A Complete Open Cloud
Storage, Virt, IaaS, PaaS

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Open Source and Standards,
Red Hat
Agenda

1. Traditional virtualization
2. The move to IaaS
3. Storage
4. PaaS, application encapsulation and orchestration
5. Cloud monitoring, service brokerage
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Virtualization

Before

After
Virtualization

- **Consolidation of hardware** – fewer, bigger servers
- **Workload management** – over-subscribed services get more hardware
- **Protect your apps** – fault tolerance, high availability, live migration, Network, disk, compute, memory Quality of Service
- **Ability to scale up** – add more hardware and modify resources allocated to VM on the fly
- **No change to legacy apps**
Open Source virtualization

**oVirt**
KVM management application
Open Source alternative to vSphere

**Xen**
Widely deployed Hypervisor
Hosted by Linux Foundation since April 2013

**Ganeti**
Developed by Google to manage clusters
Manages KVM and Xen nodes
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Infrastructure as a Service

- Self-service provision
- Many identical servers
- Stateless services
- Scale-out easily – load balancing, public IPs, database as service
- Move to object storage
Pets vs Cattle (yes, again)

“Future application architectures should use Cattle but Pets with strong configuration management are viable and still needed”
- Tim Bell, CERN

Scale Up
- Servers are like pets. Pets are given names, are unique, lovingly hand raised and cared for. When they get ill, you nurse them back to health

Scale Out
- Servers are like cattle. Cattle are given numbers and are almost identical to each other. When they get ill, you get another one.
OpenStack architecture

- Modular architecture
- Designed to easily scale out
- Based on (growing) set of core services
Instance types

Server 19234
32 cores
60GB memory

Server 19235
32 cores
60GB memory
Sample cloud application

1. Load balancer with public IP
2. Load balanced web servers
3. Load balancer
4. Load balanced application server
5. Replicated database
6. Shared storage

Web service
Sample cloud application

- Stateless – no side-effects in instance, memory only
- Persistent storage requires block storage or object storage service, or shared filesystem
- Requires rearchitecture of legacy applications
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Storage

- Clouds needs scale-out storage
- Disk drives fail. All the time
- Image, block, and object storage, and/or shared filesystem
- Scale-out storage on commodity hardware - GlusterFS, Ceph, RiakCS, Swift
- Virtualization aware, tight integration with virtualization and Infrastructure as a Service desirable
Scale-out storage
Scale-out storage
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PaaS = Platform as a Service

A Cloud Application Platform

1. Code
2. Deploy
3. Enjoy

Code your app

Push-button Deploy, and your App is running in the Cloud!

Save Time and Money
Consolidated B-24 Liberator

Incredibly sophisticated. ~500k parts, assembled by unskilled labor.

No manufacturing process. Parts were cast in rubber molds, so every part was slightly different.

Assembled in the heat of San Diego, which warped the metal and required whole assemblies to be adjusted.

Ford Motor Co. brought a manufacturing process ...

*unit production went from 250 planes a year to 650 planes a month.*

THIS IS OUR CHALLENGE TODAY
How to Build an App:
1. Have Idea
2. Get Budget
3. Submit VM Request request
4. Wait
5. Deploy framework/appserver
6. Deploy testing tools
7. Test testing tools
8. Code
9. Configure Prod VMs
10. Push to Prod
11. Launch
12. Request More Prod VMs to meet demand
13. Wait
14. Deploy app to new VMs
15. Etc.

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How to Build an App:
1. Have Idea
2. Get Budget
3. Code
4. Test
5. Launch
6. Automatically Scale

“The use of Platform-as-a-Service technologies will enable IT organizations to become more agile and more responsive to the business needs.” –Gartner*
Control vs automation

**APPLICATION**

**APPLICATION PLATFORM**
(JBOSS, PHP, RUBY, ETC)

**OPERATING SYSTEM**
(RHEL)

**VIRTUALIZATION**
(KVM)

**HARDWARE**
(x86)

**STORAGE**
(GlusterFS)

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**IaaS**

Managed and Controlled by Customer (IT, Dev, or User)
Automated and Managed by the Public or Private Cloud Offering

**Increased Control**

**PaaS**

**SaaS**

**Increased Automation**
OpenShift Origin

Multi-language, Auto-Scaling, Self-service, Elastic, Cloud Application Platform
CloudFoundry
Docker
Orchestration and deployment

- Containerization – Docker, OpenShift cartridges
- Orchestration templates – Heat, CloudFormations
- Configuration management – Foreman, Puppet, Chef, Ansible, CFEngine...
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Industry Trend – Hybrid Cloud
Existing IT + Private Cloud + Public Cloud = “Hybrid Cloud”

Physical IT → Virtual IT → Private Cloud → Hybrid Cloud

It's all coming together!!!
One Ring to Rule them All

- Cloud management software
- “Single pane of glass” to allow management of traditional Virt and private and public IaaS
  - Enables policy enforcement
  - Facilitates service migration
  - Frees you from vendor lock-in
- CloudForms Management Engine
Open Hybrid Cloud

- Legacy virtualization (VMware, oVirt/RHEV)
- Private cloud (eg. OpenStack)
- Public cloud (AWS, GCE)
Open Hybrid Cloud

- Legacy virtualization (VMware, oVirt/RHEV)
- Private cloud (e.g., OpenStack)
- Public cloud (AWS, GCE)

Cloud services broker, Cloud management
Open Hybrid Cloud

Developer environment

Platform as a Service

Cloud services broker, Cloud management

Legacy virtualization (VMware, oVirt/RHEV)

Private cloud (eg. OpenStack)

Public cloud (AWS, GCE)

Guest instances
Open Hybrid Cloud

Developer environment

Platform as a Service

Cloud services broker, Cloud management

Guest instances

Legacy virtualization
(VMware, oVirt/RHEV)

Private cloud
(eg. OpenStack)

Public cloud
(AWS, GCE)

Shared storage (object, block)
Open Hybrid Cloud

- Developer environment
- Platform as a Service
- Cloud services broker, Cloud management
- Guest instances
- Legacy virtualization (VMware, oVirt/RHEV)
- Private cloud (eg. OpenStack)
- Public cloud (AWS, GCE)
- Shared storage (object, block)
Open Hybrid Cloud needs Open Source

100,000+ PROJECTS

Apache Project

Gnome

OpenJDK

OpenStack

Linux Kernel

fedora

JBoss Community

oVirt

Gluster Community

RDO

openshift

origin

RED HAT ENTERPRISE LINUX
RED HAT JBOSS MIDDLEWARE
RED HAT ENTERPRISE VIRTUALIZATION
RED HAT STORAGE
RED HAT OPENSTACK

participate
integrate
stabilize
THANK YOU!
QUESTIONS?

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