Managing KVM with CIM

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Linux Plumbers Conference 2009

Topics

- What is CIM
- CIM glossary
- What CIM provides for virtualization
- Managing KVM with libvirt-cim
- libvirt-cim versus libvirt
- Why CIM?
- Drawbacks of CIM

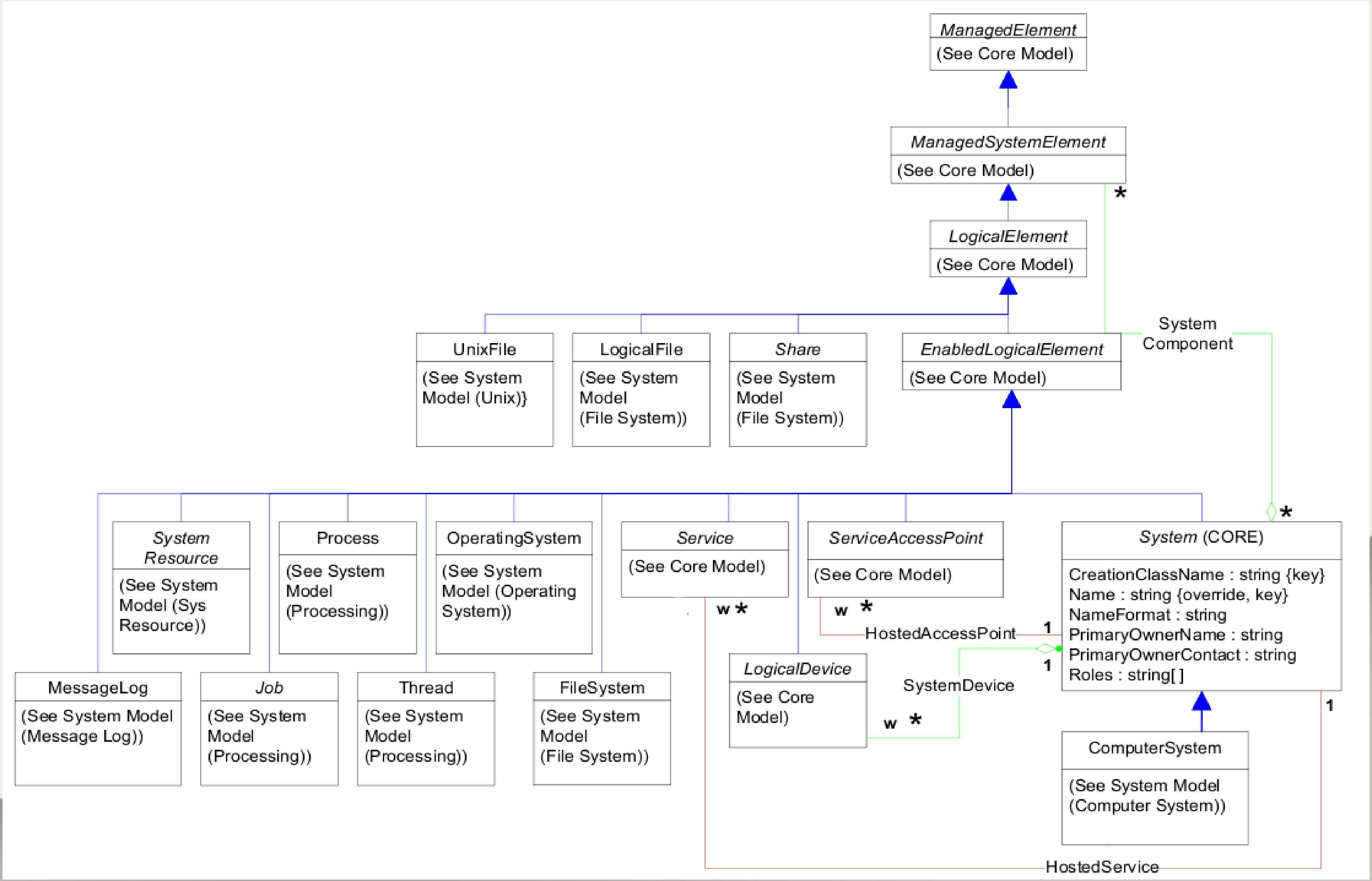
What is CIM?

- Stands for: Common Information Model
- An open standard defined by the DMTF
  - Distributed Management Task Force
- Describes how to control / exchange info about managed elements
- Profiles - model various operations and ways of representing concepts
- Uses a class hierarchy to represent objects and to show inheritance

CIM glossary

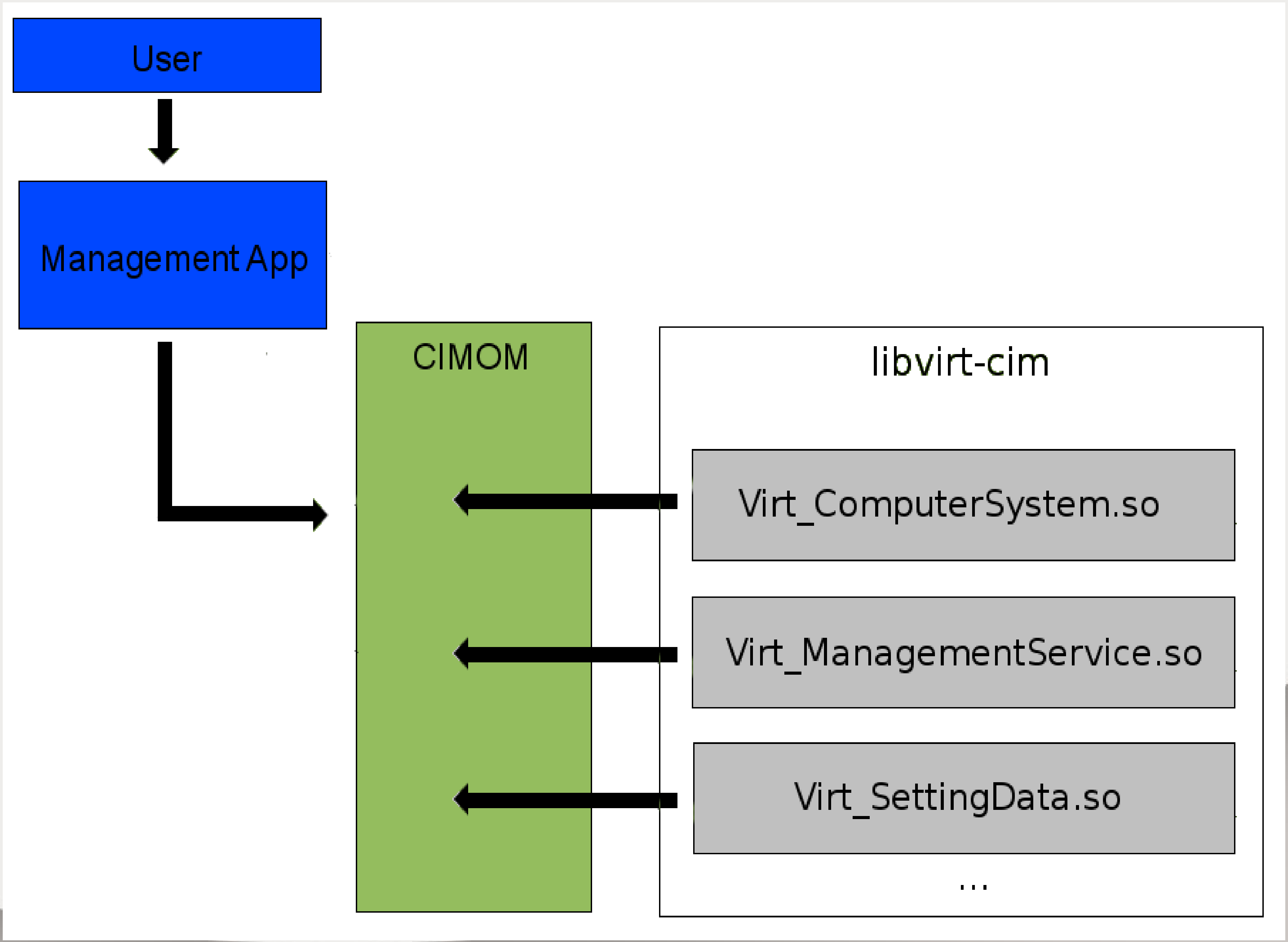
- Class – a collection of the definitions of state, behavior, and/or identity of a manageable items in a system
  - Contain:
    - Methods – functions that act on a class
    - Properties – represent attributes of a manageable item
- Associations – relationship between classes or instances of classes
  - Represents: dependency, identity, aggregation, composition

Example of a class diagram


ManagedElement
(See Core Model)
ManagedSystemElement
(See Core Model)
*
LogicalElement
(See Core Model)
UnixFile
(See System Model (Unix)}
LogicalFile
(See System Model (File System))
Share
(See System Model (File System))
EnabledLogicalElement
(See Core Model)
System Component
*
System Resource
(See System Model (Sys Resource))
Process
(See System Model (Processing))
OperatingSystem
(See System Model (Operating System))
Service
(See Core Model)
w *
ServiceAccessPoint
(See Core Model)
w *
HostedAccessPoint
1
System (CORE)
CreationClassName : string {key}
Name : string {override, key}
NameFormat : string
PrimaryOwnerName : string
PrimaryOwnerContact : string
Roles : string[ ]
1
SystemDevice
1
MessageLog
(See System Model (Message Log))
Job
(See System Model (Processing))
Thread
(See System Model (Processing))
FileSystem
(See System Model (File System))
LogicalDevice
(See Core Model)
w *
ComputerSystem
(See System Model (Computer System))
HostedService

CIM glossary

- Objects – instantiation of a class, usually just called instances
- Provider – a library that represents a given class or classes
    - Implements an API for retrieving instances, invoking methods
- CIMOM - Common Information Model Object Manager
    - Server that facilitates communication between management application and providers


User
Management App
CIMOM
libvirt-cim
Virt_ComputerSystem.so
Virt_ManagementService.so
Virt_SettingData.so
...

CMPI

- Common Manageability Programming Interface
- Technical standard developed by the Open Group
- Defines a C-based programming interface
- Prior to CMPI
  - Providers had to use CIMOM specific API
  - This tied provider sets to a specific CIMOM

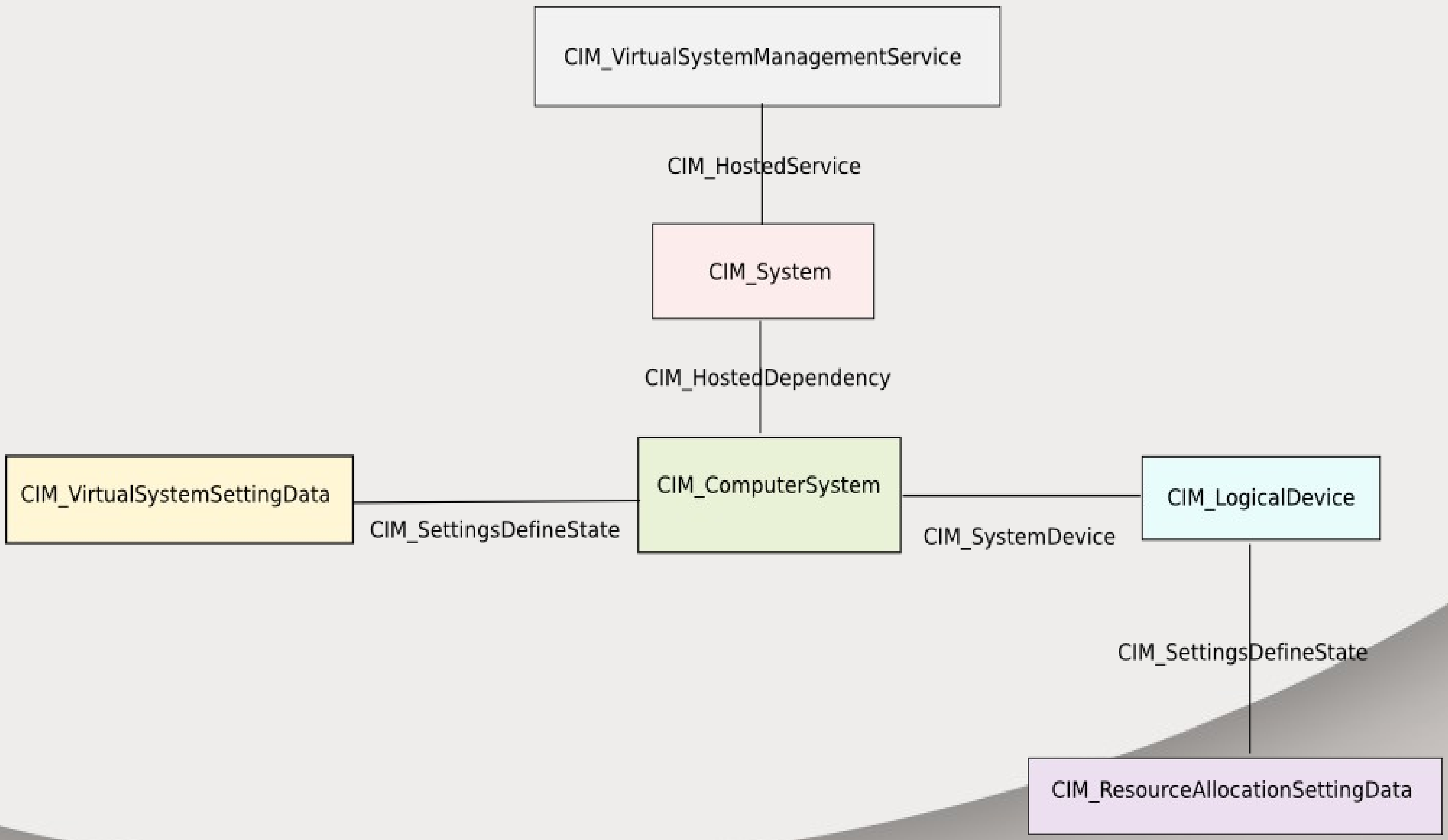
What CIM provides for virtualization

- DMTF established for modeling virtualizaiton:
  - Server Partitioning, Virtualization, and Clustering (SVPC) workgroup
- Workgroup developed profiles that describe:
  - Per guest:
    - Define / destroy / change power state / migrate
    - Add / remove / modify virtual resources
    - Representation of guest and resource configuration data

What CIM provides for virtualization

- Workgroup developed profiles that describe:
  - Host wide:
    - Create / delete / modify resource pools
    - Representation of pool configuration data
    - Generate events when a change occurs

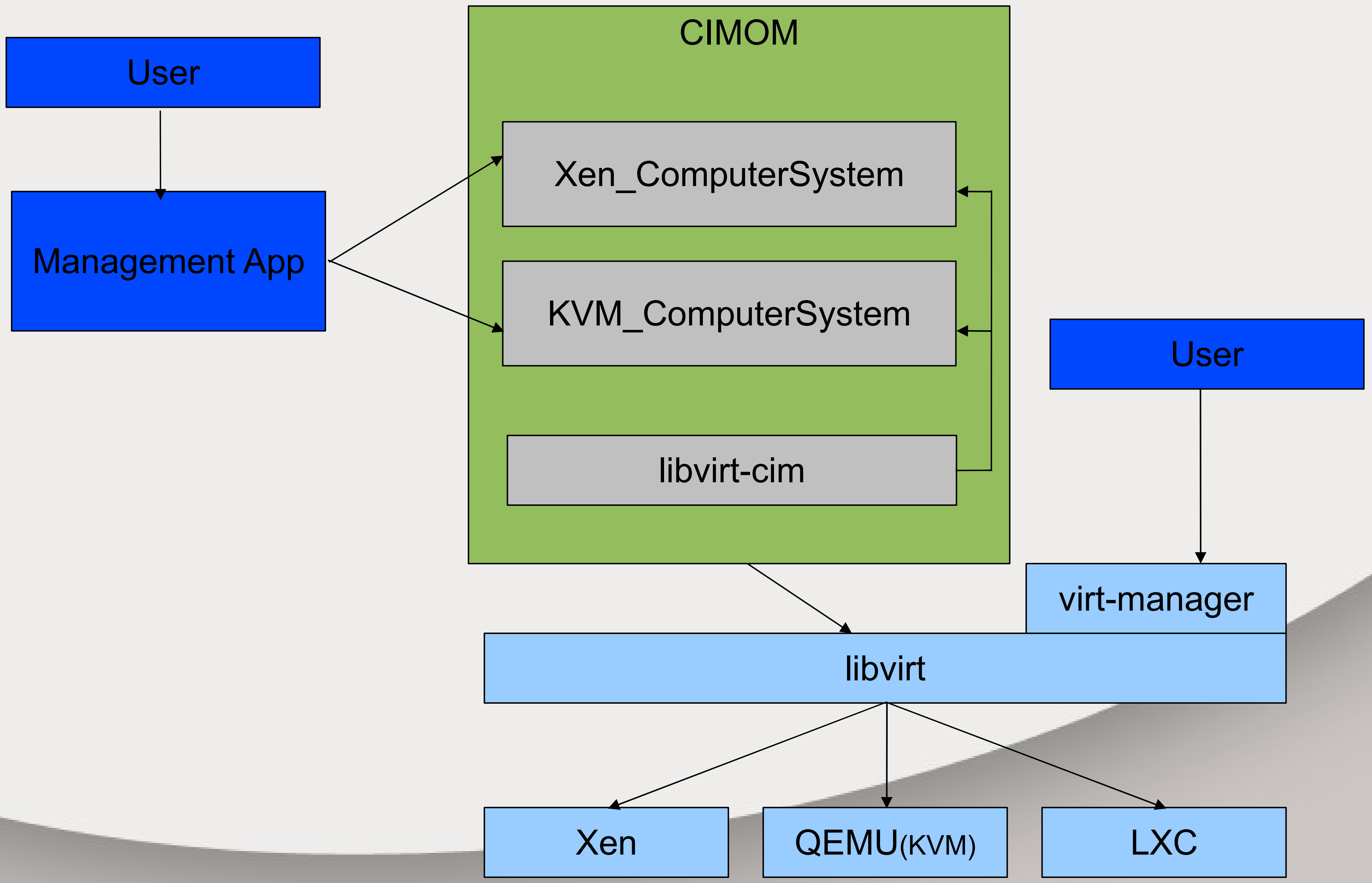
Example of the SVPC schema



Managing KVM with libvirt-cim

- A provider set that manages KVM
  - Also Xen and Linux Containers
- Uses libvirt for hypervisor abstraction layer
  - Providers don't talk directly to hypervisor
  - Avoid platform specifics – most code paths are virtualization platform neutral
  - Map CIM objects, methods to libvirt abstractions / services where possible

Managing KVM with libvirt-cim



libvirt-cim versus libvirt

- libvirt-cim:
  - Parses XML, stores data in objects
  - User can listen for event objects using subscriptions
  - VNC sessions represented
- Drawbacks:
  - Features lag behind libvirt

- libvirt
  - Most info is returned in XML format
  - User must register a callback and poll a file descriptor to get events
  - Only VNC config info represented

Why CIM?

- Allows the management application to control different hypervisor types and even different host types with a single API
- Open standard – all provider sets should work in a known way
- Interoperability between vendors
- Existing open source providers, CIMOMs, and testing tools make for easy development

Drawbacks of CIM

- No mechanism for certifying an implementation conforms to the profiles
- Profiles don't cover all attributes needed
  - Can lead to too much specialization in providers
  - Reduces interoperability between provider and management app
- Profiles don't exist for all scenarios
  - Slow to be published, as they must go through a formal review process
  - Developed largely by volunteers