

PLATFORM9

# 7 Ways OpenStack Enables Automation & Agility for KVM Environments





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## 1. Executive Summary

OpenStack's phenomenal growth has made it the industry's leading private cloud management platform, and the second largest open source project of all time. As seen in the graph below, search interest in OpenStack has far exceeded interest in alternative private cloud management platforms, including VMware's vCloud/vRealize solution.

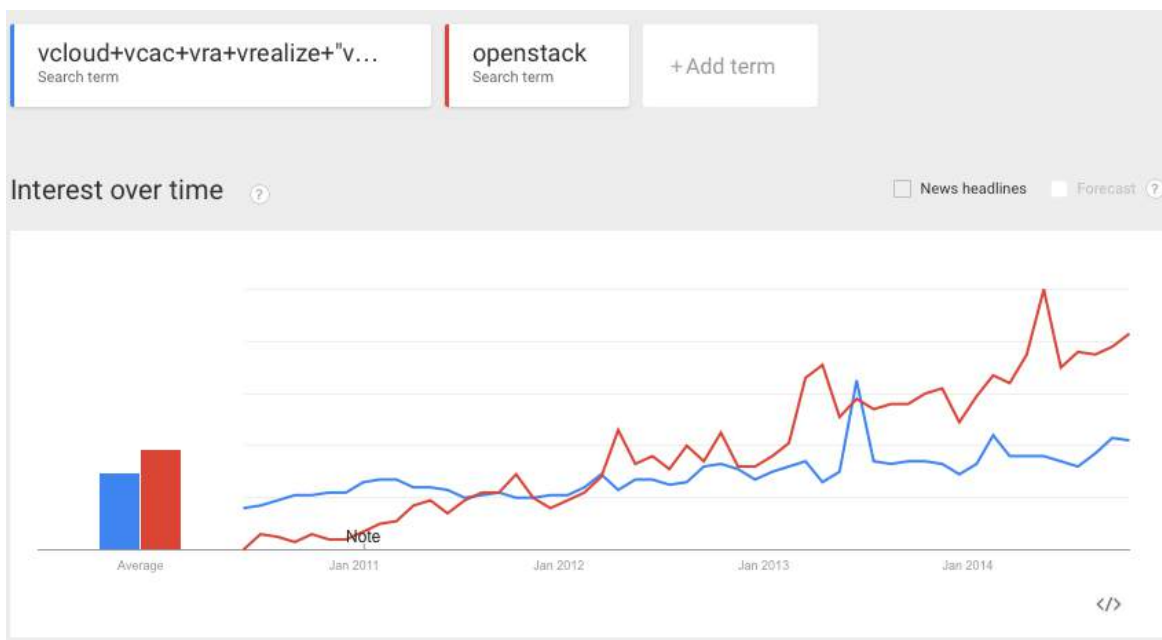


Figure 1: Search Interest reflects OpenStack momentum

This white paper looks beyond the hype that OpenStack has generated and dives into 7 specific benefits that OpenStack can deliver for your KVM infrastructure.

## 2. About Platform Managed OpenStack

Platform9 Managed OpenStack is the simplest way<sup>1</sup> for enterprises to implement an OpenStack private cloud. Platform9 enables the use of existing or new virtualized servers to power private clouds in minutes, while interoperating seamlessly with existing processes and management products.

A key differentiator is that Platform9 hosts the OpenStack controller and delivers it as a SaaS solution with an assured SLA; thereby eliminating the complexity of installing, monitoring, troubleshooting and upgrading OpenStack software. Another major feature is that Platform9 is highly compatible:

1. Supported platforms are KVM (RHEL, CentOS or Ubuntu), VMware vSphere and Docker
2. Hardware compatibility with any server, any storage and any network system.

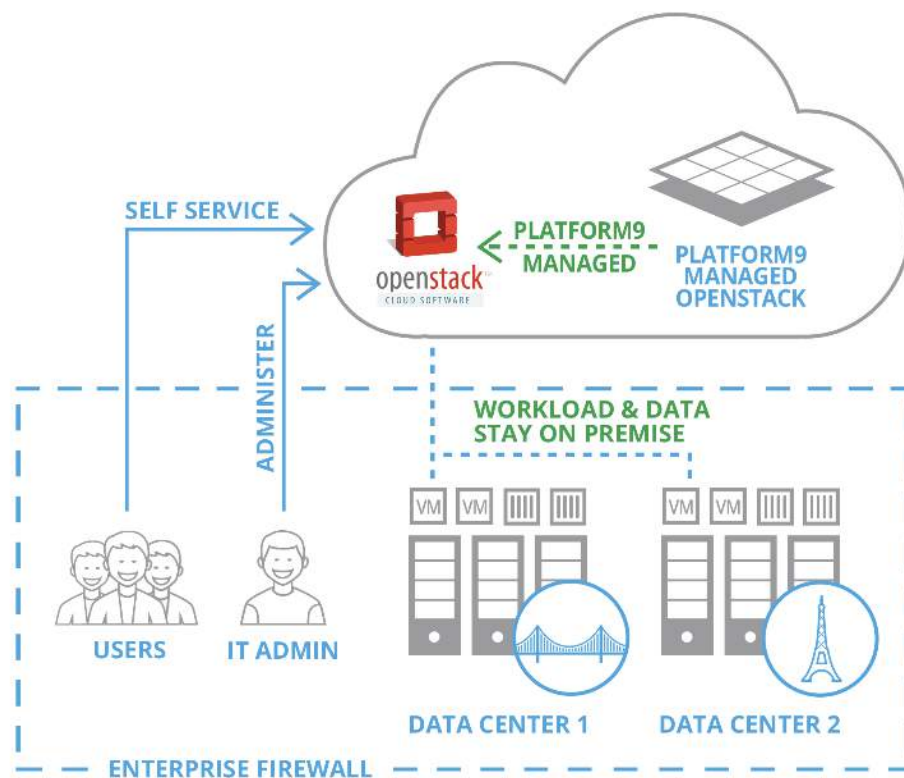


Figure 2: Platform9 delivers OpenStack as a Service, with an assured SLA

<sup>1</sup> [http://platform9.com/product/why\\_platform9.html](http://platform9.com/product/why_platform9.html)

## 3. 7 Benefits of Automating your KVM with OpenStack

### 1. Centralized Management of a KVM Environment

OpenStack helps you manage your KVM environment with a centralized database, API and User Interface. The OpenStack database stores inventory information for all important objects such as Hypervisors, Storage, Network, Images and Instances.

The benefits of a centralized management include:

- Provision for users to easily search for objects or perform operations on them using the User Interface, API or Command Line Interface
- Easy access to the Virtual Machine (VM) console
- Ability to search and organize VM instances, Hosts and Images using 'Tags'
- Monitoring of infrastructure across compute, memory, storage and network, thus helping to identify over-utilized and under-utilized infrastructure<sup>2</sup> (Figure 3)

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<sup>2</sup> <https://support.platform9.com/solution/articles/5000587686-openstack-resource-overcommitment-and-best-practices>

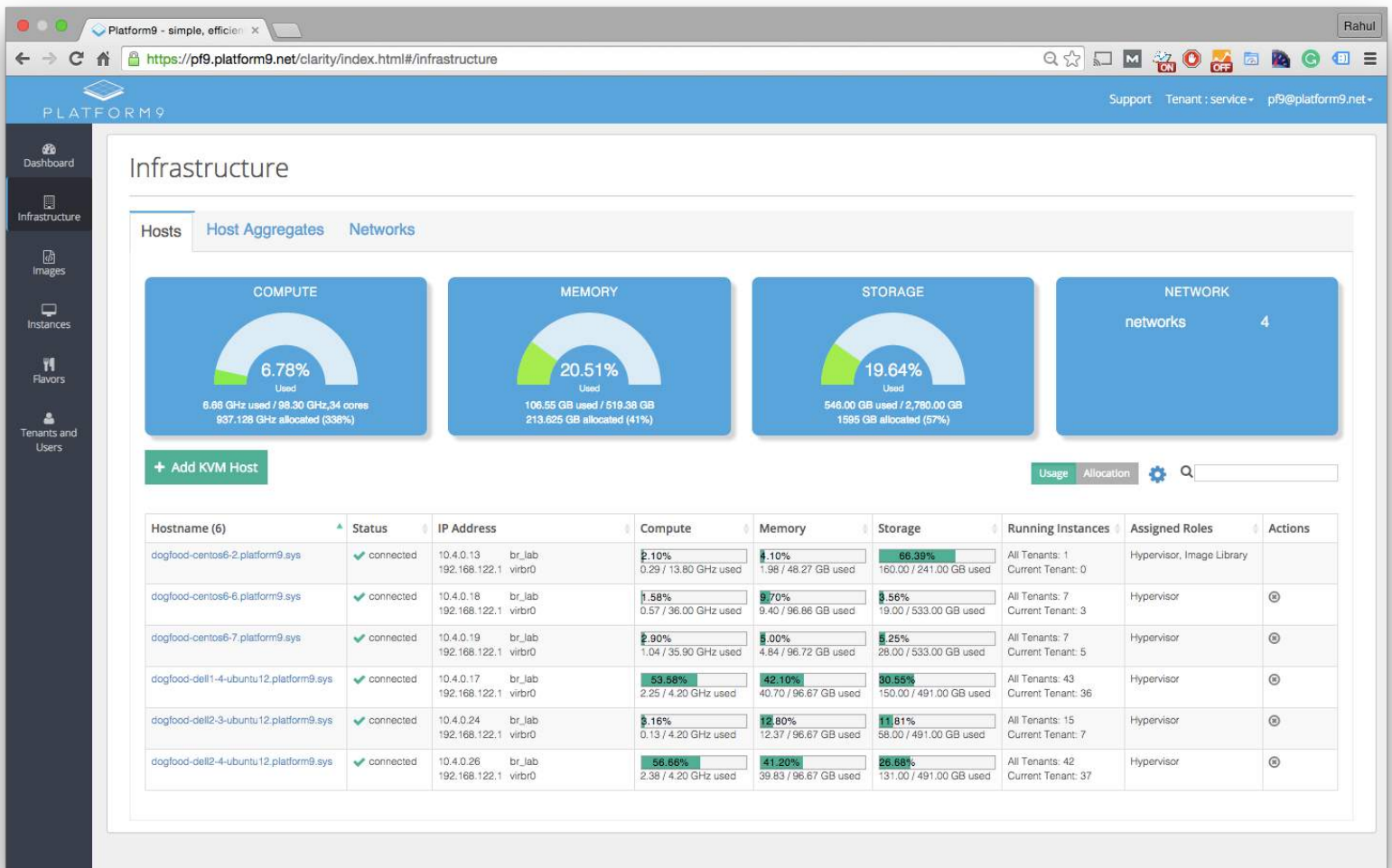


Figure 3: OpenStack's infrastructure view helps users monitor infrastructure utilization and allocation across compute, memory, storage and network

## 2. Reduced Provisioning Time

OpenStack accelerates software provisioning in your environment by pooling underlying infrastructure resources, and automating VM placement against those pools. The OpenStack scheduler accounts for resource utilization statistics when placing VMs. In addition, it can automate IP address assignment to newly deployed VM instances. The result is that applications can be deployed faster, with fewer manual steps. Administrators can optionally enable self-service access to provisioning, a popular feature among developers.

Consider this illustration of resource pooling at work: The operations team at Ultimate Airlines, Inc. has one rack of capacity in San Francisco, and three racks in Austin. The team manually deployed new VM instances using 'virsh' on manually selected servers. As a result, application provisioning took a long time, was error prone, and took too much of the team's bandwidth.

After introducing OpenStack, the team could now manage this combined infrastructure as a large resource pool of Compute, Memory, Storage and Network capacity. When a new VM instance is provisioned, OpenStack's scheduler automatically determines which resources are best suited to accommodate that VM, thereby reducing manual effort and human error (Figure 4).

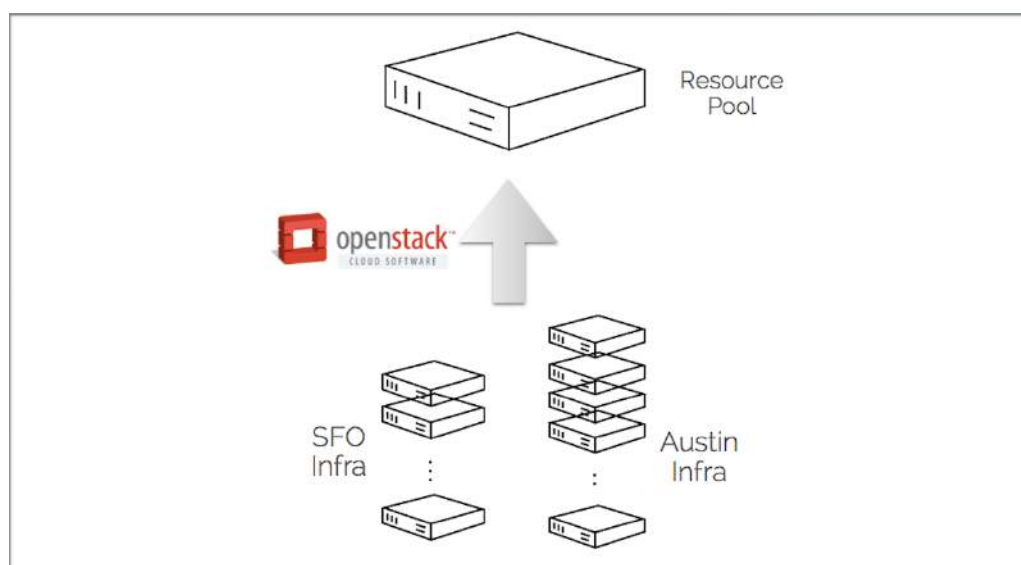


Figure 4: Automation by pooling resources

### 3. Reduced Configuration Sprawl

In a virtualized environment, it is very easy for new VM instances to be created, and those instances often keep running for a long period of time. Therefore, organizations tend to lose control over the set of curated Operating Systems (and patches) and VM configurations that are utilized by different users across departments and geographies.

OpenStack reduces configuration sprawl by:

- Centralizing image management to control the curated set of VM templates from which users can create instances (Figure 5)
- Reducing the number of unique VM templates, which can be customized during new VM creation, thereby reducing unique configurations in the environment
- Standardizing resource configurations allows 'Flavors' to capture the CPU, Memory, Disk and other allocation policies for your environment. During VM provisioning, a 'Flavor' is used to apply a pre-defined resource allocation to that VM instance (Figure 6)
- Allowing users to easily correlate VM instances with the parent image



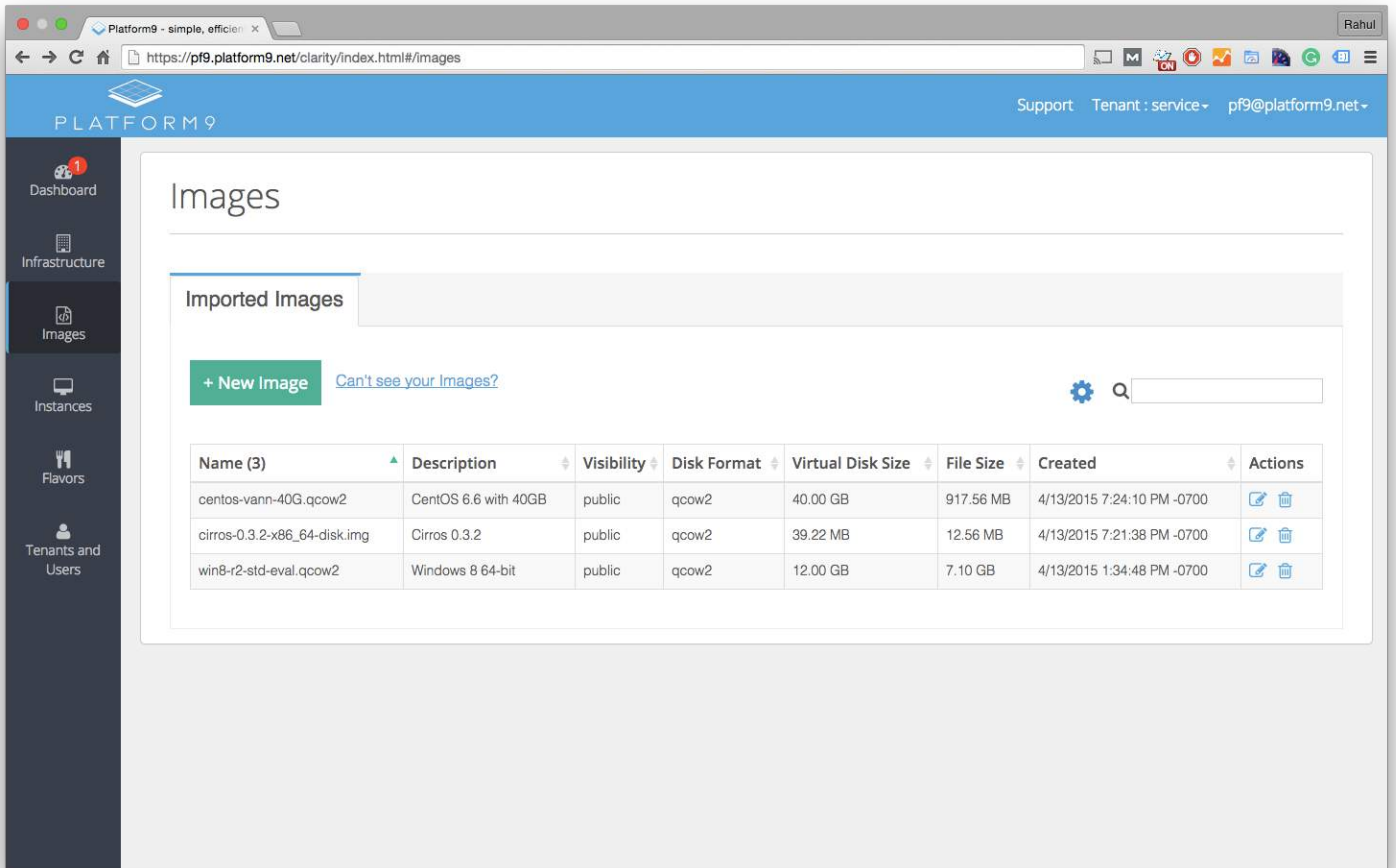


Figure 5: Centralized Image Management with OpenStack Glance

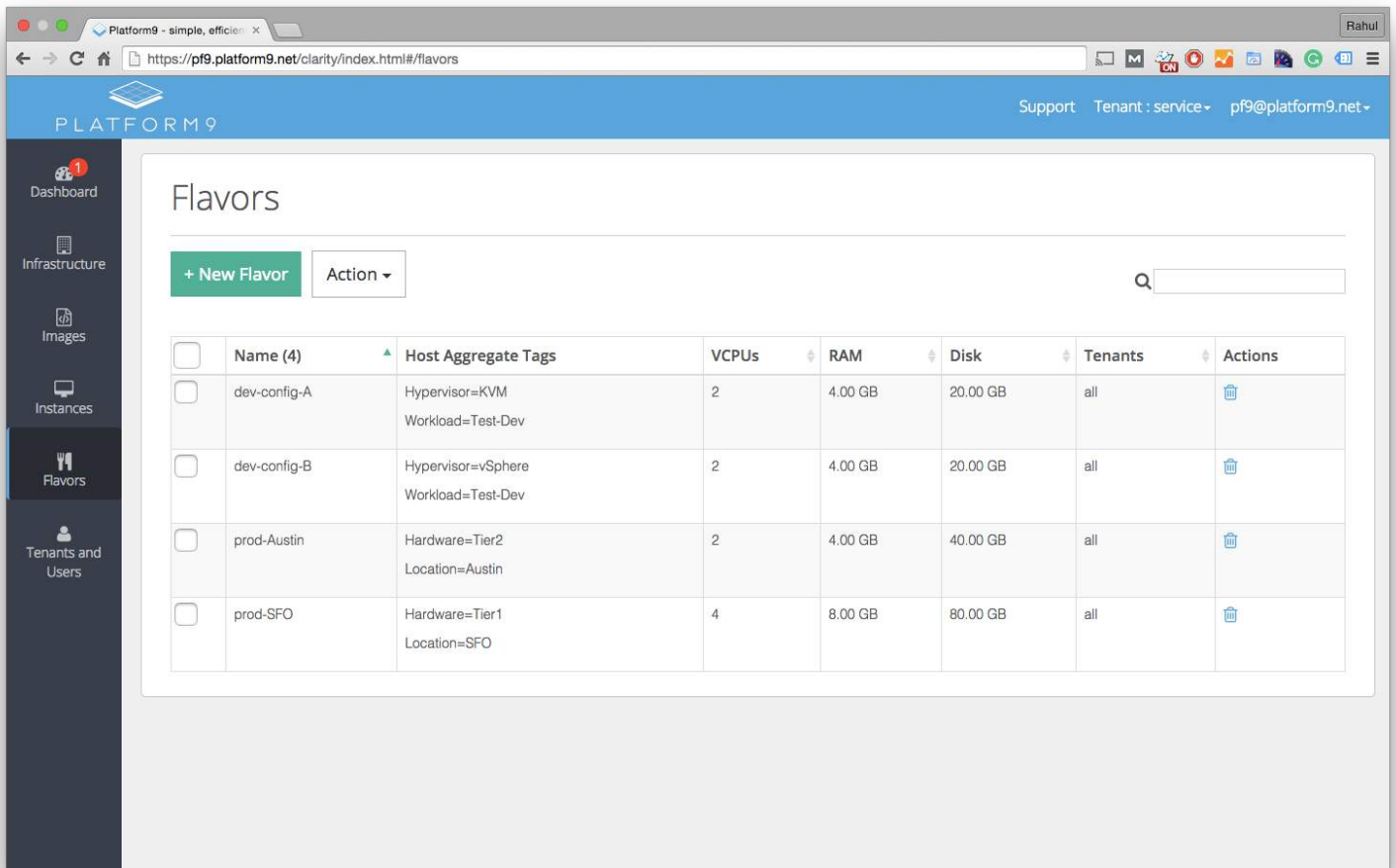


Figure 6: Flavors specify CPU, Memory, Disk and other resource allocation policies

## 4. Tiered Resources

OpenStack resource tiering works in conjunction with resource pooling so that workloads can be provisioned onto specific infrastructure. Infrastructure can be segregated by hardware type, geography or teams, and can be made available for specific groups of users or workloads.

Resource tiering works effectively in conjunction with resource pooling. Consider a scenario of a DevOps admin who has two tiers of infrastructure: Tier 1 and Tier 2. OpenStack pools these two tiers into one resource pool while resource tiering exposes infrastructure attributes: Tier 1 and Tier 2, as choices during instance provisioning (Figure 7).

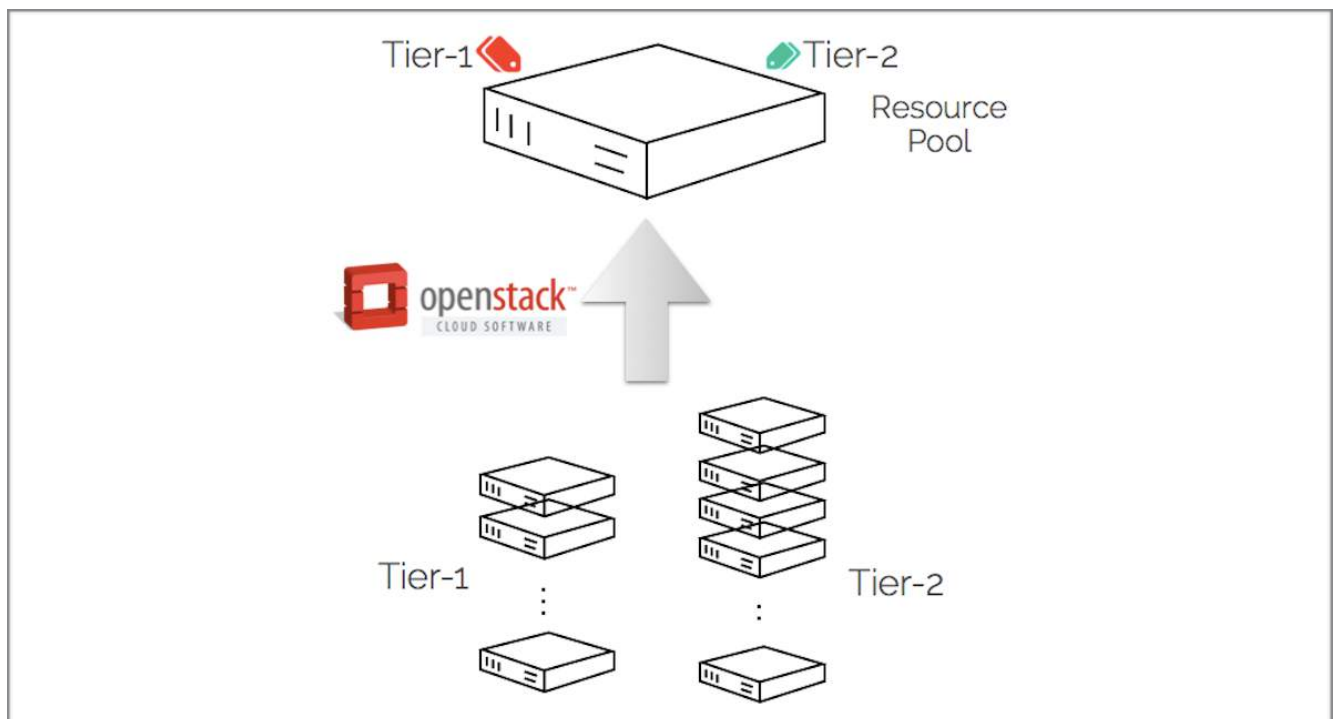


Figure 7: OpenStack pools resources while exposing Tier 1 and Tier 2

Resource tiering in OpenStack is enabled using 'Host Aggregates Tags'<sup>3</sup>, as illustrated in Figure 8. Host aggregate tags can be used to annotate infrastructure capabilities such as hardware tier, location, workload type, etc. These tags are then made available for provisioning via flavors, much like compute, memory and storage requirements.

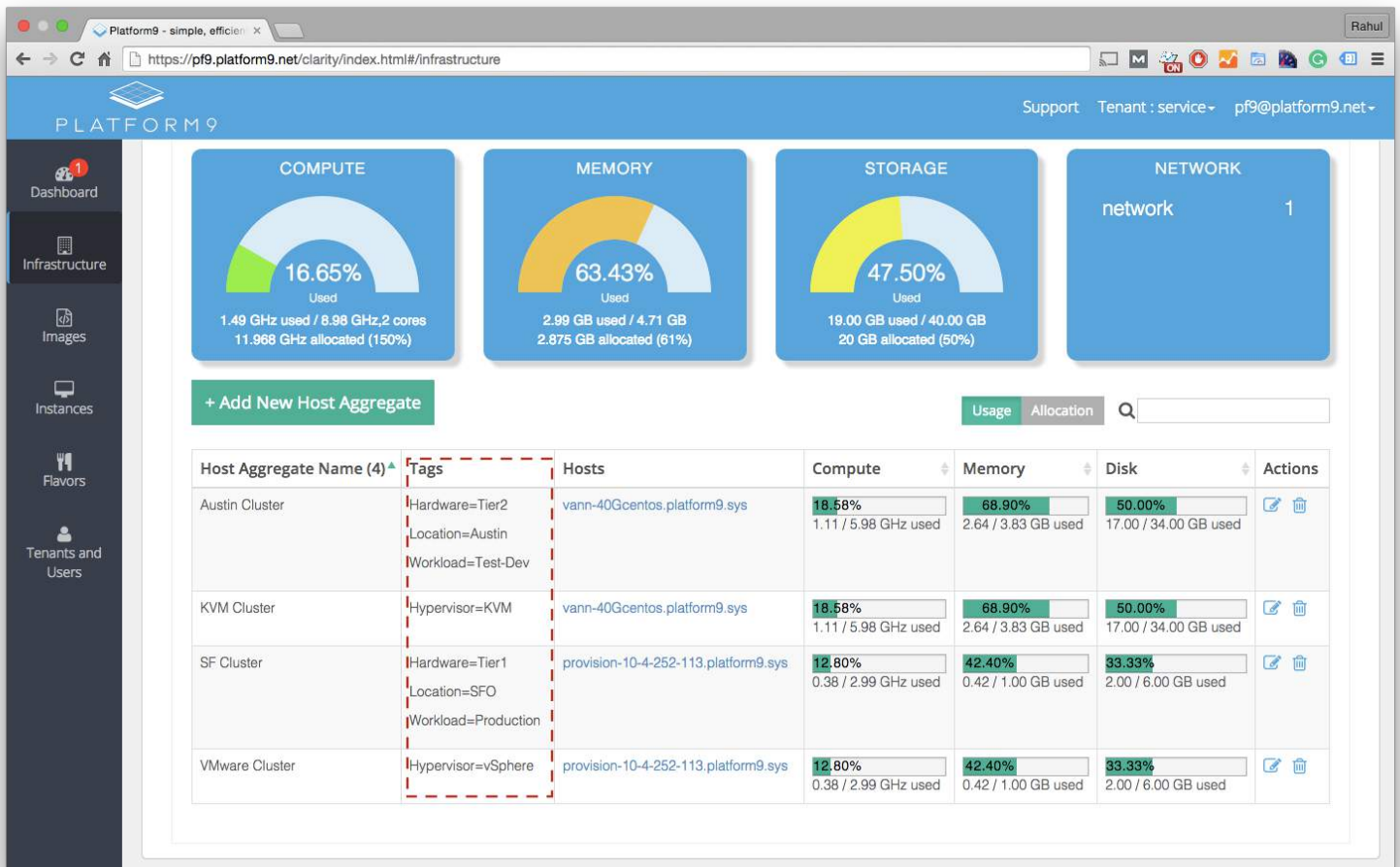


Figure 8: Host Aggregates represent tiers of resources, and integrate with flavors to influence instance provisioning

<sup>3</sup> <https://support.platform9.com/solution/articles/5000547620-setup-resource-tiers-using-host-aggregates>  
[www.platform9.com](http://www.platform9.com) | [www.twitter.com/platform9sys](https://www.twitter.com/platform9sys) | [blog.platform9.com](http://blog.platform9.com)

## 5. Enhanced Security

OpenStack enables better control of security configurations by binding VM instances to pre-validated, trusted security groups that are similar to Amazon Web Services' security groups<sup>4</sup>. These configurations specify network traffic rules in terms of the visibility each machine has over the network.

Figure 9 shows the creation of a security group - 'my\_secgroup'. The security group is then configured to only permit traffic from a trusted network, from port 443 on the source of traffic to port 443 on the destination VM.

```
[root@ip-172-31-1-105 ~(admin_admin)]# nova secgroup-create my_secgroup "My Custom Security Group"
+-----+-----+-----+-----+
| Id | Name          | Description          |
+-----+-----+-----+-----+
| 8 | my_secgroup | My Custom Security Group |
+-----+-----+-----+-----+
[root@ip-172-31-1-105 ~(admin_admin)]# nova secgroup-add-rule my_secgroup tcp 443 443 10.98.10.0/24
+-----+-----+-----+-----+-----+
| IP Protocol | From Port | To Port | IP Range      | Source Group |
+-----+-----+-----+-----+-----+
| tcp         | 443       | 443     | 10.98.10.0/24 |              |
+-----+-----+-----+-----+-----+
[root@ip-172-31-1-105 ~(admin_admin)]# nova secgroup-list-rules my_secgroup
+-----+-----+-----+-----+-----+
| IP Protocol | From Port | To Port | IP Range      | Source Group |
+-----+-----+-----+-----+-----+
| tcp         | 443       | 443     | 10.98.10.0/24 |              |
+-----+-----+-----+-----+-----+
```

Figure 9: Security Group Creation and Configuration with Traffic Restrictions

Figure 10 illustrates how the security group 'my\_secgroup' can be applied to a newly created VM instance, or to an existing VM instance.

```
[root@ip-172-31-1-105 ~(admin_admin)]# nova add-secgroup webapp-vm-23 my_secgroup

[root@ip-172-31-1-105 ~(admin_admin)]# nova boot --flavor m1.small --image du-img-2094-2015-03-10-22_15_10 --nic net-id=c3454717-f813-4419-9203-ceb78b0aa3f9 --security-group my_secgroup "testvm-1"
```

Figure 10: Security Groups can be applied during instance provisioning or later

<sup>4</sup> <https://community.hpcloud.com/article/managing-your-security-groups-135>  
[www.platform9.com](http://www.platform9.com) | [www.twitter.com/platform9sys](https://www.twitter.com/platform9sys) | [blog.platform9.com](http://blog.platform9.com)

OpenStack also reduces privileged access within your environment by enabling role-based-access-control, and managing the privileges that are available to specific users and tenant groups. This allows you to give access to specific flavors and portions of your infrastructure to specific users.

Examples of commonly used roles include:

1. Administrator: someone who can view and manage the physical infrastructure, flavors, and placement policies; manage users and quotas
2. Self-service user: someone who can provision VM instances subject to their allocated quota, but cannot modify infrastructure

## 6. Improved Storage Efficiency

OpenStack can help organizations save storage space and the time it takes to provision workloads. OpenStack can use an intelligent, copy-on-write mechanism to reduce storage duplication during VM instance creation: it caches the base image on the hypervisor where the instance is deployed, creating an incremental delta disk behind the scenes. OpenStack automatically reference counts these cached images, thereby accelerating VM provisioning, saving storage space and reducing network utilization. These savings are valuable especially in a Dev/Test automation environment where hundreds of VM Instances are set up and torn down every day.

In addition to these storage savings, OpenStack can also directly interface with a range of block-storage solutions via the Cinder API<sup>5</sup>. When used with a sophisticated block storage solution (including SolidFire and Pure Storage, among several others), OpenStack offloads key operations to the underlying storage array, which can dramatically speed up storage IO.

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<sup>5</sup> <http://docs.openstack.org/developer/cinder/>

## 7. Easy Network Provisioning

OpenStack fully supports traditional VLAN based networks. At the same time, it can interface with a variety of software-defined-network implementations such as Open vSwitch, Cisco UCS / Nexus, VMware NSX, Juniper Contrail among others.

OpenStack's Networking service (Neutron)<sup>6</sup> helps you dynamically interface with these network system implementations, thereby helping you spin up a new network more easily than could be done with traditional VLANs.

OpenStack's ability to simplify the process of deploying new networks also helps organizations provision isolated networks that can help them with use cases such as intrusive penetration testing or certain performance tests.

## 4. Key Takeaways

Organizations using KVM can realize significant operational efficiencies by deploying OpenStack as their management platform. This white paper reviewed 7 key benefits:

1. Centralized Management of a KVM environment
2. Reduced provisioning time
3. Reduced configuration sprawl
4. Tiered resources
5. Enhanced security
6. Improved Storage Efficiency
7. Easy Network Provisioning

## 5. About Platform9

Platform9 makes private clouds easy by delivering OpenStack as a Service. To learn more about how you can use OpenStack to automate your KVM infrastructure, request your free self-service trial at [www.platform9.com](http://www.platform9.com); email us at [support@platform9.com](mailto:support@platform9.com), or call +1-650-898-7369.

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<sup>6</sup> <https://wiki.openstack.org/wiki/Neutron>