Embedded SMI-S Lessons Learned

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Overview

IBM SMI-S Providers

Why did we embed?

CIMOM Selection

Device 1

Device 2

Device 3

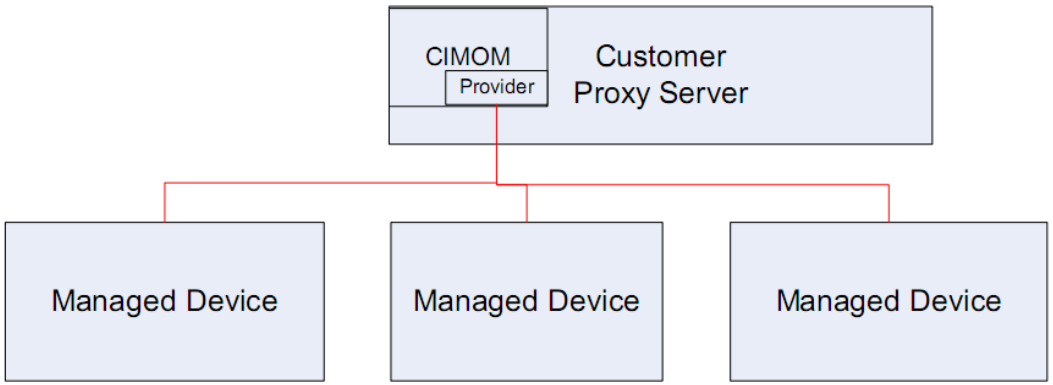
Device 4

Lessons Learned

Outcomes

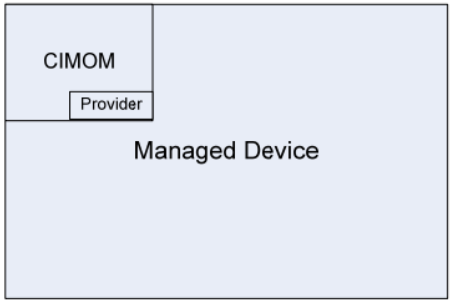
Proxy

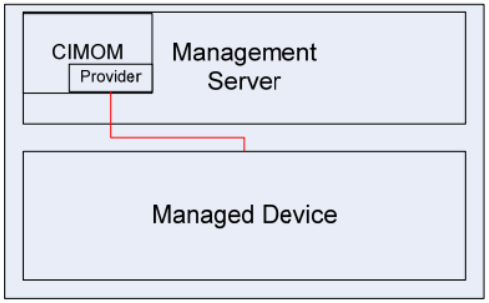
- For external devices (storage arrays, tape libraries, …)
  - Providers could run on a *proxy* server



Embedded

- Providers and CIMOM could be *embedded* in devices either acting as an integral component or as a management server possibly supporting multiple devices.





IBM SMI-S Providers

TS3500

- Large tape library

DS8xxx

- High end block storage

SAN Volume Controller

- High end block storage virtualizer

XIV

- High end block storage

Why did we embed

- Support Costs
  - ~50% of field issues tied to proxy CIM to device or client to proxy connectivity issues
  - Data Collection
- Simplify Client Infrastructure
  - It just works
  - Common authentication
  - Reduce data center footprint
  - CIMOM only manages a single device firmware version
- Performance
  - Scalability
  - Native interfaces

CIMOM Selection

- SNIA CIMOM
  - Legacy
  - Java – No JVM on some platforms
- Pegasus
  - Good support
  - Intended for Server usage
  - Poor memory and thread controls
  - C++
- SFCB – Small Footprint CIM Broker
  - Intended for embedded use
  - Good thread Controls
  - C99
  - Good support

Device I-Constraints

Can't interfere with core device services

Soft memory cap

Large legacy install base

Device I - Decisions

Open Pegasus

Loose device coupling

Preserved Proxy

Preserved Compatibility

Device 2-Constraints

Can't interfere with core device services

Restricted Memory – 32 Meg

No Swap

Restricted mass storage

Old C++ implementation

Restricted processor

RTOS

- Thread Management
- Minimal OS Services
- Thread priority

Device 2 - Decisions

Pre-SFCB CIMOM

Tight device coupling

Sunset Proxy

Preserved Compatibility

Device 3 - Constraints

Can't interfere with core device services

No Swap

Hard Limits on open files

- Clients are naughty – Many clients will leak connections
  - Add netstat to your log collection to help identify naughty clients
- Clients like to send parallel requests even though the device processes them serially
  - No good solution identified other than documentation and defensive coding.

Hard Limits on memory consumption

Hard limits on disk consumption

No more than 5% processor

Device 3 - Decisions

OpenPegasus CIMOM

Tight device coupling

One release overlap with Proxy

Preserved Compatibility

Device 4-Constraints

Can't interfere with core device services

Plenty of Memory

Plenty of Disk

Device 4 - Decisions

OpenPegasus CIMOM

Tight device coupling

No proxy release

Preserved Compatibility

Lessons Learned

- OpenPegasus or SFCB … It depends
- Ulimit is good and bad
  - Hard Limits prevent the CIMOM from interfering with core device function
  - New services on a device are the first one to be blamed for problems.... Ulimits help prevent the long nights shooting a problem that is not in your area.
  - Out of memory or file handles are not handled gracefully by the CIMOM
- Watchdogs are your friends
  - Memory
  - Responsiveness
  - File Handles

Lessons Learned - 2

- Client Software is not embedded friendly
  - Parallel Connections
  - Failure to close connections
  - Nasty Queries
  - Use protocol analyzers – ex. Ecute
  - Use network analyzers – ex. Wireshark
- Indications are not embedded friendly
  - They don't expire
  - Clients don't clean them up
  - There is no upper limit
  - Add mechanisms for third party cleanup
  - Indications don't cluster well

Lessons Learned - 3

Tight Coupling is good

- Common user names
- Common Log collection
- Common firmware updates
  - This is a design trade-off depending on your customer base and device update strategies.
- Enable/disable, Service Reset

SMI-S is not a separate service it is part of the device

Get device team buy in and work with them closely.

Log Management

- Log rotate
- Add mechanisms for managing log levels
- Tie in with system log collection

Outcomes

Significantly reduced connection related problems

Significantly reduced authentication problems

Simplified Deployments – it just works

Simplified infrastructure

Discovered odd CIMOM usage

- Firewall Proxy
- Clustering

Simplified data collection and improved first time data capture

Performance – Flat to slight improvement with a single device

Scaling – Multiple devices saw significant performance improvements.

Exposed and allowed fixing of known but hard to re-create issues.

Native interfaces enabled feature support earlier in feature development.

Questions?