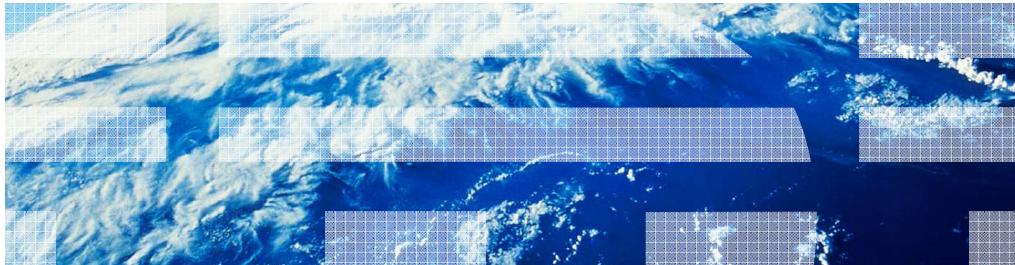# z/OS V1R13

CIM: SMI-S host profiles – HBA enhancements

Session objectives

- SNIA Storage HBA profile enhancements
  (HBA = Host Bus Adapter)
    – Implemented for FICON channel ports on z/OS (since V1.R12)
    – Now supporting events for HBA inserts and removals through CIM indications.
- SNIA SB Multipath Management enhancements
  (Describes the paths between ports and I/O Devices)
    – Implemented for FICON ports and storage devices on z/OS (since V1.R12)
    – Now supporting events for path changes:
      • Path creation
      • Path state changes (online/offline)
      • Path removal

The SMI-S specifications define the various domains of storage management in the form of CIM profiles and sub-profiles. For z/OS CIM 1.12 the Storage HBA and Host Discovered Resources (HDR) profiles were implemented. For z/OS CIM V1R13 the SMI-S instrumentation is enhanced for the Storage HBA and SB Multipath Management (a sub-profile of HDR) profiles by adding support for CIM Indications.

The support of CIM Indications avoids the periodic polling of Management Applications such as TPC for monitoring resource or resource state changes.
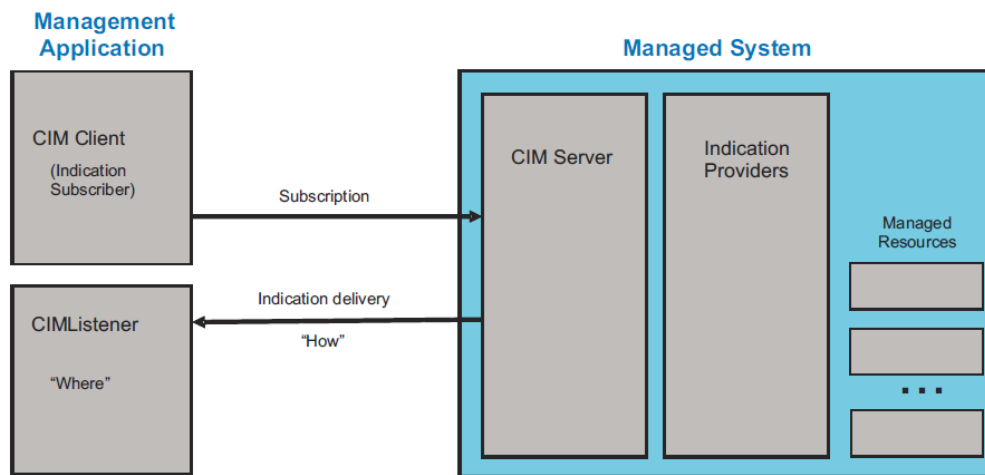
Background Information:

The Storage Management Initiative Specification (SMI-S) was developed by members of the Storage Networking Industry Association (SNIA) and defines "an interface for the secure, extensible, and interoperable management of a distributed and heterogeneous storage system. This interface uses an object-oriented, XML-based, messaging-based protocol designed to support the specific requirements of managing devices and subsystems in this storage environment. Using this protocol, this Technical Specification describes the information available to a WBEM Client from an SMI-S compliant WBEM (CIM) Server."

The "WBEM Client" mentioned above is a storage and/or SAN management application like IBM's TotalStorage Productivity Center (TPC), IBM Tivoli, and other vendor products; the "SMI-S compliant WBEM Server" is a CIM Server (like OpenPegasus on z/OS or alternative CIMOMs on other platforms) that supports the set of profiles and classes defined by SMI-S and/or DMTF as required or useful in one or more management domains.

Overview

- Problem Statement / Need Addressed
  - Avoid polling of CIM objects for FICON channel ports and channel paths to disk devices
- Solution
  - Support of CIM indications (events) for …
    - **CIM_PortController** (representing FICON channel ports)
      - HBA inserts and removals
    - **CIM_InitiatorTargetLogicalUnitPath** (representing channel paths to disk devices)
      - Path creation
      - Path state changes (online/offline)
      - Path removal
- Benefit / Value
  - Facilitates asynchronous notification about above changes through CIM

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zOS_V1R13_CIM_SMI-S_Host-Profiles_HBA-Enhancements.ppt

CIM Indications overview

Management Application — Managed System

CIM Client (Indication Subscriber) — Subscription → CIM Server | Indication Providers | Managed Resources

CIMListener "Where" ← Indication delivery "How"

z/OS CIM Users Guide provides an overview of CIM Indications

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To get notified about state changes of resources that are managed through CIM, a CIM Client subscribes to the CIM Server for one or more CIM Indications.

The CIM Server routes this request to the CIM providers that are responsible for monitoring the according resources.

If the state of resource changes for which a client is subscribed, the CIM provider notifies the CIM Server and the CIM Server sends an according indication to the Indication Listener, which was defined in the Indication subscription.

Usage and invocation

- Subscribing to a CIM Indication is a three step process:
  1) Creating a **Filter** (CIM_IndicationFilter)
     Defines the criteria about which change the subscriber wants to be notified
     A filter is defined in the form of a CQL query
  2) Creating a **Handler** (CIM_ListenerDestination)
     Defines where to send the indication by IP address/hostname and port
  3) Creating a **Subscription** (CIM_IndicationSubscription)
     Connects a Handler with a Filter through an association
- In z/OS 1.13 five types of filter queries are supported:
  - SELECT * FROM CIM_InstCreation WHERE SourceInstance ISA CIM_PortController
  - SELECT * FROM CIM_InstDeletion WHERE SourceInstance ISA CIM_PortController
  - SELECT * FROM CIM_InstCreation WHERE SourceInstance ISA CIM_InitiatorTargetLogicalUnitPath
  - SELECT * FROM CIM_InstDeletion WHERE SourceInstance ISA CIM_InitiatorTargetLogicalUnitPath
  - SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_InitiatorTargetLogicalUnitPath AND SourceInstance.CIM_InitiatorTargetLogicalUnitPath::State <> PreviousInstance.CIM_InitiatorTargetLogicalUnitPath::State

The SMI-S specification defines that an implementation may optionally support asynchronous notification of HBA inserts and removals using the InstCreation and InstDeletion indications.

For this the following CIM lifecycle indications are added in z/OS CIM 1.13 for class IBMzOS_PortController:

SELECT * FROM CIM_InstCreation WHERE SourceInstance ISA CIM_PortController

Indicates a PortController (HBA) creation.

SELECT * FROM CIM_InstDeletion WHERE SourceInstance ISA CIM_PortController

Indicates a PortController (HBA) removal.

To allow Storage Management Applications to subscribe for changes on the relationship of target and initiator ports, the following CIM lifecycle indications are added in z/OS CIM 1.13 for class IBMzOS_SBInitiatorTargetLogicalUnitPath:

SELECT * FROM CIM_InstCreation WHERE SourceInstance ISA CIM_InitiatorTargetLogicalUnitPath

Indicates a path creation.

SELECT * FROM CIM_InstDeletion WHERE SourceInstance ISA CIM_InitiatorTargetLogicalUnitPath

Indicates a path deletion.

SELECT * FROM CIM_InstModification WHERE SourceInstance ISA CIM_InitiatorTargetLogicalUnitPath AND SourceInstance.State <> PreviousInstance.State

Indicates a path state change.

Interactions and dependencies

- Software Dependencies
  - Requires z/OS Common Event Adapter (CEA) to be configured in full function mode.
- Hardware Dependencies
  - Requires IBM System z10 or IBM System z196
- Exploiters
  - So far there are no specific applications that exploit this support.

CIM: SMI-S host profiles – HBA enhancements

Migration and coexistence considerations

- None

CIM: SMI-S host profiles – HBA enhancements

Installation

- These security definitions are required for the CIM Server started task user (default is CFZSRV) to configure Indication support for the SNIA Storage HBA and Multipath Management Profiles:

```
PERMIT CEA.CONNECT CLASS(SERVAUTH) ID(CFZSRV) ACCESS(READ)
PERMIT CEA.SUBSCRIBE.ENF_0009* CLASS(SERVAUTH) ID(CFZSRV) ACCESS(READ)
PERMIT CEA.SUBSCRIBE.ENF_0027* CLASS(SERVAUTH) ID(CFZSRV) ACCESS(READ)
PERMIT CEA.SUBSCRIBE.ENF_0033* CLASS(SERVAUTH) ID(CFZSRV) ACCESS(READ)
PERMIT IOSCDR CLASS(FACILITY) ID(CFZSRV) ACCESS(UPDATE)
```

- Otherwise these error messages are issued by the CIM Server

```
CEZ03010E User CFZSRV not authorized to connect to Common Event
Adapter (CEA)

CEZ03011E User CFZSRV not authorized for subscription to Common Event
Adapter (CEA)

CEZ03000E Request user ID CFZSRV requires UPDATE permission on profile
IOSCDR CL(FACILITY).
```

The required security definitions are also provided as an update to the CFZSEC sample job.

See step ENSMIS

Session summary

- z/OS CIM adds Indication support for ...
  – FICON channel port controllers
    through CIM_FCPortController
  – FICON channel paths
    through CIM_InitiatorTargetLogicalUnitPath
- Use of this support requires
  – CEA in full function mode
  – Additional security definitions

CIM: SMI-S host profiles – HBA enhancements

Appendix - References

- IBM z/OS Common Information Model Users Guide Book# SC33-7998
- CIM & WBEM Standards by the DMTF
    – http://www.dmtf.org/standards
- Storage Management Initiative Specification (SMI-S) by SNIA
    – http://www.snia.org/tech_activities/standards/curr_standards/smi/

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