Open Source Storage Management
Aperi and SMI-S for Linux

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Agenda

- Open Source & Standards
- Open Storage Management
  - Introduction to Aperi
    - Storage Resource Management
  - SUSE Linux Enterprise 10
    - The “Well Managed” System
      - SMI-S Providers for Linux Servers
- Demo
- Conclusions
Open Source

open management with CIM

<Openwsman> ws-management for all

HighAvailability

Bandit

eclipse

INCLUDES OpenLDAP

YaST
Open Standards

SNIA

FSG

DMTF

OASIS

IETF

Java Community Process
Collaboration Meets Innovation

- 9 leading vendors founded an Eclipse project to accelerate storage standards adoption and spur innovation
- Vendor-neutral framework that includes an implementation of SNIA’s SMI-S standard
- Initial IBM contribution of 1 million lines of code
- Follow-on contributions from community
- Aperi framework passed SMI-S interoperability conformance testing program (CTP)
- Latest contribution includes SAN simulator

“SNIA’s planned relationship with Aperi will include interoperability programs for SMI-S, the use of SNIA facilities for Aperi interoperability programs, and advancing current and new storage standards. The IT industry will benefit from Aperi helping to drive SMI-S implementations, storage technologies and open standards.”  

-- Wayne Adams, SNIA Chairman
Aperi’s Mission

• Provide an open, extensible, standards-based storage management framework

• Give customers more flexibility and choice on how to manage their storage

• Simplify the infrastructure customers need to manage storage

• Drive adoption of industry standards

Currently in incubation phase of Eclipse project development
• Storage Resource Manager
  – Discover, monitor, control storage resources
  – Reporting, event management
  – Graphical CIM client with topology viewer
  – Supports several device and vendor types
    • Storage subsystem configuration
      – LUN assignment, and zoning
    • SAN fabric manager
    • Tape library discovery and reporting
    • File system capacity reporting
      – size, %used, %free only
• Storage Area Network Simulator
  – Simulates network of storage devices
    • Switches, tape, subsystems, etc
  – Reduces the need for expensive hardware resources
  – Extensible to support new vendor devices
  – Device setup done in two ways:
    • Manual configuration
    • Snapshot of real device
  – “Productizing” for v0.4 release
The Eclipse platform consists of runtimes, tooling, and components.

Eclipse provides a community oriented development environment:
- CVS, mailing lists, wikis, newsgroups

Get up and running quickly within the Eclipse IDE:
- Download Aperi source code from Eclipse CVS
- Download additional 3rd party libraries
- Compile Aperi code
- Run Aperi’s components from within the IDE
  - With integrated source level debug environment

Leverages Eclipse Development Environment
Aperi Architecture

Management Console

User Interfaces

Core Framework Services

Service Interfaces
- Discovery
- Monitoring
- Control
- Logging
- Scheduling
- Configuration
- DB Interface
- Web Services
- CIM
- Fibre Channel
- SNMP

Eclipse Equinox

Aperi Framework

Aperi Managers
- Disk
- Fabric
- Data
- Tape

Aperi Applications

Management Server

Data Repository

Storage Management Services

Implements OSGi R4 & Eclipse Extensions Registry

Host Agents

Provided by device manufacturer

SMI-S Provider

Device

Inband Agent

Host

Core Framework Services

User Interfaces

Management Console
Recent Aperi Activities

• Novell donates support for XEN virtualization
• YottaYotta joins community
• Aperi Webcast (available online)
• Linux Technical Review article published
• Milestone 0.4 completed
• Brocade, LSI and NetApp join Eclipse Foundation
• Novell Brainshare futures demo includes Aperi and N_Port_ID virtualization for Xen VMs
• Eclipse Foundation Aperi booth at SNW
• SNIA and Eclipse-Aperi Alliance (2006)
Aperi Downloads by Country

- United States: 470
- Germany: 70
- China: 282
- Canada: 58
- United Kingdom: 70
- Malaysia: 130
- India: 55
- Macedonia: 53
- Russian Federation: 53
- Netherlands: 40
- Brazil: 38
- Other countries: *

1429 downloads / 56 countries

45 Countries with 30 or less downloads: Israel, Republic of Korea, France, Japan, Italy, Indonesia, Taiwan, Turkey, Austria, Switzerland, Ireland, Hungary, Australia, Belgium, Hong Kong, Mexico, Tunisia, Sweden, Thailand, South Africa, Norway, Spain, Bulgaria, Denmark, Greece, Lithuania, Poland, Finland, Ukraine, Romania, Ghana, Czech Republic, Venezuela, Philippines, Albania, Pakistan, Colombia, Portugal, Saudi Arabia, New Zealand, Sri Lanka, Singapore, Cyprus, Vietnam
HOWTO - Get Involved

• Aperi Roadmap

• Aperi Website & Demo
  http://www.eclipse.org/aperi/

• Aperi Project Collaboration
  http://dev.eclipse.org/mailmain/listinfo/aperi-dev
  http://wiki.eclipse.org/index.php/Aperi_Storage_Management_Project
  news://news.eclipse.org/eclipse.technology.aperi
• The platform for the open enterprise
  – Built-in certified application security
  – Integrated systems management
  – Virtualization and HA storage foundations
  – Supported by major IHV platforms
The need for standardized management is driven by IT customers who want to manage all their systems – standalone, rack mount, blades and storage – using integrated tools. This requires a focus on the intersection of open management standards in the server, storage and virtualization areas.
CIM based Standards

• Intelligent Platform Management Interface (IPMI)

• Systems Management Architecture for Server Hardware (DMTF SMASH)

• Storage Management Initiative Specification (SNIA SMI-S)

• System Virtualization, Partitioning and Clustering (DMTF SVPC-V & C)
Why Standards?

• Interop
  – Be a 1st class citizen in enterprise networks

• Model
  • Associates inter-dependent managed elements
    – Virtual machine -> cluster resource ->
      cluster node -> SAN path -> SAN LUN
  • Necessary for emerging enterprise-scale problems
    – Configuration management for virtualized data centers

• Policy
  – Monitoring plus Model = foundation for Policy
    – Auto-migrate virtual machine on multi-path failure indication
Reference Model
Representing Services as Graphs
Virtual Machines

- Virtual Machines
  - Guest
    - Domain 1
    - IO System
    - Physical Driver
    - Linux Kernel
  - Other OS Kernel
    - Unmodified Guest (i.e., Windows)
    - Domain N + 1
    - IO System
    - Physical Driver
- XEN Hypervisor
  - Direct IO Path
  - Hardware
    - Memory & CPU (x86, x86-64, EM64T)
    - Intel VT
    - AMD Pacifica

VM Management
Application
Internal/External
SNIA SMI-S Profiles

• Implemented (per CTP)
  – Server Profile
  – Volume Management Profile
    • Block services
    • Health packages
  – Extent Composition Subprofile
  – Indication Subprofile

• Work in Progress
  – Copy Services Subprofile
  – iSCSI and Multipath SCSI I/O
Storage Pool Manipulation
• CMPI
  – OpenPegasus or OpenWbem
• Developed using ECUTE Analyzer
• Dependencies
  – Open management with CIM
  – Enterprise Volume Management System
• EVMS abstracts MD and DM
  – Modeled via SMI-S StorageCapabilities
    • Multidisk (MD) for software RAID
    • DeviceMapper (DM) for LVM2 regions
Demo
Example: Xen Cluster

YaST Patterns:
- High Availability
- Xen Virtual Machine Host Server
- Web-Based Enterprise Management

- Linux-ha v2
- iSCSI initiator and target
- Oracle Cluster File System 2
- OpenWbem and OMC SMASH
Conclusions

• Open Source

• Open Standards

• Model is Required
  – For Service Oriented Infrastructure
  – Relate Storage to other Resource Types

• Mixed Source Software
  – For the Next Generation Data Center
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