

# Real World CI with Red Hat Cloud Suite

Sim Zacks - Principal Quality Engineer  
Oded Ramraz - Manager QE Ops TLV  
29.6.2016

## Who we are

- DevOps Engineers - experts in software engineering and sys admin
- QE Ops - we build customer-like environments for testing products
- Central CI - we manage all the CI requirements for the testing env

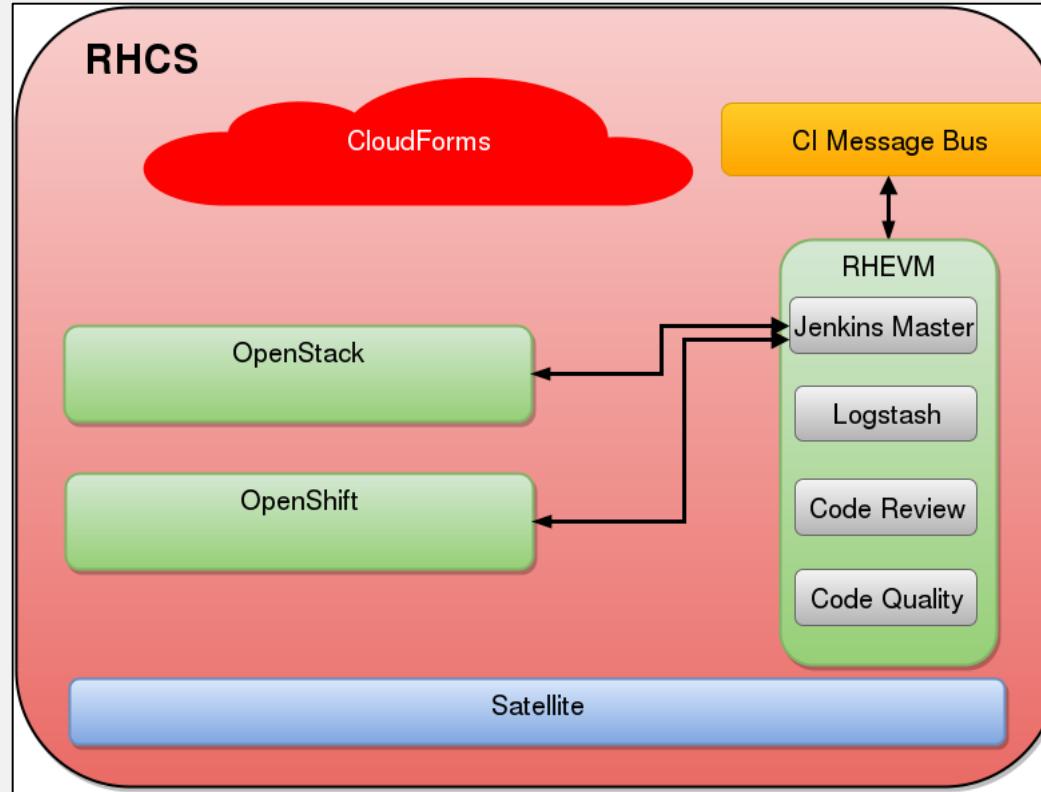


Sim Zacks  
Principal Quality Engineer

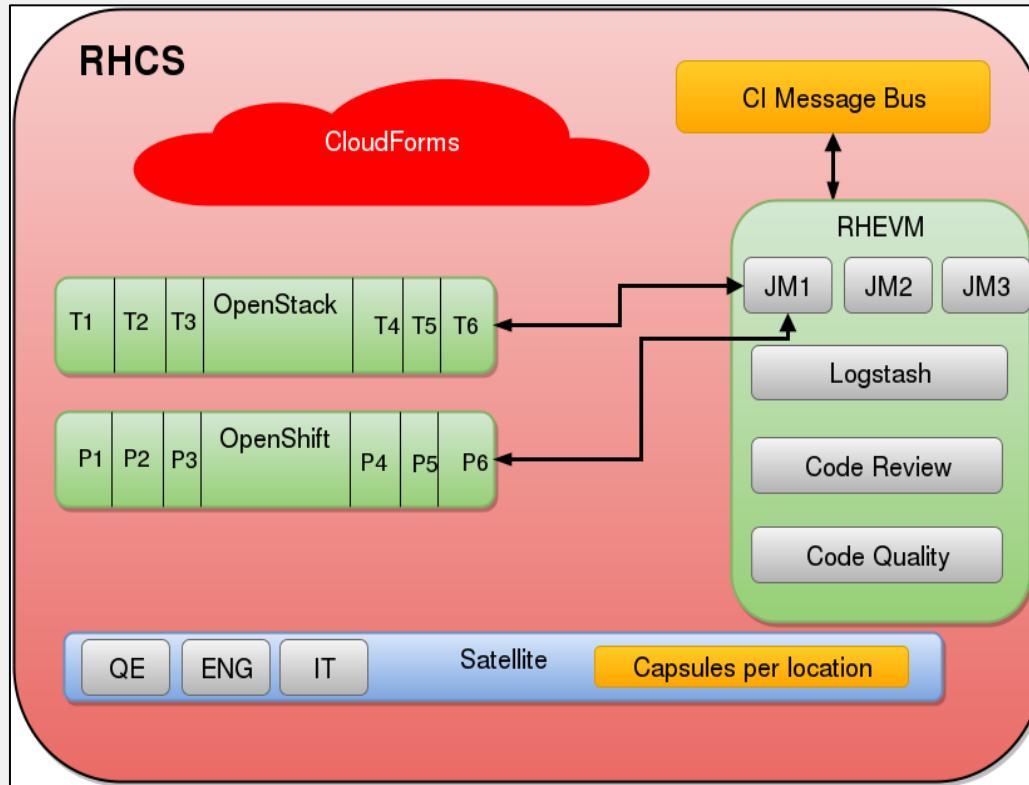


Oded Ramraz  
Manager QE Ops

# Introduction - Central CI Environment



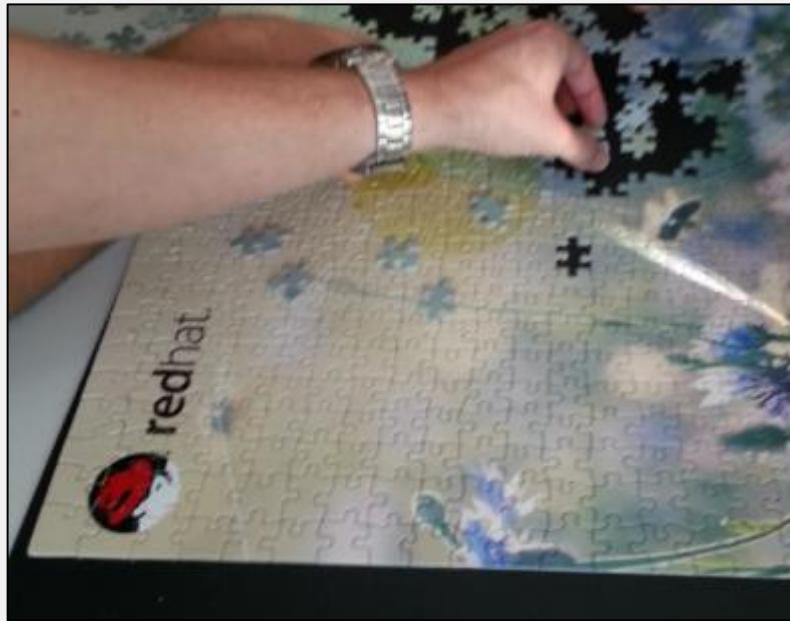
# Enterprise solution for multiple teams



# RHCS Components - Harmonious Conjunction

Robust, Stable, Flexible

VM? Instance? Container?



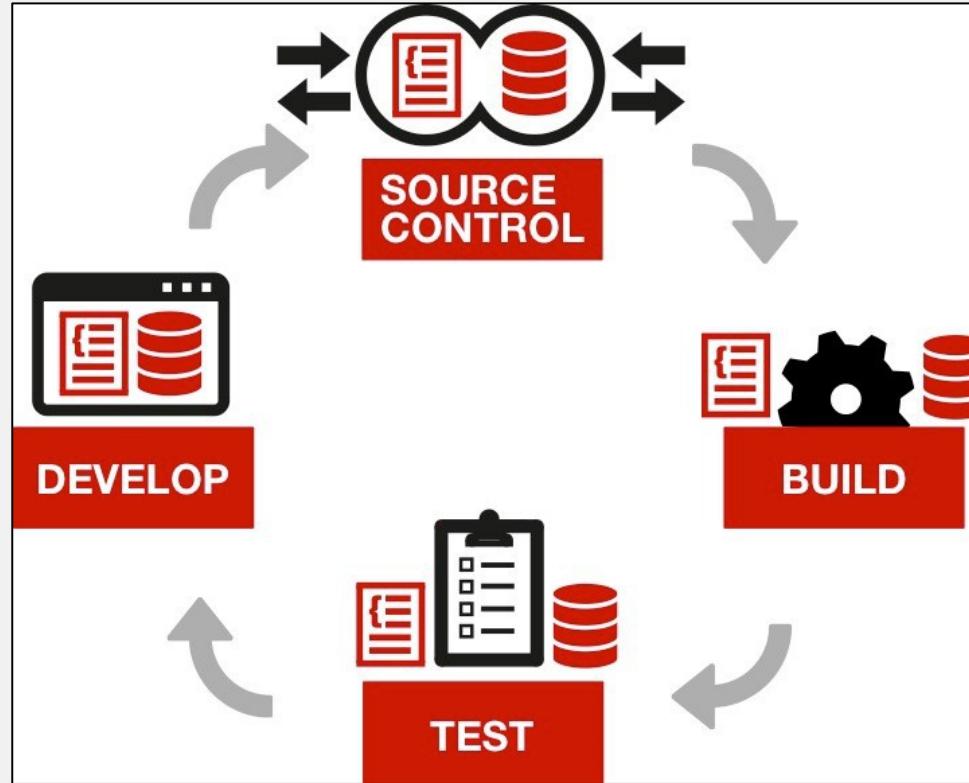
Jenkins, Logstash, Sonar, Gerrit  
Build your own CI Workflow!!

# Agenda

- The What and How of CI
- RHCS Components Role
  - Added value of each component
  - Satellite Configuration Management
  - RHEV VM vs OpenStack Instance vs OpenShift Container
  - Integration with Jenkins, Gerrit, Logstash, ...
  - High level management and reporting with CloudForms
- Summary

# What is CI?

- Multi-user
- Continuous
- Integrated
- Automated



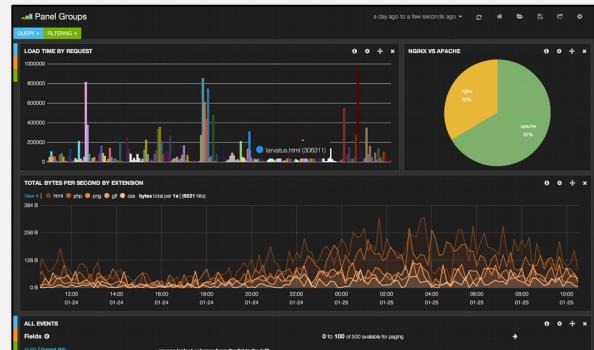
# Why do we need CI?



Prevent broken builds



Early detection of bugs

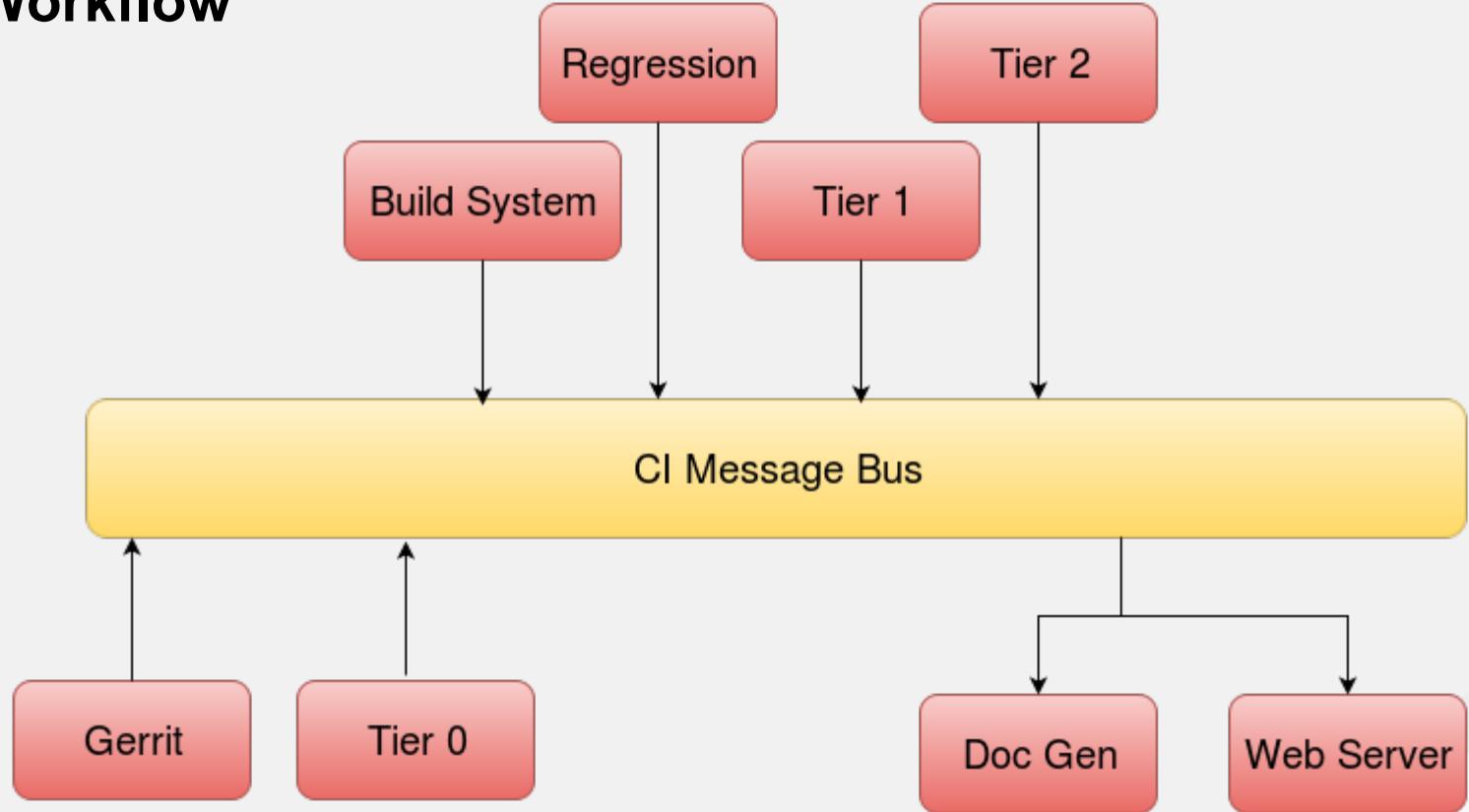


Continuous quality monitoring

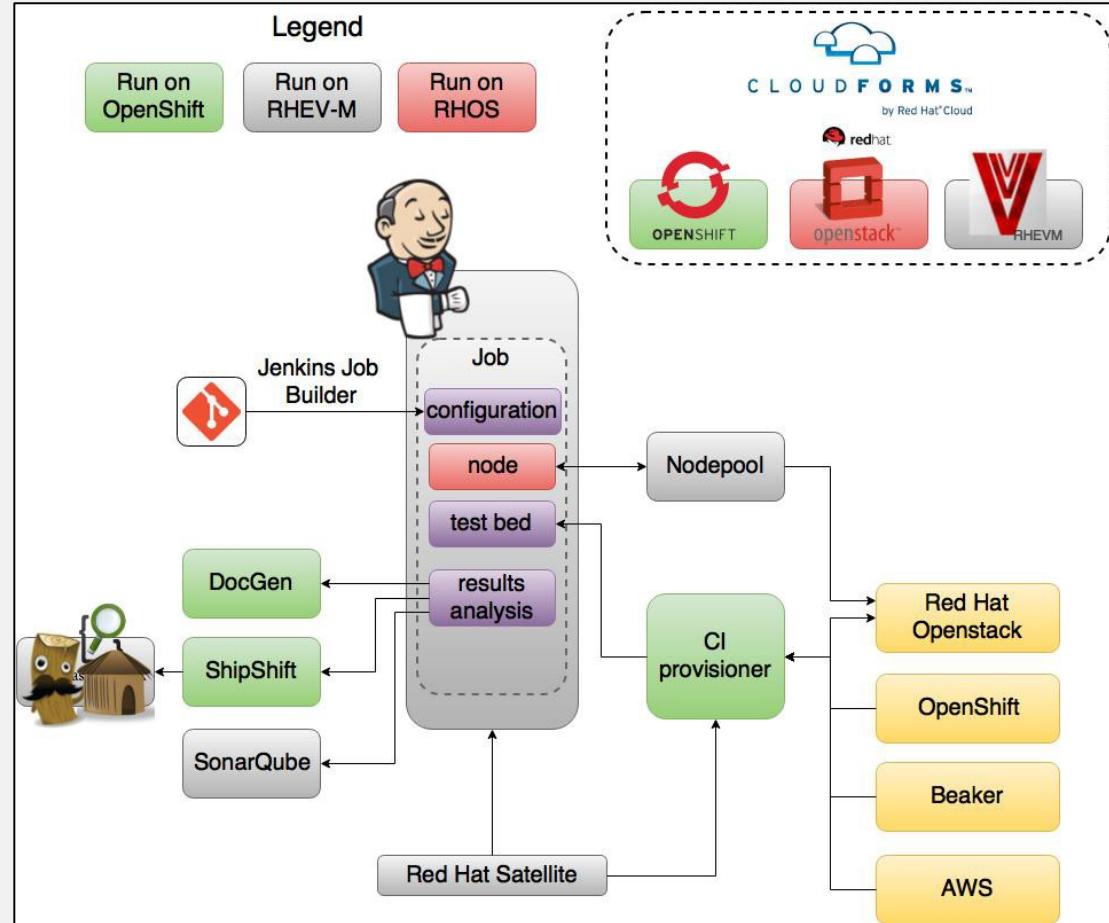


Increase SW  
development process

# CI Workflow



# CI Infrastructure



# CI Goals

- Continuous quality analysis
- Automatic provisioning
- Configuration management
- Centralized reporting



# Continuous Quality Analysis

Overview Components Issues Settings More

### SOALE Sunburst

Depth: 3

The chart is a sunburst diagram with three concentric rings. The innermost ring represents 'Reliability' with segments for 'Architecture', 'Logic', and 'Data'. The middle ring represents 'Complexity' with segments for 'Method signatures', 'Branches', and 'Expressions'. The outermost ring represents 'Maintainability' with segments for 'Unused Methods', 'Method names', 'Fields', 'Constructors', 'Locality', and 'Comments'. Each segment is color-coded and contains a small icon representing a specific quality metric.

### Size: Lines of code Color: Coverage

A treemap visualization showing the distribution of code coverage across various source code modules. The modules are represented as rectangles of different sizes and colors, where size corresponds to the number of lines of code and color corresponds to the coverage percentage. The modules include 'sources/backend/manager/modules...', 'sources/frontend/webadmin/modules...', and 'sources/backend/manager/modules/...'.

### DOCUMENTATION

12.9%

Public API: 33,657 | Pub. Undoc. API: 29,304

### Comments

7.0%

Comment Lines: 41,321

### STATISTICS

Date	Value
Jan 20 2016	36.2
Jan 24 2016	102,601
Complexity	96,977
Coverage	48.2%
Success Rate (%)	48.9%

### Overall Coverage

48.9%

### Line Coverage Condition Coverage

Line Coverage: 53.3% | Condition Coverage: 38.8%

### PROJECTS

The widget can not be rendered because some components have no measure for the selected metric(s).

Metric	Value
Lines Of Code	550,542
Files	6,963
Functions	51,120
Java	
Directories	552
Lines	733,314
Classes	9,188
Statements	197,239
Accessors	9,657

### Unit Tests Coverage

48.9%

### Line Coverage Condition Coverage

Line Coverage: 53.3% | Condition Coverage: 38.8%

### Complexity

102,601

/Function: 2.0 | /Class: 11.2 | /File: 14.7

A histogram showing the distribution of complexity across functions and files. The x-axis represents the complexity value (1, 2, 4, 6, 8, 10, 12) and the y-axis represents the count (0 to 30,000). The distribution is heavily skewed, with the highest frequency at complexity value 1.

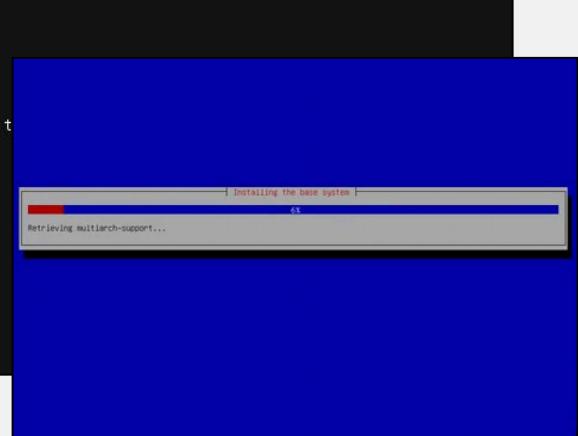
# Automatic Provisioning

- Reduces provision time and human errors
- Reduces non test related errors
- Allows investing more time on development

```
# Example comment: foreman.example.com

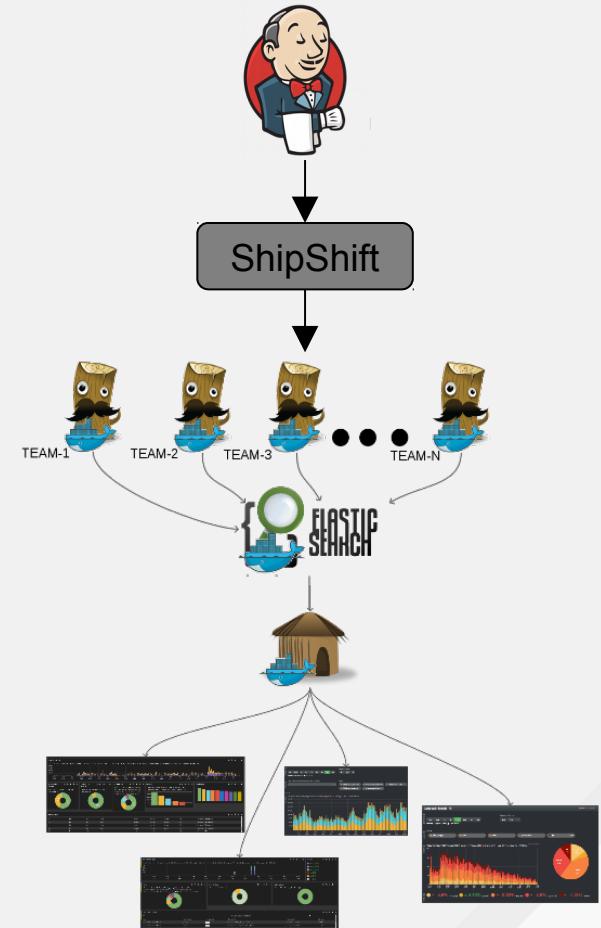
# Locale
d-i debian-installer/locale string en_US
# country and keyboard settings are automatic. Keep t
# ... for wheezy and newer:
d-i keyboard-configuration/xkb-keymap seen true
# ... for squeeze and older:
d-i console-keymaps-at/keymap seen true

# Network configuration
d-i netcfg/choose_interface select auto
d-i netcfg/get_hostname string foreman.example.com
d-i netcfg/get_domain string example.com
d-i netcfg/wireless_wep string
```

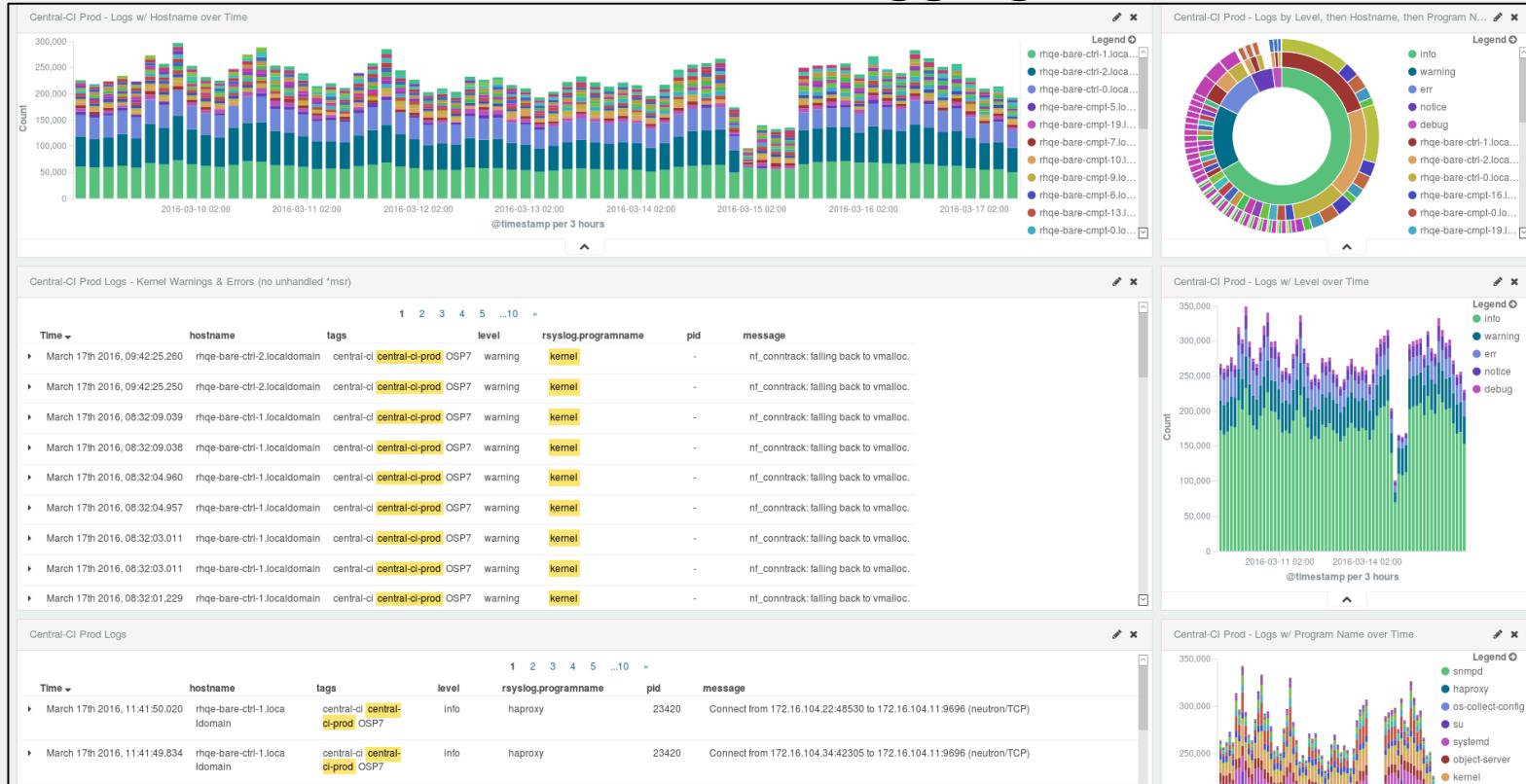


# Centralized Logging

- Detection of anomalous activity
- Simplify log analysis and correlation tasks
- Display trends, graphs and data tables
- Fast deployment
- Jenkins integration
- Containerized
- Scalable



# Centralized Logging



## How we do it - RHCS Components

# RHEVM



The screenshot shows the RHEVM interface with a list of virtual machines (VMs) and their resource usage. The table includes columns for Name, Comment, Host, IP Address, FQDN, Cluster, Data Center, Memory, CPU, Network, Graphics, Status, and Uptime. The Data Center column shows RHEV-CI for all VMs. The Memory, CPU, and Network columns include progress bars indicating usage. The Status column shows 'Up' for most VMs except for 'afedoret-jenkins...' and 'bigdataci-jenkins...', which are 'Down'. The Uptime column shows the time since the VM was last active.

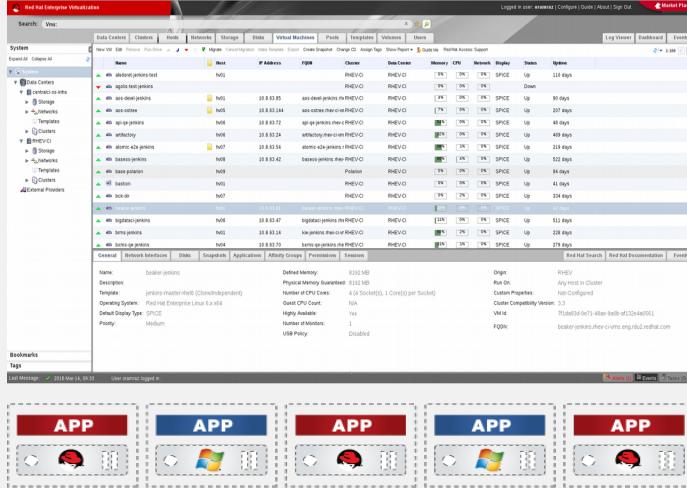
System													
<a href="#">New VM</a> <a href="#">Import</a> <a href="#">Edit</a> <a href="#">Remove</a> <a href="#">Clone VM</a> <a href="#">Run Once</a> <a href="#">Migrate</a> <a href="#">Cancel Migration</a> <a href="#">Cancel Conversion</a> <a href="#">Make Template</a> <a href="#">Export</a> <a href="#">Create Snapshot</a> <a href="#">Change CD</a> <a href="#">Assign Tags</a> <a href="#">Guide Me</a> <a href="#">Show Report</a>													
<a href="#">Expand All</a> <a href="#">Collapse All</a>													
	Name	Comment	Host	IP Address	FQDN	Cluster	Data Center	Memory	CPU	Network	Graphics	Status	Uptime
System	afedoret-jenkins...					RHEV-CI	RHEV-CI	0%	0%	0%	None	Down	
Data Centers	aos-devel-jenkins	clone fro...	hv03	10.8.63.85	aos-devel-jenkin...	RHEV-CI	RHEV-CI	4%	0%	0%	SPICE	Up	146 days
centralci-os-infra	aos-ostree	Owned b...	hv08	10.8.63.144	aos-ostree.rhev...	RHEV-CI	RHEV-CI	11%	0%	0%	SPICE	Up	263 days
Storage	api-qe-jenkins		hv08	10.8.63.72	api-qe-jenkins.rh...	RHEV-CI	RHEV-CI	41%	0%	0%	SPICE	Up	104 days
Networks	artifactory		hv08	10.8.63.24	artifactory.rhev-ci...	RHEV-CI	RHEV-CI	32%	0%	0%	SPICE	Up	525 days
Templates	atomic-e2e-jenkins	Owned b...	hv07	10.8.63.54	atomic-e2e-jenki...	RHEV-CI	RHEV-CI	9%	1%	0%	SPICE	Up	275 days
Clusters	baseos-jenkins		hv05	10.8.63.42	baseos-jenkins.r...	RHEV-CI	RHEV-CI	65%	2%	0%	SPICE	Up	578 days
RHEV-CI	base-polarion		hv09			Polarion	RHEV-CI	0%	0%	0%	SPICE	Up	150 days
Storage	bastion		hv01			RHEV-CI	RHEV-CI	0%	0%	0%	SPICE	Up	37 days
Networks	bck-dir		hv07			RHEV-CI	RHEV-CI	0%	2%	0%	SPICE	Up	390 days
Templates	beaker-jenkins		hv05	10.8.63.81	beaker-jenkins.r...	RHEV-CI	RHEV-CI	32%	0%	0%	SPICE	Up	98 days
External Providers	bigdataci-jenkins	395540 ...				RHEV-CI	RHEV-CI	0%	0%	0%	None	Down	
Errata	brms-jenkins		hv07	10.8.63.14	kie-jenkins.rhev...	RHEV-CI	RHEV-CI	42%	1%	0%	SPICE	Up	284 days
Guest Information	bxms-qe-jenkins		hv04	10.8.63.70	bxms-qe-jenkins...	RHEV-CI	RHEV-CI	55%	0%	0%	SPICE	Up	335 days
	capsule		hv07	10.8.63.174	capsule.rhev-ci-v...	RHEV-CI	RHEV-CI	22%	3%	0%	SPICE	Up	9 days

- Centralized virtual infrastructure management (e.g hosts, VMs, networking, storage, templates)
- Providing mechanism for VMs high availability
- Delivering leading performance and scalability for virtual machines on a stable and secure platform
- Running crucial CI services such as Jenkins, ELK, CFME, etc

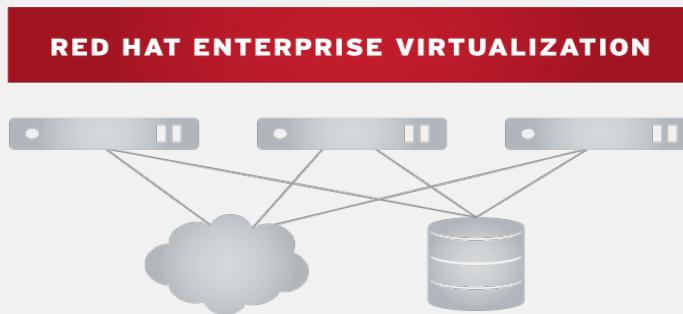
# RHEVM - Permanent services (Jenkins, Satellite, Gerrit, ELK stack, SonarQube, ...)



# RHEVM - Static platform/properties

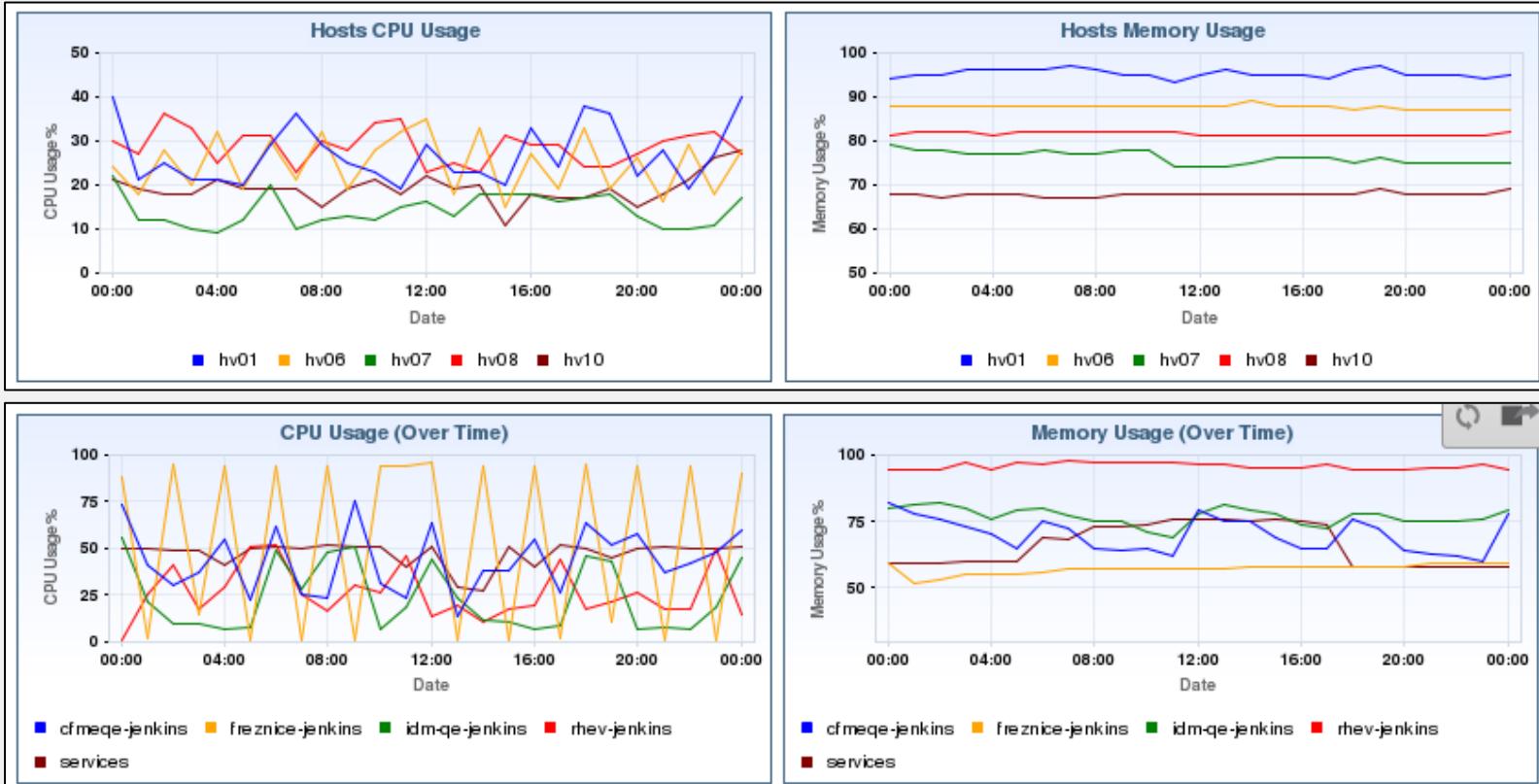


The screenshot shows the RHEV-M interface. On the left, a sidebar lists clusters, storage, templates, and hosts. The main area displays a table of virtual machines with columns for Name, IP Address, FQDN, Owner, Data Center, Memory, CPU, Network, Display, Status, and Options. A specific VM named 'beaker-jenkins' is selected. The bottom of the interface features a dashboard with five application icons labeled 'APP'.



- High availability
- Live migration
- Storage live migration
- Live snapshots
- Load balancing
- Power saving
- Hot plug disk and network
- Storage on local disk, FC, iSCSI, NFS, Red Hat Storage Server, IBM GPFS, Posix or Direct LUN
- Self service portal with quotas

# RHEVM - Reporting



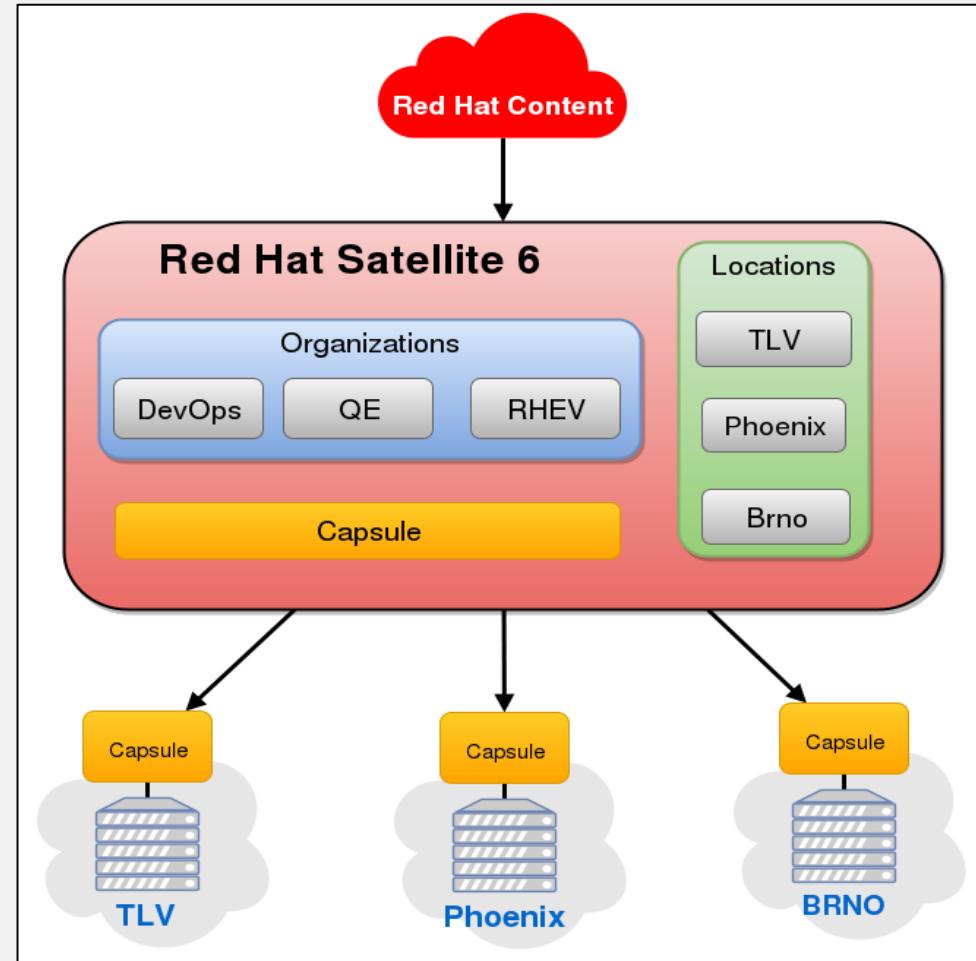
# Satellite

## RED HAT SATELLITE 6

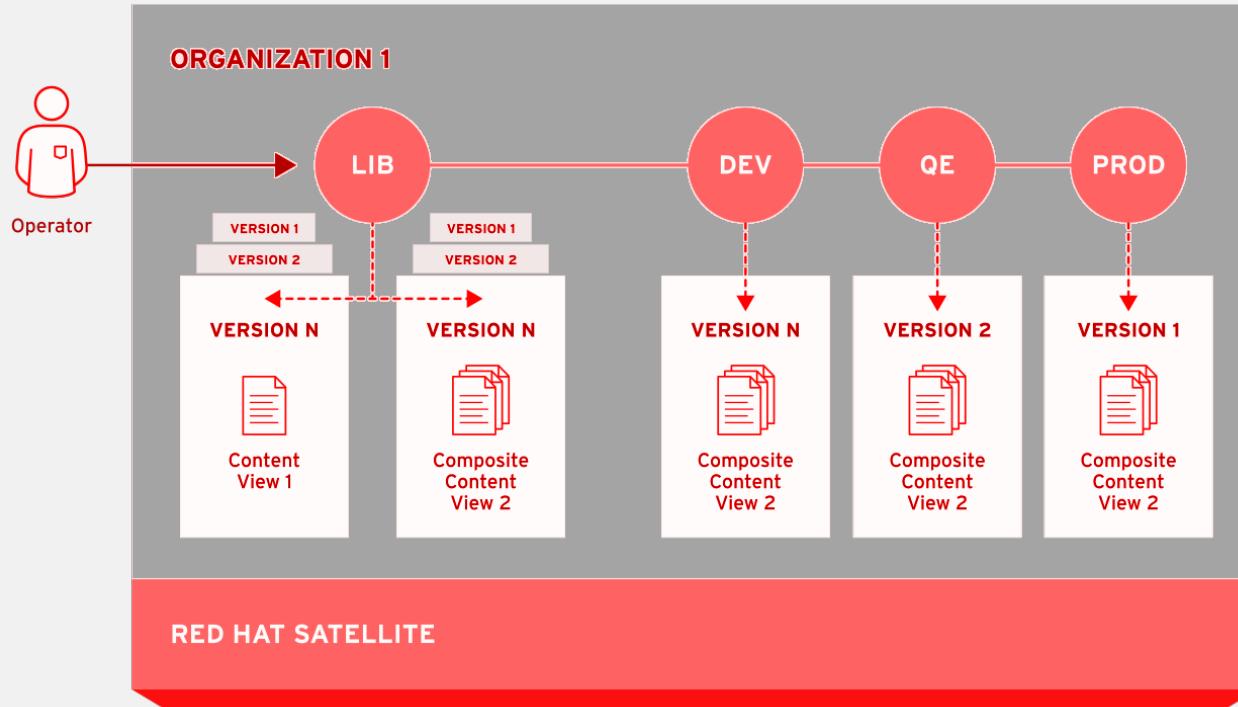


- New modern design, cutting-edge open source software
- Designed for software life cycle (SLC) management
- Bare metal, virtual machine (VM), and cloud deployment

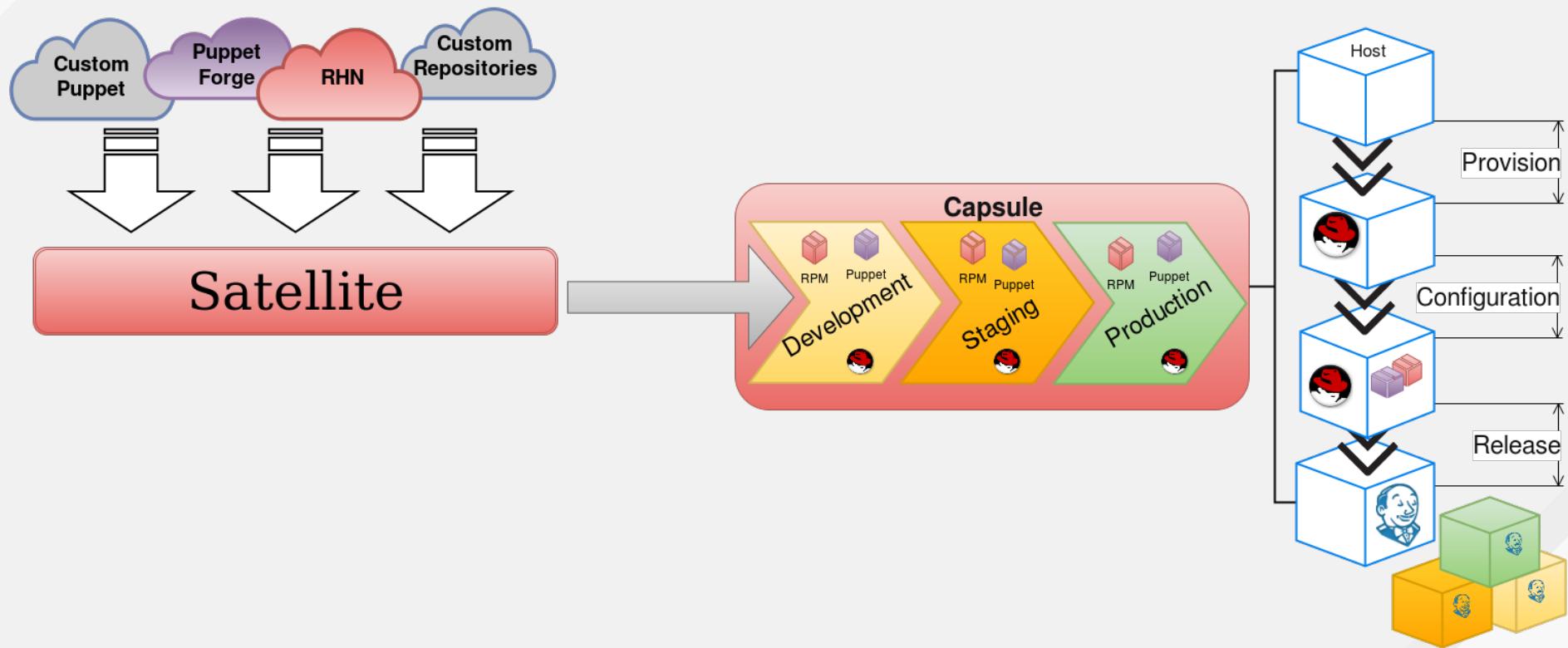
# Satellite 6 Architecture



# Satellite - Application Lifecycle Management



# Satellite - Provisioning



# Jenkins

- Pluginable
- Supports various source control management tools
- Supports various script languages and common tools
- Allows triggered builds

The screenshot displays the Jenkins web interface. On the left, a 'Build' configuration is shown with a 'Source Code Management' tab selected. It shows a repository URL of <https://github.com/jenkinsci/jenkins> and a 'Git' credential. On the right, a 'Build History' dashboard is visible, showing three recent builds (#34, #33, #32) with their execution times and status (failed).

**Build Configuration (Left):**

- Source Code Management:** Git, Repository URL: <https://github.com/jenkinsci/jenkins>, Credentials: - none -
- Build:** Execute shell, Command:

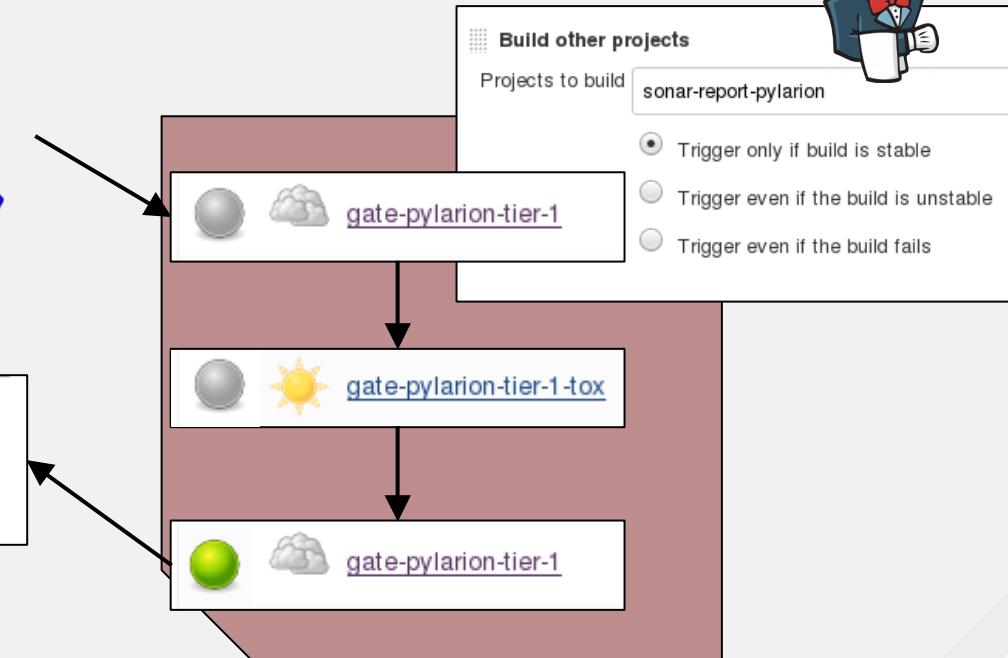
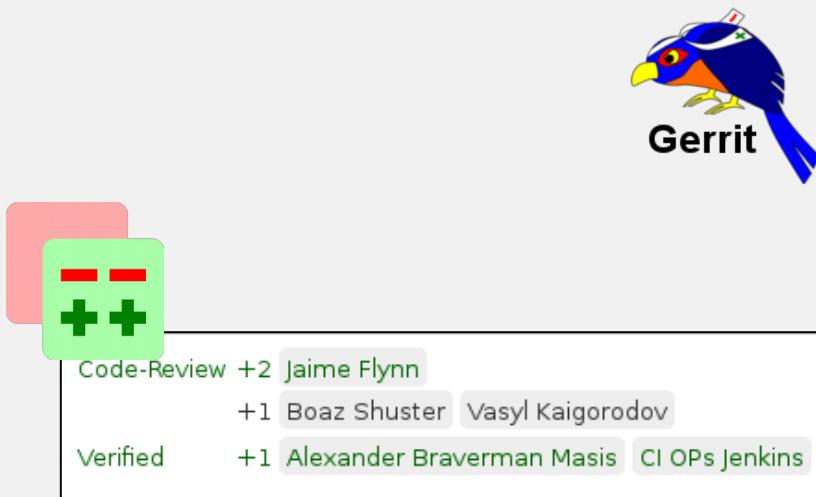
```
# Prepare the zone files
mkdir -p "$WORKSPACE"/chroot/zones
authdns-gen-zones "$WORKSPACE"/templates "$WORKSPACE"/chroot/zones

# lint them
gdnsd -d "$WORKSPACE"
```

**Build History (Right):**

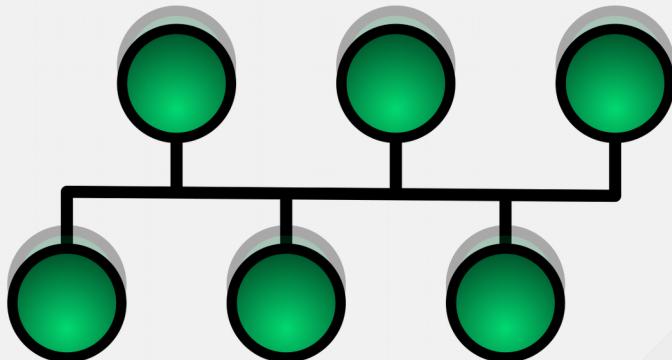
Build #	Date	Commits	Duration	Status
#34	Mar 03 18:56	81 commits	19s	1min 34s failed
#33	Dec 22 13:00	3 commits	17s	1min 54s failed
#32	Dec 22 12:33	20 commits	15s	1min 35s

# Jenkins - Workflow - Triggers



# Jenkins - Workflow - CI Message Bus

- Expands trigger capabilities
- Allows passing additional information for smart triggering
- Allows customizing Jenkins triggers



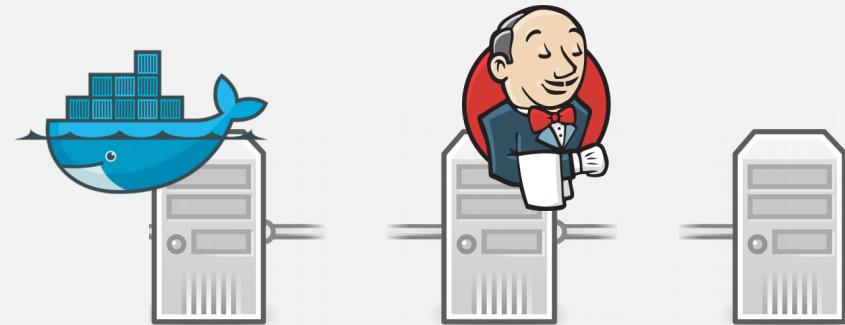
# Jenkins - Workflow - Plugins

- Jenkins functionality extended via plugins
- For example, CI message bus is a Jenkins plugin
- New plugins could be added according to requirements



# Jenkins - Workflow - Jenkins nodes (slaves)

- Jenkins nodes are used for Jenkins builds
- VM, bare metal and containers could be used as Jenkins nodes
- Jenkins nodes connected to Jenkins master
- Accessible by Jenkins plugins and Jenkins master



# Jenkins - Workflow - Tools

- Jenkins Job Builder:

- Allows us to maintain Jenkins Jobs in YAML format
- Fast deployment of jobs

- Nodepool:

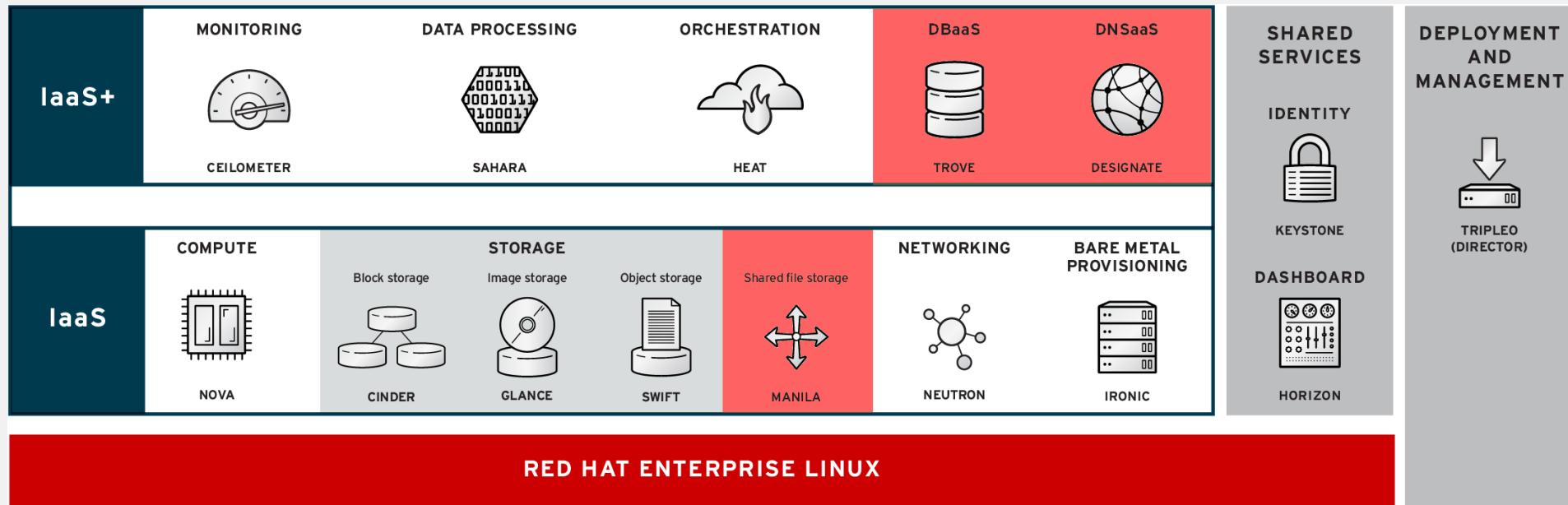
- Key part of Openstack CI infra.
- Allows Jenkins nodes lifecycle management

- CI provisioner:

- Test bed provision/teardown
- Allows provision of complex topologies that contain bare metal, vm from various providers, containers

# Cloud Implementation Openstack/OpenShift

# OpenStack



Technology Preview

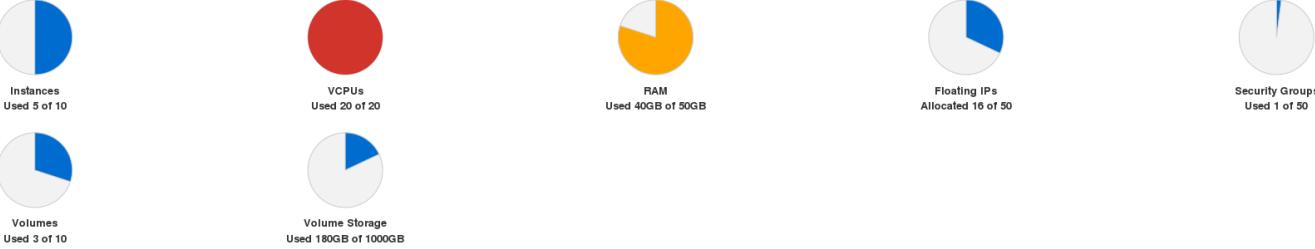
#redhat #rhsummit



# OpenStack - Tenant per team

Overview Instances Volumes Images Access & Security

### Limit Summary



Resource	Used	Allocated
Instances	5	10
VCPUs	20	20
RAM	40GB	50GB
Floating IPs	16	50
Volumes	3	10
Volume Storage	180GB	1000GB

### Usage Summary

Select a period of time to query its usage:

From:  To:   The date should be in YYYY-mm-dd format.

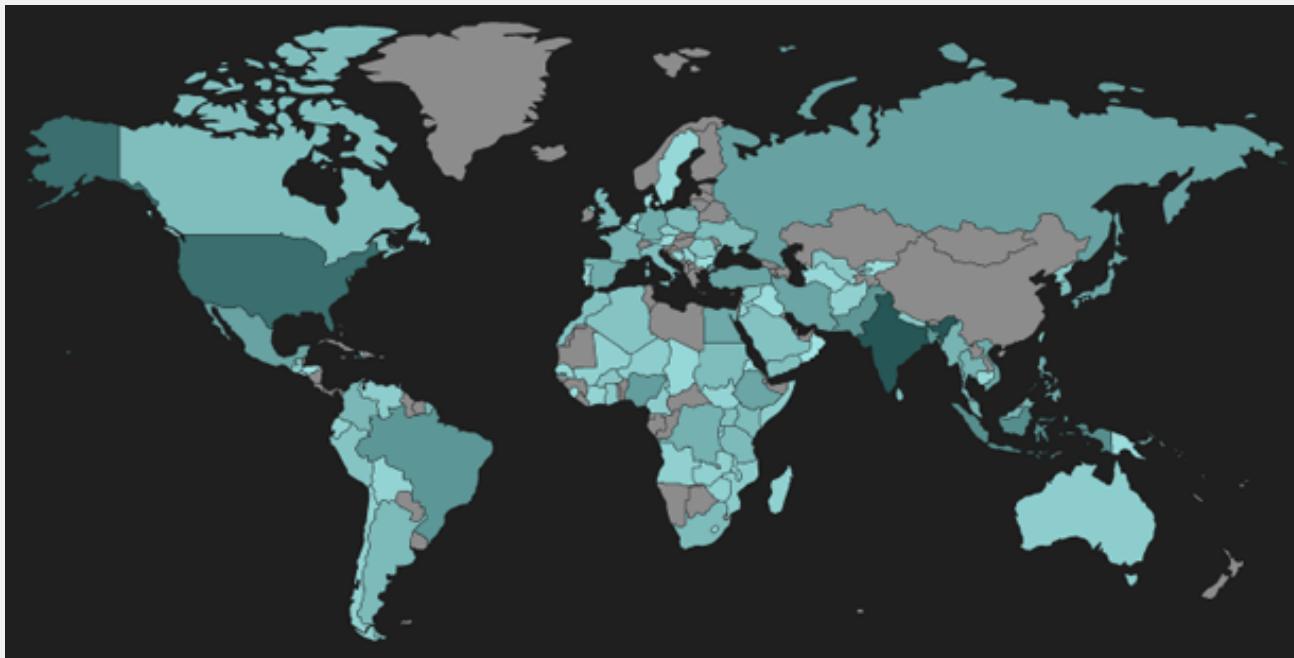
Active Instances: 5 Active RAM: 40GB This Period's VCPU-Hours: 4021.56 This Period's GB-Hours: 100539.03 This Period's RAM-Hours: 8236156.99

Usage

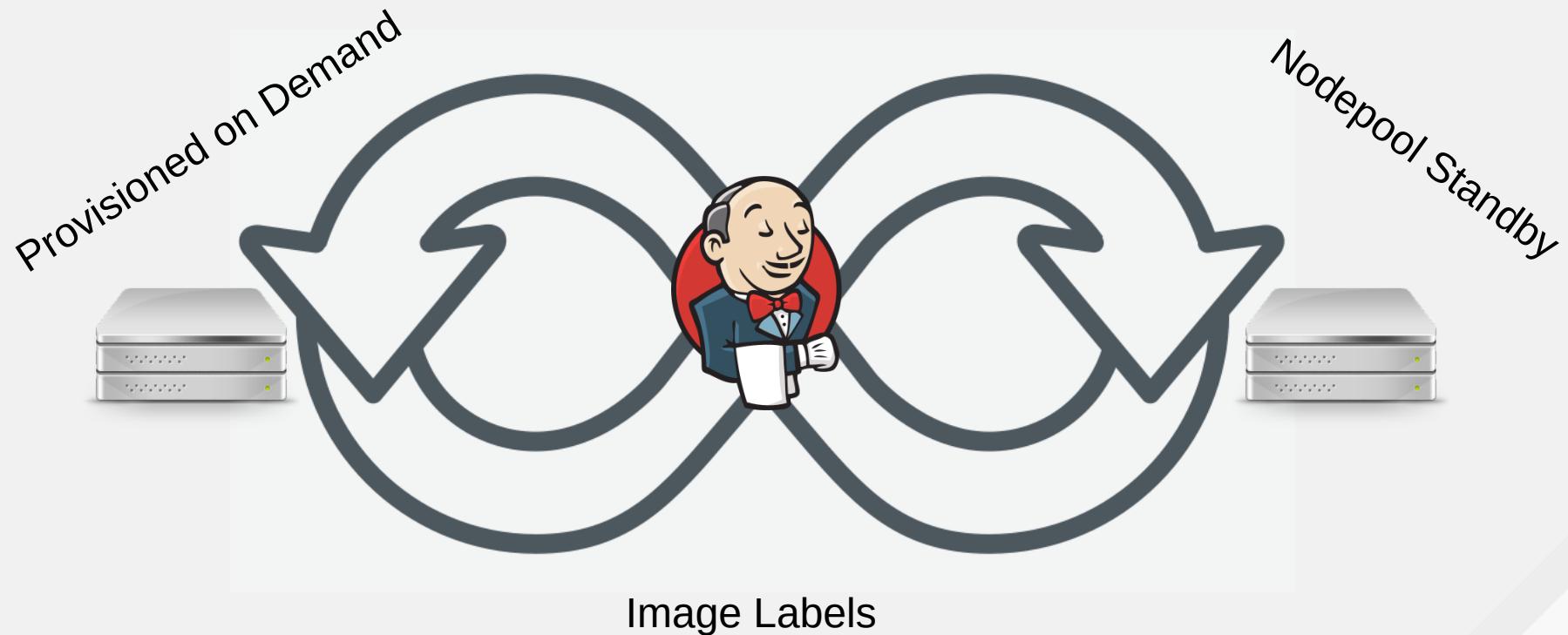
Instance Name	VCPUs	Disk	RAM	Time since created
Windows2012	4	100GB	8GB	1 month, 1 week
Win12R2PostSP	4	100GB	8GB	6 days, 11 hours
Win12R2PostCygSSH	4	100GB	8GB	6 days, 11 hours
Win12R2-test2	4	100GB	8GB	6 days, 9 hours
Mike-Deploy-test	4	100GB	8GB	2 days, 2 hours

Displaying 5 items

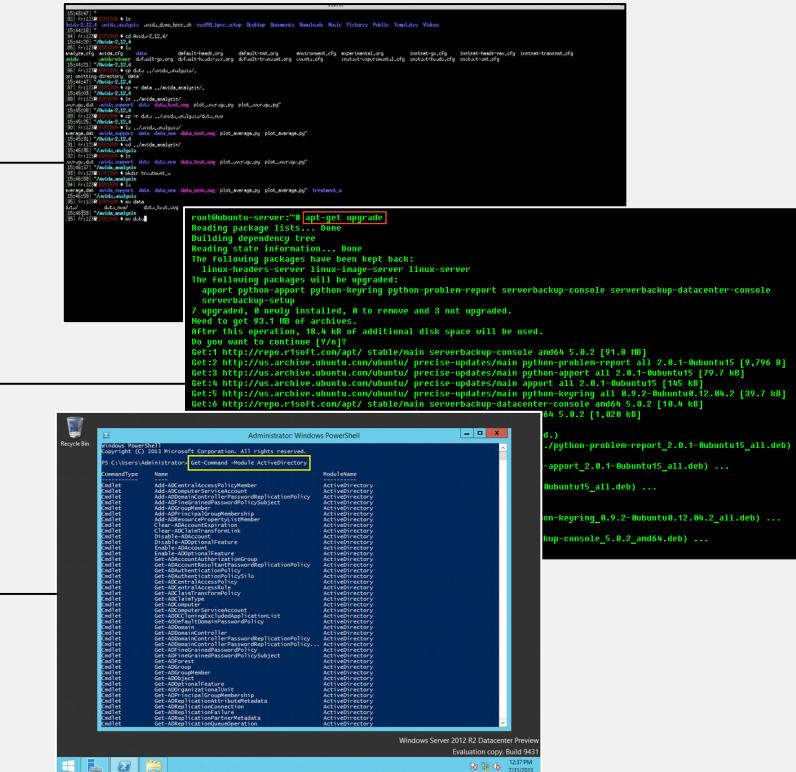
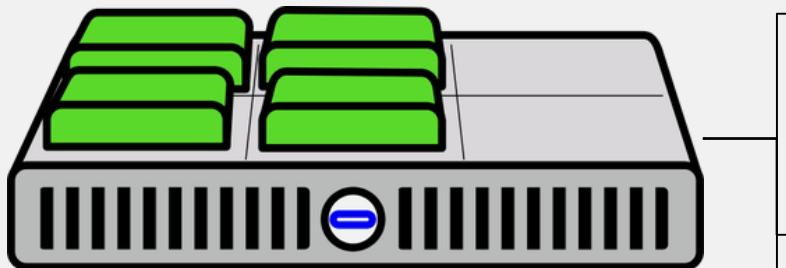
# OpenStack - Zones



# OpenStack - Jenkins slaves



# OpenStack - Virtualized Test Resources

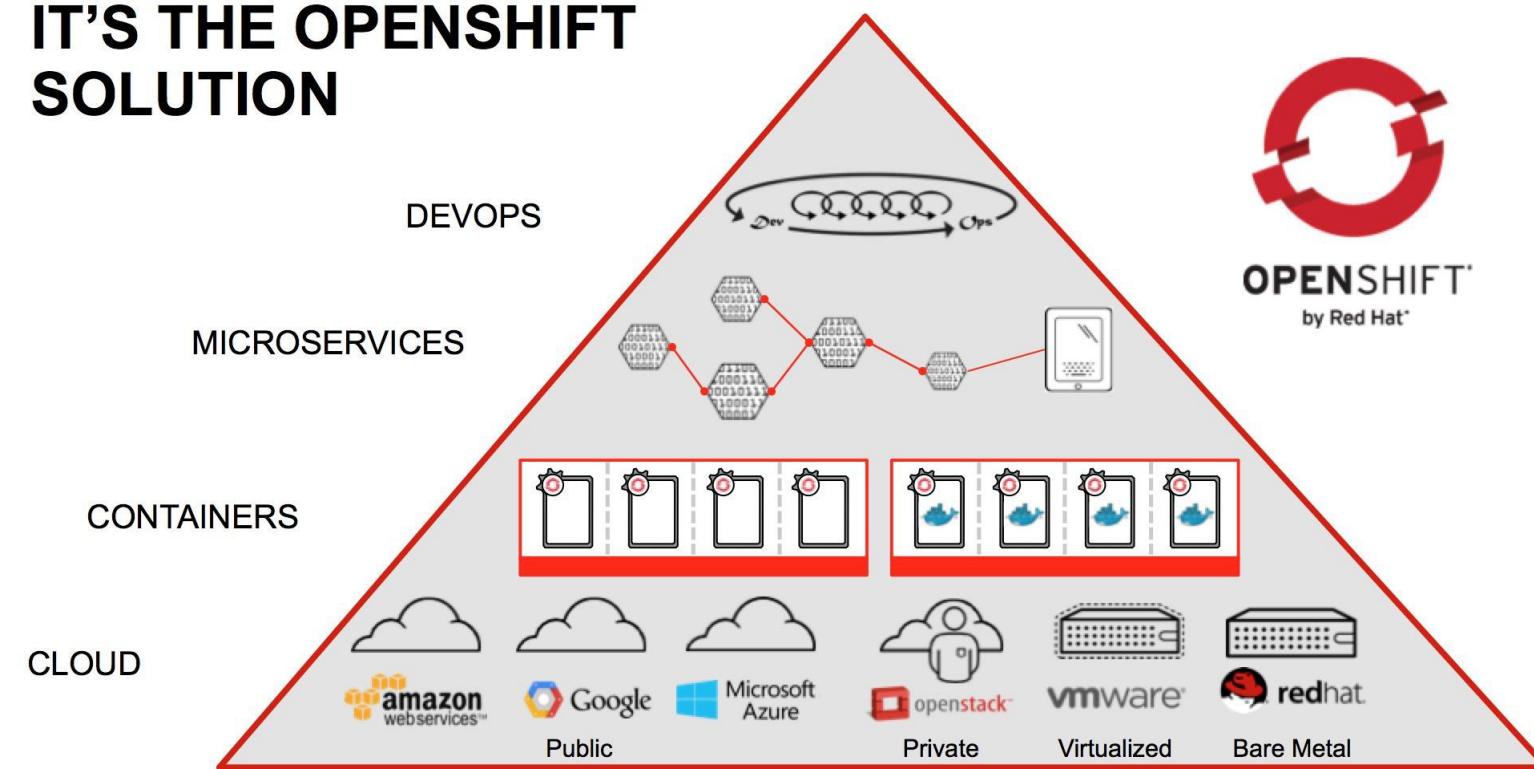


# OpenStack - Image Management



# OpenShift

## IT'S THE OPENSHIFT SOLUTION



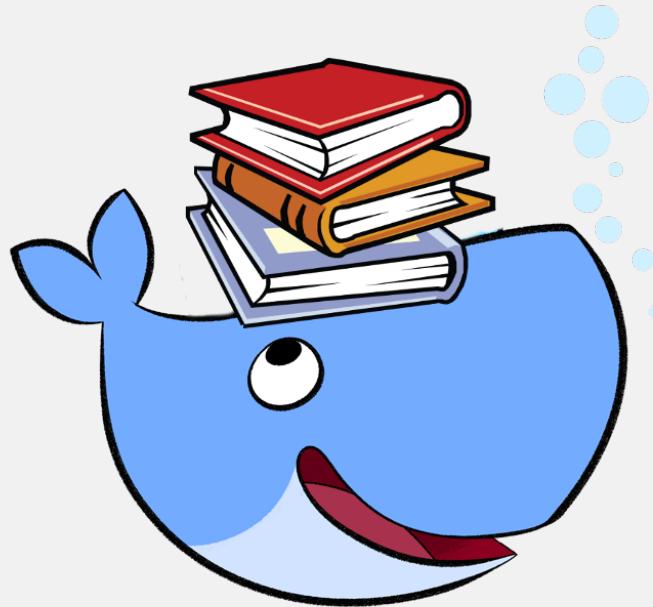
# OpenShift - Containers



# OpenShift - Lightweight disposable tasks



# OpenShift - Lightweight disposable tasks - Doc Gen



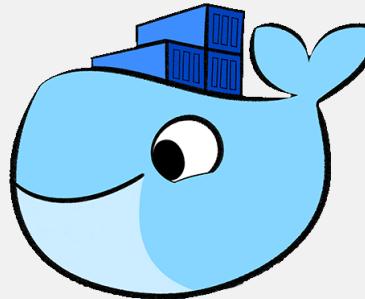
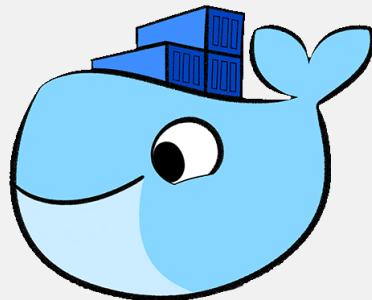
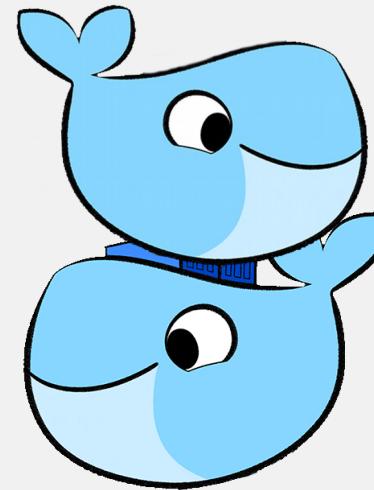
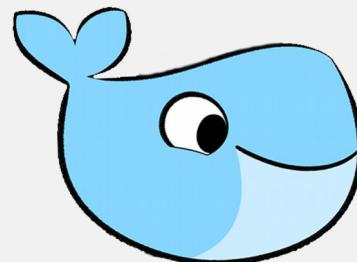
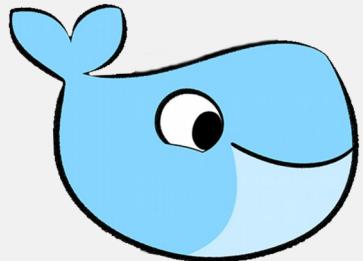
# OpenShift - Lightweight disposable tasks - Unit Testing



# ShipShift / Logstash

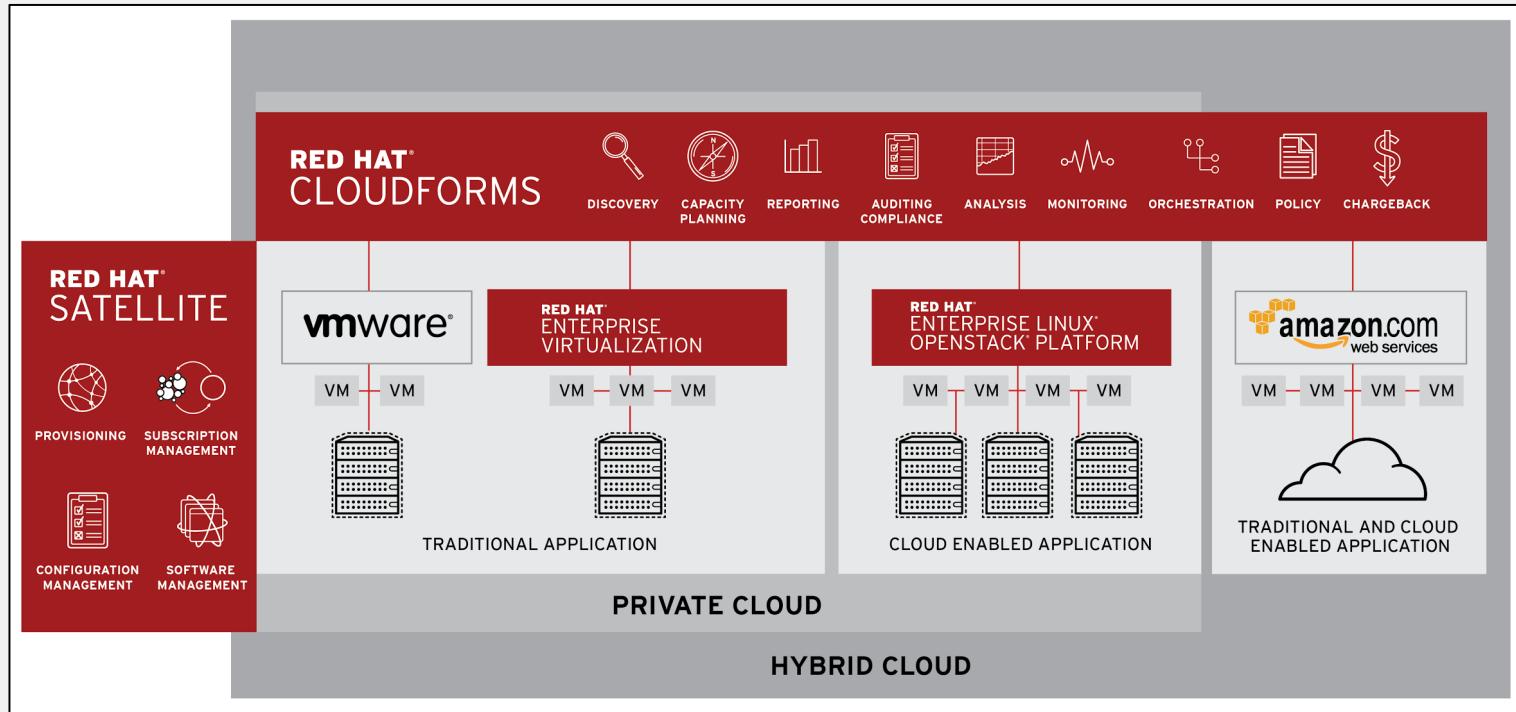


# Container Management



# Cloud Management CloudForms

# CloudForms - Unified Management

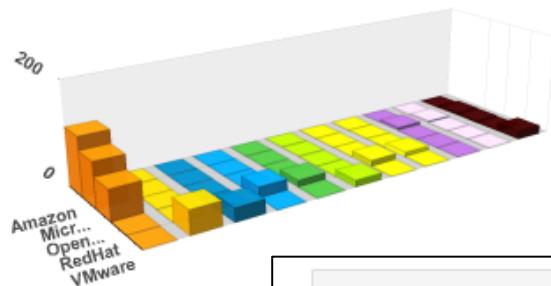


# CloudForms - Reporting

## Vendor and Guest OS Chart

- Unknown
- Debian GNU/Linux 4...
- other\_linux
- rhel\_6
- Red Hat Enterprise...
- Other

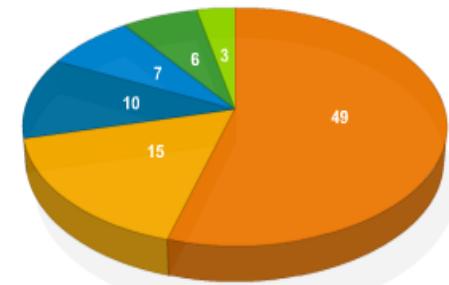
- Red Hat Enterprise...
- other
- Red Hat Enterprise...
- rhel\_7x64
- 64-bit edition of ...



## Workload by Provider

- VMware vCenter
- Microsoft System C...
- Amazon EC2

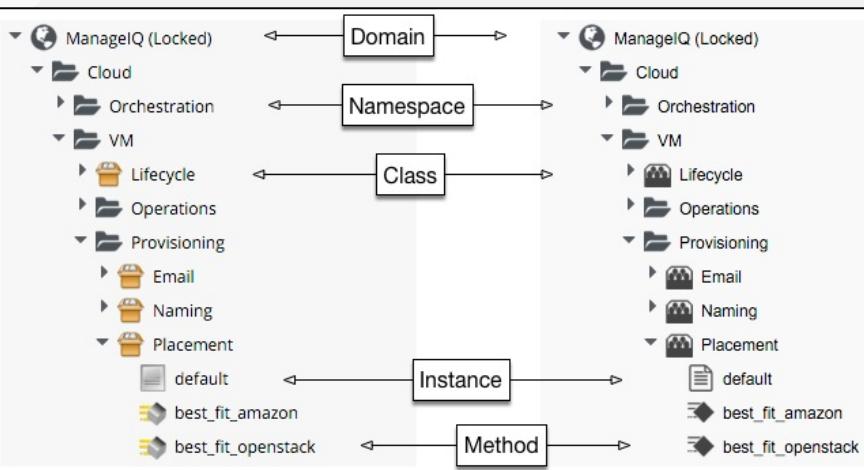
- Red Hat Enterprise...
- OpenStack
- Azure



## Top CPU Consumers (Last Hour)

VM Name	CPU Usage	Allocated vCPUs	VM Vendor
DemoMaster	4.6%	4	VMware
Analytics VM	3.7%	2	VMware
cf31_AWS_testbed	2.9%	4	VMware
UI VM	2.9%	2	VMware
VMware vCenter Server Appliance	2.1%	2	VMware

# CloudForms - Automation



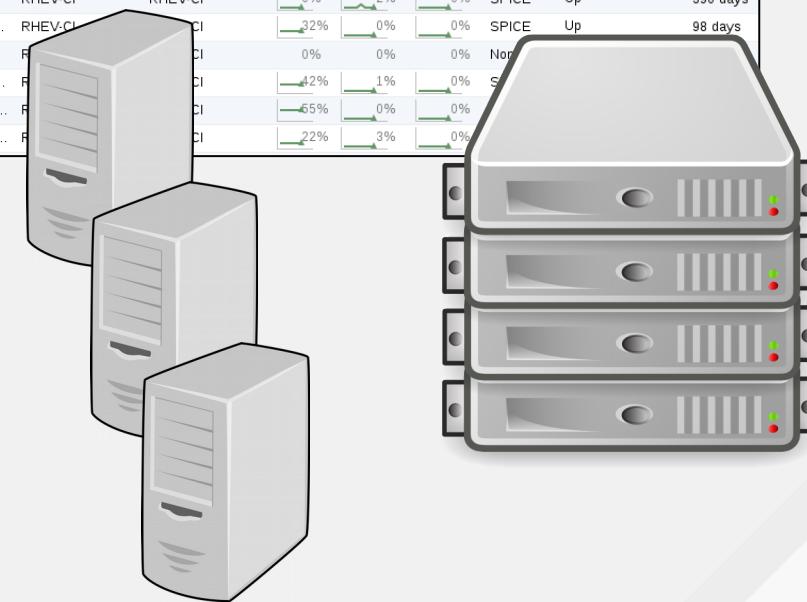
# Summary

System

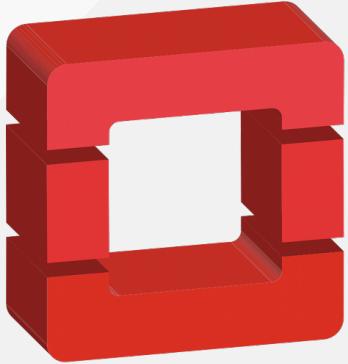
New VM Import Edit Remove Clone VM Run Once Migrate Cancel Migration Cancel Conversion Make Template Export Create Snapshot Change CD Assign Tags Guide Me Show Report

Expand All Collapse All

	Name	Comment	Host	IP Address	FQDN	Cluster	Data Center	Memory	CPU	Network	Graphics	Status	Uptime
▼	afedoret-jenkins-...					RHEV-CI	RHEV-CI	0%	0%	0%	None	Down	
▼	aos-devel-jenkins	clone fro...	hv03	10.8.63.85	aos-devel-jenkin...	RHEV-CI	RHEV-CI	4%	0%	0%	SPICE	Up	146 days
▼	aos-ostree	Owned b...	hv08	10.8.63.144	aos-ostree.rhev...	RHEV-CI	RHEV-CI	11%	0%	0%	SPICE	Up	263 days
▼	api-qe-jenkins		hv08	10.8.63.72	api-qe-jenkins.rh...	RHEV-CI	RHEV-CI	41%	0%	0%	SPICE	Up	104 days
▼	artifactory		hv08	10.8.63.24	artifactory.rhev-ci...	RHEV-CI	RHEV-CI	32%	0%	0%	SPICE	Up	525 days
▼	atomic-e2e-jenkins	Owned b...	hv07	10.8.63.54	atomic-e2e-jenki...	RHEV-CI	RHEV-CI	9%	1%	0%	SPICE	Up	275 days
▼	baseos-jenkins		hv05	10.8.63.42	baseos-jenkins.r...	RHEV-CI	RHEV-CI	65%	2%	0%	SPICE	Up	578 days
▼	base-polarion		hv09			Polarion	RHEV-CI	0%	0%	0%	SPICE	Up	150 days
▼	bastion		hv01			RHEV-CI	RHEV-CI	0%	0%	0%	SPICE	Up	37 days
▼	bck-dir		hv07			RHEV-CI	RHEV-CI	0%	2%	0%	SPICE	Up	390 days
▼	beaker-jenkins		hv05	10.8.63.81	beaker-jenkins.r...	RHEV-CI	RHEV-CI	32%	0%	0%	SPICE	Up	98 days
▼	bigdataci-jenkins	395540 ...				RHEV-CI	RHEV-CI	0%	0%	0%	None	Up	
▼	brms-jenkins		hv07	10.8.63.14	kie-jenkins.rhev...	RHEV-CI	RHEV-CI	42%	1%	0%	SPICE	Up	
▼	bxms-qe-jenkins		hv04	10.8.63.70	bxms-qe-jenkins...	RHEV-CI	RHEV-CI	65%	0%	0%	SPICE	Up	
▼	capsule		hv07	10.8.63.174	capsule.rhev-ci-v...	RHEV-CI	RHEV-CI	22%	3%	0%	SPICE	Up	







Overview

Logged in as: admin Settings Help Sign Out

**openstack**  
PROJECT

Project Admin

CURRENT PROJECT admin

Manage Compute

Overview

Instances

Volumes

Image & Snapshots

Access & Security

Quota Summary

Used 1 of 10 Available Instances

Used 1 of 20 Available vCPUs

Used 512 MB of 51 200 MB Available RAM

Used 0 of 10 Available volumes

Used 0 GB of 1 000 GB Available volume storage

Select a month to query its usage:

From: 2013 Start

Active Instances: 1 Active RAM: 512 MB This Month's vCPU Hours: 0,05 This Month's GB-Hours: 0,00

Usage Summary

Download CSV Summary

System Info

Logged in as: admin Settings Help Sign Out

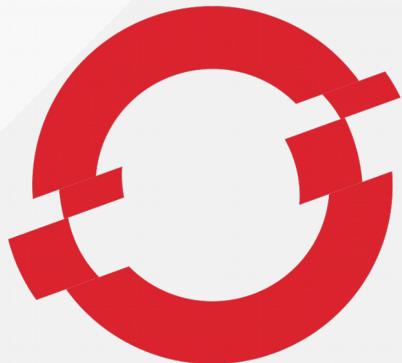
Services Compute Services Availability Zones Host Aggregates Network Agents

## Network Agents

Filter  Filter

Type	Name	Host	Status	State	Updated At
L3 agent	neutron-l3-agent	dfw02.localdomain	Enabled	Up	0 minutes
Open vSwitch agent	neutron-openvswitch-agent	dfw02.localdomain	Enabled	Up	0 minutes
DHCP agent	neutron-dhcp-agent	dfw02.localdomain	Enabled	Up	0 minutes
Open vSwitch agent	neutron-openvswitch-agent	dfw01.localdomain	Enabled	Up	0 minutes

Displaying 4 items



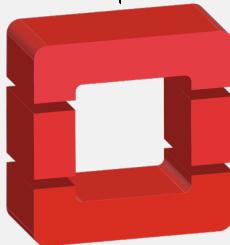
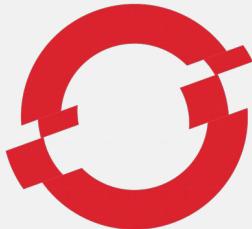
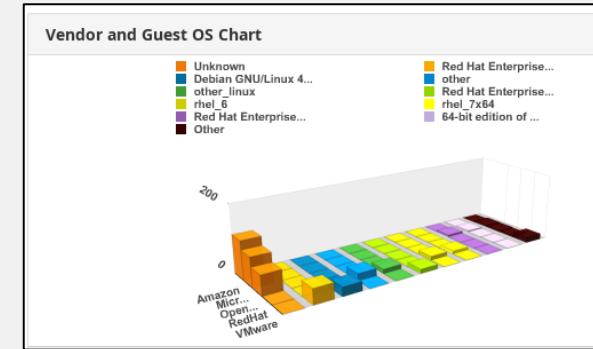
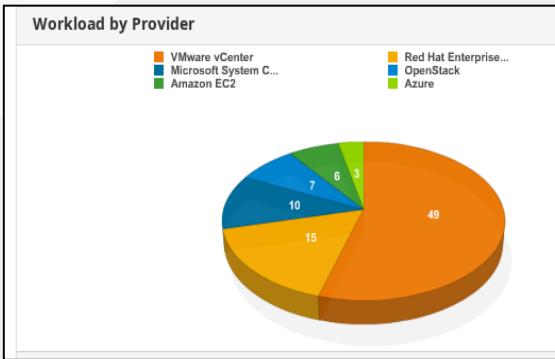
Applications Settings Help ▾

## Applications

Available in domain [halturataty](#)

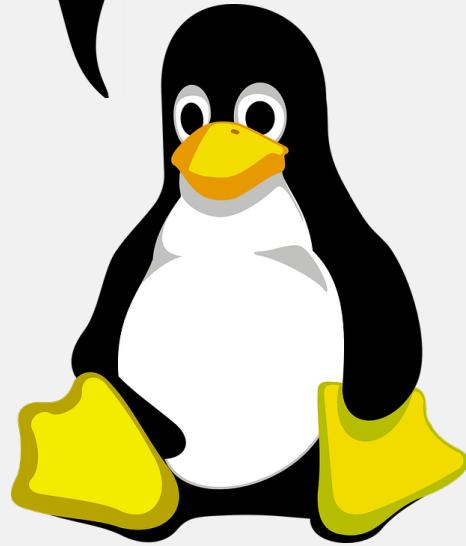
3 of 3

<a href="#">djangotest1</a> Python 3.3, MongoDB 2.4	<input type="checkbox"/> 1
<a href="#">hexoblogtest1</a> Node.js 0.10	<input type="checkbox"/> 1
<b>Cartridges</b>	<input type="checkbox"/> 1
Node.js 0.10	Status <b>Stopped</b> Gears 1 small Storage 1 GB
MongoDB 2.4	Database: <b>haptime</b> User:  Password: <b>show</b>
10gen Mongo Monitoring Service Agent	
RockMongo 1.1	<input type="checkbox"/>

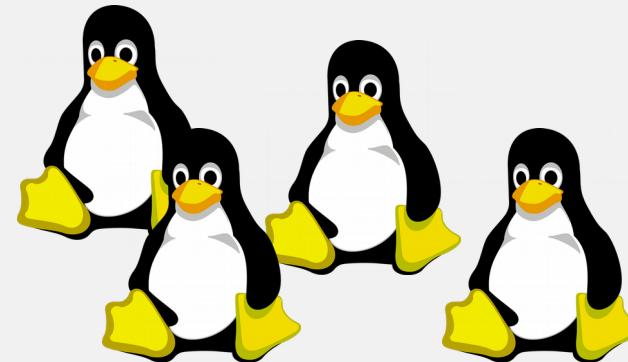


**RED HAT  
ENTERPRISE VIRTUALIZATION 3**

WHAT?



Q & A





RED HAT  
**SUMMIT**

LEARN. NETWORK.  
EXPERIENCE OPEN SOURCE.