Open Source Toolchains for Cloud and OVF Management

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Chief Architect Cloud Management
Disclaimer

- The information in this presentation represents a snapshot of work in progress within the DMTF.
- This information is subject to change. The Standard Specifications remain the normative reference for all information.
- For additional information, see the Distributed Management Task Force (DMTF) Web site.

The DMTF was formed to lead the development, adoption and unification of management standards and initiatives for desktop, enterprise and internet environments.
Intent and Goals

• Introduce you to the wide body of Open Source material
• Discuss the relevancy of Open Source to our work
• Apply Open Source projects to major categories
• Look intently at OVF and Open Source with demo
The Beginnings

Middle Ages
1970s and 1980s
The Beginnings
Subject: New UNIX implementation

"Starting this Thanksgiving I am going to write a complete Unix-compatible software system [...] Contributions of time, money, programs and equipment are greatly needed. I consider that the golden rule requires that if I like a program I must share it with other people who like it. [...] I have decided to put together a sufficient body of free software so that I will be able to get along without any software that is not free."

- Richard Stallman, 27 Sep 1983
Open Source

OW2 in top-4 global open source organizations with diversified code

Diversified-code organizations

Product line organizations

Technology-oriented communities

Legal ressources organizations

Standards organizations

Advocacy and lobbying organizations
Open Source

A truly global membership
Open Source

Some 80 Open Source Middleware Projects

Mature Projects
(37)
Acceleo
ASM
Bonita
CARDAMOM
CAROL
CLiF
Enhydra
Shark
EasyBeans
eXo Platform
FederID
Fractal
sync4j
GASP
InterLDAP
JavaService
JOas
JOFE
JORM

JOTM
Lomboz
NovaForge
Open Mobile IS
OPS
Orchestra
PetALS
ProActive
RmiJdbc
RUBiS
Salome-TMF
Sat4J
SOFAs
Spagic
Spago
Spago4Q
SpagoBI
Telosys
XWiki

Projects in Incubation
(23)
Aspire RFID
BEEN
CMI
Demoiselle
Dragon
Dream
Dysoweb
EasyWSDL
Elastic-Grid
FraSCAti
J2WS
JASMiNe
JASptE
JWTGen
LeWYS
OpenSuit
OSLC
Perseus
Q-lmPrESS
Scarbo
Ubistar
xPlus

Projects in Archive
(26)
Azuki
BarracudaMVC
C-JDBC
DotNetJ
Dryerl
EclipseJDO
Enhydra XMCL
GOTM
HOWL
Introspector
Jalışo
Jonathan
JORM
Massiv
MEDOR
Mobi1Tools
Monolog
Odette FTP
Oscar
ParGRES
SNAP
Speedo
SURF
Tribe
XAPool
XQua1e

2.5 million downloads per year since 2007

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Open Source

http://www.ow2.org
IT, Cloud, Virtualization and Open Source

- IT Services are now synonymous with Cloud
- In most respects Open Source projects die a premature death but live a full life- we can learn from observing and participating in that life!- albeit short as it is…
- The lists are growing
- What about CIM specific Open Source offerings?
  - We’ll get into that but until then
    • 5,6,7,8,9,10
So, what are we really talking about?
Moron, cloud, virtualization and CIM
Still, as of old….

- SOAP; XML; OCCI; CMWG; EC2/S3; CDMI; etc.
- UDDI 1&2; WS-Service Group; WS-Coordination; WS-Notification; WS-ServiceGroup; WS-MetadataExchange; WS-AtomicTransaction; WSDL; WS-Addressing; WS-BaseFaults; WS-Security; OpenAM; OpenSSO; Shibboleth;
- JSR-47; Logging Services; etc.
- DEN-ng models; DMTF-CIM; OVF; RASDs; OCCI; WS*; DMTF-CIM with various Management Profiles; OpenOVF; etc.
- DEN-ng models; OpenBSS; OSS/J; TMF SID and eTOM; OpenNMS; JSR-47; Syslog; etc.
- DEN-ng models; OpenNMS; WebNMS; Claudia; Eucalyptus; RESERVOIR; OVF; Cumulus; OpenStack; etc.
- DEN-ng models; OpenNMS; xmlGateway; WebNMS; Nagios; etc.
- OpenNMS; xmlGateway; WebNMS; Nagios; Eucalyptus; RESERVOIR;
Real World still exists

Everything highlighted in this box represents managed Entities that are ‘virtualized’ and do not exist in the real world familiar to Telcos. Everything represented is identified as a Service and managed as such.

Each managed Service entity must be mapped to a lifecycle that allows it to exist prior to mapping to physical resources. VMs (simplest) are configuration file entries in the hosting System.

This is the only point at which ‘real’ network devices, connections and services exist! Terms like ‘jitter’ and ‘latency’ really do NOT apply as data interchange between VMs or Apps is done primarily via IPC methods like the Dom/Ring interchange with Xen.

Virtual Network Devices are software apps, not boxes. A ‘Virtual Network’ does not use packets and processes like a real network does.

A ‘vNetwork’ is made up largely of VLAN IDs given to vNICs (config files) and other identifiers specified by vendors or standards.
Open Source Domain

Major Layer breakdown to Reference Layers and alignment to prior slides.
And still has to be managed!
IT, Cloud, Virtualization and Open Source

- What about CIM specific Open Source offerings?
  - And don’t forget my favorite- OpenNMS – 22s
  - Zenoss is a peer NMS for cloud, virtualization and CIM mgmt

*Figure 1: The OpenNMS architecture*
Managing most everything with Open Source

• All the parts are there
  – Cloud
  – Hypervisors / Virtualization
  – Operating Systems
  – Everything Else

In some fashion or another (this is not a turn key presentation! – neither is open source)
Managing Cloud with Open Source

- Provisioning
- Configuration Management
- Automation / Orchestration
- Monitoring (FCAPS)
Managing Cloud with Open Source

- Provisioning

<table>
<thead>
<tr>
<th>Pckg</th>
<th>Language</th>
<th>License</th>
<th>Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cobbler</td>
<td>Python</td>
<td>GPL</td>
<td>RedHat, OpenSUSE, Fedora, Debian, Ubuntu</td>
</tr>
<tr>
<td>FAI</td>
<td>Perl</td>
<td>GPL</td>
<td>Debian</td>
</tr>
<tr>
<td>Kickstart</td>
<td>Python</td>
<td>GPL</td>
<td>Most Debian and RH distros</td>
</tr>
<tr>
<td>Viper</td>
<td>Perl</td>
<td>GPL</td>
<td>Debian</td>
</tr>
</tbody>
</table>
## Managing Cloud with Open Source

### Configuration Management

<table>
<thead>
<tr>
<th>Pckg</th>
<th>Year launched</th>
<th>Language</th>
<th>License</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bcfg2</td>
<td>2003</td>
<td>Python</td>
<td>BSD</td>
</tr>
<tr>
<td>Cfengine</td>
<td>1993</td>
<td>C</td>
<td>Apache</td>
</tr>
<tr>
<td>Chef</td>
<td>2009</td>
<td>Ruby</td>
<td>Apache</td>
</tr>
<tr>
<td>Puppet</td>
<td>2004</td>
<td>Ruby</td>
<td>GPL</td>
</tr>
</tbody>
</table>
Managing Cloud with Open Source

• Automation / Orchestration

<table>
<thead>
<tr>
<th>Pkg</th>
<th>Language</th>
<th>License</th>
<th>Community</th>
</tr>
</thead>
<tbody>
<tr>
<td>AutomateIT</td>
<td>Ruby</td>
<td>GPL</td>
<td>None</td>
</tr>
<tr>
<td>Capistrano</td>
<td>Ruby</td>
<td>MIT</td>
<td>None</td>
</tr>
<tr>
<td>Control Tier</td>
<td>Java</td>
<td>Apache</td>
<td>DTO Solutions</td>
</tr>
<tr>
<td>Func</td>
<td>Python</td>
<td>GPL</td>
<td>Fedora project</td>
</tr>
<tr>
<td>RunDeck</td>
<td>Java</td>
<td>Apache</td>
<td>DTO Solutions</td>
</tr>
</tbody>
</table>
### Monitoring

<table>
<thead>
<tr>
<th>Pckg</th>
<th>License</th>
<th>Language</th>
<th>Functionality</th>
<th>Collection Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cacti</td>
<td>GPL</td>
<td>Php</td>
<td>Performance</td>
<td>SNMP, syslog</td>
</tr>
<tr>
<td>Nagios</td>
<td>GPL</td>
<td>C/php</td>
<td>Availability</td>
<td>SNMP, TCP, ICMP, IPMI, syslog</td>
</tr>
<tr>
<td>Zabbix</td>
<td>GPL</td>
<td>C/php</td>
<td>Availability, Performance</td>
<td>SNMP, TCP, ICMP, IPMI, Synthetic Transactions</td>
</tr>
<tr>
<td>Zenoss</td>
<td>GPL</td>
<td>Python</td>
<td>Availability, Performance, Event Management</td>
<td>SNMP, ICMP, SSH, syslog, WMI</td>
</tr>
</tbody>
</table>

11, 12,  
And many more like OpenNMS 22s (the best in my book…)}
## Managing Cloud with Open Source

And many more—like 13,

### Cloud Toolkits: Market Overview

<table>
<thead>
<tr>
<th>Hypervisor</th>
<th>RHEV</th>
<th>Xen-Server</th>
<th>Hyper-V</th>
<th>Eucalyptus</th>
<th>Nimbus</th>
<th>Open Nebula</th>
<th>oVirt</th>
</tr>
</thead>
<tbody>
<tr>
<td>VMware vSphere</td>
<td>VMware</td>
<td>KVM</td>
<td>Xen, Hyper-V</td>
<td>Hyper-V, Xen</td>
<td>Xen, KVM, VMware</td>
<td>Xen</td>
<td>Xen, KVM, VMware</td>
</tr>
<tr>
<td>VLAN</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Scheduling</td>
<td>Yes</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>Limited</td>
<td>External</td>
<td>External</td>
</tr>
<tr>
<td>Live Migr.</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>High Avail.</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Hybrid Cloud</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Partially</td>
<td>Partially</td>
<td>Yes</td>
</tr>
<tr>
<td>Admin GUI</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Req. Intel VT / AMD-V</td>
<td>No</td>
<td>Yes</td>
<td>only for Windows guests</td>
<td>No</td>
<td>if KVM hypervisor is used</td>
<td>only for Windows guests</td>
<td>if KVM hypervisor is used</td>
</tr>
<tr>
<td>Guest OSs</td>
<td>W/L/So/N</td>
<td>W/R</td>
<td>W/R/C/S/D</td>
<td>W/S/R</td>
<td>Depends</td>
<td>Depends</td>
<td>Depends</td>
</tr>
<tr>
<td>License</td>
<td>Propr.</td>
<td>Propr.</td>
<td>Propr.</td>
<td>Propr.</td>
<td>BSD</td>
<td>Apache 2</td>
<td>Apache 2</td>
</tr>
<tr>
<td>Annual Cost</td>
<td>up to $4400 per CPU</td>
<td>up to $750 per socket</td>
<td>Free / up to $5500 per host</td>
<td>up to $3300 per CPU</td>
<td>Free / N/A</td>
<td>Free</td>
<td>Free</td>
</tr>
</tbody>
</table>
Managing Cloud with Open Source

Or-
14s
15

And what about CIM and Cloud Management?
16s

Or Cloud simulators?
17

Or Microsoft?
18
Managing Virtualization with Open Source

• All the parts are there
  – Cloud
  – Hypervisors / Virtualization
  – Operating Systems
  – Everything Else

In some fashion or another (this is not a turn key presentation! – neither is open source)
Hypervisor /Virtualization are synonymous in Open Source

• Most every hypervisor instrumented with CIM of sorts
  • Xen - 19s
  • KVM - 20s
  • Microsoft - 21s
  • Tools – 22
  • Vendors – 23
  • Most using ‘libvirt’ - 24
Managing Operating Systems with Open Source

- All the parts are there
  - Cloud
  - DC
  - Hypervisors
  - Operating Systems
  - Everything Else

In some fashion or another (this is not a turn key presentation! – neither is open source)
Most every distro of Linux would fit into this diagram in some fashion.
Operating System Management with CIM and Open Source

Or this one- see 25s
Or Microsoft!

- OMI can even be thought of as a Data Center Abstraction Layer!
- OMI will perform the same functions for Cloud / SDDCs as HAL did for x86 platforms!
- I believe Microsoft is being too humble and not promoting this approach well enough into standards and open source communities!

Look again at 18s!!!
More OS Info!

- ‘Deep Dive CIM and SBLIM’ – 26
- ‘CIM Models of Apache Web Server apps’ – 27
- ‘HPC Cluster Management with CIM’ – 28
- ‘Using CIM Tools to Manage Dell’ – 29
- Various WBEM Research papers, topics and tutorials from RedHat, SUSE, Fedora, Linux general – 30s
- The Open Group past APTS on CIM and OMI- 31
- “Love Story” – 32
- IBM and CIM Management- 33
Everything Else with Open Source

- CIM as, with, on, in Ontologies- 34s
- Open Source Tools – 35 (especially Wheeler’s top 20)
- And on…
BREAK first
DEMOs

• 2-Part Ganeti tutorial with VirtualBox “Hands-on Virtualization” - 36s
OVF and Open Source Tools

- Must Start with Contrail Infrastructure Management with OVF! - 37
• 38- Building Virtual Appliances using the OVF Toolkit
References

• Text