CLOUD INFRASTRUCTURE ARCHITECTURE DESIGN

Dan Radez
OpenStack
Red Hat

Brad Ascar
CloudForms
Red Hat
Agenda

• Red Hat OpenStack Platform
  • Installation
  • OpenStack Architecture
  • Highly Available OpenStack

• Red Hat CloudForms
  • Overview
  • Why a Cloud Management Platform
  • Web Scale Architecture
Red Hat Enterprise Linux OpenStack Platform
RHEL OSP 4.0

Dan Radez
Sr. Software Engineer
OpenStack Installation

• Packstack
  • Unsupported
  • Proof of concept / demo / one-off installations
  • Uses ssh & puppet for configuration

• Staypuft project
  • OpenStack installer foreman plugin
  • Can provide provisioning, dhcp, dns services
  • Uses puppet master & puppet for configuration
  • Recommended for longer term maintained deployments
OpenStack Installation: Packstack
Staypuft

New OpenStack Deployment

Name: redkuster

Description: keep an eye on the 'staypuft' Foreman plugin.

Deployment Layout:
- Distributed with High Availability, Nova Networking
- Distributed, Nova Networking
- Distributed with High Availability, Neutron Networking
- Distributed, Neutron Networking

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Staypuft

New OpenStack Deployment

<table>
<thead>
<tr>
<th>Host Groups &amp; Available Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distributed - Neutron Networking</td>
</tr>
</tbody>
</table>

- **Controller (Neutron)**
  - MySQL
  - Neutron (Controller)
  - Cinder
  - Heat
  - Ceilometer
  - qpid (non-HA)
  - Keystone (non-HA)
  - Glance (non-HA)

- **Neutron Networker**
  - Neutron - L3
  - DHCP
  - OVS

- **LVM Block Storage**
  - Cinder

- **Swift Storage Node**
  - Swift

- **Compuver (Neutron)**
  - Neutron-compute
  - Neutron-ovs-agent
Staypuft

New OpenStack Deployment

Cinder Service Configuration

- Cinder backend gluster: False
- Cinder backend iscsi: False
- Cinder db password: f6bfb60b19f752442b9d3be7803e4a0c
- Cinder cluster servers: 192.168.0.4, 192.168.3.5, 192.168.6.6
- Cinder cluster volume: cinder
- Cinder user password: 6d973e307298410b62e54d85906c

Services
- MySQL
- Neutron (Controller)
- Cinder
- Heat
- Cinder (non-HA)
- Keystone (non-HA)
- glance (non-HA)
- Neutron - L3
- DHCP
Staypuft

testcluster

<table>
<thead>
<tr>
<th>Host Groups</th>
<th>Hosts</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Host Groups" /></td>
<td><img src="image" alt="Hosts" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>MAC Address</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>b8:ca:3e:60:b2:20</td>
<td>b8:ca:3e:60:b2:20</td>
<td>Host::Managed</td>
</tr>
<tr>
<td>b8:ca:3e:60:b1:18</td>
<td>b8:ca:3e:60:b1:18</td>
<td>Host::Managed</td>
</tr>
<tr>
<td>b8:ca:3e:60:b1:20</td>
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</tr>
</tbody>
</table>

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OpenStack Architecture
RHEL OSP 4.0
OpenStack Architecture: Logical

- Control
- Compute
- Network
OpenStack Architecture: Logical

**Control / Network**
- API
- Horizon
- Networking
- Database
- Messaging

**Compute**
- Hypervisor
- Compute Service
- Network Agent
OpenStack Architecture: Logical

**Control**
- API
- Horizon
- Database
- Messaging

**Network**
- Networking

**Compute**
- Hypervisor
- Compute Service
- Network Agent
OpenStack Architecture: Scaled

Control
- API
- Horizon

Network
- Networking

Compute
- Hypervisor
- Compute Service

Messaging
OpenStack Architecture: Scaled

- Keystone
- Nova
- Database
- Glance
- Cinder
- Swift Proxy

- Database
- Messaging
- Horizon
OpenStack Architecture: Scaled

- Database
- Keystone
- Glance
- Nova
- Swift Proxy
- Cinder
- Messaging
- Horizon
- Nova
- Cinder
OpenStack Architecture: Scaled

- Database
- Keystone
- Glance
- Swift Proxy

- Messaging
- Horizon
- Nova
- Cinder
- Network

Swift
OpenStack Architecture: Scaled

- Database
- Keystone
- Glance
- Swift Proxy
- Swift
- Messaging
- Horizon
- Nova
- Cinder
- Network
- Compute
OpenStack High Availability and Load Balancing
RHEL OSP 4.0
OpenStack Architecture: HA / LB

Pacemaker

- HAProxy
- Database
- Messaging
- Virtual IPs
- Shared DB Storage
- Memcache

HAProxy

- API Services
OpenStack Architecture: HA / LB

- HAProxy
- Database
- Messaging
- Floating IP
- Shared DB Storage
- Memcache
OpenStack Architecture: HA / LB

- **Pacemaker**
  - HAProxy
  - Floating IP1
  - Memcache
  - Floating IP4

- **Pacemaker**
  - Database
  - Floating IP2
  - DB Storage

- **Pacemaker**
  - Messaging
  - Floating IP3

- **Keystone**
- **Glance**
- **Horizon**
- **Cinder**
- **Nova**
- **Swift Proxy**
Red Hat CloudForms

Brad Ascar
Field Product Manager
Cloud Management Platform
What capabilities should be sought?

CMP Capabilities
- Self-Service Automated Provisioning
- Service Catalog
- Chargeback
- Capacity Management
- Performance Management
- Configuration & Change Management
- Life-cycle Management
- Orchestration
- External Cloud Connection

http://www.gartner.com/it-glossary/cloud-management-platforms
Delivers an Open Cloud Management Platform that Supports Heterogeneous Private, Public and Hybrid Clouds

Enables Evolution from Proprietary Infrastructures to Open, Hybrid Clouds

Enables IT to Deliver IAAS and Broker Cloud Services, Optimize Resources and Reduce Costs

Manages Service Deployment across Hybrid Clouds Using Policies, SLAs and Cost

Provides Rich Integration into Existing Enterprise Management Systems and Processes

Eliminates Proprietary Cloud Management Tool Vendor Lock-In
CLOUDFORMS
Built for Cloud Scale Operations Management

AGENT-FREE, VIRTUAL APPLIANCE ARCHITECTURE
- Rapid deployment, non-invasive (Industry Standard OVF)

WEB-BASED OPERATIONS, ADMIN AND SELF-SERVICE
- Access anywhere from any browser

ENTERPRISE DIRECTORY SUPPORT
- Leverage directory for authentication and role

SUPPORTS MULTI-TENANCY
- Securely share infrastructure

HORIZONTALLY SCALABLE
- Highly scalable, load balancing

LOAD BALANCING, FAILOVER/BACK
- Provides reliability, high availability

MANAGEMENT ACROSS MULTIPLE LOCATIONS
- Single pane of glass, unified management

MANAGEMENT ACROSS VIRTUAL PLATFORMS & PUBLIC CLOUDS
- Single pane of glass, unified management
CLOUDFORMS
Built for Virtualization and Cloud Management
IT CLOUD MANAGEMENT
Seamless Self-Service

- Role-based Delegation
- Self-Service Portals
- Service Catalogs
- Automated Provisioning
- Quotas & Chargeback
SELF-SERVICE AUTOMATED PROVISIONING
Deployment of Self-Service Resources

- Requests
  - Role-Based Access Controls
  - Quota Enforcement
  - CLOUDFORMS
  - Approval Workflow

- Service Delivery
- Chargeback

- "Intelligent" Workload Placement
- Converged Infrastructure
- OpenStack
- VMware
- Amazon Web Services

Management

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CLOUD BROKERING
Controlling Where Requests Get Met

- Where do I have available capacity?
- What policies affect placement?
- Which options offer least cost?
IT CLOUD MANAGEMENT

Executive Management

- Financial Management
- Governance & Compliance
- Forecasting & Planning
- Health, Availability

Cloud Forms

Platforms:
- OpenStack
- Amazon Web Services
- VMware
- Red Hat
- Microsoft
AUTOMATING IT PROCESS
Protect Environment – Stop VM if it Breaks Policy

Sample Rule: Every Windows VM must have McAfee v2.0 installed

• Users only see conforming VMs/Workloads
• Non-conforming VMs preventing from running
• Policy breach notifications sent automatically
• Tagging certain items allows one to apply policies to only tagged items
Red Hat CloudForms
Cloud Enablement Integrated with Infrastructure Management

Cloud Enablement
- Approval Workflow
- Compliance
- Self Service
- Chargeback
- Quota Enforcement

Automation
- Policies
- Tagging

Cloud Bursting

Infrastructure Management
- Resource Mgmt
- Capacity Planning
- Optimize
- Config Mgmt
- Root Cause Analysis

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Red Hat CloudForms

PROVIDE OUR CUSTOMERS WITH BETTER VALUE WITH MORE FLEXIBILITY . . .

Benefits
* Fastest Time to Cloud
* Low Acquisition Cost
* Tool Reduction

* Low Implementation Costs
* Continuous Optimization
* Increased Automation
* Open / Flexible
Get Started With Private Cloud Today

**PLATFORM-AS-A-SERVICE**
- Agile
- Framework and Language Choice
- Developer Productivity

OpenShift Enterprise by Red Hat

**CLOUD MANAGEMENT**
- Self-Service
- Orchestration
- Interoperability

**INFRASTRUCTURE-AS-A-SERVICE**
- Massive Scalability
- On Demand
- Increased Efficiency

Red Hat Enterprise Linux OpenStack Platform
Red Hat Cloud Infrastructure

**VIRTUALIZATION**
- Secure
- Cost Effective
- High Performance

Red Hat Enterprise Virtualization
Red Hat CloudForms
Complete Solution for Your Cloud Journey
IT CLOUD MANAGEMENT
Integration

Enterprise Service Catalogs
Management & Reporting
Event Consoles
CMDB
ITPA/RBA

openstack
amazon web services
vmware
redhat
Microsoft
WASTE DETECTION
Optimize the Environment

Over-Allocated
CPU by 16 GHz
Memory by 18 GB
Storage by 213 GB

- VM sprawl
- Incorrectly configured workload
- Over-allocated resource pools

Storage Consumption
Understand resource consumption today and trending over time:
Storage – 78% Used 22% Free
CHARGEBACK/SHOWBACK

Tagging Provides Flexibility

4 Dimensions to Cost:
- Whole Unit
- Allocated
- Actual Usage
- Tagged

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Memory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Network</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Diagram:**
- Whole Unit
- Allocated
- Actual Usage
- Tagged

**Table:**

| VM Name        | Total Cost | Owner | CPU Allocated | CPU Allocated | CPU Cost | CPU Used | Disk I/O Used Cost | Disk I/O Used Cost | Fixed Comp Cost 1 | Fixed Comp Cost 2 | Fixed Total Cost | Memory Allocated | Memory Allocated | Memory Allocated | Memory Allocated | Memory Allocated | Memory Allocated | Memory Allocated |
|----------------|------------|-------|---------------|---------------|----------|-----------|-------------------|-------------------|------------------|------------------|-----------------|----------------|-----------------|-----------------|----------------|-----------------|----------------|
| 2013/12/12 AEECUW50B002 | $112,782.88 | 112,782.88 | 112,782.88 | 112,782.88 | $14.40 | 4512 GB | $88.06 | 7.0 GB |
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**Note:**
- Percentages may vary based on specific usage metrics.
CloudForms Integrations

**Virtualization Platforms:**
- VMware vSphere/ESX
- RedHat Enterprise Virtualization (RHEV & RHEVM)
- Microsoft HyperV/SCVMM (in process)

**Bare Metal:**
- RHEL
- VMware ESX

**IPAM:**
- Bluecat, Infoblox, DHCP, DNS

**Directories:**
- Active Directory, IBM Blue Pages
- Any LDAP Directory

**Operations Management:**
- Microsoft System Center Operations Manager
- CA Spectrum
- HP Operations Manager
- Any Web Services or SNMP enabled system

**CMDB:**
- ServiceNow, BMC Remedy
- Any Web Services enabled system

**Incident and Change Management:**
- ServiceNow, BMC Remedy
- Any Web Services enabled system

**Enterprise Service Catalogs:**
- ServiceNow, BMC Remedy
- Any Web Services enabled system

**Public Cloud Providers:**
- Amazon AWS
- Openstack

**Compute:**
- vBlock (TBD)
- UCS (TBD)

**Storage:**
- NetApp

**Network:**
- Cisco Nexus (TBD)

**Miscellaneous:**
- F5 Load Balancers

**Configuration Management:**
- Puppet (in process)
- Chef (TBD)
- IPMI – hardware discovery, server provisioning and configuration

In Process = planning and work underway for this calendar year
TBD = being investigated as a potential roadmap item
CloudForms
Getting More Information

- Flex workloads across private, public, & hybrid clouds with Red Hat CloudForms
  John Hardy & Ronak Mallik – Red Hat
  Wednesday 3:40-4:40pm

- Speeding up infrastructure provisioning with Red Hat CloudForms
  Jason Dillaman, Nick Lans & Sean Lee – Red Hat
  Thursday 11:00-12:00pm

- Getting started with Red Hat CloudForms and it’s service catalog
  Brad Ascar & John Hardy – Red Hat
  Thursday 9:00-11:00am

- Petal to the metal: Red Hat CloudForms for workload & infrastructure management
  Alex Barreto, Jason Dillaman & Bill Helgeson – Red Hat
  Thursday 9:45-10:45am

- www.redhat.com/products/cloud-computing/cloudforms/
  - White Papers & other collaterals
  - On-Demand Webinars
  - Success Stories
  - Cloud Self-Assessment Tool
  - Videos
  - Blogs & Social Media

Join us at pod #12 in the Red Hat booth to discuss your specific cloud management goals and see a demonstration of capabilities most desired