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# Safe Harbor Statement

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# OpenStack in Solaris 11.2

## OS-Technologien für Clouds



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Oracle Systems Sales Consulting  
Europe North

ORACLE®

# Evolution of Datacenters



Computing



Storage



Networking

# Evolution of Datacenters ... Virtualization



More Computing

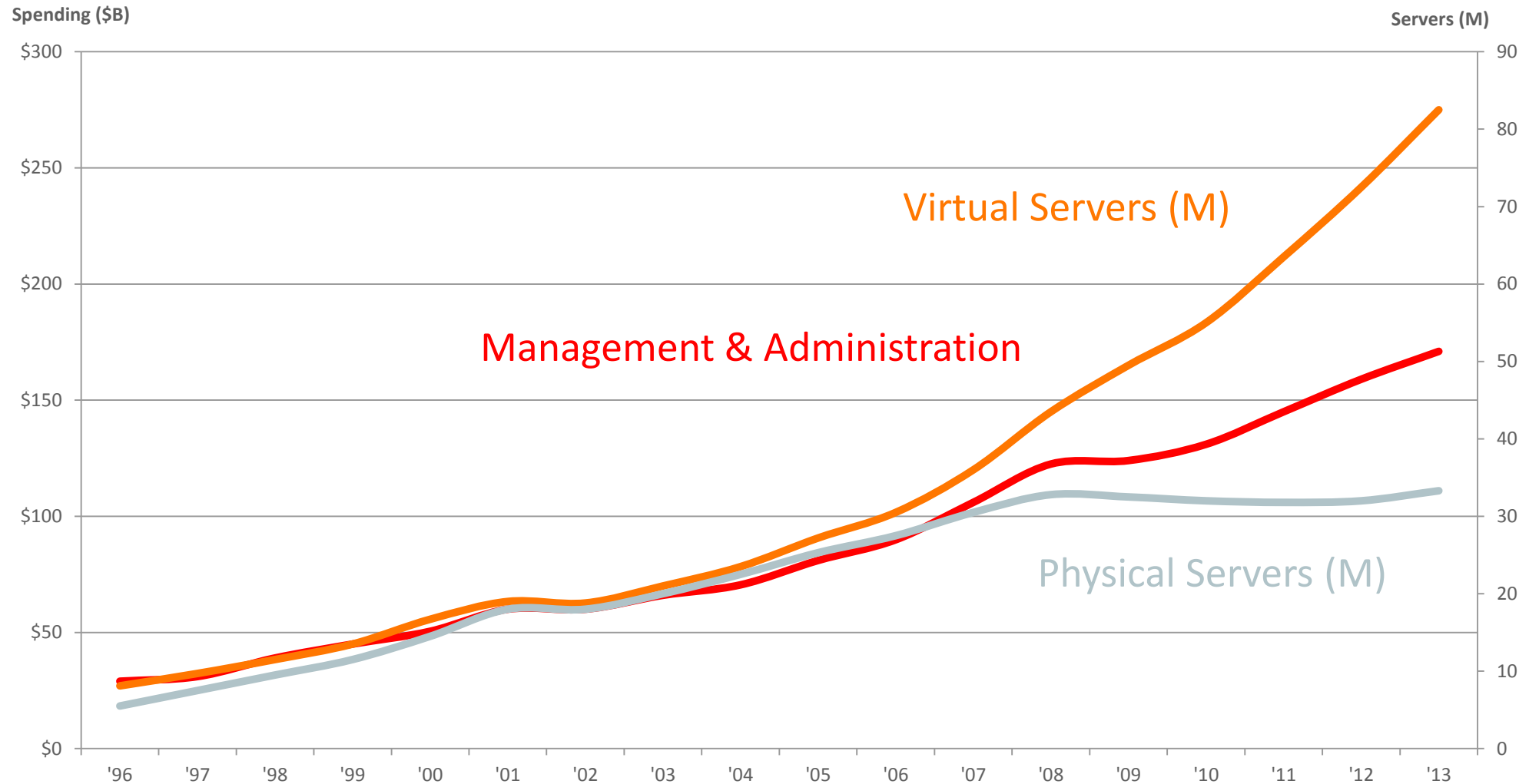


More Storage

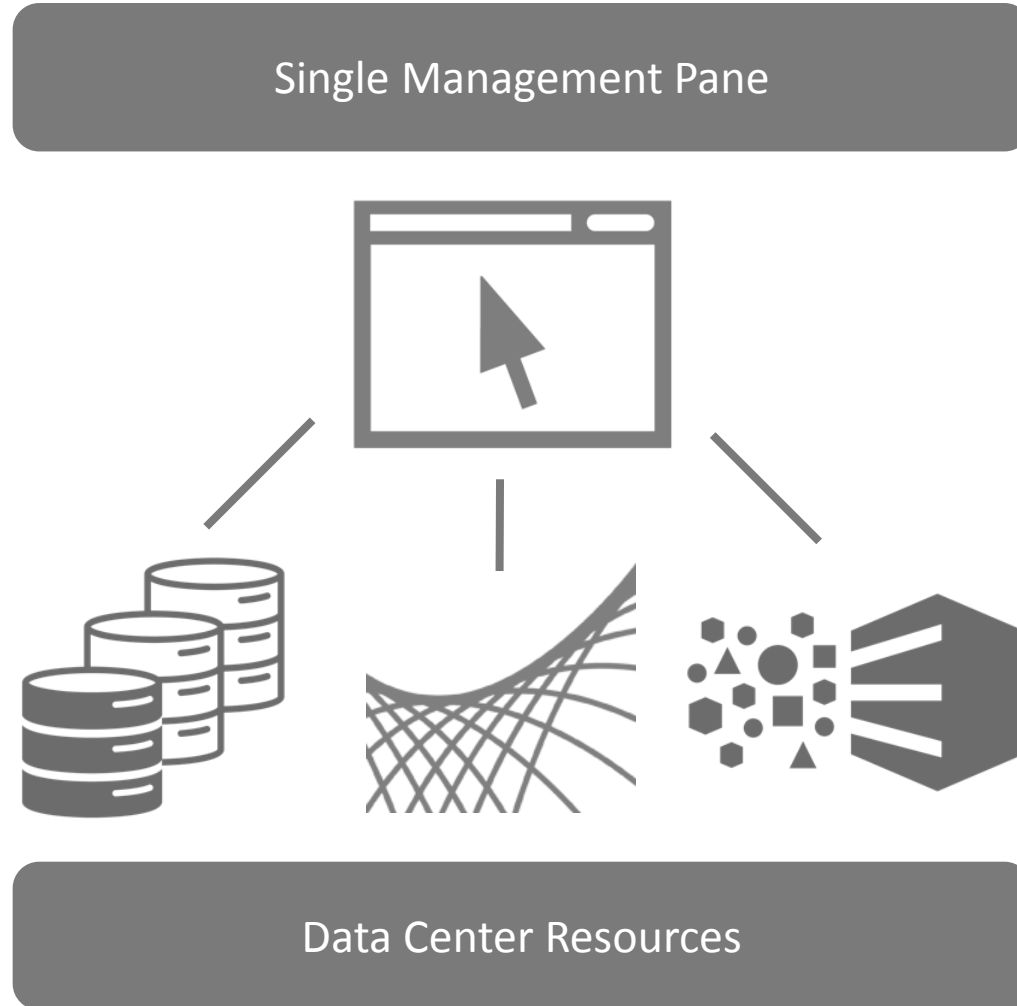


More Networking

# Virtualization Drives Management Costs



# OpenStack - A Quick View





## OpenStack Dashboard

User Name

Password

Sign In



Project

CURRENT PROJECT

**sct**

Manage Compute

Overview

Instances

Volumes

Images & Snapshots

Access & Security

Manage Network

Network Topology

Networks

Routers

Object Store

Containers

## Overview

### Limit Summary



**Instances**  
Used 11 of 60



**VCPUs**  
Used 61 of 200



**RAM**  
Used 63.0 GB of 4.9 TB



**Floating IPs**  
Used 56 of 60



**Security Groups**  
Used 0 of 10

### Select a period of time to query its usage:

From:

To:

The date should be in YYYY-mm-dd format.

**Active Instances: 11 Active RAM: 63GB This Period's VCPU-Hours: 75.62 This Period's GB-Hours: 1718.53**

Instance Name	VCPUs	Disk	RAM	Uptime
dminer-x86-1	1	10	2GB	2 weeks
esaxe-kzt-1	1	10	2GB	1 week, 2 days
ssdickso-x86-kz-1	4	20	4GB	1 week, 2 days
esaxe_ngz_1	1	10	2GB	1 week, 2 days
ssdickso-x86-ngz-1	4	20	3GB	1 week, 2 days

Project

CURRENT PROJECT

**sct**

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**Images & Snapshots**

Project (0)

Shared with Me (0)

Public (5)

Delete Images

Create Image

<input type="checkbox"/>	Image Name	Type	Status	Public	Protected	Format	Actions
<input type="checkbox"/>	sol-12_0-52-sparc	Image	Active	Yes	No	RAW	Launch More ▾
<input type="checkbox"/>	sol-11_2-42-sparc	Image	Active	Yes	No	RAW	Launch More ▾
<input type="checkbox"/>	sol-11_2-42-x86	Image	Active	Yes	No	RAW	Launch More ▾
<input type="checkbox"/>	sol-12_0-51-x86	Image	Active	Yes	No	RAW	Launch More ▾
<input type="checkbox"/>	sol-12_0-51-sparc	Image	Active	Yes	No	RAW	Launch More ▾

Displaying 5 items

	Name	Description	Size	Status	Volume Name	Actions
No items to display.						

Displaying 0 items

Project

### Instances

CURRENT PROJECT  
**sct**

Manage Compute

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Access & Security

Manage Network

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Routers

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Containers

<input type="checkbox"/>	Instance Name
<input type="checkbox"/>	jbutler-s12
<input type="checkbox"/>	bwahl VM-1
<input type="checkbox"/>	lossig-demu 1
<input type="checkbox"/>	ssdickso- sparc-ngz-3
<input type="checkbox"/>	ssdickso- sparc-ngz-
<input type="checkbox"/>	ssdickso- sparc-kz-1

### Launch Instance

Details

Access & Security

Networking

#### Availability Zone

nova

#### Instance Name

glfoste\_s11

#### Flavor

Oracle Solaris kernel zone - tiny

#### Instance Count

1

#### Instance Boot Source

Boot from image

#### Image Name

sol-11\_2-42-x86 (1.2 GB)

Specify the details for launching an instance.

The chart below shows the resources used by this project

#### Flavor Details

Name	Oracle Sola...
VCPUs	1
Root Disk	10 GB
Ephemeral Disk	0 GB
Total Disk	10 GB
RAM	2,048 MB

#### Project Limits

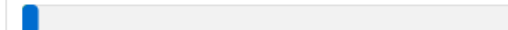
##### Number of Instances



##### Number of VCPUs



##### Total RAM



Cancel

Launch

- Project
- CURRENT PROJECT  
**sct**
- Manage Compute
  - Overview
- Instances**
- Volumes
- Images & Snapshots
- Access & Security
- Manage Network
  - Network Topology
  - Networks
  - Routers
- Object Store
- Containers

### Instances

<input type="checkbox"/>	Instance Name											Actions
<input type="checkbox"/>	gfoste_s11											Associate Floating IP More ▾
<input type="checkbox"/>	jibutler-s12											Create Snapshot More ▾
<input type="checkbox"/>	bwahl VM-1	sol-12_0-52-sparc	192.168.67.8 10.134.12.30	Oracle Solaris kernel zone - tiny   2GB RAM   1 VCPU   10.0GB Disk	bwahl	Active	None	Running	15 hours, 6 minutes			Create Snapshot More ▾
<input type="checkbox"/>	lossig-demo-1	sol-11_2-42-sparc	192.168.67.5 10.134.12.58	Oracle Solaris kernel zone - tiny   2GB RAM   1 VCPU   10.0GB Disk	darrenm	Active	None	Running	1 day, 12 hours			Create Snapshot More ▾
<input type="checkbox"/>	ssdickso-sparc-ngz-2	sol-12_0-51-sparc	192.168.67.7	Oracle Solaris non-global zone - small   3GB RAM   4 VCPU   20.0GB Disk	ssdickso	Active	None	Running	6 days, 14 hours			Create Snapshot More ▾
<input type="checkbox"/>	ssdickso-sparc-ngz-1	sol-12_0-51-sparc	192.168.67.4 10.134.12.46	Oracle Solaris non-global zone - small   3GB RAM   4 VCPU   20.0GB Disk	ssdickso	Active	None	Running	1 week			Create Snapshot More ▾

### Manage Floating IP Associations

**IP Address**

IP Address: 10.134.12.36 +

Port to be associated: gfoste\_s11: 192.168.67.11

Select the IP address you wish to associate with the selected instance.

Filter  Filter

Terminate Instances Soft Reboot Instances Launch Instance

<input type="checkbox"/>	Instance Name	Image Name	IP Address	Size	Keypair	Status	Task	Power State	Uptime	Actions
<input type="checkbox"/>	gfoste_s11	sol-11_2-42-x86	192.168.67.11	Oracle Solaris kernel zone - tiny   2GB RAM   1 VCPU   10.0GB Disk	-	Active	None	Running	3 minutes	<a href="#">Create Snapshot</a> <a href="#">More ▾</a>

Project

CURRENT PROJECT

sct

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Network Topology

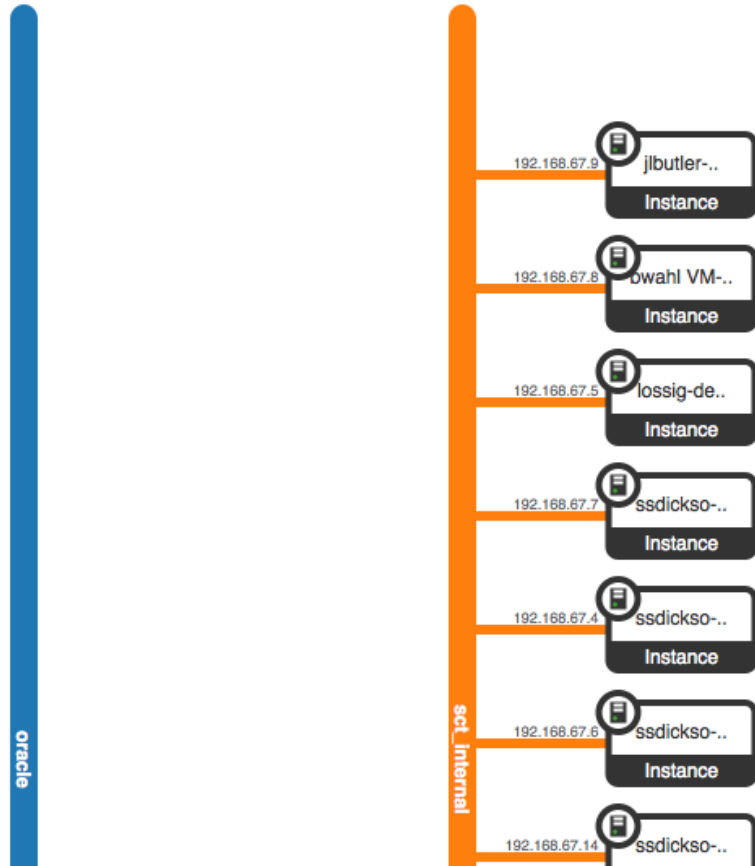
Small

Normal

Launch Instance

Create Network

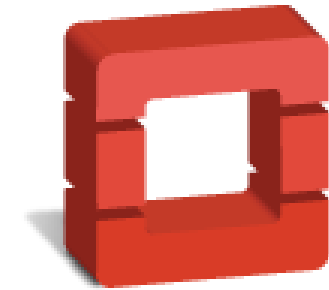
Create Router



# What is OpenStack?

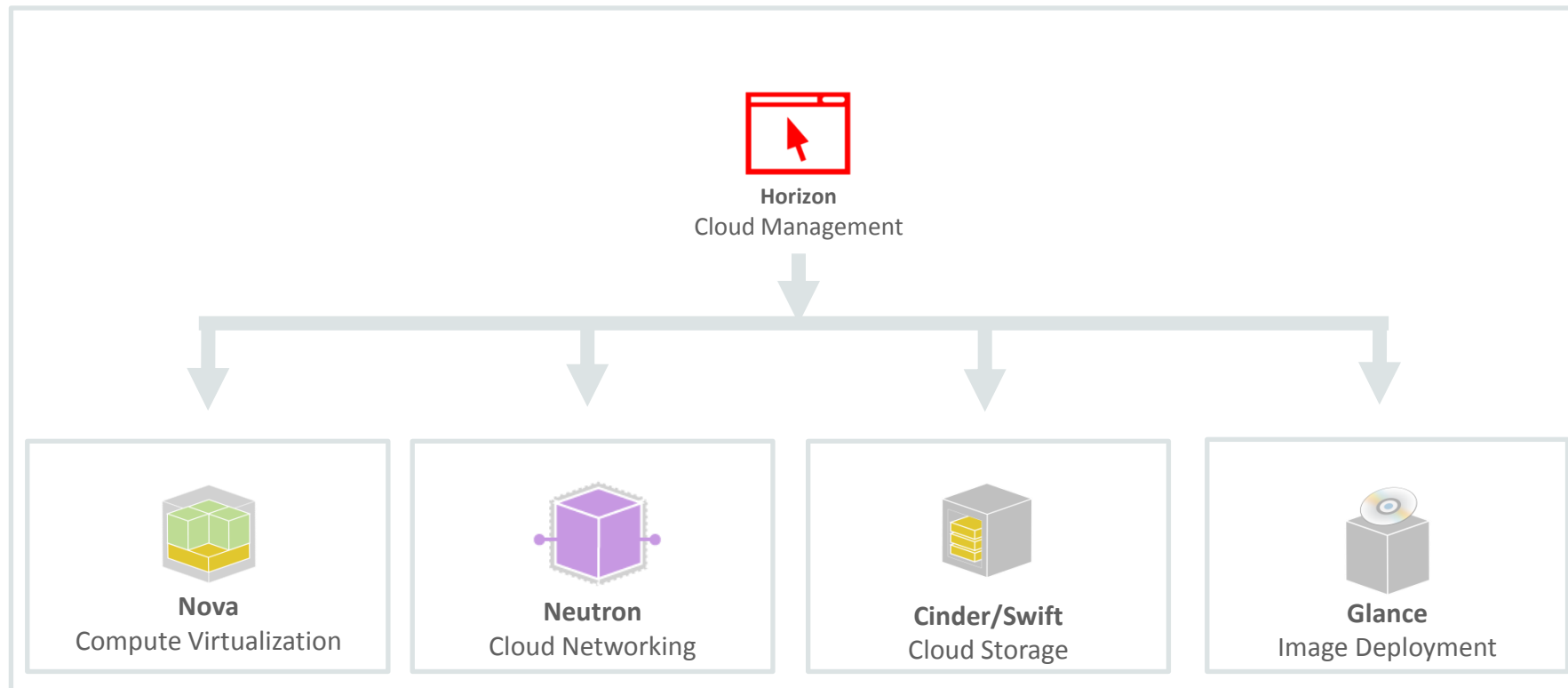
Open source software for managing private and public clouds

- A set of distributed services which control compute, storage, network, identity management, orchestration, and much more
  - Open source
    - Governed by Apache 2.0 License
  - Driven by a global community
  - 6 month release cycle
- Initial focus on IaaS, evolving into PaaS and SaaS
- Single management dashboard
- Open standardized APIs



**openstack**<sup>™</sup>  
CLOUD SOFTWARE


# OpenStack Simplified






# OpenStack - Modular Architecture

- Web portal / dashboard for cloud admins and self-service users
- Cloud services exposed through APIs
- CLI, Python libraries, ...
- Interoperating services with REST APIs



The image shows a screenshot of the OpenStack Horizon dashboard. The browser address bar displays 'horizon.openstack.org/project'. Below the address bar, there is a 'CURRENT PROJECT' dropdown menu and an 'Overview' link. Two circular progress indicators are visible, showing '24' and '5'. A large red banner is overlaid on the dashboard, containing the text 'SOFTWARE TO CONTROL YOUR CLOUD' in white. To the left of the banner, it says 'With The API' with a dashed arrow pointing down. To the right, it says 'With The Dashboard' with a dashed arrow pointing up. Below the banner, a dark grey box contains terminal-style text: 'nova boot --flavor 1 --image 397e713c-b95b-4186-ad46-6126863ea0a9 --key-name key\_pair1 my\_server', 'nova list', and 'swift upload my\_container ~/this\_object'.

[Watch a Demo of the Dashboard](#) 

[www.openstack.org](http://www.openstack.org)

# OpenStack API

RESTful API - <http://docs.openstack.org/api>

Representational State Transfer

**Table 2.1. Response formats**

Format	Accept Header	Query Extension	Default
JSON	application/json	.json	Yes
XML	application/xml	.xml	No

\* XML support is now deprecated

## Example 2.1. Request with headers: Get volume types

```
GET /v2/441446/types HTTP/1.1
Host: dfw.blockstorage.api.openstackcloud.com
X-Auth-Token: eaaafd18-0fed-4b3a-81b4-663c99ec1cbb
Accept: application/xml
```

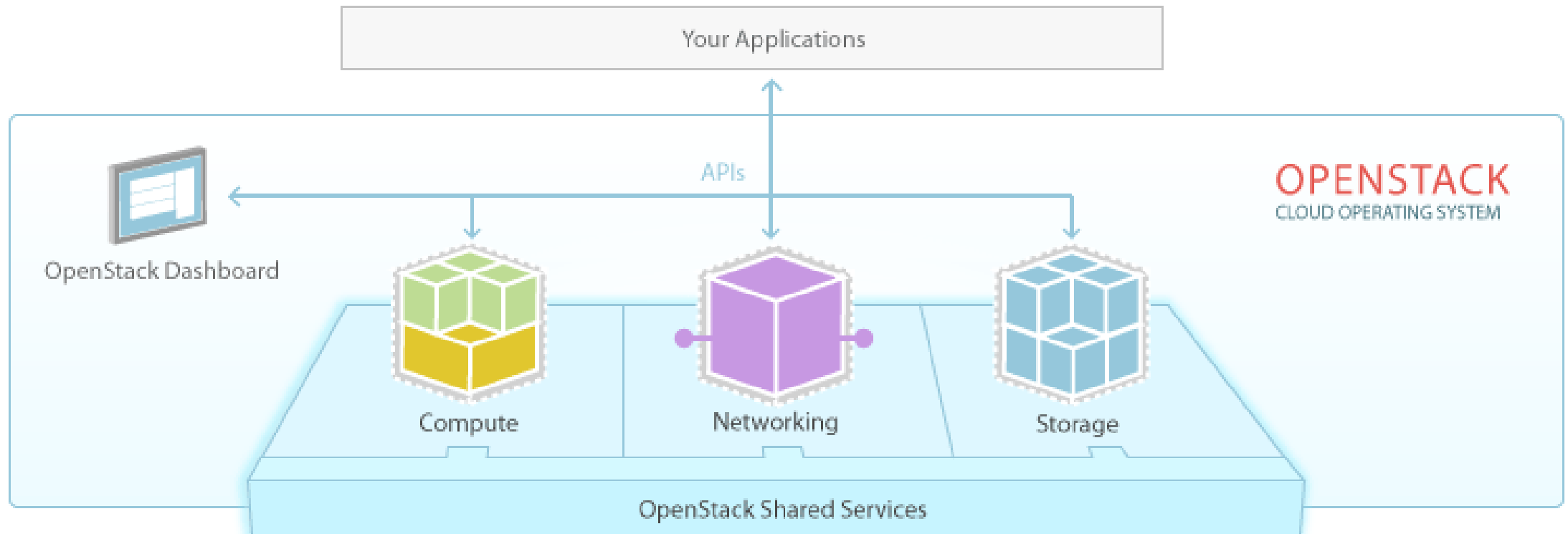
An XML response format is returned:

## Example 2.2. Response with headers

```
HTTP/1.1 200 OK
Date: Fri, 20 Jul 2012 20:32:13 GMT
Content-Length: 187
Content-Type: application/xml
X-Compute-Request-Id: req-8e0295cd-a283-46e4-96da-cae05cbfd1c7
```

```
<?xml version='1.0' encoding='UTF-7'?>
  <volume_types>
    <volume_type id="1" name="SATA">
      <extra_specs/>
    </volume_type>
    <volume_type id="2" name="SSD">
      <extra_specs/>
    </volume_type>
  </volume_types>
```

# OpenStack - Open APIs for Cloud Services



# OpenStack History

- Joint project launched by RackSpace and NASA in July 2010
- Evolved to non-profit corporate entity in September 2012
  - Kick-off Design Summit in Austin, TX: 2010
    - 25+ Companies, 100+ Advisors, Developers, and Founding Members
- Grown to 300+ Companies and Organizations
  - Oracle joined in December 2013 as Corporate Sponsor
  - Oracle Sponsors OpenStack Foundation;  
Offers Customers Ability to Use OpenStack to Manage Oracle Cloud Products and Services
    - <http://www.oracle.com/us/corporate/press/2079843>
- 2014: 4.500 attendees at OpenStack Summit in Atlanta, 4.600 in Paris  
May 18-22, 2015 in Vancouver

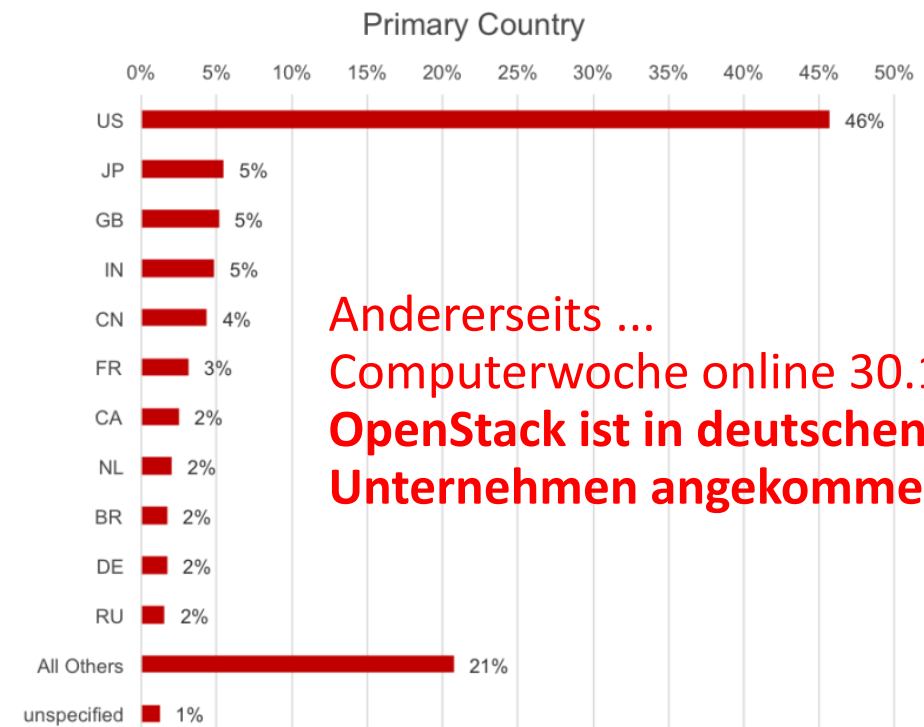
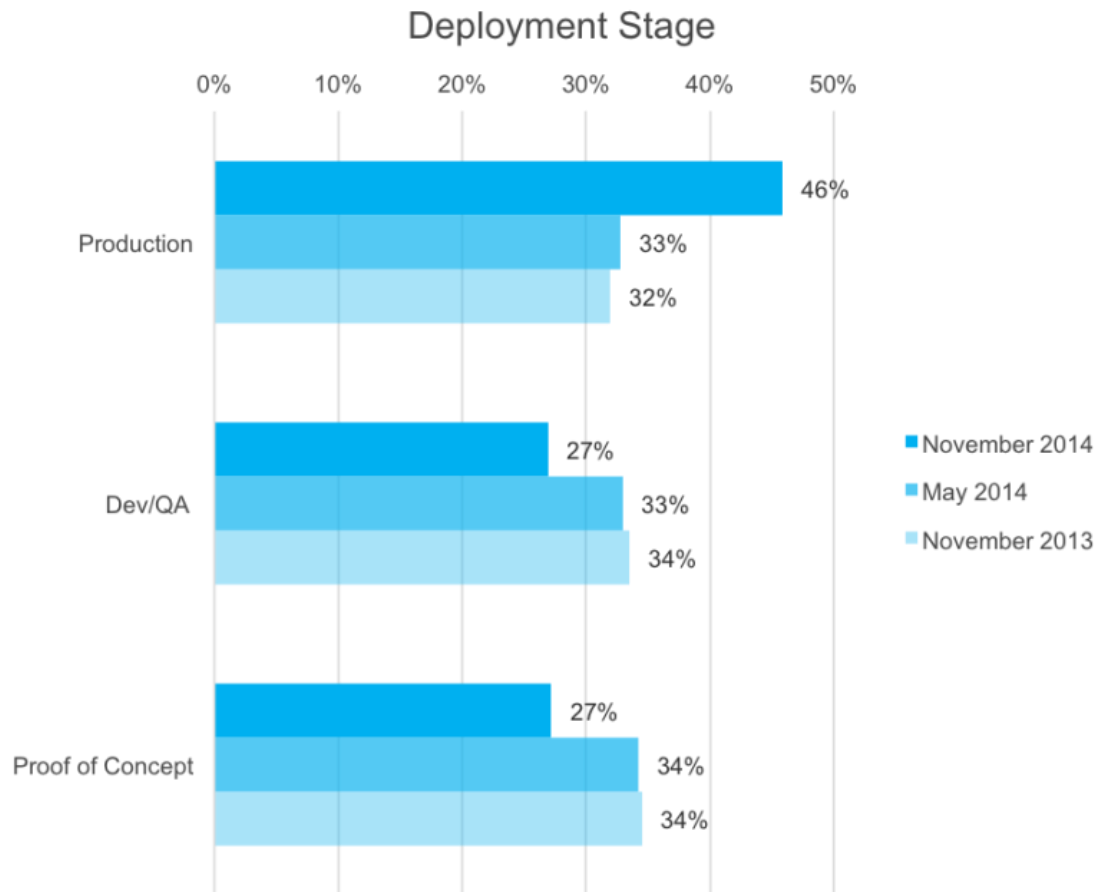
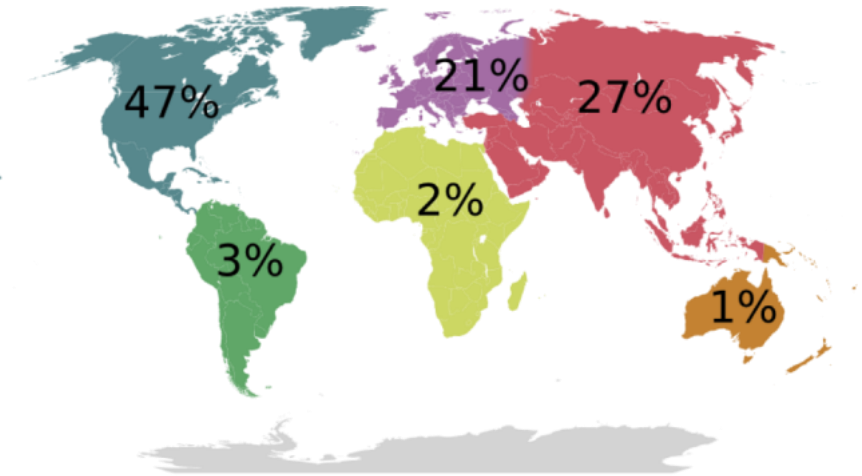


# OpenStack Deployment Survey

## Paris Summit, November 2014

1500 responses, 740 unique deployments

<http://superuser.openstack.org/articles/openstack-user-survey-insights-november-2014>



**Andererseits ...  
Computerwoche online 30.10.2014  
OpenStack ist in deutschen  
Unternehmen angekommen**

# OpenStack Deployments and Superusers

Forbes

2013

TECH | 3/26/2013 @ 9:28AM | 61,125 Views

### Paypal To Drop VMware From 80,000 Servers and Replace It With OpenStack (Updated)

+ Comment Now + Follow Comments

(Update: VMware Loses More Than \$2 Billion in Market Cap on PayPal / Ebay Rumors)

InformationWeek  
**NETWORK**Computing

DATA CENTERS

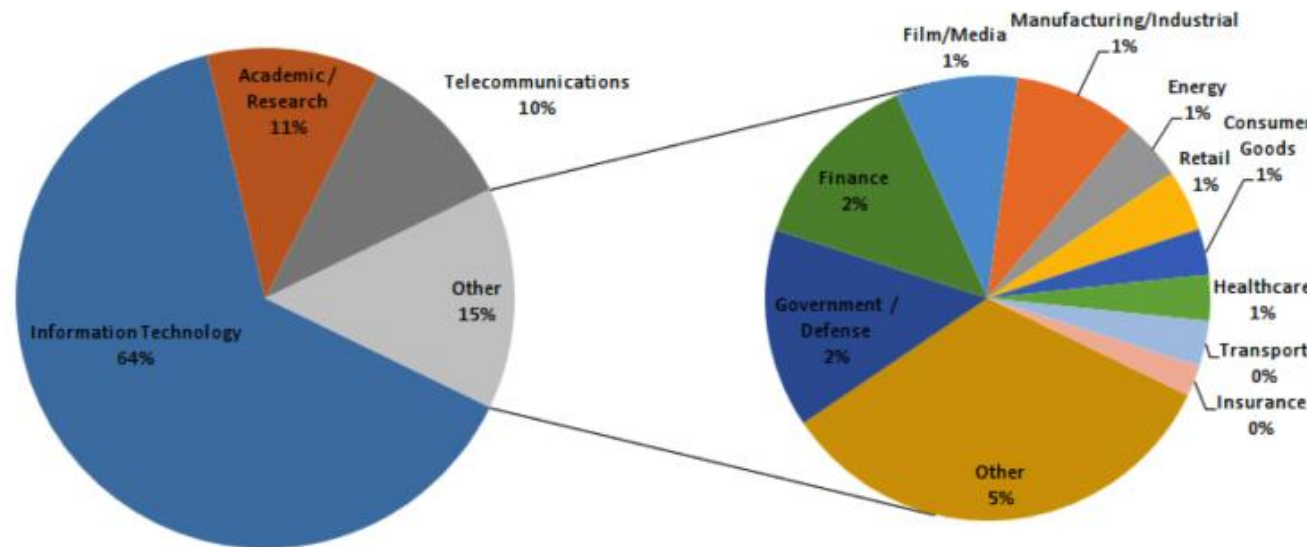
9/20/2013  
10:21 PM

### PayPal: OpenStack Won't Replace VMware In Data Center



VMware vs. OpenStack won't be an either/or decision for PayPal. It will layer OpenStack on top of existing tech as it moves toward a software-defined data center.

## Industries



OpenStack User Survey, November 2014

[openstack.org/user-stories](http://openstack.org/user-stories)

## Featured Superusers at OpenStack Summits

### Atlanta May 2014:

Wells Fargo, Disney, AT&T, Sony, Digital Film Tree

### Paris, November 2014:

[BMW](#), [CERN](#), [Expedia](#), [Tapjoy](#), BBVA Bank

Telcos: NFV – Network Function Virtualization

[Telekom Deutschlands Arroach to NFV](#)

CERN: 75.000+ cores, Rackspace: 20.000+ cores

Walmart: 100.000+ cores



# Pets versus Cows Service Models

## Heavily versus lightly managed workloads

Origins of this paradigm

Are your servers PETS or CATTLE?

[http://www.theregister.co.uk/2013/03/18/servers\\_pets\\_or\\_cattle\\_cern/](http://www.theregister.co.uk/2013/03/18/servers_pets_or_cattle_cern/)

### Pattern: Scale-out, not UP

Scale Up: (Virtual\*)  
Servers are like pets



garfield.company.com

You name them  
and when they get  
sick, you nurse  
them back to  
health

Scale Out: (Virtual\*)  
Servers are like cattle



web001.company.com

You number them  
and when they get  
sick, you shoot  
them

### Service Model



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



- Cattle are given numbers like vm0042.cern.ch
- They are almost identical to other cattle
- When they get ill, you get another one

• Future application architectures should use Cattle but Pets with strong configuration management are viable and still needed



attrib: Bill Baker, Distinguished Engineer, Microsoft  
\* added by yours truly ...

19

cloudscaling

CERN Data Centre Evolution

<http://www.slideshare.net/gmccance/cern-data-centre-evolution>

# OpenStack Community Releases

## 5 Years, 12 Releases

Version	Release Date
Austin	October, 2010
Bexar	February, 2011
Cactus	April, 2011
Diablo	September , 2011
Essex	April 2012
Folsom	September, 2012
Grizzly	April, 2013
Havana	Oct, 2013
Icehouse	April, 2014
Juno	Oct 2014
Kilo	April 2015 (Expected)
Liberty	Q4 2015 (Expected)



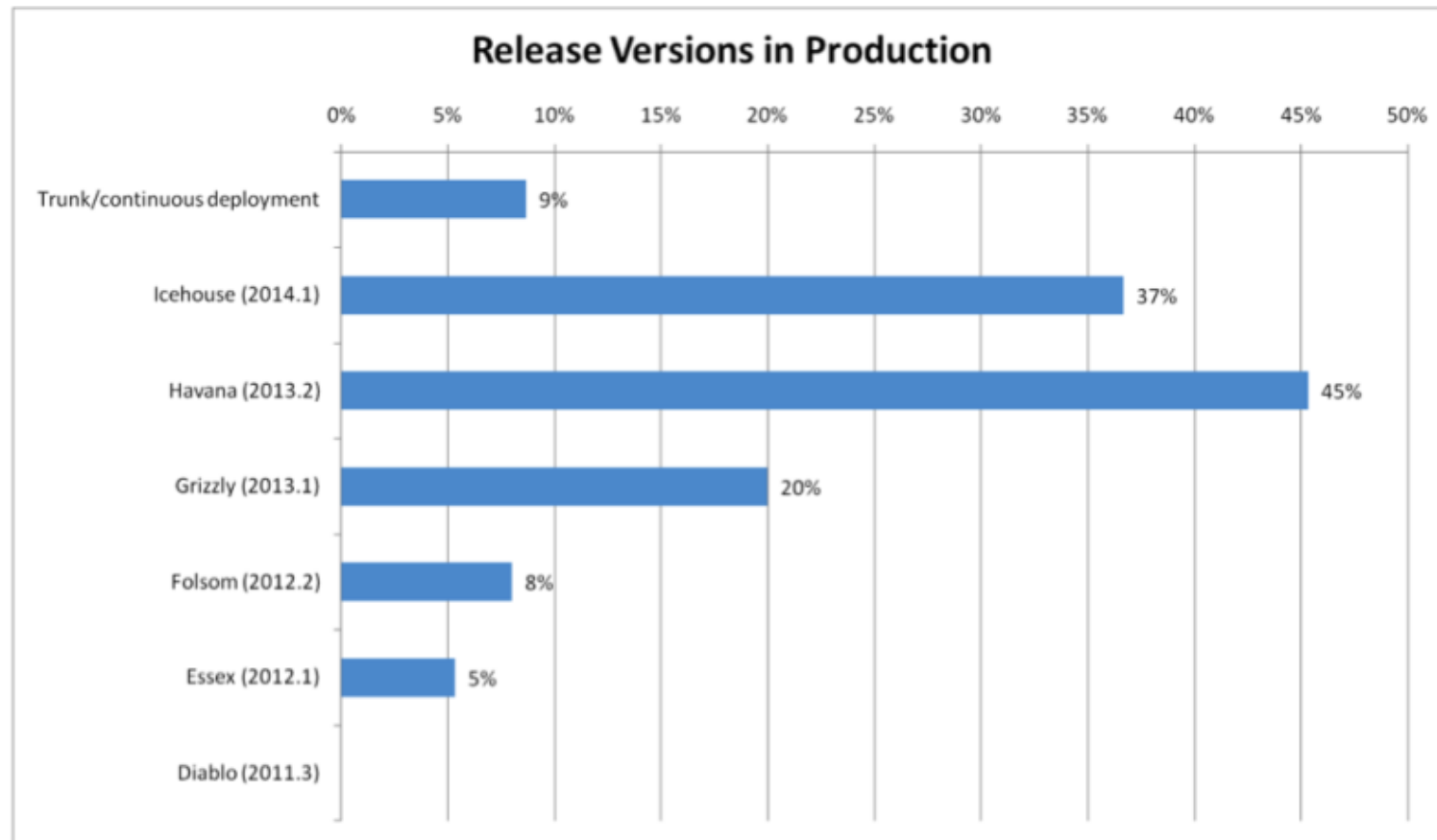


# OpenStack Deployment Survey

## Paris Summit, November 2014

1500 responses, 740 unique deployments

<http://superuser.openstack.org/articles/openstack-user-survey-insights-november-2014>



# OpenStack Distros

## http://www.openstack.org/marketplace/distros

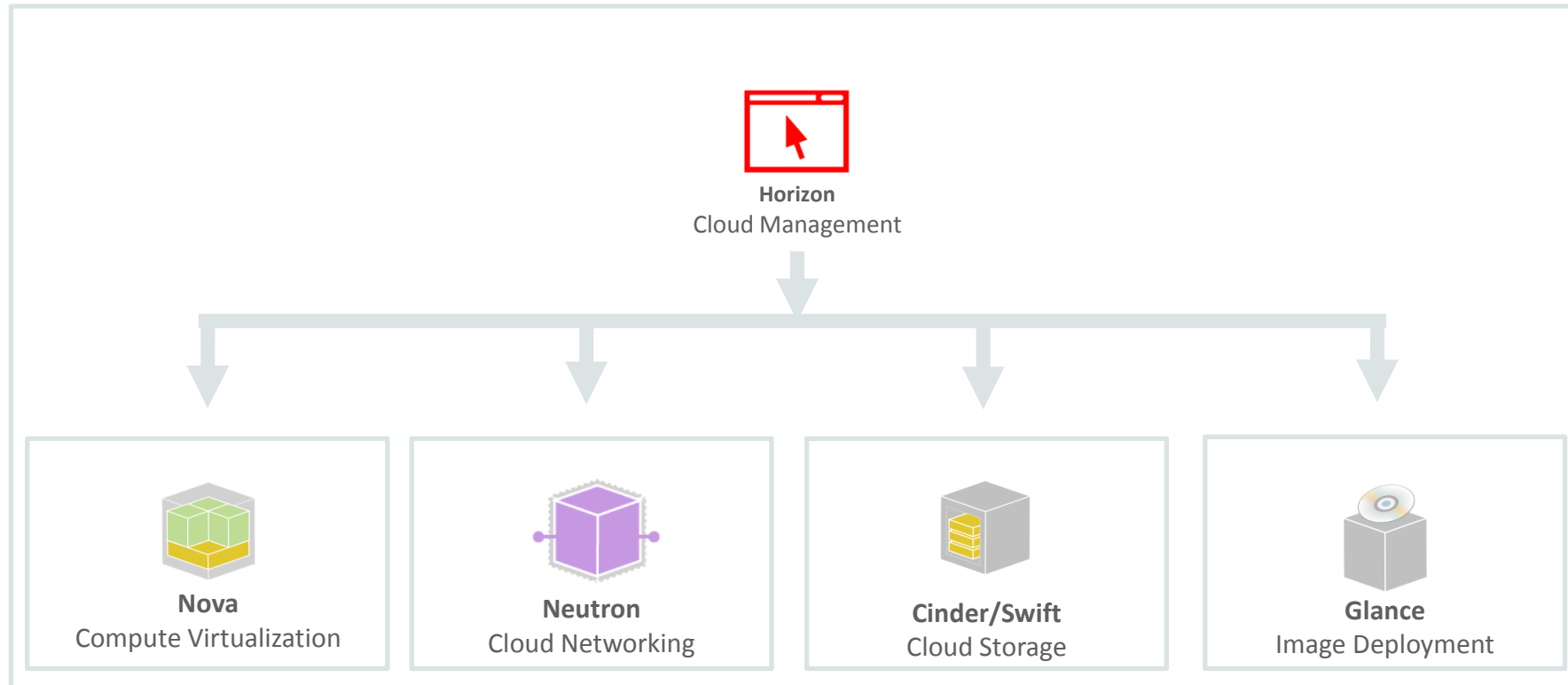
The screenshot displays the OpenStack Marketplace website interface. At the top, there is a navigation bar with the OpenStack logo, a search bar, and links for Software, Users, Community, Marketplace, Events, Blog, Docs, and Sign In. Below the navigation bar, there are several category icons: Training, Distros & Appliances, Public Clouds, Hosted Private Clouds, Consulting & Integrators, and Drivers. A filter bar allows users to search for products by name or select a service.

The main content area is a grid of product cards, each representing a different OpenStack distribution. Each card includes the provider's logo, the product name, a brief description, and a 'Details' button. The products shown are:

- NEBULA ONE CLOUD CONTROLLER**: Nebula sells a turn-key hardware appliance allowing enterprises to easily deploy private clouds that support self-service, multi-tenant elastic compute, storage, & network services that are API compatible with OpenStack & AWS EC2 & S3.
- IBM CLOUD MANAGER WITH OPENSTACK**: IBM Cloud Manager with OpenStack is an easy to deploy cloud management software offering based on OpenStack with open cloud APIs. We include enhancements that features a self-service portal for workload provisioning, image management, and monitoring.
- RED HAT ENTERPRISE LINUX OPENSTACK PLATFORM**: Engineered with the latest OpenStack community and Red Hat Enterprise Linux code, RHEL-OSP offers users a scalable and secure foundation for building an open private or public cloud without compromising on availability, security or performance.
- ORACLE OPENSTACK FOR ORACLE SOLARIS**: Oracle Solaris, "Engineered for Cloud", delivers mission-critical cloud and enterprise infrastructure with built-in virtualization, simplified software lifecycle management, cloud scale data management, and advanced protection cloud environments.
- METACLOUD OPENSTACK**: Metacloud OpenStack® delivers a public cloud experience, privately in your DC, or colo, or hosted in our 7 global DCs. We provide engineering, setup, and 24x7 ops for your OpenStack private cloud, so you can focus on building and running your apps.
- HP HELION OPENSTACK® COMMUNITY EDITION**: HP Helion OpenStack® Community edition is a pure, free-to-license distribution that offers hardened, automated deployment and updates with optional support for small-scale private cloud deployments. Customers can upgrade for large scale-out needs.
- SUSE CLOUD**: SUSE Cloud is an open source software solution based on the OpenStack and Crowbar projects that provides the fundamental capabilities for enterprises to deploy and operate an automated, mixed hypervisor Infrastructure-as-a-Service Private Cloud.
- OPEN CLOUD SYSTEM OCS**: Open Cloud System 3.1 is a complete Infrastructure as a Service IaaS solution powered by OpenStack technology. OCS is designed to meet the requirements of next-generation cloud-based, scale-out applications.
- PISTON OPENSTACK™**: Piston OpenStack software automates the orchestration of an entire private cloud environment on x86 commodity servers. Companies building web, mobile, and big data applications use Piston to bring products to market faster.
- ONYXCCS ELECTRASTACK**: ONYX delivers a turnkey, hyperscale, OpenStack™ cloud system automated with Symphony™ software. The powerful software automation takes the complexity and cost out of deploying and running your public or private cloud no matter how small or large.
- SERVICE PROVIDER CLOUD**: This product provides to Service Provider a unified Openstack infrastructure and best-of-breed applications. Self-service management portal allows end-users to provision their own IT resources and deploy applications, fully administrated by provider.
- ORACLE OPENSTACK FOR ORACLE LINUX**: Oracle OpenStack for Oracle Linux is a combined offering supported end to end including OpenStack, operating system, hypervisor and more. The product is available as part of Oracle Linux and Oracle VM Premier Support at no additional cost.
- MIRANTIS OPENSTACK**: Mirantis OpenStack is the most flexible and open distro of OpenStack. It integrates core OpenStack, key related projects and 3rd party plug-ins to offer community innovations with the testing, support and reliability of enterprise software.
- SWIFTSTACK OBJECT STORAGE PLATFORM**: SwiftStack powers enterprise customers with a durable, massively scalable, software defined object storage platform that seamlessly integrates with existing IT infrastructure and manages any standard hardware across multi-geographic data centers.
- RACKSPACE PRIVATE CLOUD SOFTWARE**: Start building your private cloud today. Rackspace Private Cloud combines the power of OpenStack with a streamlined deployment process that allows you to get your private cloud up and running in less than an hour.
- UBUNTU OPENSTACK**: Ubuntu OpenStack is a fully integrated and optimised combination of Ubuntu Server LTS, OpenStack and powerful tools to deploy, manage and scale OpenStack clouds. Ubuntu OpenStack is available with 24x7 production grade support worldwide.

On the right side of the page, there is a sidebar titled 'OPENSTACK ONLINE HELP' with links to Online Docs, Operations Guide, Security Guide, and Getting Started. Below this, there is a question: 'Does your company offer distributions or appliances for OpenStack? Be listed here! Email us for details.'

# OpenStack Simplified



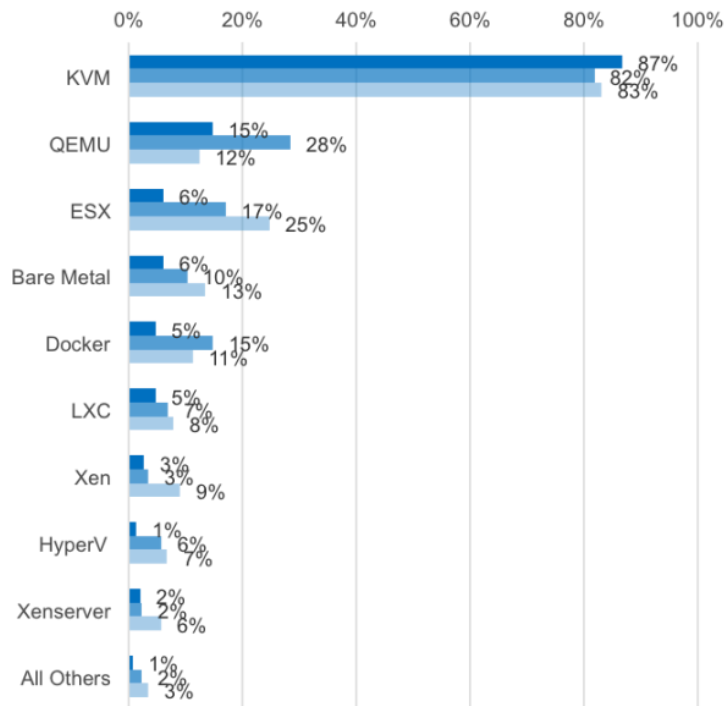
# OpenStack Deployment Survey

## Paris Summit, November 2014

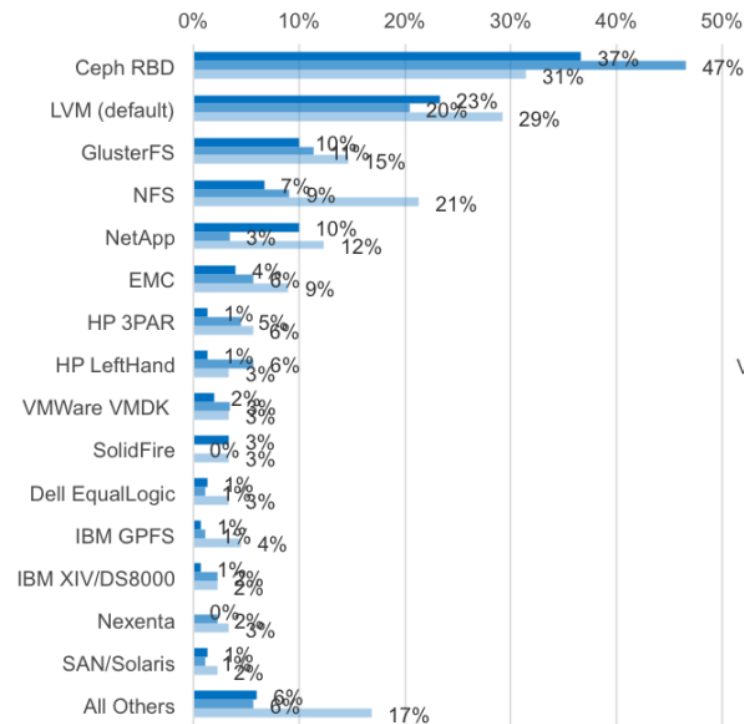
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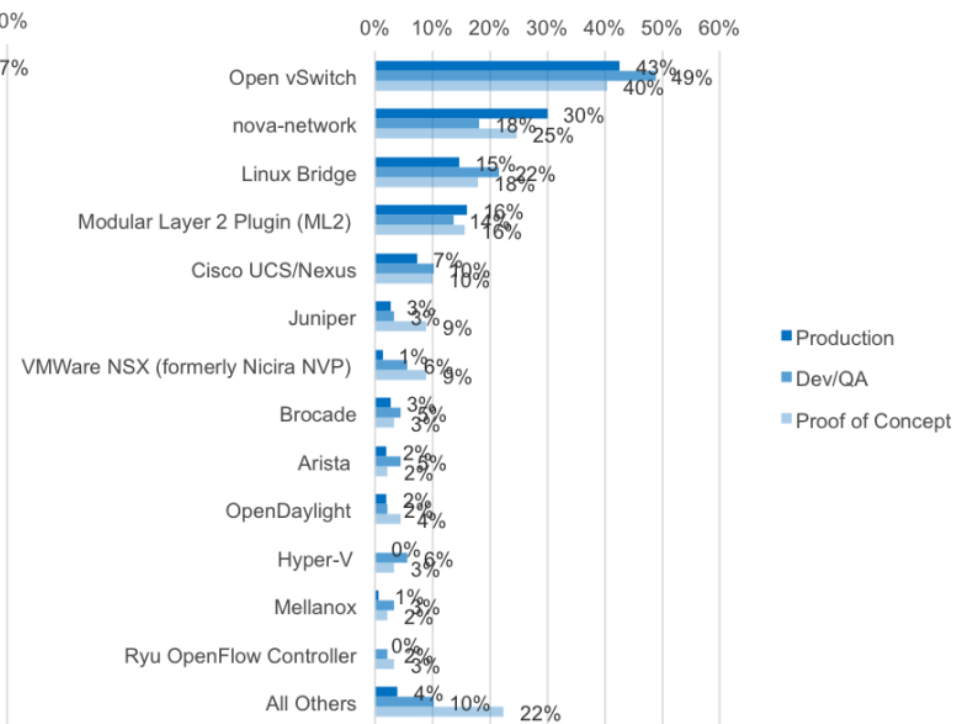
### Hypervisors



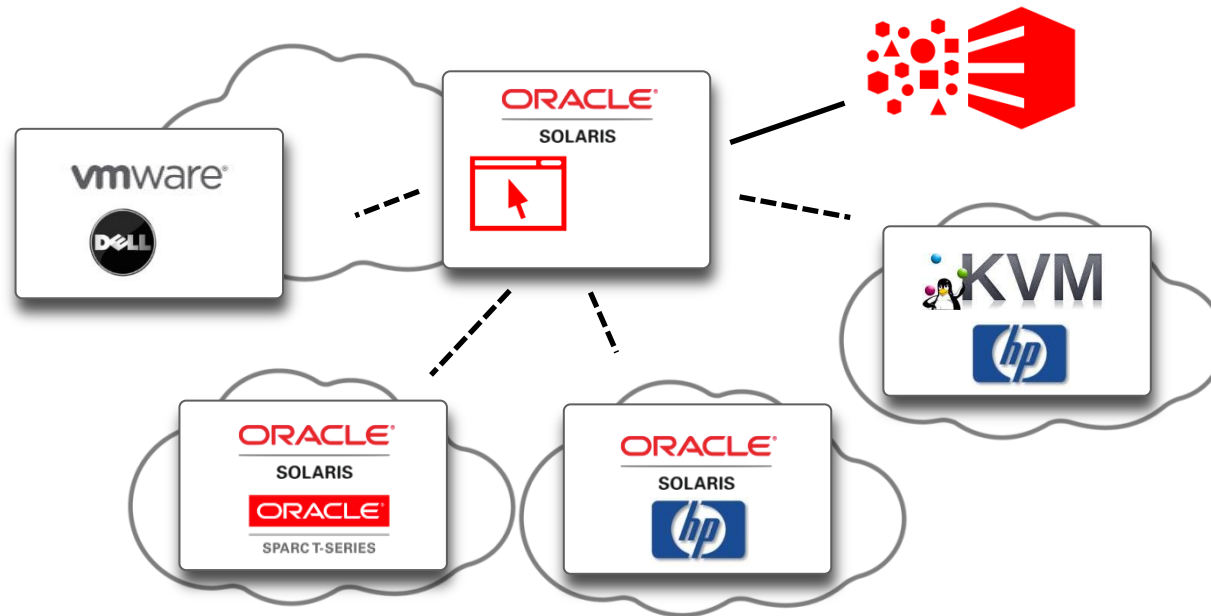
### Block Storage Drivers



### Network Drivers

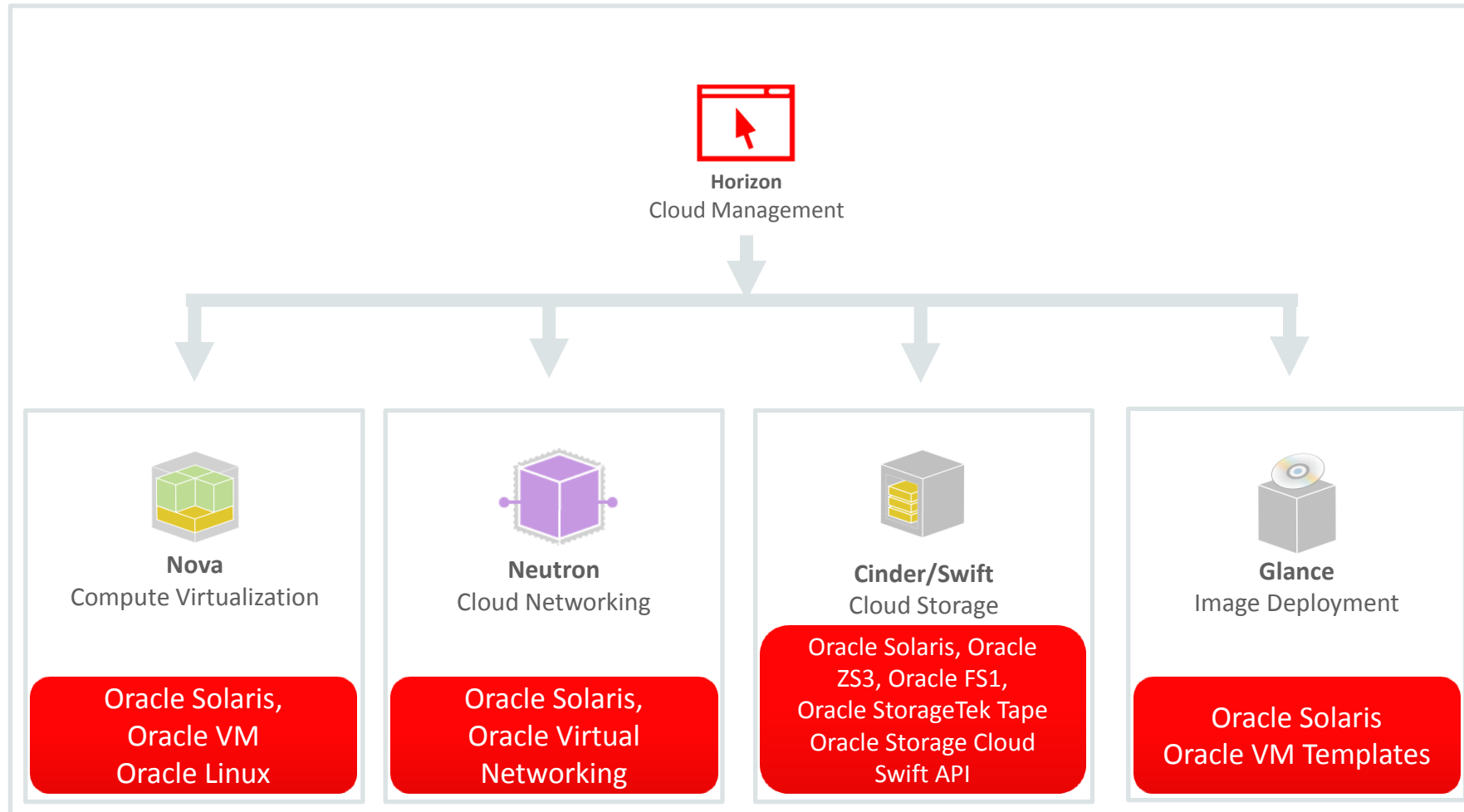


# OpenStack Use Cases – Heterogeneous IaaS



Today some caveats e.g. networking

# OpenStack Engineering Across Oracle's Portfolio



# Oracle Solaris 11.2: Enterprise OpenStack OS. Virtualization. SDN. OpenStack. Complete.

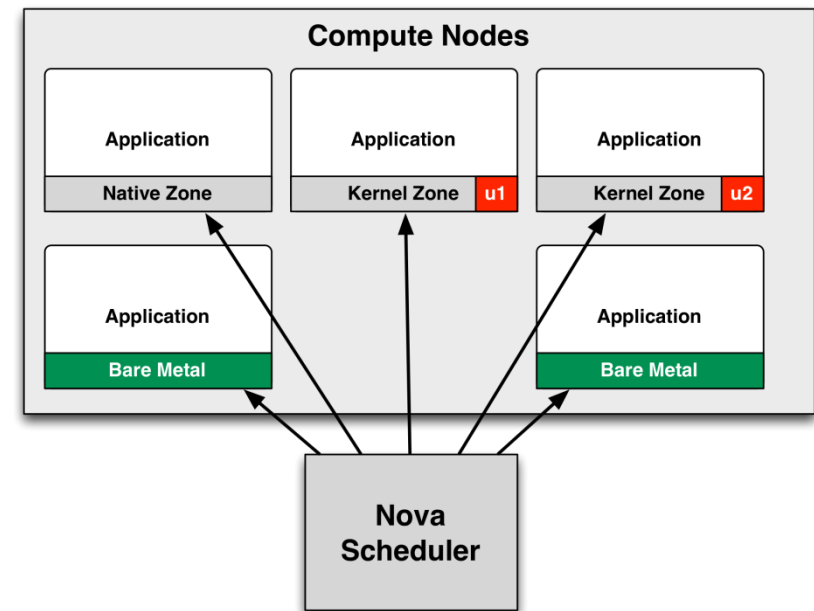
- Complete OpenStack
  - Havana-based
    - Nova, Neutron, Cinder, Swift, Glance, Keystone, Horizon
  - Heat engine with SRU 11.3.4.1
- All integrated into Oracle Solaris 11.2
- Upstream contributions to OpenStack Project
  - <https://openstack.java.net/> -> Browse Source



# OpenStack Nova Compute – Oracle Solaris Zones

High density virtual environments – ideal for multi-tenant cloud

- Provision Native Zones and/or Kernel Zones
  - Independent patching and updating with Oracle Solaris Kernel Zones
  - Same administrative interfaces
- Integrated SDN
- Fully portable with Unified Archives
  - Easy transitioning between Kernel Zones, Native Zones, Oracle VM and bare-metal

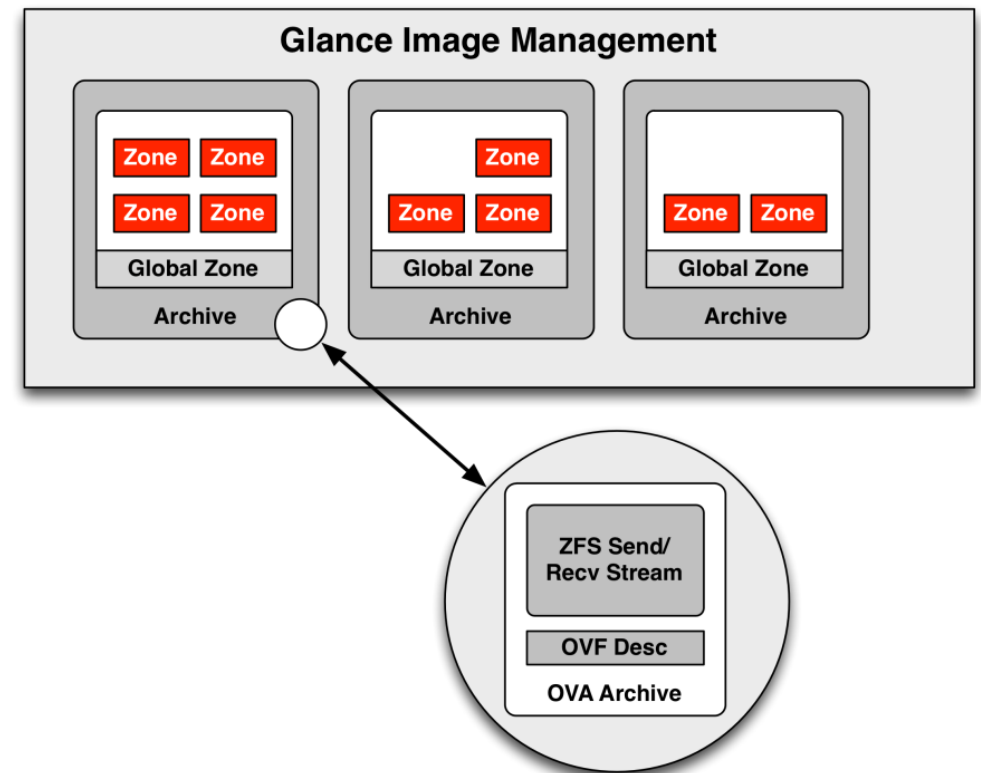




# OpenStack Glance Image Management – Unified Archives

## Rapid deployment through VM templates

- Flexible deployment on bare metal or virtualized
  - Same archive image for both
  - Unified Archives introduced in Solaris 11.2
    - archive formats for cloning and for recovery
    - archiveadm(1M)
- Snapshot a running VM as an image back to Glance to later re-deploy
- Rapid deployment with Automated Installer across all compute nodes



# Creating and Importing an Unified Archive into Glance

- `global# zonecfg -z myzone create`  
`global# zoneadm -z myzone install`  
`global# ...`  
`global# archiveadm create -z myzone /var/tmp/myzone.uar`  
`global# glance image-create --container-format bare --disk-format raw \  
--is-public true --name "Oracle Solaris 11.2 x86 NGZ" \  
--property architecture=x86_64 \  
--property hypervisor_type=solariszones \  
--property vm_mode=solariszones < /var/tmp/myzone.uar`

# OpenStack Nova Flavor

## extra\_spec zonecfg:brand

```
$ nova flavor-list
```

ID	Name	Memory_MB	Disk	Ephemeral	Swap	VCPUs
1	Oracle Solaris kernel zone - tiny	2048	10	0		1
10	Oracle Solaris non-global zone - xlarge	16384	80	0		32
2	Oracle Solaris kernel zone - small	4096	20	0		4
3	Oracle Solaris kernel zone - medium	8192	40	0		8
4	Oracle Solaris kernel zone - large	16384	40	0		16
5	Oracle Solaris kernel zone - xlarge	32768	80	0		32
6	Oracle Solaris non-global zone - tiny	2048	10	0		1
7	Oracle Solaris non-global zone - small	3072	20	0		4
8	Oracle Solaris non-global zone - medium	4096	40	0		8
9	Oracle Solaris non-global zone - large	8192	40	0		16

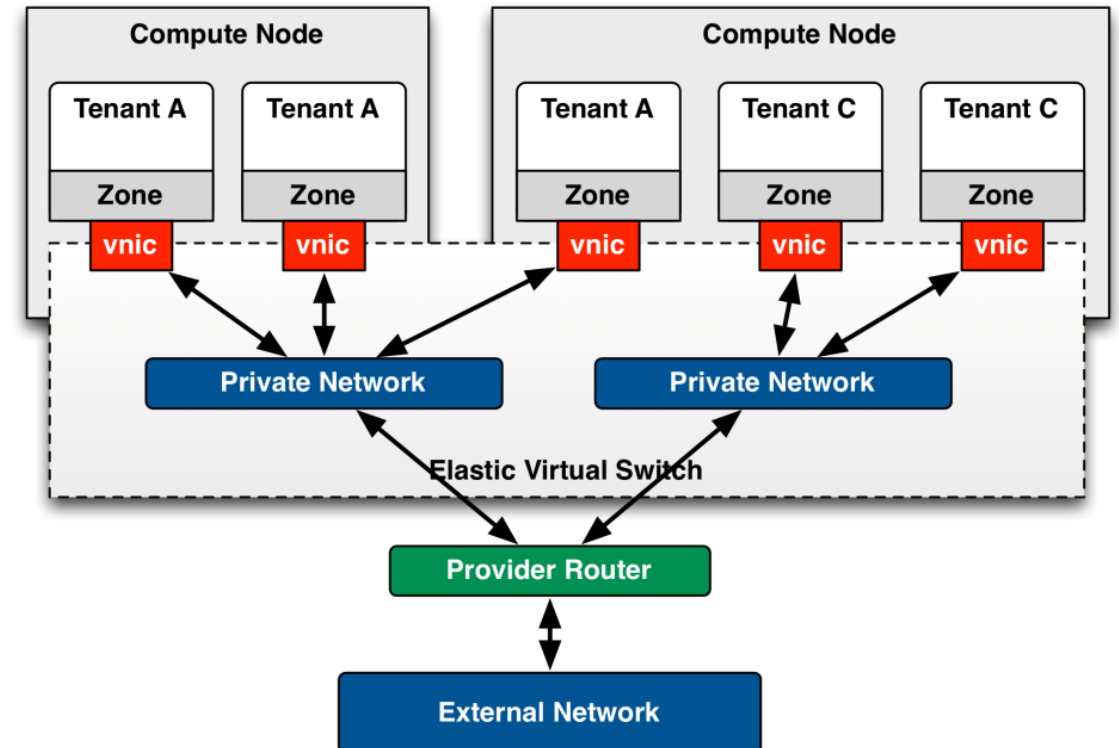
```
$ nova flavor-show 4
```

Property	Value
name	Oracle Solaris kernel zone - large
ram	16384
OS-FLV-DISABLED:disabled	False
vcpus	16
extra_specs	{'zonecfg:brand': u'solaris-kz', u'zonecfg:bootargs': u'-v'}
swap	
os-flavor-access:is_public	True
rxtx_factor	1.0
OS-FLV-EXT-DATA:ephemeral	0
disk	40
id	4

# OpenStack Neutron Networking – Solaris EVS

## SDN for servers and switches

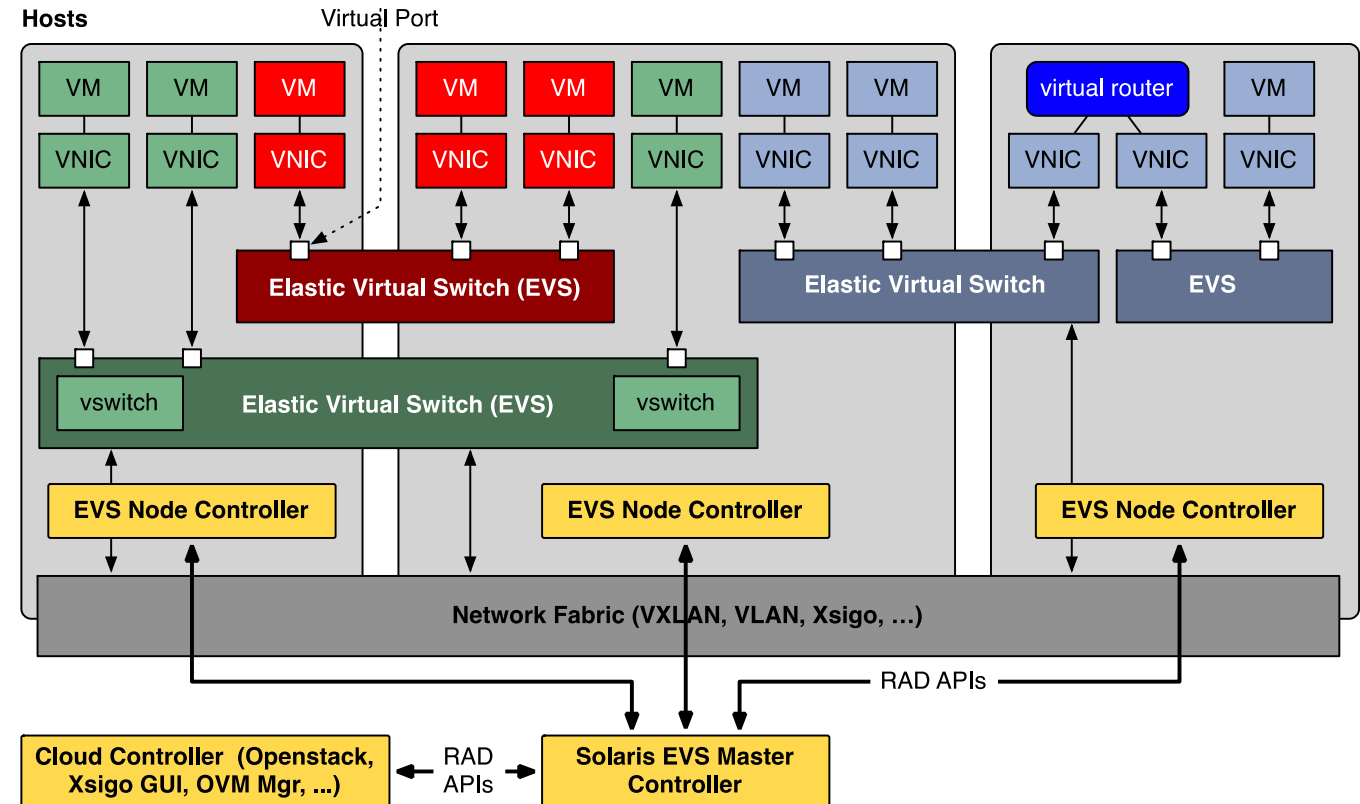
- Integrated with Oracle Solaris network virtualization
  - Elastic Virtual Switch connects compute resources with virtual switching
  - Flexible resource management to help maintain critical SLAs



# Multi-Tenant Virtual Networks

## Solaris Elastic Virtual Switches (EVS)

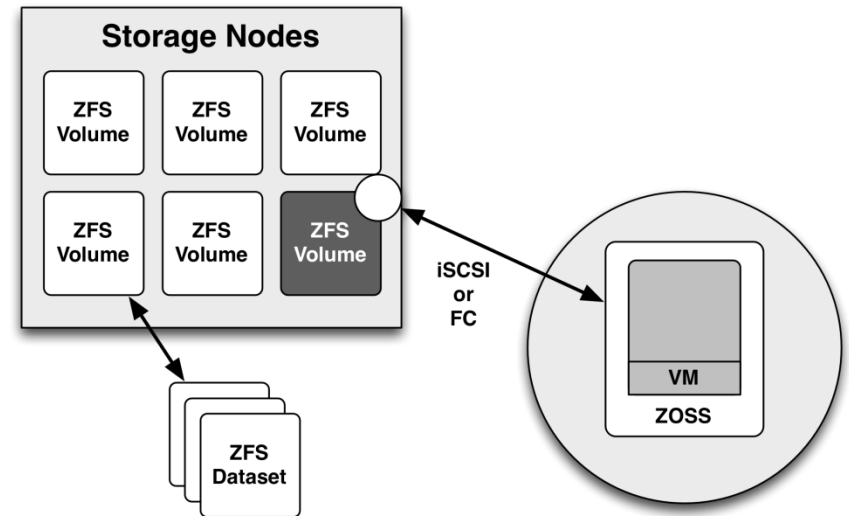
- Deploy on any fabric
  - VLAN or VxLAN
    - VxLAN: Virtual segments layered on top of generic IP networks – RFC 7348
  - evsadm(1M)
- Virtual Ports (VPorts)
  - Centralized management and statistics
  - SLA enforcement per VPort
- Application-driven SLA
  - Limit bandwidth, set priority from the application
    - setsockopt() SO\_FLOW\_SLA
  - High-priority hardware-assisted L7 flows



# OpenStack Cinder/Swift Data Management – ZFS

Production ready data management, no compromises

- ZFS is primary backend for block and object storage
  - Integrated data services including snapshots, encryption, and deduplication
  - iSCSI or FC LUN provisioning
- Integrated Cinder Driver for the ZFS Storage Appliance
- Choose volume driver in `/etc/cinder/cinder.conf`
  - ZFSVolumeDriver - local volumes for use by Nova on the same node as the Cinder volume service.



– ZFS iSCSI Driver Supports creation and export of iSCSI targets for use by remote Nova compute nodes.

# OpenStack Cinder Data Management – ZFS

## Volume Driver

- Choose volume driver in `/etc/cinder/cinder.conf`
  - ZFSVolumeDriver
    - Supports creation of local volumes for use by Nova on the same node as the Cinder volume service.
  - ZFSISCSIDriver
    - Supports creation and export of iSCSI targets for use by remote Nova compute nodes.
  - ZFSFCDriver
    - Supports creation and export of Fibre Channel LUNs for use by remote Nova compute nodes.
  - ZFSSAISCSIDriver
    - Supports creation and export of iSCSI targets from a remote Oracle ZFS Storage Appliance for use by remote Nova compute nodes.

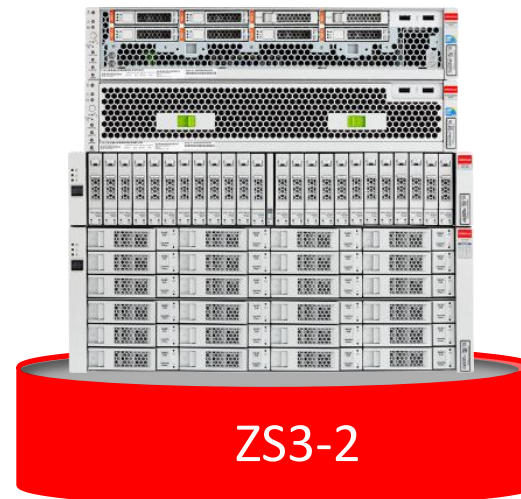
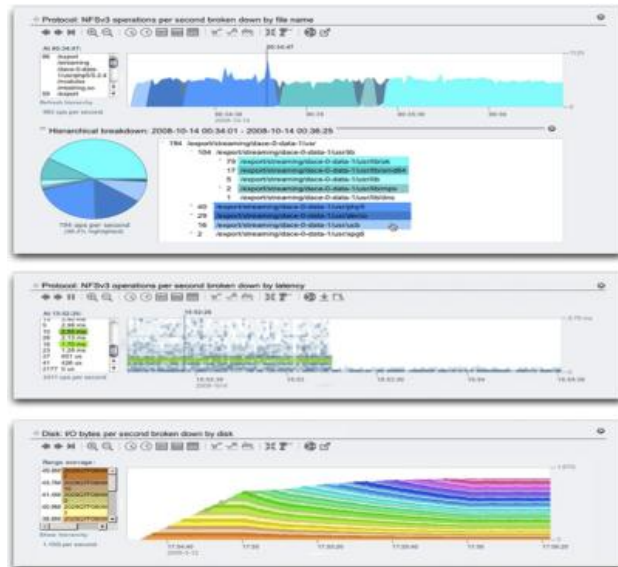
# Oracle ZFS Storage Appliance



## ZFS Storage OS

Most powerful storage software suite  
Co-Engineered with Oracle software

- HCC Support
- Oracle Intelligent Storage Protocol (OISP)
- Hybrid Storage Pools
- BUI
  - Fine Grained Real Time Analytics



ZS3-2

- Single or Dual Controllers
- 512GB or 1TB DRAM
- 8 PCIe Slots
- 12TB Read Flash
- 4TB Write Flash
- 1.5PB scalability (16 DE's)
- 32 CPU cores



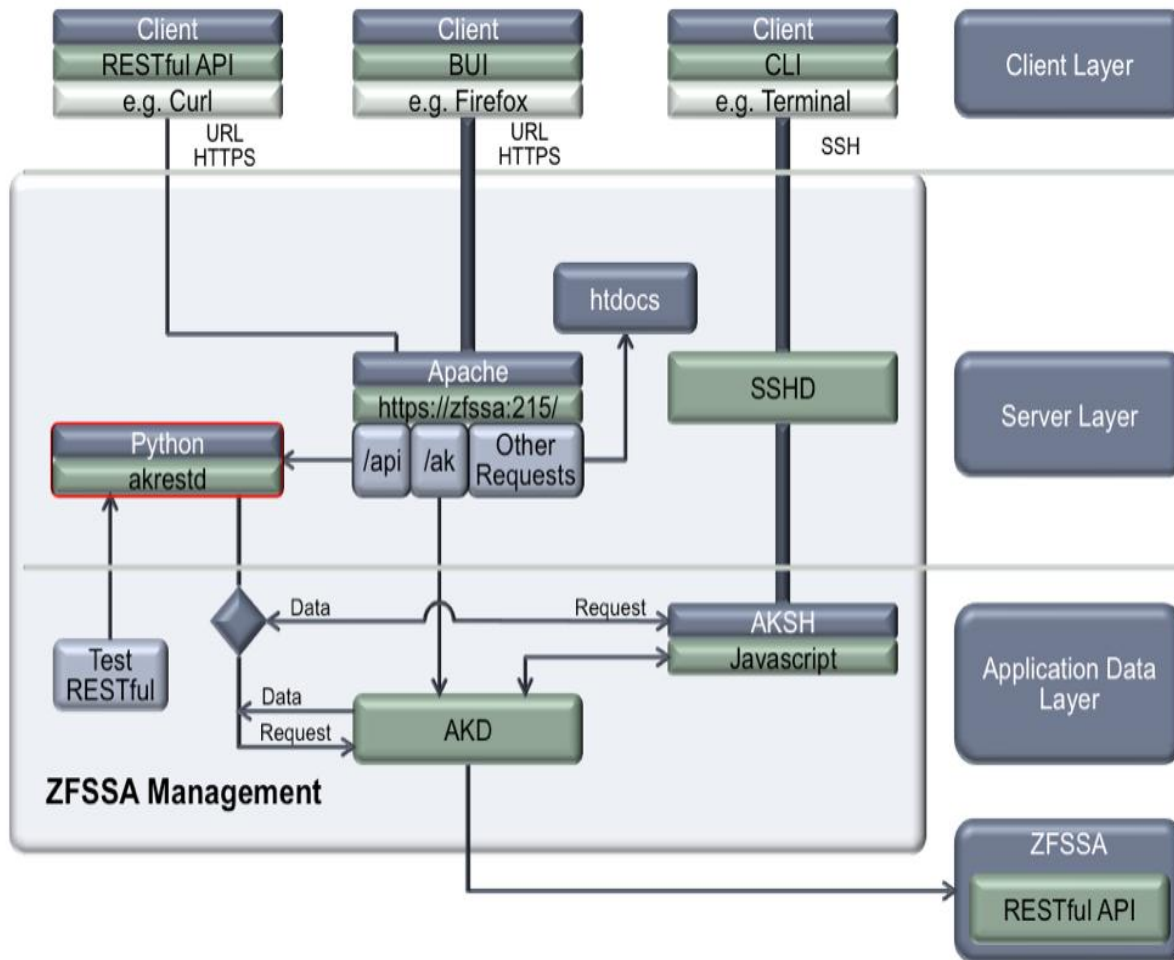
ZS4-4

- Single or Dual Controllers
- 3TB DRAM
- 11 PCIe Slots
- 12TB Read Flash
- 10TB Write Flash
- 3.5PB scalability (36 DE's)
- 120 CPU cores



# RESTful Management API for Cloud Orchestration

## A full-featured management interface



### Full Programmatic API

- REST compatible: Every ZFS feature available using HTML/JSON semantics
- Full-featured, fully documented API interface
- Plug compatibility for next-generation management architectures

### Simplifies Cloud Integration

- Compatible with popular cloud architectures
- Access to OpenStack cinder implementation for EC2-like block storage implementations

### Integration Point for Other Services

- N-Way management
- Object storage capabilities
- OpenStack Cinder services

# How to Configure the ZFS Storage Appliance iSCSI Cinder Driver

- Run Workflow on ZFS SA: Create Cinder user, set role authorizations, enable RESTful service, set corresponding parameters in /etc/cinder/cinder.conf
- Create Running (Oracle Linux) OpenStack Icehouse with ZFS Storage Appliance (Simulator in VirtualBox) by Ronen Kofman
  - [https://blogs.oracle.com/ronen/entry/running\\_openstack\\_icehouse\\_with\\_zfs](https://blogs.oracle.com/ronen/entry/running_openstack_icehouse_with_zfs)
- OpenStack in Oracle Solaris 11.2 Docs
  - [http://docs.oracle.com/cd/E36784\\_01/html/E54155/cinderinst.html#OSTCKzfssadriver](http://docs.oracle.com/cd/E36784_01/html/E54155/cinderinst.html#OSTCKzfssadriver)
- OpenStack Juno Community Release Docs

The screenshot shows a web browser displaying the OpenStack Juno documentation page for the Oracle ZFSSA iSCSI Driver. The browser address bar shows the URL: docs.openstack.org/juno/config-reference/content/zfssa-volume-driver.html. The page header includes the OpenStack logo and the title "Oracle ZFSSA iSCSI Driver". The main content area is titled "Oracle ZFSSA iSCSI Driver" and contains the following text:

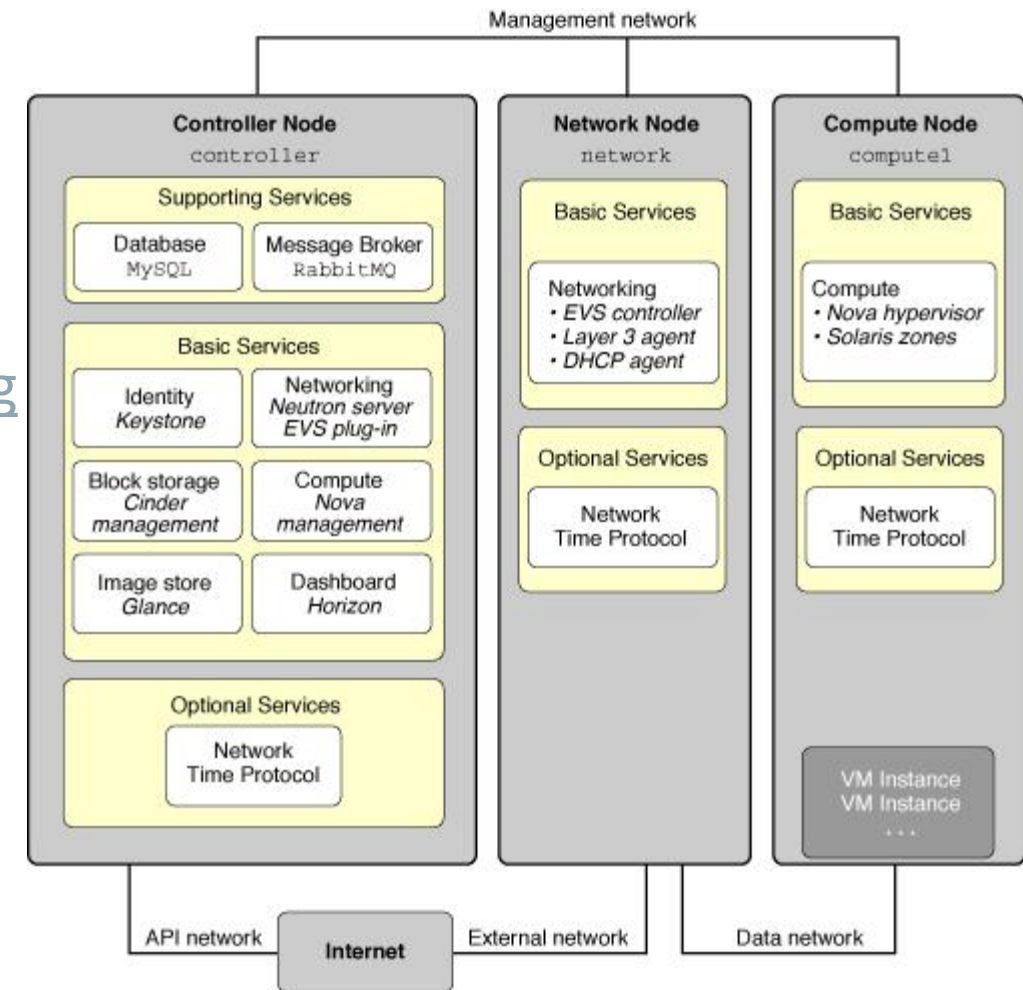
Oracle ZFS Storage Appliances (ZFSSAs) provide advanced software to protect data, speed tuning and troubleshooting, and deliver high performance and high availability. Through the Oracle ZFSSA iSCSI Driver, OpenStack Block Storage can use an Oracle ZFSSA as a block storage resource. The driver enables you to create iSCSI volumes that an OpenStack Block Storage server can allocate to any virtual machine running on a compute host. The Oracle ZFSSA iSCSI Driver, version 1.0.0, supports ZFSSA software release 2013.1.2.0 and later.

**Configuration**

1. Enable RESTful service on the ZFSSA Storage Appliance.
2. Create a new user on the appliance with the following authorizations:
  - scope=stmf - allow\_configure=true
  - scope=nas - allow\_clone=true, allow\_createProject=true, allow\_createShare=true, allow\_changeSpaceProps=true, allow\_changeGeneralProps=true, allow\_destroy=true, allow\_rollback=true, allow\_takeSnap=true

# Oracle OpenStack for Oracle Solaris Simplified Deployment

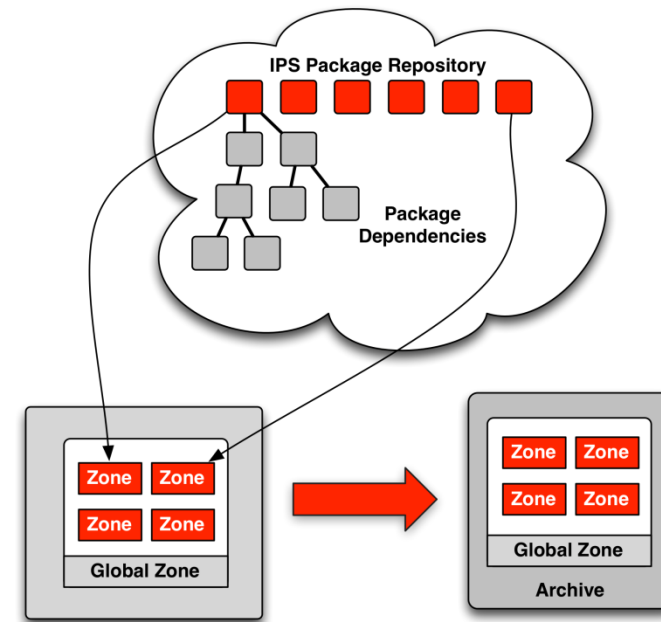
- [Unified Archive for single node deployment](#)
- [Documentation for multi node deployments](#)
- Blog Series by [Dave Miner](#)  
[Building an OpenStack Cloud for Solaris Engineering](#)
  - Rationale and Architecture
  - Automated Installer and SMF Configuration Profiles
  - Puppet Configuration Management
  - Configuring OpenStack



# OpenStack Packaging – IPS

## Easy and fast cloud update

- Fail proof updates with IPS
  - Full rollback to previous state if needed
  - Integrated with Oracle Solaris Zones and Unified Archives for seamless lifecycle management



# OpenStack and Oracle Solaris 11.2 - Package List

```
# pkg list -af | grep openstack
cloud/openstack                0.2013.2.3-0.175.2.0.0.42.1 ---
cloud/openstack/cinder        0.2013.2.3-0.175.2.0.0.42.1 ---
cloud/openstack/glance        0.2013.2.3-0.175.2.0.0.42.1 ---
cloud/openstack/horizon       0.2013.2.3-0.175.2.0.0.42.1 ---
cloud/openstack/keystone      0.2013.2.3-0.175.2.0.0.42.1 ---
cloud/openstack/neutron       0.2013.2.3-0.175.2.0.0.42.1 ---
cloud/openstack/nova          0.2013.2.3-0.175.2.0.0.42.1 ---
cloud/openstack/swift         1.10.0-0.175.2.0.0.42.1    ---
```

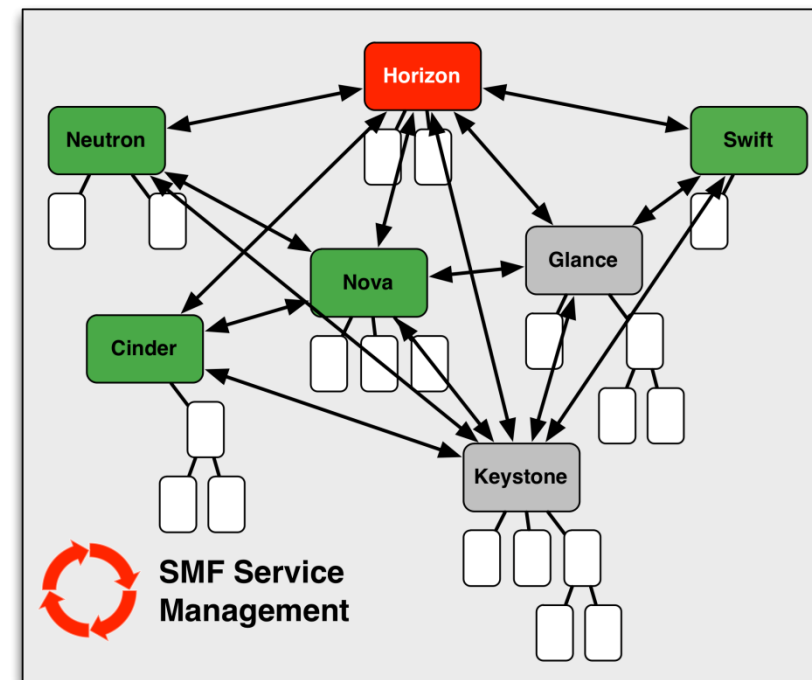
# Openstack and Oracle Solaris 11.2 - Versioning

```
# pkg info -r cloud/openstack
      Name: cloud/openstack
      Summary: OpenStack
      Description: OpenStack is a cloud operating system that controls large pools
                   of compute, storage, and networking resources throughout a data
                   center, all managed through a dashboard that gives
                   administrators control while empowering their users to provision
                   resources through a web interface.
      Category: Meta Packages/Group Packages (org.opensolaris.category.2008)
                System/Administration and Configuration (org.opensolaris.category.2008)
                System/Enterprise Management (org.opensolaris.category.2008)
                System/Virtualization (org.opensolaris.category.2008)
                Web Services/Application and Web Servers (org.opensolaris.category.2008)
      State: Not installed
      Publisher: solaris
      Version: 0.2013.2.3 (Havana 2013.2.3)
      Build Release: 5.11
      Branch: 0.175.2.0.0.42.1
      Packaging Date: June 23, 2014 01:03:42 AM
      Size: 5.46 kB
      FMRI: pkg://solaris/cloud/openstack@0.2013.2.3,5.11-0.175.2.0.0.42.1:20140623T010342Z
```

# OpenStack Services – SMF

Highly available and reliable and secure cloud services

- Automatic service restart in case of failure
  - Integrated with Oracle Solaris fault management
  - Full dependency checking for precise and efficient cloud start up
- OpenStack services run with minimum privileges necessary, and don't run as root



# OpenStack Heat - Orchestration

- Represent an application (topology and resource needs) with a Heat Template
- Perform fully automated, orchestrated deployment of Heat Templates to the cloud.
- Components
  - heat-api: OpenStack-native RESTful API
  - heat-api-cfn: AWS CloudFormation compatible API.
  - heat-engine
    - Drives orchestration from a user-provided template
    - defines Parameters, Resources, Output
    - formats:
      - HOT (Heat Orchestration Template, based on YAML)
      - CFN (AWS CloudFormation template syntax , typically JSON)

**Heating Up Your OpenStack Cloud**

[https://blogs.oracle.com/dminer/entry/heating\\_up\\_your\\_openstack\\_cloud](https://blogs.oracle.com/dminer/entry/heating_up_your_openstack_cloud)



# Oracle Solaris 11.2: Enterprise OpenStack OS. Virtualization. SDN. OpenStack. Complete.

- Complete OpenStack
  - Havana-based
    - Nova, Neutron, Cinder, Swift, Glance, Keystone, Horizon
  - Heat engine with SRU 11.3.4.1
- All integrated into Oracle Solaris 11.2
- Simplified deployment
  - [Unified Archive for single node deployment](#)
  - [Documentation for multi node deployments](#)
- Upstream contributions to OpenStack Project
  - <https://openstack.java.net/> -> Browse Source



# OpenStack and Solaris

<http://www.oracle.com/technetwork/server-storage/solaris11/technologies/openstack-2135773.html>

Engineered Systems
Ksplice
Oracle Linux
Oracle Optimized Solutions
Oracle VM
Oracle VM VirtualBox
SAN Storage
Secure Global Desktop
Server Management Tools
Solaris 10
Solaris 11
Solaris Cluster
Solaris Studio
SPARC Servers
StorageTek Tape Storage
Sun Blade 6000 Modular Systems
Sun Desktops & Peripherals
Sun Flash Storage
NAS Storage
Netra Systems
Networking and Data Center Fabric Products
Sun Storage Software
General
Sun Ray Products
Sun x86 Servers
Virtual Desktop Infrastructure
OpenStack
Corente Cloud Services Exchange
Software in Silicon

- Overview
- Technologies
- Docs
- Downloads
- Training
- Learn More
- Partners

## OpenStack Cloud Management

Oracle Solaris 11 includes a complete OpenStack distribution, allowing administrators to centrally share and manage data center resources through a single pane of management, including infrastructure and virtualization offerings provided by other vendors.

Integrated into the core technology foundations such as Oracle Solaris Zones, the ZFS file system, Unified Archives and comprehensive software defined networking, OpenStack on Oracle Solaris provides self-service computing, allowing IT organizations to deliver services in minutes rather than weeks, with enterprise-grade reliability, security, and performance.



### How-To Guide and White Paper

- Hands-On Lab: Deploying an Enterprise Private Cloud with OpenStack in 20 Minutes (Part 1)
- Hands-On Lab: Deploying Applications Quickly and Securely in an Enterprise Private Cloud with OpenStack (Part 2)
- Getting started with OpenStack on Oracle Solaris 11.2
- How to Build OpenStack Block Storage on ZFS
- Analyst White Paper (IDC): Oracle OpenStack for Oracle Solaris

### Videos

- Oracle Solaris OpenStack
- Enterprise cloud with Oracle Solaris and OpenStack
- Agile Provisioning in the cloud with Unified Archives and OpenStack
- OpenStack and ZFS: Simple, Efficient, Secure
- Application driven SDN and network virtualization in Oracle Solaris
- Home Movie: Sophia, Where's My Cloud?

### Product Documentation

- Installing and Configuring OpenStack in Oracle Solaris 11.2

### Download

- Oracle Solaris OpenStack Unified Archives

### Screencasts

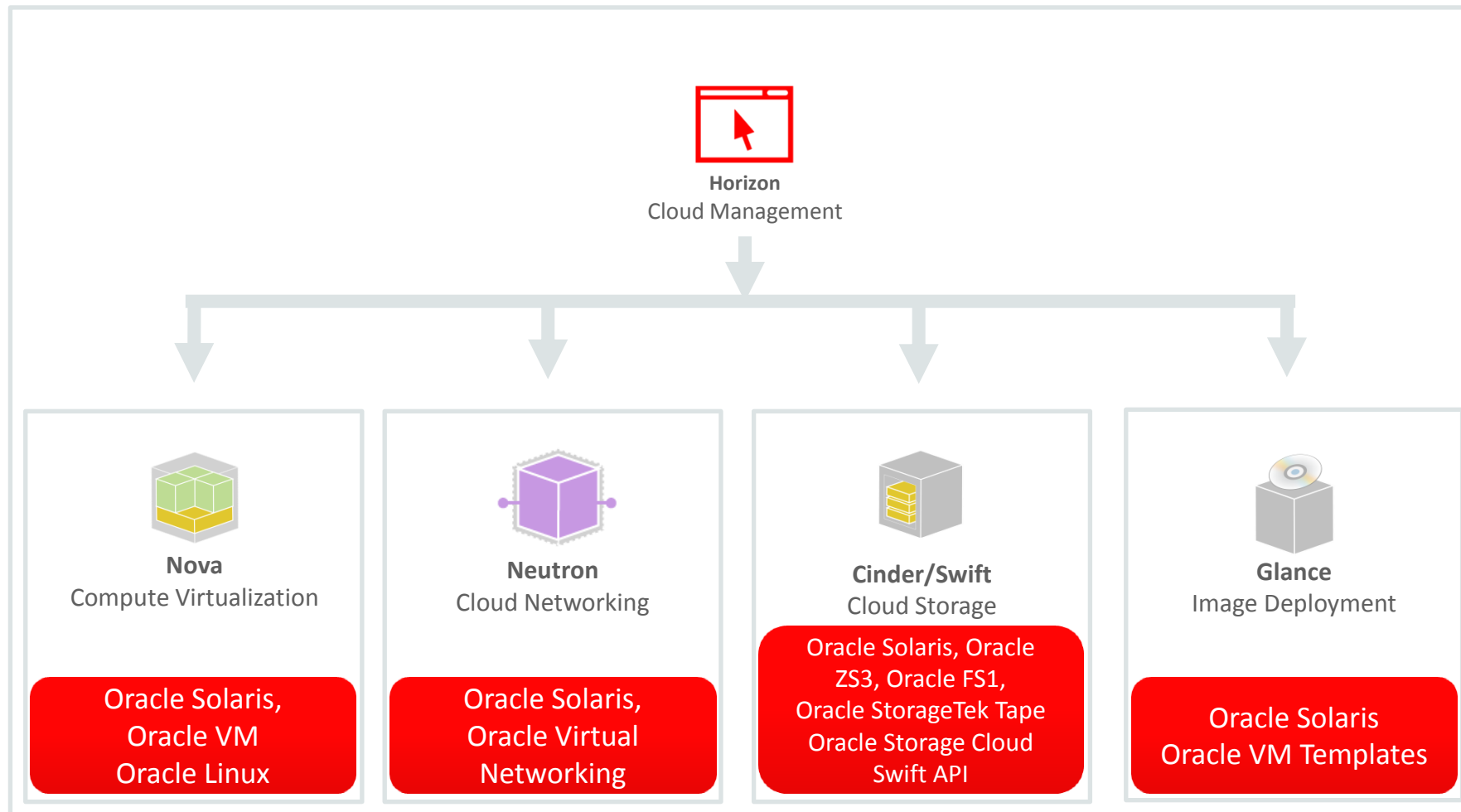
- Exploring OpenStack Horizon - Part 1, Admin Panel
- Exploring OpenStack Horizon - Part 2, Project Panel
- Oracle Solaris Elastic Virtual Switch - Part 1
- Oracle Solaris Elastic Virtual Switch - Part 2

### Resources

- Oracle OpenStack for Oracle Solaris on o.com
- Oracle Solaris OpenStack FAQ
- OpenStack Engineering Blog
- Oracle Solaris OpenStack Dev Project Page
- OpenStack Community

[OpenStack Cloud in Solaris Engineering blogs.oracle.com/dminer](http://blogs.oracle.com/dminer)  
[IDC White Paper: Oracle OpenStack for Oracle Solaris](#)

# OpenStack Engineering Across Oracle's Portfolio



# OpenStack Component Projects

Component	Project Name	First Release	Brief Overview
Compute	Nova	Austin	On-demand compute resources
Object Storage	Swift	Austin	Manage redundant scalable block storage
Image Services	Glance	Bexar	Repository and delivery of disk and server images
Dashboard	Horizon	Essex	Admin and user admin control
Identity	Keystone	Essex	Access and security
Block Storage	Cinder	Folsom	Raw block level storage
Networking	Neutron (Quantum)	Folsom	Network integration
Orchestration	Heat	Havana	Automate compute, storage, & network
Telemetry	Ceilometer	Icehouse	Usage & Performance
Database	Trove	Icehouse	DBaaS – relational & non-relational
Data Processing	Sahara	Juno	Hadoop as a Service
Bare Metal	Ironic	TBD	Bare Metal Provisioning
Queue Service	Zagar (Marconi)	TBD	Messaging and Queueing
Shared File System	Manila	TBD	File Sharing Service

# EM12c Database as a Service



## DBaaS



- Rapid Database Provisioning
- Catalog based on Service Levels
- Data Cloning
- Database Performance and Lifecycle Management
- Real Application Testing

## Oracle Enterprise Manager 12c

(Planning, Provisioning, Management, Chargeback)

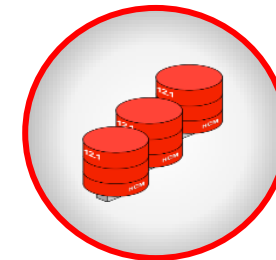
Dedicated  
Databases



Schemas



Pluggable  
Database



Snap Clone



[oracle.com/openstack](http://oracle.com/openstack)

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