IBM Cloud Manager with OpenStack 4.1
WHY CLOUD?
Cloud is redefining technology, business and entire industries

<table>
<thead>
<tr>
<th>Early adopters have nearly 2.5x higher gross profit than their peers and almost 2x the revenue growth</th>
<th>50% of enterprises will have full blown hybrid cloud by 2017</th>
<th>50% purchase new servers for cloud deployments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Almost 40% of cloud purchasing decisions are made/influenced by LOB</td>
<td>Storage is 47% of Public Cloud hardware infrastructure spend</td>
<td>58% of early adopters are prioritizing open source cloud platforms</td>
</tr>
</tbody>
</table>
What is OpenStack?
OpenStack Cloud Management Software

OpenStack is a global collaboration of developers & cloud computing technologists working to produce an ubiquitous Infrastructure as a Service (IaaS) open source cloud computing platform for public & private clouds.

Design Tenets…
- scalability and elasticity are main goals
- share nothing, distribute everything (asynchronous and horizontally scalable)
- any feature that limits our main goals must be optional
- accept eventual consistency and use it where appropriate

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- Red Hat

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- IBM
- HP
- AT&T
- Ubuntu

http://openstack.org
Why OpenStack?
Why OpenStack?

• Community development improves speed of innovation
  – Over 12,000 people in the community
  – Covering 130 countries
  – Rapid growth of community
    • Apr 2012 – 150 orgs, 2600 individuals
    • Jan 2013 – 850 orgs, 6600 individuals
    • Sept 2013 over 12,000 individuals

• Protects current investment with simple path to new technology
  – Broad industry support and ecosystem for extensive device support and cloud standards
  – Open and extensible architecture to quickly integrate into existing infrastructures

• Open alternative to proprietary cloud stacks
  – Open APIs provide flexibility and agility
  – Foundation for private and public clouds built on best practices of industries leading thinkers
OpenStack release names & SCE/CMwO product versions

- Folsom 2012.2
- Grizzly 2013.1 3.1
- Havana 2013.2 3.2
- Icehouse 2014.1 4.1
- Juno 2014.2 4.2
Why OpenStack from IBM?
Why OpenStack from IBM?

- IBM is working as integral part of the openstack community to advance the openstack framework, working with agile development practicing CI/CD.
- Self Service UI (optional), supporting openstack multi region, vCenter co-existence scenarios.
- IBM Cloud Manager with OpenStack has **unique** value add components such as
  - the advanced (optional) PRS scheduler that is provided by the IBM Platform team,
  - supporting an enterprise database (db2) as alternative to MYSQL
  - Unique set of supported cloud targets:
- IBM Cloud Manager with OpenStack covers many different targets
  - openstack/KVM on RHELs 6.5/x86_64
  - openstack/HyperV on Microsoft Windows 2012 (R2) x86_64 and HyperV Server 2012 (R2)
  - openstack/KVM on ppc on the new Power 8 HW
  - PowerVM (via PowerVC)
  - openstack for Z/VM (managed to)
- IBM Cloud Manager with OpenStack packages openstack as RPM packages to allow for robust change management with real packet versions.
- IBM cloud development performs intensive testing in addition to the community best practices test pipelines.
- IBM support 5y+3
- IBM services and business partners
IBM is working to accelerate OpenStack Foundation success

Because an open interoperable Cloud is critical for flexible cloud deployment and customer success…

- Exponential growth in ~1 YR
  - Mar 2013: 859 Contributors
  - April 2014: 2130 Contributors
  - 8,500 Individuals
  - 15,800+ Individuals

- IBM has 14 core contributors
- IBM is #2 in contributions to integrated projects
- IBMers active in the projects
- IBMers working on OpenStack – from formation of the Foundation to Code Quality & New Function

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OpenStack Participant Growth

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IBM Cloud Manager with OpenStack
IBM Cloud Manager with OpenStack Intent

- Enable IBM and IBM partner platforms for cloud
  - “Cloud Ready” for Power, Pure, x, z, Storage, Networking

- Simplify the journey to Cloud for IBM clients
  - Evolution from Virtualization->Virtualization Management->IaaS->PaaS
  - IBM Cloud Manager with OpenStack
  - IBM Cloud Orchestrator

- Enable and simplify the journey from “simple cloud” to full IBM value stack
  - IBM CMO to IBM CO

- Capture the emerging OpenStack ecosystem
  - MSPs/CSPs
  - Sophisticated clients
  - Partner applications/services

- Provide the OpenStack foundation for SDE
IBM offers systems management supporting multiple user roles

- The transition to cloud has empowered end users to perform tasks previously restricted to admins
- A distinct cloud manager role has emerged (separate from virtual/physical resource management)
- Skilled virtual resource management is required for virtual compute, storage and network infrastructure
- As always, skilled physical resource managers (either offsite or on-premise) are as critical as ever

IBM Cloud Manager with OpenStack supports these user types:

- Lisa, End User: Self-service IT requests via mobile & Web clients
- Claudia, Cloud Manager: Manage cloud workloads, Manage cloud users, Manage cloud environment
- Oscar, Platform Manager: Manage physical resources (servers, storage and networking)
- Vince, Virtualization Admin: Manage virtualized resources (servers, storage and networking)
IBM Cloud Manager with OpenStack delivers cloud usage benefits to users

- Hides underlying infrastructure from user and shifts focus to services delivered
- Enables the ability to provide standardized and lower cost services
- Facilitates a granular level of services metering and billing
- Workload standardization eases complexity
IBM Cloud Manager with OpenStack end user capabilities

Projects
• Request access from login panel
• Request access to a project

Images
• Request image deploy
• Set user VM parameters (flavors, or CPU & memory)

Instances
• Start/resume/stop an instance
• Review instance properties
• View CPU, Memory & Disk usage of an instance
• View Instance console logs
• Resize running instances
• Delete an instance
• Clone an instance
• Capture an instance
IBM Cloud Manager with OpenStack delivers cloud admin benefits to managers

- Tailor workload options for users and groups
- Independent volume life cycle
- Monitor usage with workload metering
- Provides project level customization
IBM Cloud Manager with OpenStack cloud manager capabilities

- **Configuration**
  - Cloud configuration to vCenter or OpenStack
  - Configure networks
  - Configure LDAP environment

- **Images**
  - Import and manage images
  - Configure images for user deployments
  - Create and manage flavors
  - Present users with simplified options

- **Volumes**
  - Create, delete, capture, attach, and detach volumes

- **User / Project Management**
  - Create users and roles
  - Create and manage projects
  - Add users to projects as "Owner", "User" and "Viewer"
  - Expiration policies

- **Approvals**
  - Configure Approval and Expiration policies at the Cloud and Project levels
  - Approve/reject new workload requests
  - Approve/reject workload resize requests

- **Utilization**
  - Configure to generate metering records
  - Configure billing for charging accounts and manage account assignment
  - View capacity utilization

- **Review event logs & failures**

- **Initiate Live Migrations to manage outages**
The architecture evolution to IBM Cloud Manager with OpenStack

Self service cloud manager UI

- SCE infrastructure services
- VMControl
- vCenter
- PowerVM
- KVM
- vSphere
- ESX
- z/VM
- Hyper-V
- KVM

Self service cloud manager UI

- IaaS federation/gateway
- SCE Legacy
- OpenStack

Cloud User
Cloud Admin

Cloud Applications

- OpenStack cloud solutions
- OpenStack APIs exposed for applications

SmartCloud Entry is evolving from a entry level cloud application to an OpenStack based cloud solution

- Entry level cloud solution
- Internal cloud “middleware”
- Integration with VM Mgrs
- Entry level cloud solution
- Internal OpenStack based cloud “middleware”
- New virtual environments via OpenStack
- New points of integration with the hypervisor
OpenStack components
**OpenStack Infrastructure Management Software**

**Providing an ubiquitous IaaS management platform**

**Cloud Management APIs**
- Focus on providing IaaS
- Broad Eco System

**Management Services**
- Image Management
- Virtual Machine Placement
- Account Management

**Foundation (Middleware)**
- AMQP Message Broker
- Database for Persistence

**Virtualization Drivers**
- Adapters to hypervisors
- Server, storage, network
- Vendor Led Drivers

**OpenStack API**

- Security (KeyStone)
- Scheduler
- Projects
- Images (Glance)
- Flavors
- Quotas

**Higher Level Mgmt Ecosystem**

- Cloud Mgmt SW
- Enterprise Mgmt SW
- Other Mgmt SW

**Simple Console**
- Built using OS REST API
- Basic GUI for OS functions

**OpenStack API Components**

- AMQP
- DBMS

**Components**

- Nova
- Cinder
- Neutron

**Server**

**Storage**

**Network**

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OpenStack icehouse programs

Core services
✓ Compute (Nova)
✓ Object Storage (Swift)
✓ Image Service (Glance)
✓ Identity (Keystone)
✓ Dashboard (Horizon)
✓ Networking (Neutron)
✓ Block Storage (Cinder)
✓ Telemetry (Ceilometer)
✓ Orchestration (Heat)
Database Service (Trove)

Incubation
Bare metal (Ironic)
Queue service (Marconi)
Data processing (Sahara)
Key management (Barbican)
Deployment

IBM SmartCloud Entry 2.x & 3.x
• Appliance model with OVF activation
  o Very quick and simple to deploy
  o Unflexible
• Compute nodes
  o installed via installshield (KVM/HyperV)

IBM Cloud manager with OpenStack
• Includes chef-server
• Automated install
• Flexible topologies
  • Including “AllInOne + n compute”
• Role based
• Utilizes Chef Cookbooks/recipes
• Allows for entry SCE-like config’s
• Allows for large, distributed cloud config’s
• Allows for multi-region openstack config’s
• Hybrid config’s via LBS/ITS service eng.
IBM Cloud Manager with OpenStack – Environment genesis

STEP 1 DEPLOYMENT SERVER

1. Install deployment server rhels 6.5 x86_64 (VM or on metal)
2. Install deployment server
   
   ```bash
   ./cmwo410_xlinux_install.bin -i silent -f installer.properties
   ```
3. Customize chef environment.json
   
   ```bash
   ssh chef-server knife environment from file local/local.json
   ```
4. Customize chef topology.json

STEP 2 cloud environment (example)

1. Install rhels 6.5 x86_64 (VM or on metal) for IBM Cloud Manager controller
2. Install rhels 6.5 x86_64 (on metal) on all compute nodes
3. Deploy solution according to topology
   
   ```bash
   ssh chef-server knife os manage deploy topology local/local-topology.json
   ```
IBM Cloud Manager with OpenStack – topology sample

{
  "name":"local-topology",
  "description":"local-topology",
  "environment":"local",
  "secret_file": "/opt/ibm/cmwo/chef-repo/data_bags/example_data_bag_secret",
  "run_sequentially":false,
  "nodes": [
    {
      "fqdn":"osc2014-1.private.cloud.com",
      "identity_file": "/root/.ssh/id_rsa",
      "quit_on_error":true,
      "run_order_number":1,
      "runlist": [
        "role[ibm-os-single-controller-node]",
        "role[ibm-os-prs-ego-master]",
        "role[ibm-os-prs-controller-node]",
        "role[ibm-sce-node]"
      ]
    },
    {
      "fqdn":"pcn1.private.cloud.com",
      "identity_file": "/root/.ssh/id_rsa",
      "quit_on_error":true,
      "run_order_number":2,
      "runlist": [
        "role[ibm-os-compute-node-kvm]",
        "role[ibm-os-prs-compute-node]"
      ]
    },
    {
      "fqdn":"pcn2.private.cloud.com",
      "identity_file": "/root/.ssh/id_rsa",
      "quit_on_error":true,
      "run_order_number":2,
      "runlist": [
        "role[ibm-os-compute-node-kvm]",
        "role[ibm-os-prs-compute-node]"
      ]
    }
  ]
}
IBM Cloud Manager with OpenStack – PRS

IBM PRS Resource Optimization Offering

- PRS
- PRS Python API
- Nova Scheduler
- Resource Optimization Service
- Notification Service

Nova

- Nova-api
- Nova-conductor
- DB
- Nova-compute

VM Migrating request by OpenStack API

Nova API extension for DRUD of optimization policy

- Host attributes, VM allocation and migration plan
- VM placement replacement decision
- state chance of VM, VM group, host, host aggregate
- host metrics
- schedule request
- message queue

IBM PRS Resource Optimization Offering
• User defined metrics
• VM group support
• Utilization-based scheduling
• Topology-aware scheduling
• Optimization plan recommendation
• VM-HA policy
• Managed-to:
  o KVM, PowerVC and Hyper-V
IBM Cloud Manager with OpenStack - Controller & Compute Node Operating Systems

<table>
<thead>
<tr>
<th>Controller Node (manage-from)</th>
<th>Cloud Manager (application)</th>
<th>Host OS</th>
</tr>
</thead>
<tbody>
<tr>
<td>X86</td>
<td>RHELs 6.5 / Windows Server 2012</td>
<td></td>
</tr>
<tr>
<td>Power</td>
<td>RHELs 6.5</td>
<td></td>
</tr>
<tr>
<td>System Z</td>
<td>RHELs 6.5</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OpenStack Controller Node</th>
<th>Host OS</th>
</tr>
</thead>
<tbody>
<tr>
<td>X86</td>
<td>RHELs 6.5 x86_64</td>
</tr>
<tr>
<td>Power</td>
<td>RHELs 6.5 ppc_64 BE,</td>
</tr>
<tr>
<td>System Z*</td>
<td>RHELs 6.5, Suse</td>
</tr>
</tbody>
</table>

* Managed-from Z will be delivered later this year

<table>
<thead>
<tr>
<th>Compute Node (manage-to)</th>
<th>System x &amp; Pureflex (x)</th>
<th>Power &amp; Pureflex (Power)</th>
<th>System z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypervisor / Compute Node</td>
<td>VMware via SCE +VCenter</td>
<td>VMware via OS</td>
<td>Hyper-V (2012 Svr) via OS</td>
</tr>
<tr>
<td>Guest OS</td>
<td>Windows</td>
<td>Windows</td>
<td>Windows</td>
</tr>
<tr>
<td></td>
<td>Linux Suse</td>
<td>Linux Suse</td>
<td>Linux Suse</td>
</tr>
<tr>
<td></td>
<td>Linux Redhat</td>
<td>Linux Redhat</td>
<td>Linux Redhat</td>
</tr>
<tr>
<td></td>
<td>Other Linux</td>
<td>Other Linux</td>
<td>Other Linux</td>
</tr>
<tr>
<td>First Supported</td>
<td>2Q13</td>
<td>2Q14</td>
<td>2Q13</td>
</tr>
</tbody>
</table>
Introducing IBM Cloud Manager with OpenStack

An easy to deploy and use cloud management software offering based on OpenStack with IBM enhancements and support.

- Enables rapid IT response to ever-changing demands of business via self-service provisioning of infrastructure services, as end users can re-deploy virtual servers with an easy to use interface.
- Yields improved virtualization operational efficiency and greater overall business effectiveness. Administrators capture & manage standard VM images with support for common business processes.
- Provides capability to track/correlate cost of infrastructure to department usage via basic usage metering, so Organizations & Managed Service Providers (MSPs/CSPs) can align service to expense.
- Supports production-grade cloud operations & interoperability at scale via enhanced foundation and full OpenStack API compatibility.
- Open computing cloud alternative to proprietary vendors, with world-class support from IBM.
- Hybrid capability to IBM SoftLayer through a Services offering.
- IBM Cloud Manager with OpenStack works with Platform Resource Scheduler, learn more about PRS [here](https://ibm.biz/SCEtrial)

**Featured Content**
IBM Cloud Manager with OpenStack - Self Service UI and Horizon

Cloud Management Dashboard

Flavors

<table>
<thead>
<tr>
<th>Flavor Name</th>
<th>VCPUs</th>
<th>RAM</th>
<th>Root Disk</th>
<th>ephemeral Disk</th>
<th>Swap Disk</th>
<th>ID</th>
<th>Public</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>m1.tiny</td>
<td>1</td>
<td>512MB</td>
<td>1GB</td>
<td>0GB</td>
<td>0MB</td>
<td>1</td>
<td>Yes</td>
<td>Edit Flavor</td>
</tr>
<tr>
<td>m1.small</td>
<td>1</td>
<td>2048MB</td>
<td>20GB</td>
<td>0GB</td>
<td>0MB</td>
<td>2</td>
<td>Yes</td>
<td>Edit Flavor</td>
</tr>
<tr>
<td>m1.medium</td>
<td>2</td>
<td>4096MB</td>
<td>40GB</td>
<td>0GB</td>
<td>0MB</td>
<td>3</td>
<td>Yes</td>
<td>Edit Flavor</td>
</tr>
<tr>
<td>m1.large</td>
<td>4</td>
<td>8192MB</td>
<td>80GB</td>
<td>0GB</td>
<td>0MB</td>
<td>4</td>
<td>Yes</td>
<td>Edit Flavor</td>
</tr>
<tr>
<td>m1.xlarge</td>
<td>8</td>
<td>16384MB</td>
<td>160GB</td>
<td>0GB</td>
<td>0MB</td>
<td>5</td>
<td>Yes</td>
<td>Edit Flavor</td>
</tr>
</tbody>
</table>

Displaying 5 items
IBM Cloud Manager with OpenStack v4.1 offers:

- Full access to openstack Icehouse APIs, backed with IBM support.

- A cloud management solution that is designed to be easy to deploy and simple to use, featuring a self-service portal for workload provisioning and virtualized image management.

- Heterogeneous support for IBM PowerVM, IBM z/VM, IBM PowerKVM and x86, Linux Kernel-based Virtual Machine (KVM), Microsoft Hyper-V, and VMware vSphere virtualization environments.

- Multi-region support for managing multiple on-premise openstack regions from a single pane of glass.

- Support for deploy, resize and capture, backup and restore, image management, approvals, expiration, billing and metering.

- Support for PowerKVM which includes: Volume management, Flavor management, Secure Shell (SSH) key management, and basic multi-tenancy support.

- All* functions previously available with IBM Smart Cloud Entry V3.2.

- A Cloud Manager with OpenStack v4.1 and IBM Platform Resource Scheduler v2.2 trial use offer

* Last release supporting VMC, install on AIX: SCE 3.2
IBM Cloud Manager with OpenStack - Summary

- From a single user interface, manage cloud workloads on IBM Power Systems and PowerLinux servers, x86 platforms, and on Power or x86 compute nodes in an IBM PureFlex System or IBM Flex System.

- Create unique cloud settings for each cloud instance.

- As cloud administrator, generate custom expiration policies for each cloud instance determining unique deployment expiration behavior for each cloud type.

- Author approval policies, requiring the cloud administrator approvals unique to each cloud instance.

- As cloud administrator, establish custom expiration policies at the project level, overriding the cloud instance default for unique settings such as enablement, maximum expiration date, grace period, and whether to stop or delete the workload upon expiration.

- Ability to view Capacity Utilization on hosts on all Cloud types.

- Initiate Live Migration of workloads from one host to another within an OpenStack Cloud Region and hypervisor.

- Customize the IBM Cloud Manager with OpenStack v4.1 user interface with logos and product names to enable better integration with the user's desired look and feel, and with their corporate branding requirements.

- Dropped support for IBM System Director/VMC targets, IBM SmartCloud Entry 3.2 is last to ship it.
Thank you