

Server Management

Configure, Manage, Monitor Linux Systems

Russell Doty
rdoty@redhat.com
Red Hat

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Mid Level Sysadmin

Routine, day to day tasks

Experienced with Microsoft & VMware

New to Linux



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lvcreate

nmcli

mk.xfs

HELP!

yum

parted

systemctl

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Experienced Linux Sysadmin





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OpenLMI Project Goals

- **Improve manageability of Linux systems**
  - Configuration of remote servers
  - Main Initial Focus: configure storage, networks, and authentication
  - Broader management support planned
- Reduce learning curve for new SysAdmins to perform common Linux administration tasks
- Provide a foundation for advanced automation and interfaces
- Build on open industry standards
- Open and extensible
  - Including 3rd parties and customers

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What Can You Do With OpenLMI?

- **Example: Storage**
  - Determine what storage devices are connected to the system
    - Friendly device names & persistent device names
  - Partition, format, encrypt, create RAID sets, create logical volumes and volume groups, mount filesystems
    - Local & remote block devices
  - From programs, scripts or CLI
    - CLI example:
      “lmi> storage raid create –name R1 5 sdb sdc sdd sde sdf”
      (creates 5 disk RAID 5 set called R1)
    - More power and flexibility from LMIShell and OpenLMI API
  - *Query, configure, monitor and change storage*

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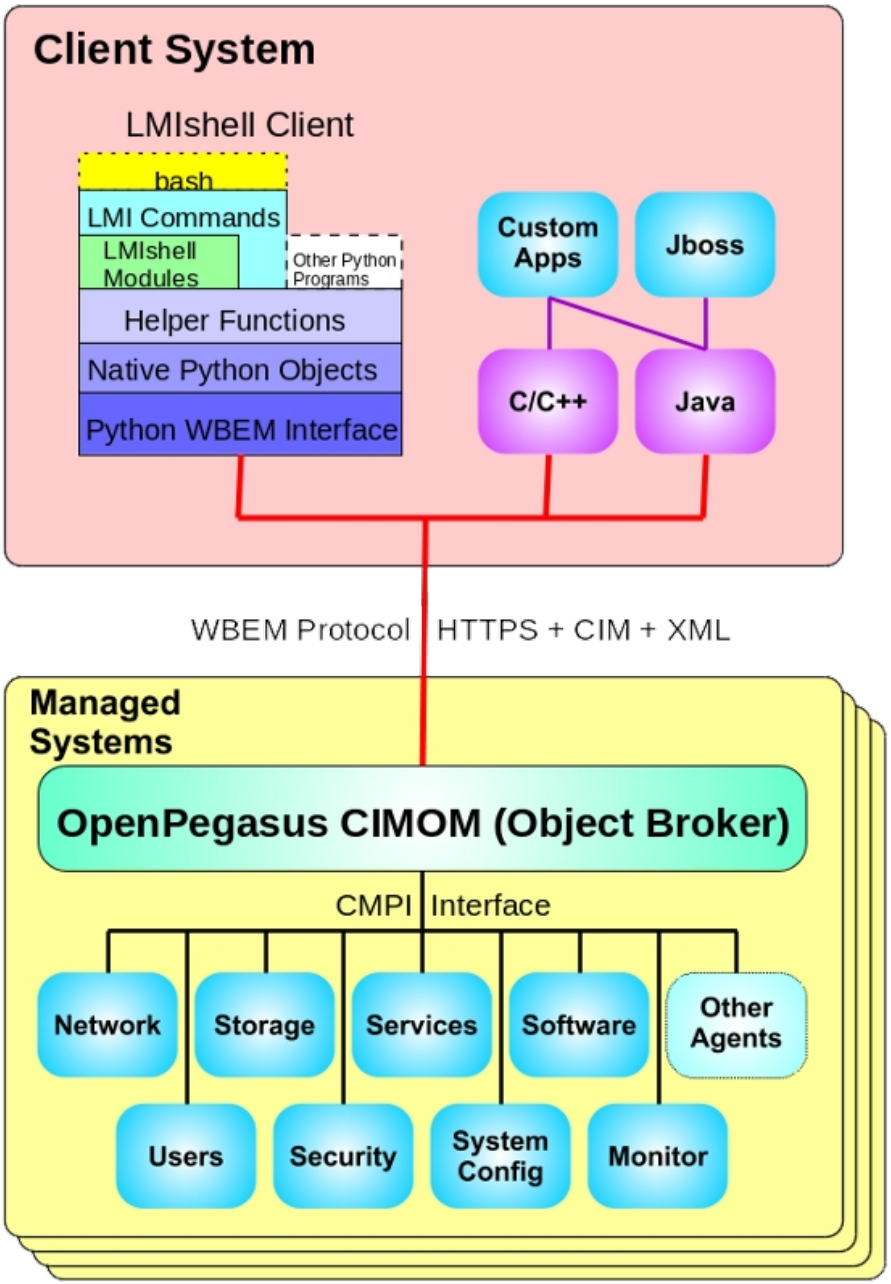
What is OpenLMI?

- A set of *Management Agents*
  - That query, modify & monitor systems
- A *Standardized Remote API*
- A *Standard Communications Infrastructure*
  - Built on XML over https
- A *Client Environment*
  - CLI
  - Scripting (built on Python)
  - Other languages



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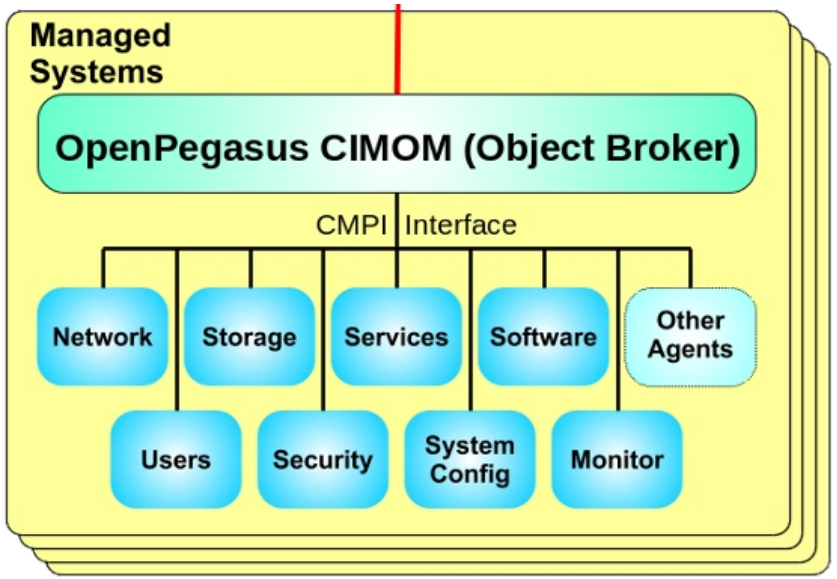
OpenLMI Providers (Agents)



- Providers are Functional Modules
  - Get/Put attributes
  - Methods & relations
- Standard Interfaces
- Introspection
- Providers do all the work
- Toolchain for developing Providers
  - UML schema compile to produce skeleton
- Providers can be written in C/C++ or Python
- Providers can be call/response or asynchronous event driven

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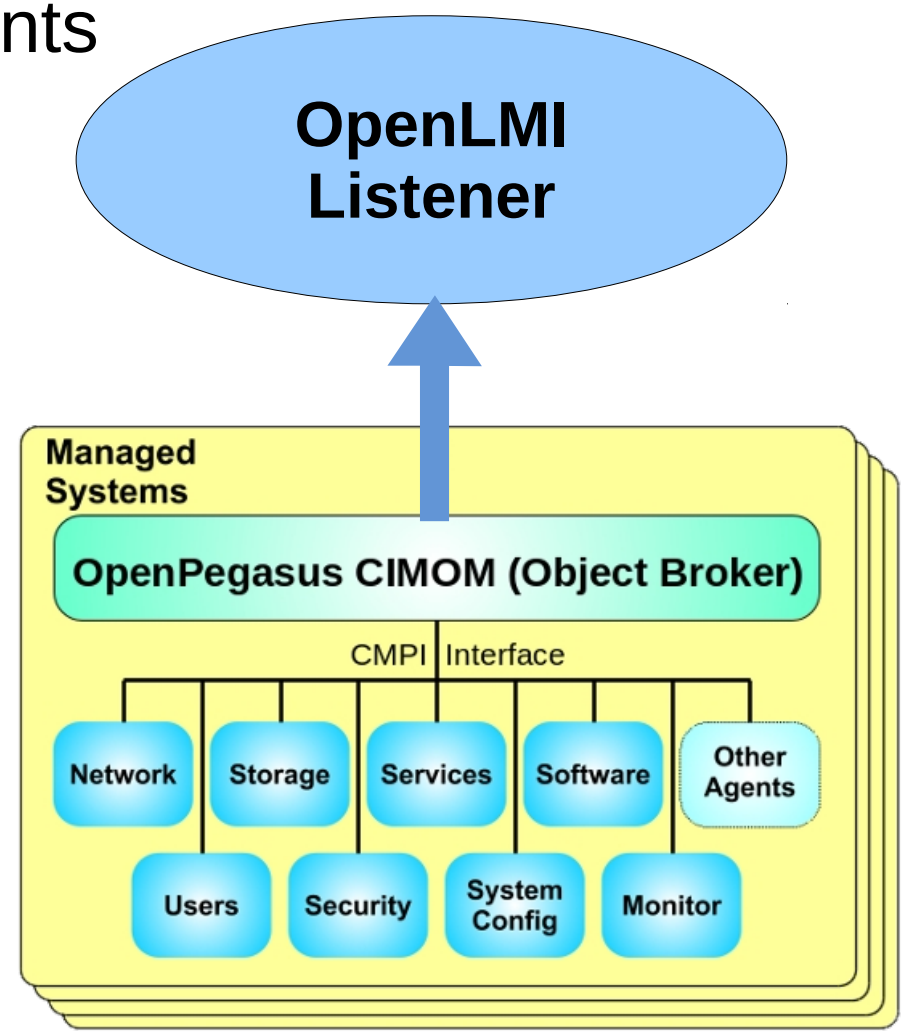
Events - OpenLMI Indications

- Notification of Asynchronous Events
  - e.g. job completion, drive failure, NIC changed state, password changed
- Usage:
  - Listener registers with CIMOM
    - Multiple Listeners per event
  - All registered Listeners notified when event occurs
  - Powerful tool for monitoring



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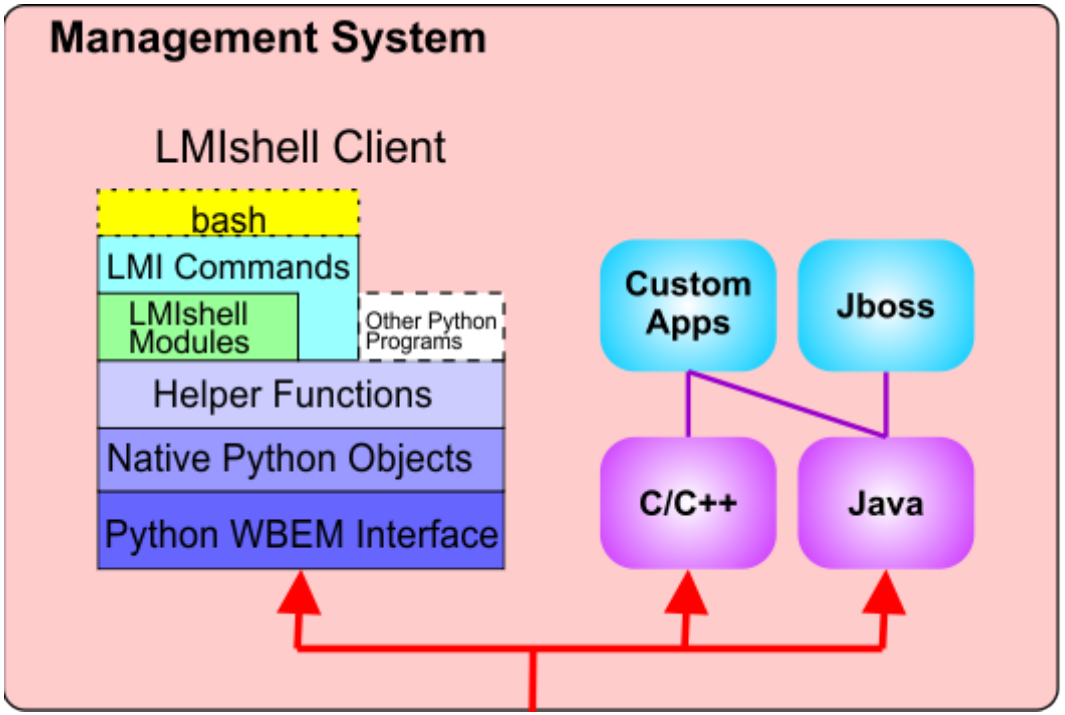
OpenLMI Client Interfaces

- LMI
  - Enhanced CLI – interactive & BASH friendly
- LMIShell
  - Powerful Python scripting environment
  - Extensive library of Management Modules
  - Task Focused/Admin Friendly
  - Designed to be extended & modified
- **REST** – under development



- **C/C++ API**
  - Powerful interface for writing Apps or integrating with existing Apps
- Java
  - Write Java Apps
  - Easy interface with JBoss

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Manage Multiple Servers



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Server Discovery



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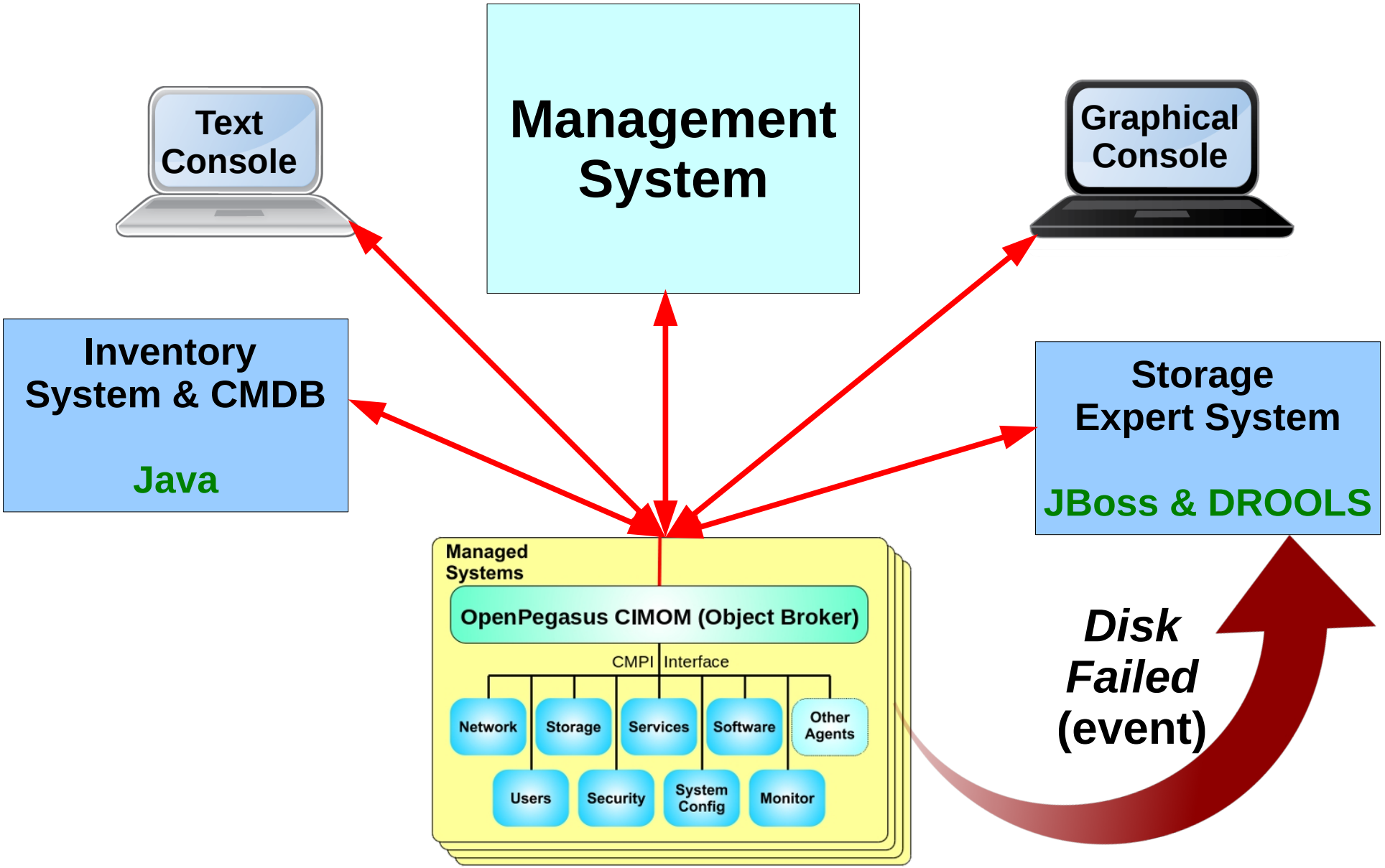
Build Multiple Client Applications



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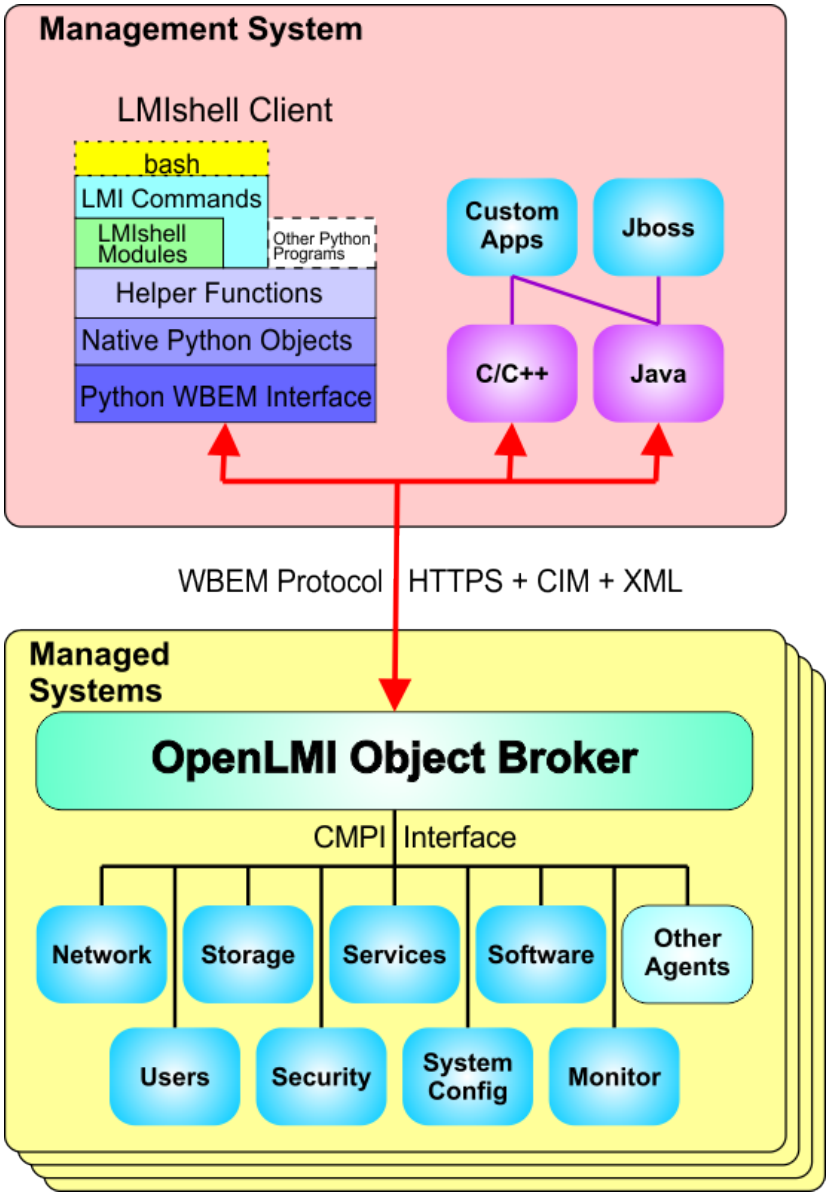
OpenLMI in RHEL 7 & Fedora 20



- **Implementation:**
  - DMTF/CIM technology stack
  - Https transport (no general Web server)
- **Included Providers:**
  - Storage
  - Network
  - System Services
  - Power Management
  - Local User Management
  - Software Management
  - System Monitoring (basic)
  - System Information & Configuration

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Build a RAID Set

```
lmi> storage raid create --name myraid 5 vdb
vdc vdd
lmi> storage vg create myvg myraid
lmi> storage lv create myvg myvol 1G
lmi> storage fs create xfs myvol
lmi> storage mount create \
     /dev/mapper/myvg-myvol \
     /mnt/myvol
```


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Configure a NIC

```
lmi> net device list
     ElementName OperatingStatus MAC Address
     em1         InService
3C:97:0E:4B:2E:53
     lo          NotAvailable
00:00:00:00:00:00
     virbr0-nic  NotAvailable
52:54:00:DF:BD:C4
     wlp3s0      InService
60:67:20:C9:0B:DC

lmi> net address replace em1 192.168.0.130 24

lmi> net activate em1
```


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Install an Application

```
lmi> sw show pkg httpd
      Name=httpd
     Arch=x86_64
     Version=2.4.9
     Release=2.fc20
     Summary=Apache HTTP Server
     Installed=no
     Description=The Apache HTTP Server is a
     powerful,efficient, and extensible web
     server.
lmi> sw install httpd
lmi> sw update httpd
```


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Check if a Service is Running and Restart

```
lmi> service show cups
     Name=cups
     Caption=CUPS Printing Service
     Enabled=Yes
     Status=Running
lmi> service stop cups
     Stopped service "cups.service".
lmi> service restart cups
     Restarted service "cups.service".
```


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Reboot a Server

```
lmi> power list
     PowerState      Available
     suspend         yes
     force reboot    yes
     hibernate       yes
     force poweroff  yes
     poweroff        yes
     reboot          yes
lmi> power reboot
lmi> power off
```


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The Elephant in the Room...



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What About Puppet?



- Puppet and OpenLMI do different things
  - Puppet *puts system into a defined state*
  - OpenLMI *interacts with system*
- Puppet and OpenLMI are complementary
- Goal: for Puppet to be able to use OpenLMI to operate on systems

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OpenLMI Security

- Communications encrypted using TLS (https)
  - Recommend using domain management such as Red Hat Identity Management (IdM)
- Authentication (Username & Password) required for all OpenLMI management operations
  - Authorization performed using standard admin accounts
- Works with SELinux in enforcing mode
- Planned future enhancement:
  - GSSAPI for domain based authentication
  - RBAC

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Key Information

- Software: RHEL 7 or Fedora 20
- Project Website: www.openlmi.org
- Blog: techponder.wordpress.com
- Mailing list: lists.fedorahosted.org/mailman/listinfo/openlmi-devel
- IRC: #openlmi on freenode

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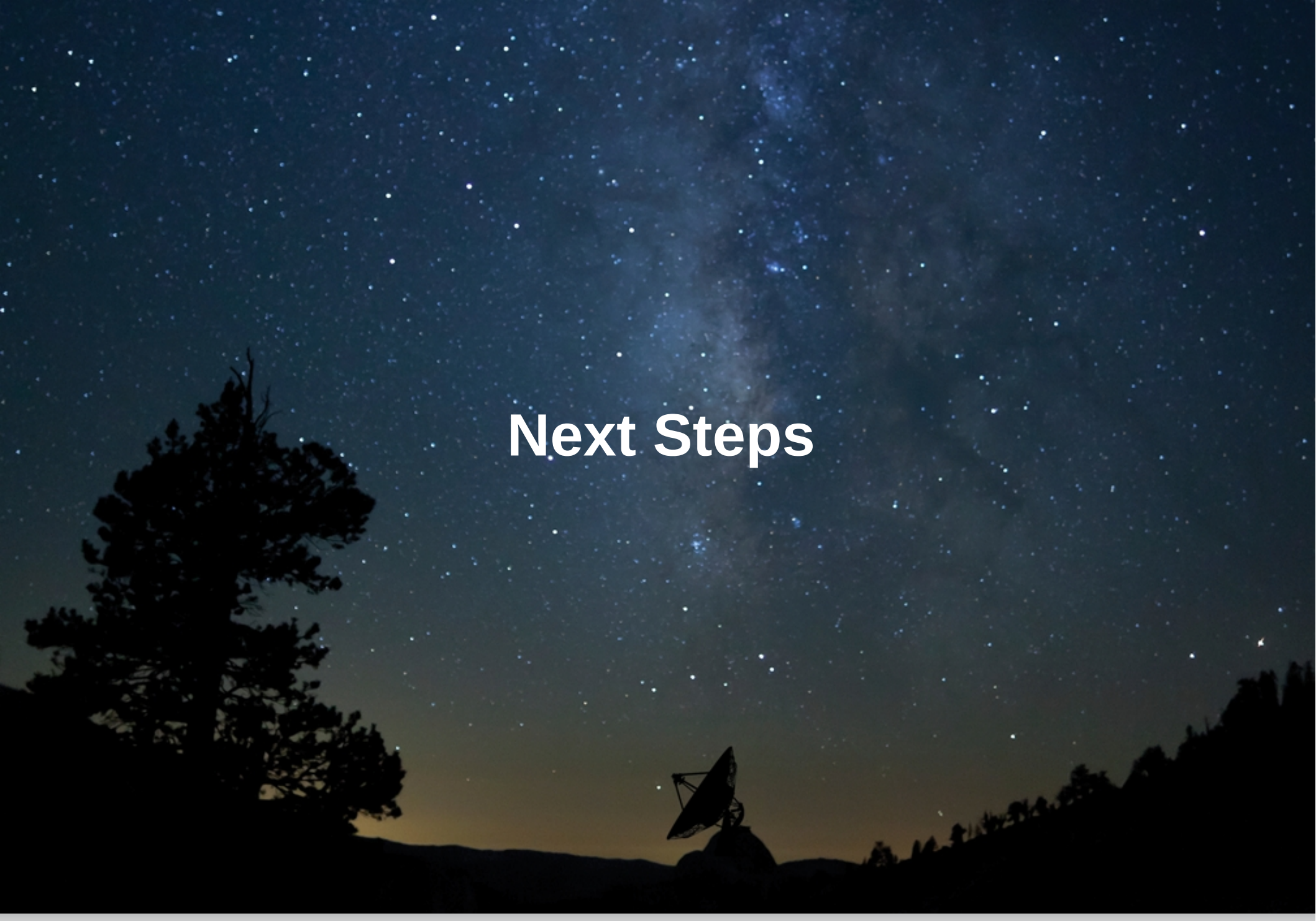

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Getting Started with OpenLMI

- Install OpenLMI on Fedora 20 or RHEL 7
- Easiest way is to use OpenLMI is with LMI command
- Study the existing LMIShell modules
  - Find something close to what you want to do
  - Hack up the LMIShell module
  - Consider submitting it to the upstream community
- Study the OpenLMI API documentation
- Use implementation language of your choice
  - Python, Java, C/C++,
    - REST or Ruby? Talk to us.

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What You Can Do With OpenLMI - In Detail

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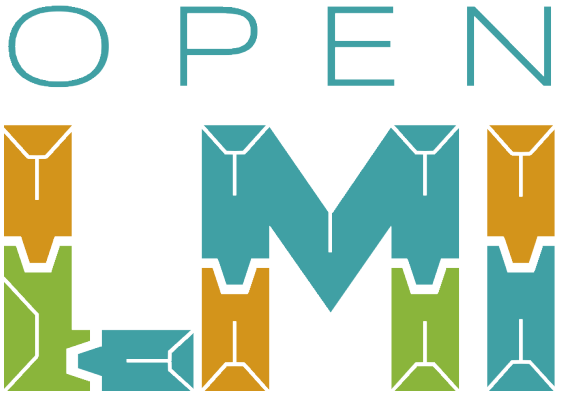

What can you do with OpenLMI?

- Storage
- Networks
- Users
- Software
- Power
- System Services
- System configuration
- Active Directory

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Storage Management

- All Storage
  - Partition
  - Format
  - RAID
  - Volume Management (Logical Volumes & Volume Groups)
  - Encryption
  - Mount
  - Query
  - Basic monitoring
- Local Storage
  - Enumerate Devices (drives)
  - Support for both persistent and friendly device names
- Remote Storage
  - Works today with any remote storage that can provide a LUN
  - Working with libstoragemgmt team to manage remote storage

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Networking

- Goal: support all server features of Network manager
  - Enumerate and configure NICs
  - Configure network
  - Bonding
  - Bridging

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Other Core Providers

- Software
  - List, install, remove, update rpm based software
- System Services
  - List, state, start/stop/restart, modify settings
  - Add/Remove through Software Provider
- Users
  - Add, remove, edit local users
- Power
  - Query and modify basic power states
  - Shutdown & reboot system
  - Need external support for Boot (e.g. BMC)

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Other Core Providers (cont)

- Realmd
  - Integration with Active Directory for user authentication
  - Integration with Red Hat Identity Manager for user authentication
  - Configuration of Linux system to join domain
  - Capabilities:
    - Query domain membership
    - Join a domain
    - Leave a domain

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Other Providers (Not in RHEL 7.0)

- Journald
  - Read journald log records
  - Traverse log records using persistent iterators
  - Receive notification of new log entries
  - Write new log entries
- SSSD
  - Configure SSSD (System Services Security Daemon)
- Firewalld
  - Start/stop/restart firewall
  - Change firewall rules
  - Provides mechanism for central management of firewall
- SELinux
  - Query & set SELinux state
  - Manage booleans, ports & file labels

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Other Providers (Not in RHEL 7.0)

- Performance Co-Pilot
  - List and select performance metrics
  - Reports a variety system statistics monitored by Performance Co-Pilot services.
- JON proof of concept
  - OpenLMI Providers function as JON Agents
  - Don't need JON/JBoss infrastructure on managed system

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Key Technologies for OpenLMI Development

- Agent definition through modeling language – MOF files. UML based, defines the object model
- Toolchain to develop Agents
  - Generate code skeletons directly from MOF files
    - “C” - KonkretCMPI
    - Python – YAWN
- LMI & LMIShell – powerful, friendly client environment & interface
  - Higher level of abstraction
  - Command expansion, integrated documentation, etc.
- Samples, examples, and actual agents
- Documentation and tutorials

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