maintains a list of WWNs that each Fibre Channel Port connects to, and this package uses this list of WWNs to establish Fibre Channel Connection links.

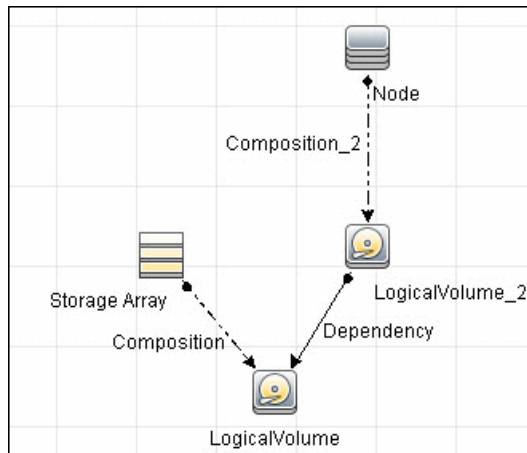
SAN topology data populate a map as shown here:



Storage Topology

Storage topology consists of relationships between Logical Volumes on a host and Logical Volumes on a Storage Array. DFM uses multiple tables to identify this relationship as shown in the query below. This view is a summary of all of the above information.

Storage topology data populate a map as shown here:



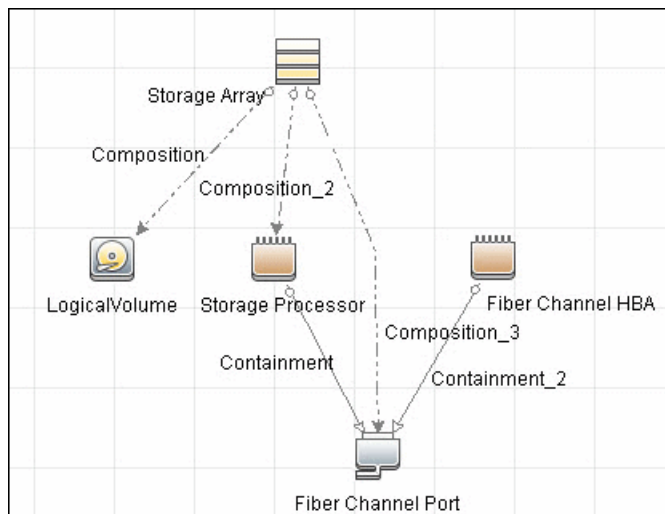
Views

The SOM package contains views that display common storage topologies. These are basic views that can be customized to suit the integrated SOM applications.

Storage Array Details

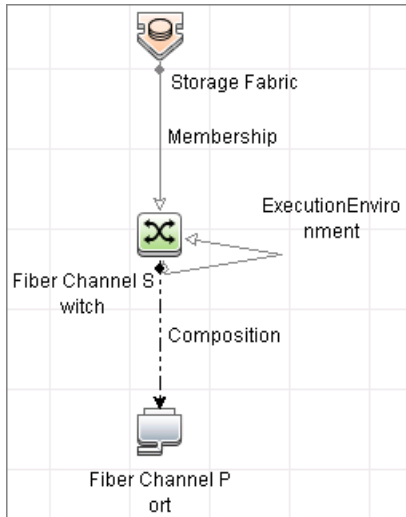
This view shows a Storage Array and its components including Logical Volumes, HBAs, Storage Processors, and Fibre Channel Ports. The view shows each component under its container Storage Array and groups Logical Volumes by CI Type.

Storage Array does not require all components in this view to be functional. Composition links stemming from the Storage Array have a cardinality of zero-to-many. The view may show Storage Arrays even when there are no Logical Volumes or Storage Processors.



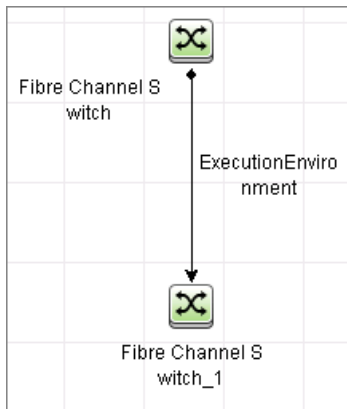
FC Switch Details

This view shows a Fibre Channel Switch and all connected Fibre Channel Ports.



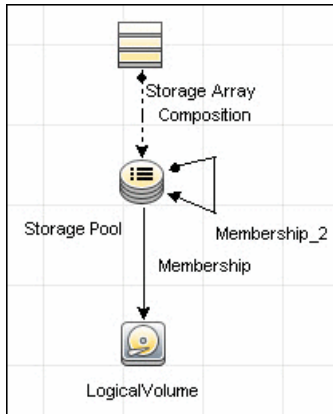
FC Switch Virtualization

FC Switch Virtualization consists of a physical switch or chassis, partitioned into multiple logical switches. Unlike Ethernet virtualization, physical ports are not shared among multiple virtual switches. Rather, each virtual switch is assigned one or more dedicated physical ports that are managed independently by the logical switches.



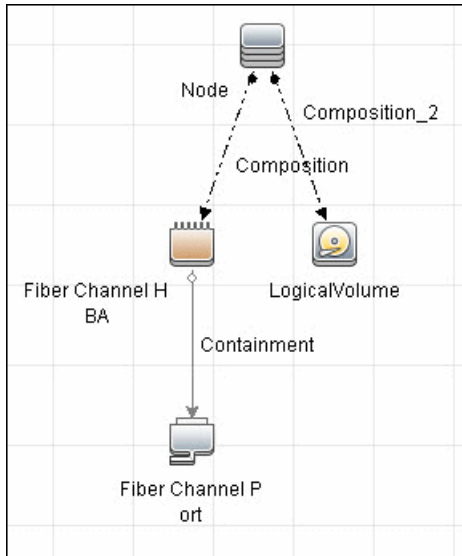
Storage Pool Details

This view shows Storage Pools with associated Storage Arrays and Logical Volumes.



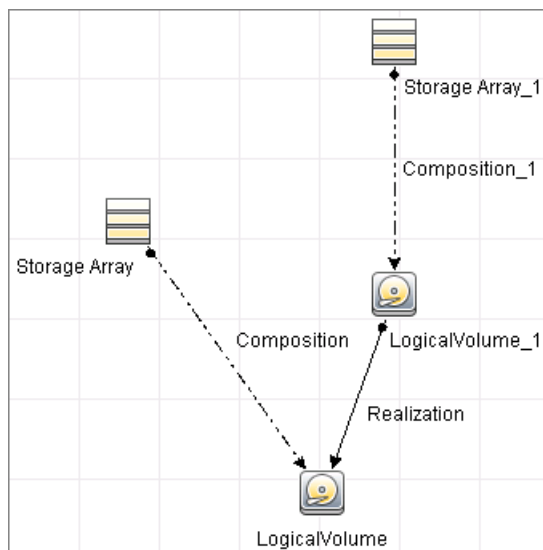
Host Storage Details

This view shows only Hosts that contain a Fibre Channel HBA or a Logical Volume. This keeps the view storage-specific and prevents hosts discovered by other DFM jobs from being included in the view.



SAN External Storage

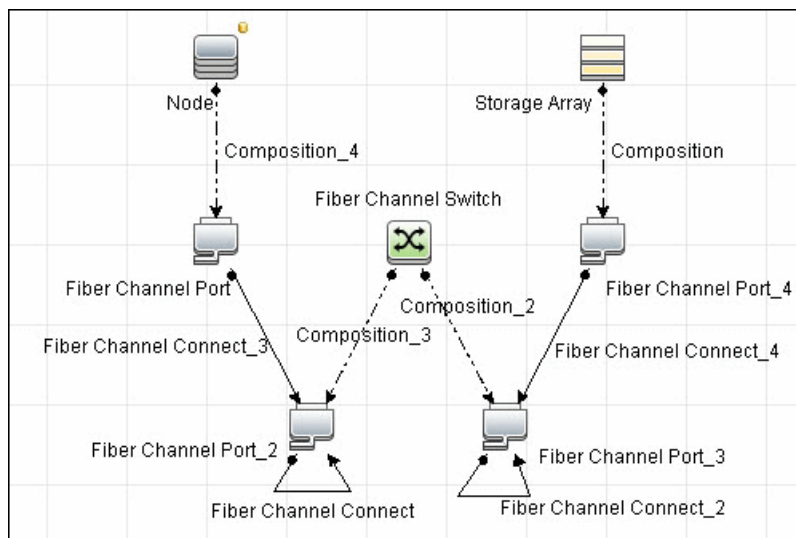
External storage configuration consists of a storage array presenting a logical volume that, in reality, belongs to another storage array. This is typically used in configurations where high-end, more expensive, front-end arrays present volumes from back-end, cheaper, storage to servers. The goal of this type of virtualization is to virtualize multiple disk arrays from different vendors, scattered over the network, into a single monolithic storage device that can be managed uniformly.



SAN Topology

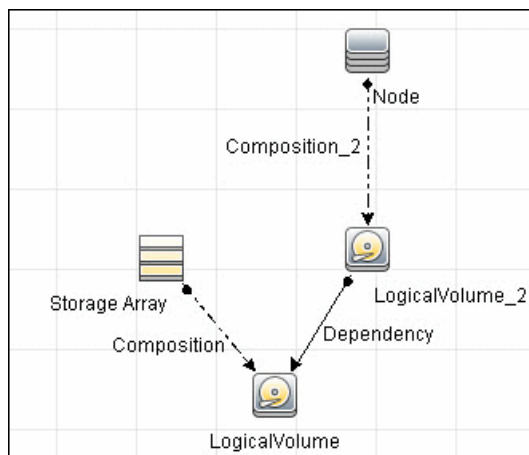
This view maps physical connections between Storage Arrays, Fibre Channel Switches, and Hosts. The view shows Fibre Channel Ports below their containers. The view groups the Fibre Channel Connect relationship CIT to prevent multiple relationships between the same nodes from appearing in the top layer.

Note: A node can be a physical host or an inferred host.



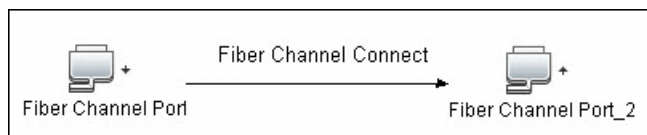
Storage Topology

This view maps logical dependencies between Logical Volumes on Hosts and Logical Volumes on Storage Arrays. There is no folding in this view.



FC Port to FC Port

This rule propagates events on a Fibre Channel Port to another connected Channel Port.



Example of HBA crashing on a Storage Array:

- The event propagates from the HBA to the Storage Array and the Logical Volumes on the Array because of the Storage Devices to Storage Array rule.
- The impact analysis event on the Logical Volume then propagates to other dependent Logical Volumes through the Logical Volume to Logical Volume rule.
- Hosts using those dependent Logical volumes see the event next because of the Host Devices to Host rule.
- Depending on business needs, you define impact analysis rules to propagate events from these hosts to applications, business services, lines of business, and so on. This enables end-to-end mapping and impact analysis using UCMDB.

Impact Analysis Rules

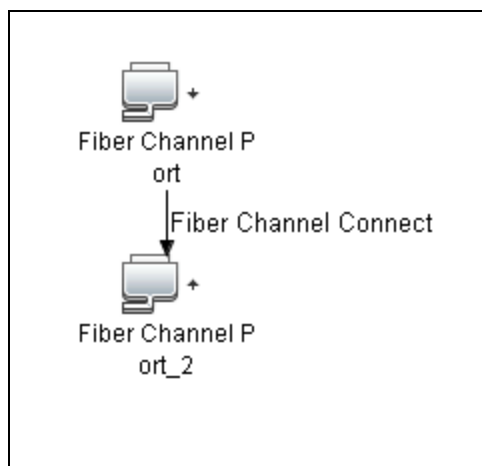
This package contains basic impact analysis rules to enable impact analysis and root cause analysis in UCMDB. These impact analysis rules are templates for more complex rules that you can define based on business needs.

All impact analysis rules fully propagate both Change and Operation events. For details on impact analysis, see "Impact Analysis Manager Page" and "Impact Analysis Manager Overview" in the *HP Universal CMDB Modeling Guide*.

Note: Impact analysis events are not propagated to Fibre Channel Ports for performance reasons.

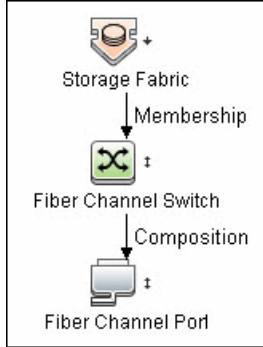
FC Port to FC Port

This impact analysis rule propagates events between related fiber channel ports.



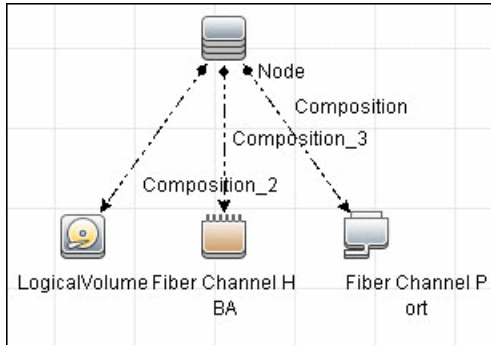
FC Switch Devices to FC Switch

This impact analysis rule propagates events from a Fibre Channel Port to and from a Switch. The event is also propagated to the associated Storage Fabric.



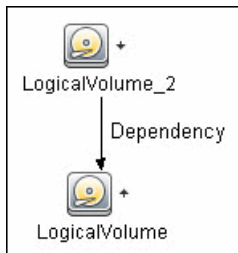
Host Devices to Host

This impact analysis rule propagates events between Fibre Channel HBAs and Hosts, and Logical Volumes on the Host.



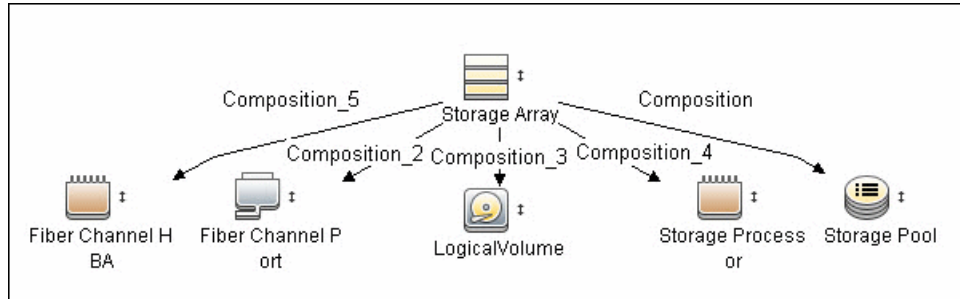
Logical Volume to Logical Volume

This impact analysis rule propagates events on a Logical Volume contained in a Storage Array to the dependent Logical Volume on the Host.



Storage Array Devices to Storage Array

This impact analysis rule propagates events between Logical Volumes, Storage Processors, Fibre Channel HBAs, and Storage Arrays.



Reports

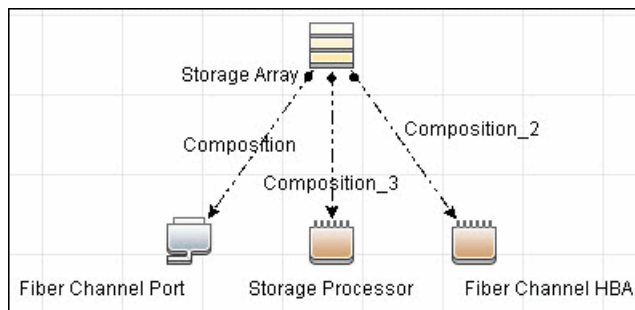
The SOM package contains basic reports that can be customized to suit the integrated storage content.

The Change Monitoring and Asset Data parameters are set on each CIT in this package to enable Change and Asset Reports in Universal CMDB. The following reports are available:

- ["Storage Array Configuration" below](#)
- ["Host Configuration" on the next page](#)
- ["Storage Array Dependency" on the next page](#)
- ["Host Storage Dependency" on page 23](#)
- ["Storage Pool Configuration" on page 23](#)

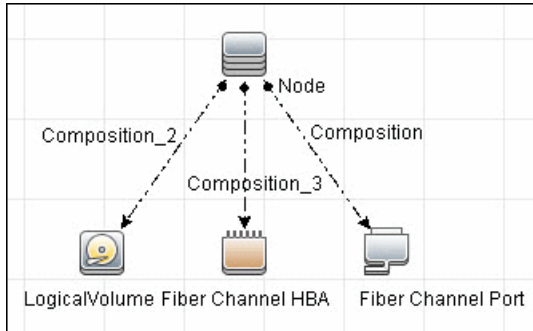
Storage Array Configuration

This report shows detailed information on Storage Arrays and its sub-components including Fibre Channel Ports, Fibre Channel Arrays, and Storage Processors. The report lists Storage Arrays with sub-components as children of the Array.



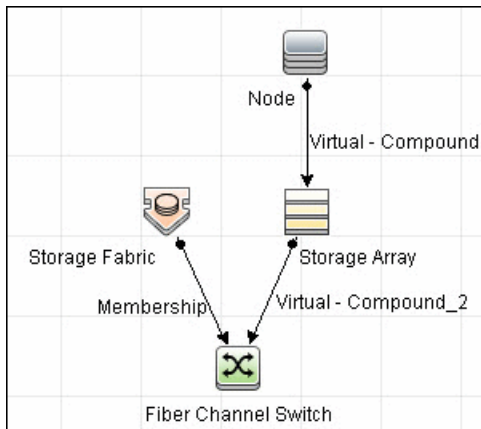
Host Configuration

This report shows detailed information on hosts that contain one or more Fibre Channel HBAs, Fibre Channel Ports, or Logical volumes. The report lists hosts with sub-components as children of the host.



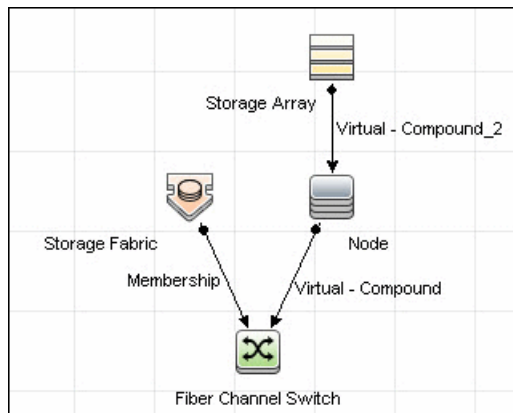
Storage Array Dependency

This report maps dependencies on a Storage Array. The report also displays information on switches connected to it.



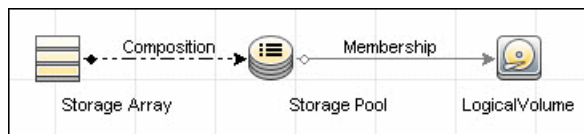
Host Storage Dependency

This report shows detailed information on storage infrastructure dependencies of a Host. The report lists hosts and dependent components.



Storage Pool Configuration

This report shows detailed information on Storage Pool configuration.



Troubleshooting the Integration

This section contains useful information for troubleshooting the SOM-UCMDB Integration.

- Log files
 - Integration errors and exceptions are logged in the RemoteProcesses.log file, which is located in the following directory:
`<DataFlowProbeInstalLDir>\runtime\log`
The default `<DataFlowProbeInstalLDir>` is `<Drive>:\hp\UCMDB\DataFlowProbe`.
 - You can also view the log information from the UCMDB console. To view the log for an integration point, in the Integration Studio, select an integration point. In the integration jobs list, right click a job, and then click **View Communication Log**.
- Differences in identifiers

The data type of the FC port identifiers and the storage pool identifiers differs between SOM and UCMDB. For this reason, the SOM IDs cannot be stored directly in the UCMDB database.

The integration assigns a new identifier to each FC port and each storage pool. The integration maintains a mapping file of the new UCMDB IDs to the existing SOM IDs. This mapping file must be present on the UCMDB server for CI reconciliation to occur during the SOM data collection cycle.

The mapping file is maintained in the following location:

```
<DataFlowProbeInstallDir>\runtime\probeManager\  
discoveryResources\som\cache
```


Known Issues

This section describes the known issues of the SOM-UCMDB Integration.

- The SAN host configuration report page shows all switch, host, and storage data.
- The integration does not currently support NAS devices.
- For Switch CITs, UCMDB applies the following identification rules:

Nodes are identified using OS identifiers (for example, IP address or Net Bios name) or hardware identifiers (for example, MAC address or serial number). Two nodes that match the value for at least one OS identifier and one hardware identifier are considered to be the same node. Nodes that do not have such a match and have a conflicting value in either an OS identifier or a hardware identifier are considered to be different.
- OS identifiers include:
 - Name
 - 66% of their IP addresses
 - 66% of their IP addresses' Authoritative DNS Name
 - Net Bios name
- Hardware identifiers include:
 - 66% of their interfaces' MAC addresses
 - SNMP system name
 - BIOS serial number
 - BIOS UUID
 - Serial number
 - BIOS asset tag
- Two similarly identified nodes are always considered to be different entities for a mismatch of at least one of the following:
 - Operation System Family
 - Cluster Resource Group
- UCMDB displays only one port for an NPIV switch.

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