RED HAT OPENSTACK DEEP DIVE

OPEN CLOUD INFRASTRUCTURE BUILT ON RED HAT TECHNOLOGIES

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August 2013
AGENDA

- What is OpenStack
- Cloud Workloads
- What is Red Hat OpenStack?
- Some OpenStack History
- OpenStack Components
- Red Hat in the OpenStack community and upstream
- RDO: Community OpenStack from Red Hat
- OpenStack Upstream vs Red Hat OpenStack releases
- What's next in OpenStack and Red Hat OpenStack
- Questions
There will be Demo
OpenStack is ...

Compute, Networking, Storage

Image credit: http://www.openstack.org/software
OpenStack is ...

Public or Private Cloud

OMG CLOUD!!!
OpenStack is ...

Self Service

- APIs
- Web Dashboard
OpenStack is ...

Pay as you go
OpenStack is ...

Illusion of Infinite Capacity
OpenStack is ...

Massive Scale
Cloud Ready Workloads?
SERVICE MODELS / WORKLOADS

TRADITIONAL WORKLOADS

CLOUD WORKLOADS
SERVICE MODELS / WORKLOADS

- **TRADITIONAL WORKLOADS**
  - Stateful VMs: Application defined in VM
  - Application SLA = SLA of VM
  - SLA requires enterprise virtualization features to keep VMs highly available
  - VMs scale up: add vCPU, vRAM, etc.
  - Lifecycle may be measured in years
  - Applications not designed to tolerate failure of VMs

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CLOUD WORKLOADS

- Stateless VMs: Application distributed
- Application SLA not dependent on any one VM
- SLA requires ability to create and destroy VMs when needed
- Applications scale out: add more VMs
- Lifecycle measured in hours to months
- Applications designed to tolerate failure of VMs
SERVICE MODELS / WORKLOADS

TRADITIONAL WORKLOADS

CLOUD WORKLOADS
SERVICE MODELS / WORKLOADS

TRADITIONAL WORKLOADS

- Pets are unique, lovingly hand raised and cared for
- They are given names
- When they get ill you nurse them back to health

CLOUD WORKLOADS

- Cattle are almost identical to each other
- They are given numbers
- When they get ill you get another one

Credit: Bill Baker @ Microsoft & Tim Bell @ CERN
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EVOLVING IT ARCHITECTURES

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Are You Cloud Ready?
OPENSTACK
RUNS ON LINUX

- Modular architecture
- Designed to easily scale out
- Based on (growing) set of core services
RED HAT ENTERPRISE LINUX OPENSTACK PLATFORM
CLOUD INFRASTRUCTURE FOR CLOUD-ENABLED WORKLOADS

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

- RHEL 6.4 + RHOS 3.0 (Grizzly)
- All In One profile using Packstack
- Hosted on dedicated hardware
  - Nova requires HW Virtualisation for Performance
- RHEL 6.4 pre-installed (kickstart)
  - Packages pre-cached to reduce install time
Timeline
OpenStack History and Cadence

Havana (Oct 2013)
- Ceilometer & Heat integrated

Grizzly (Apr 2013)
- Maturation of Quantum and Cinder, focus on upgrade support

Folsom (Oct 2012)
- Quantum (Networking) full inclusion, Volume Service added

Essex (Apr 2012)
- Dashboard and Identity service released, Quantum incubated

Diablo (Sep 2011)
- First “Production Ready” release

Cactus (Apr 2011)
- Scaling enhancements, support for many hypervisors

Bexar (Feb 2011)
- OpenStack Compute ready, initial release of Image Service

Austin (Oct 2010)
- Initial release, Object Storage Production Ready, Compute in testing

6-month cadence
OpenStack Trends, Growth & Milestones

- Red Hat assigns its first developer to the OpenStack community (Aug 2011)
- First OpenStack release with Red Hat code (Oct 2012)
- OpenStack Foundation formed (Sep 2012)
- Largest OpenStack Summit to date, enterprise customer keynotes
- First OpenStack release with Red Hat code
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Data extracted from Google Trends (keyword: OpenStack) and Bitergia reports. "Committees" shown above indicate the number of individual committers across the top ten contributing companies.
#1
OVERALL CODE CONTRIBUTOR TO GRIZZLY
(Apr 2013)
WHY ARE WE INVOLVED WITH OPENSTACK?

- Red Hat Enterprise Linux OpenStack Platform will be to OpenStack what Red Hat Enterprise Linux is to Linux
- We bring what OpenStack needs
  - Supportability
  - Stability
  - Enterprise grade features (Security, Performance, RAS)
  - Certified ecosystem
  - Lifecycle
OpenStack Components
OPENSTACK ARCHITECTURE

- Modular architecture
- Designed to easily scale out
- Based on (growing) set of core services
OpenStack Identity (KEYSTONE)

- Identity Service
- Common authorization framework
- Manages users, tenants and roles
- Pluggable backends (SQL, PAM, LDAP, etc)
OpenStack Identity (Keystone)
OpenStack Identity (Keystone) Scaling
OpenStack Compute (NOVA)

- Core compute service comprised of
  - Compute Nodes – hypervisors that run virtual machines
    - Supports multiple hypervisors KVM, Xen, LXC, Hyper-V and ESX
    - Distributed controllers that handle scheduling, API calls, etc
  - Native OpenStack API and Amazon EC2 compatible API
OpenStack Compute (Nova)
OpenStack Compute (Nova) Scaling
OpenStack Image Service (GLANCE)

- Image service
- Stores and retrieves disk images (virtual machine templates)
- Supports Raw, QCOW, VMDK, VHD, ISO, OVF & AMI/AKI
- Backend storage: Filesystem, Swift, Amazon S3
OpenStack Image Service (Glance)
OpenStack Object Storage (SWIFT)

- Object Storage service
- Modeled after Amazon's S3 service
- Provides simple service for storing and retrieving arbitrary data
- Native API and S3 compatible API
OpenStack Networking (NEUTRON formerly QUANTUM)

- Network Service
- Provides framework for Software Defined Network (SDN)
- Plugin architecture
  - Allows integration of hardware and software based network solutions
OpenStack Block Storage (CINDER)

- Block Storage (Volume) Service
- Provides block storage for virtual machines (persistent disks)
- Similar to Amazon EBS service
- Plugin architecture for vendor extensions
  eg. NetApp driver for Cinder
OpenStack Dashboard (HORIZON)

- Dashboard
- Provides simple self service UI for end-users
- Basic cloud administrator functions
  - Define users, tenants and quotas
  - No infrastructure management
Demo – Horizon
OPENSTACK INCUBATING PROJECTS

OpenStack Orchestration (HEAT)

- Provides template driven cloud application orchestration
- Modeled after AWS CloudFormation
- Targeted to provide advanced functionality such as high availability and autoscaling
- Introduced by [Red Hat](http://redhat.com)

Graduated from Incubation to Integrated status for the Havana release
OpenStack Monitoring and Metering (CEILOMETER)

- Goal: To provide a single infrastructure to collect measurements from an entire OpenStack infrastructure; eliminate need for multiple agents attaching to multiple OpenStack projects
- Primary targets metering and monitoring; provides extensibility

Graduated from Incubation to Integrated status for the Havana release
OpenStack Metering (Ceilometer)

Credit: Doug Hellman
http://stevedore.readthedocs.org/en/latest/essays/pycon2013.html#requirements-for-ceilometer
HOW DO WE GET FROM COMMUNITY OPENSTACK TO RED HAT OPENSTACK?
RED HAT LEADS THROUGH OPEN INNOVATION
OPENSTACK PROGRESSION

- Open source, community-developed (upstream) software
- Founded by Rackspace Hosting and NASA
- Managed by the OpenStack Foundation
- Vibrant group of developers collaborating on open source cloud infrastructure
- Software distributed under the Apache 2.0 license
- No certifications, no support

- Latest OpenStack software, packaged in a managed open source community
- Facilitated by Red Hat
- Aimed at architects and developers who want to create, test, collaborate
- Freely available, not for sale
- Six-month release cadence mirroring community
- No certification, no support
- Installs on Red Hat and derivatives

- Enterprise-hardened OpenStack software
- Delivered with an enterprise life cycle
- Six-month release cadence offset from community releases to allow testing
- Aimed at long-term production deployments
- Certified hardware and software through the Red Hat OpenStack Cloud Infrastructure Partner Network
- Supported by Red Hat

RED HAT ENTERPRISE LINUX OPENSTACK PLATFORM
OPENSTACK RELEASE CADENCE

- Upstream
  - Source code Only
  - Releases every 6 month
  - 2 to 3 'snapshots' including bug fixes
  - No more fixes/snapshots after next release
- RDO
  - Follows upstream cadence
  - Delivers binaries
OPENSTACK RELEASE CADENCE

- Red Hat Enterprise Linux OpenStack Platform
  - 6 Month cadence
  - Roughly 2 months AFTER upstream
    - Time to stabilize, certify, backport etc.
  - Initially 1 year lifecycle
    - e.g., Support for Folsom ends after Havana release
    - Support for Grizzly ends after “I” release
- Will increase lifecycle over time
  - Based on upstream stability and resources
RED HAT ENTERPRISE LINUX OPENSTACK PLATFORM

VALUE

- Enterprise grade OpenStack deployment with ecosystem, lifecycle, support that customers expect from Red Hat
  - Based on RHEL and includes required fixes in both OpenStack and RHEL
  - Enterprise hardened OpenStack code
  - Longer supported lifecycle
    - includes bug fixes, security errata, selected backports
  - Certified ecosystem (Red Hat Certified OpenStack Partner program and Red Hat Enterprise Linux ecosystem)
  - Full support and Certifications for RHEL and Windows workloads
Let’s Follow a Request..

Hey Glance, can I get the RHEL 6.4 image?

Spin me up a VM! And make it LARGE!

Umm, Do I know you? I need to see some papers!!

Keystone

Ok, we need to find a place to build this VM.

Tag - you’re it!

Papers are good. Time to get to work!

Cinder, have that volume ready for me?

Indeed I do. Don’t forget to mount it!

Quantum, I need a network with all the trimmings!

Quantum, I need a network with all the trimmings!

Here’s your IP, default route and FW settings.

Swift

Node

Nova

N o v a

Glance

Node

Node

VM

capacity
capacity
capacity

capacity
Futures
OPENSTACK: WHAT'S NEXT?

Common customer concerns:

- No centralized management or installer
- Limited storage options
  - No fiber channel support, no storage migration, backup, DR, etc
- No (or limited) Live Migration
- No workload management (DRS)
- No High Availability
- No monitoring
- Upgrading
- No reporting
- Limited configuration options
- Performance concerns
Q: WHO WILL BE THE RED HAT OF OPENSTACK?

A: RED HAT WILL
TRADEMARK STATEMENTS

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THANK YOU
Questions