

Introduction to Openstack, an Open Cloud Computing Platform

Libre Software Meeting

10 July 2012

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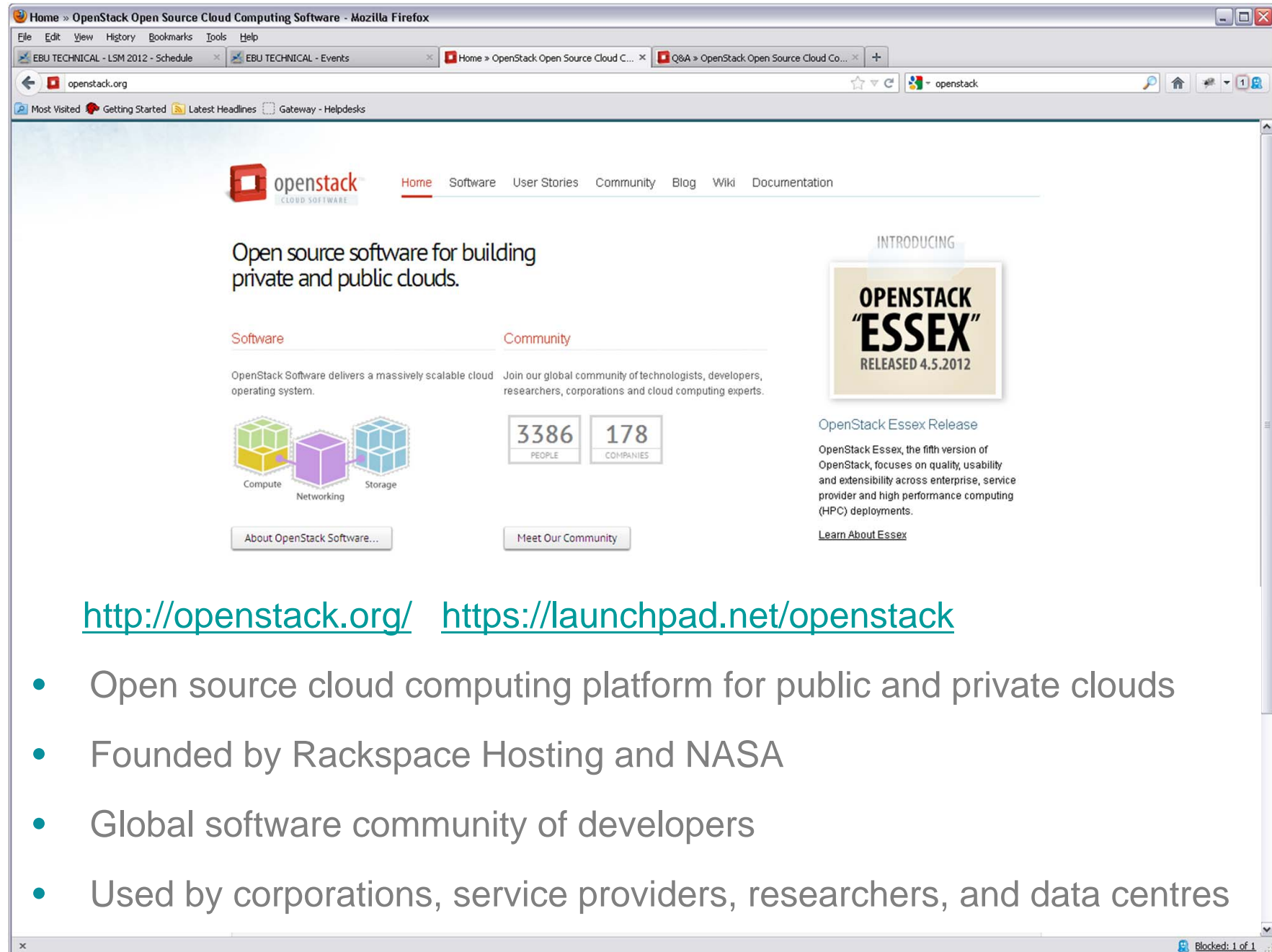
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Introduction: Libre Software Meeting 2012

- What is covered in this presentation
 - What is Openstack?
 - Why is the BBC interested in cloud?
 - BBC cloud proof of concept
 - Openstack timeline
 - Openstack components
 - Openstack DIABLO
 - Openstack ESSEX
 - Openstack install process

What is OpenStack



The screenshot shows the OpenStack website homepage. The browser window title is "Home » OpenStack Open Source Cloud Computing Software - Mozilla Firefox". The address bar shows "openstack.org". The main content area features the OpenStack logo and navigation links: Home, Software, User Stories, Community, Blog, Wiki, and Documentation. The main heading reads "Open source software for building private and public clouds." Below this, there are two columns: "Software" and "Community". The "Software" column describes OpenStack as a massively scalable cloud operating system and lists components: Compute, Networking, and Storage. The "Community" column states "Join our global community of technologists, developers, researchers, corporations and cloud computing experts." and displays statistics: 3386 PEOPLE and 178 COMPANIES. A prominent announcement box on the right says "INTRODUCING OPENSTACK 'ESSEX' RELEASED 4.5.2012". Below this, it describes the OpenStack Essex Release as the fifth version, focusing on quality, usability, and extensibility. The browser's status bar at the bottom indicates "Blocked: 1 of 1".

<http://openstack.org/> <https://launchpad.net/openstack>

- Open source cloud computing platform for public and private clouds
- Founded by Rackspace Hosting and NASA
- Global software community of developers
- Used by corporations, service providers, researchers, and data centres

Why Cloud in the BBC?

Flexibility

- Easier to change and maintain operations & services
 - Separation of services from hardware

Efficiency

- Better utilisation of our servers and resources
 - Re-use of resources for multiple services

Scalability

- Scale services with demand
 - Re-deploy services and access external resources

Cost

- Lower capital and operations cost ???
 - Lower support cost for business services?

1. Simple File and Document Management

Automated file transfer capability enabling BBC staff to “send” a file to a cloud location to be securely accessed by other individuals.

2. Streaming Bulk Storage and Manipulation

Very large file movement service, ideally supporting scripted file manipulation between private and public clouds.

3. On-Demand IaaS/PaaS for Test and Development

A deployable test and development environment for build, integration and test.

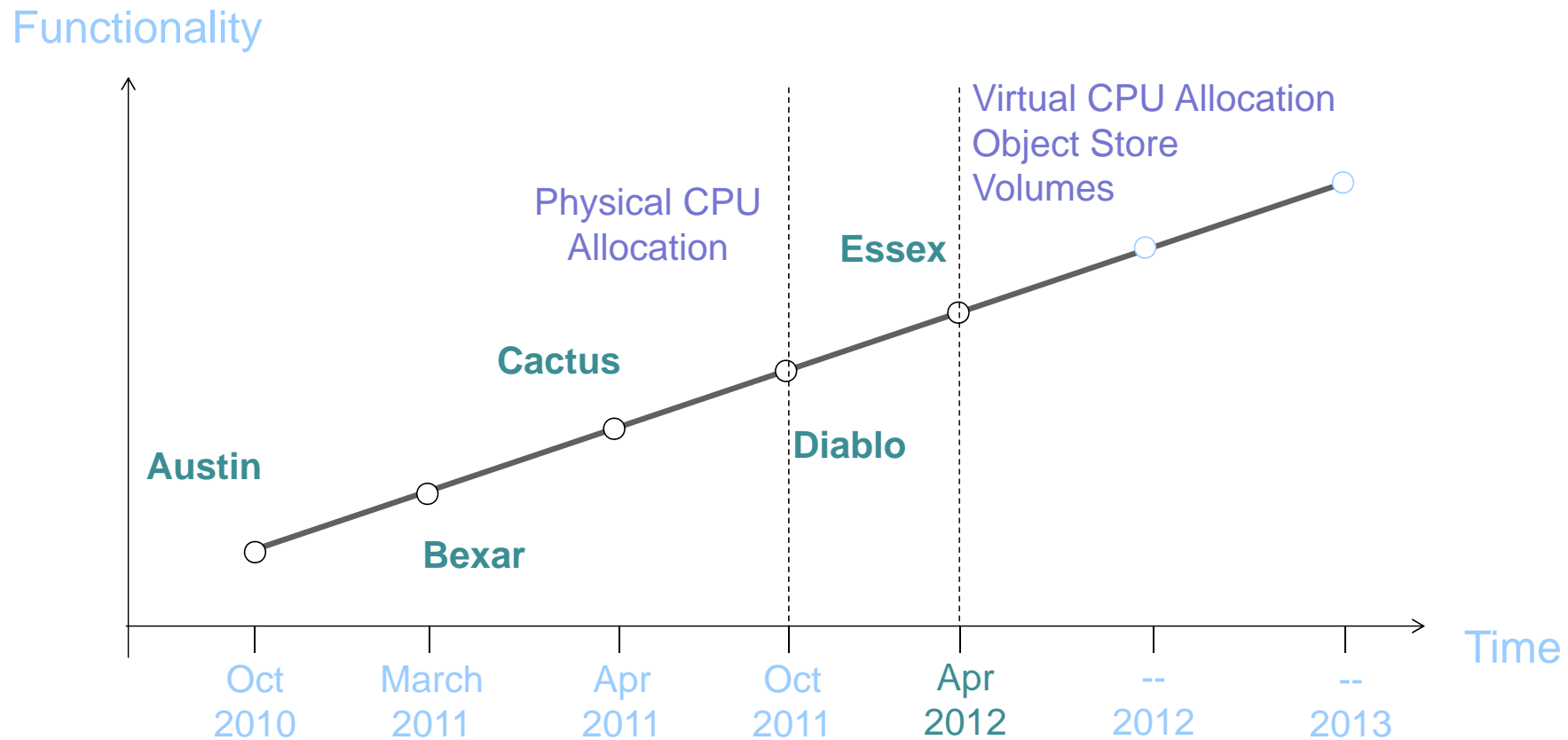
4. Simple Encode/Transcode/Render as a service

Simple media transcode and/or render workflow “as a service”, to send media and metadata to the cloud through a simple user interface.

5. Automated Processing of Archive Imagery and Video

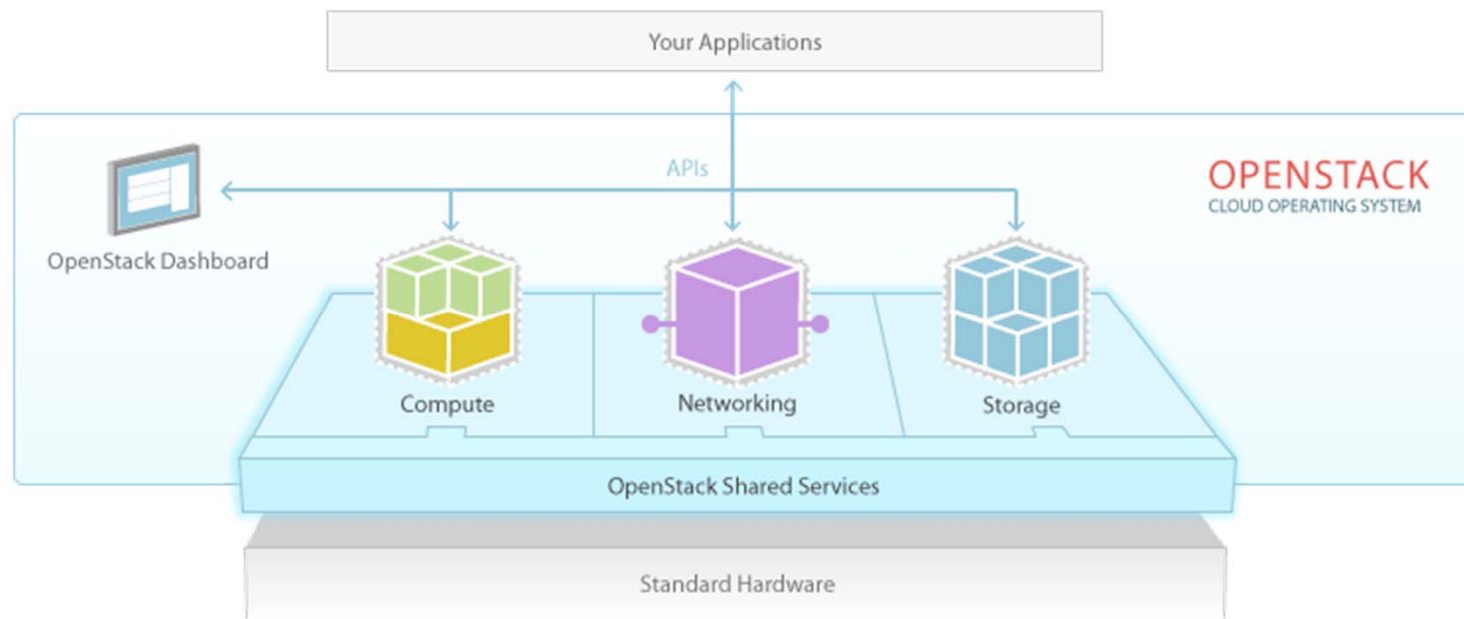
A secure distributed image processing service with appropriate handling of the master material, transient data and final results.

Openstack: Time Line



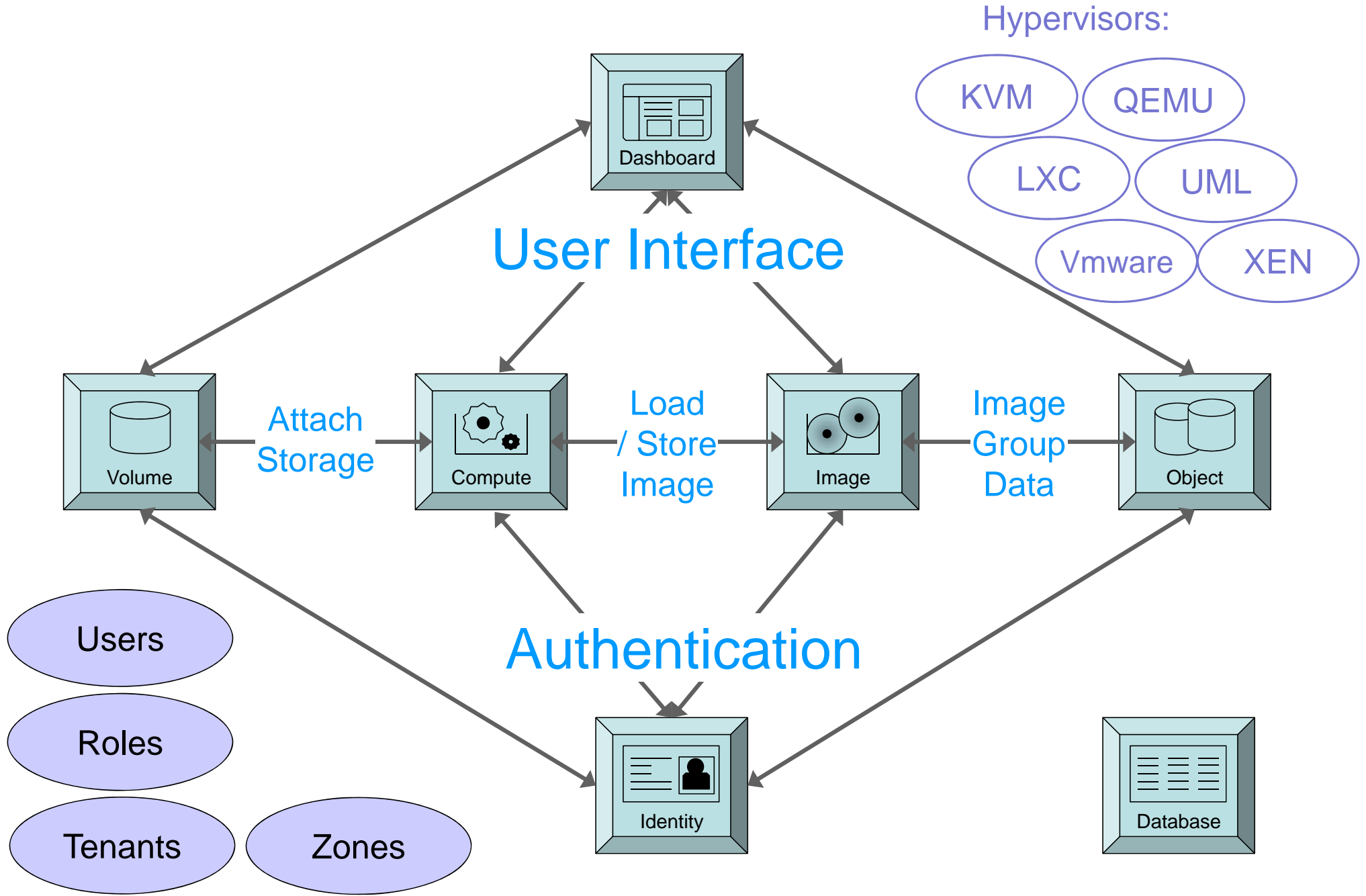
- Openstack is used for real commercial services, e.g. Rackspace etc
- Openstack is used in commercial public cloud service platforms
- Openstack is catching up with commercial private cloud service platforms

OpenStack Components



- Compute Components
 - API Server (nova-api)
 - Message Queue (rabbit-mq server)
 - Compute Workers (nova-compute)
 - Network Controller (nova-network)
 - Volume Worker (nova-volume)
 - Scheduler (nova-scheduler)
 - Image Service (glance)
- Dashboard
 - User Interface (horizon)
- Service Object Storage
 - Storage Infrastructure (swift)
- Security and Users
 - Identity Service (keystone)
 - Database (mysql)

How the components work together



Openstack DIABLO: Resources

The screenshot shows the OpenStack Dashboard System Panel Overview. The page displays monitoring information for Nagios and Ganglia. A dropdown menu allows selecting a month to query its usage, currently set to June 2012. The main content area shows a green status box with an upward arrow and the text "Status: Good". Below this, resource usage is summarized: 8 CORES (1 USED, 7 AVAIL), 7.8 GIB RAM (2 GIB USED, 5.8 GIB AVAIL), and 264 GIB DISK (20 GIB USED, 244 GIB AVAIL). A summary row indicates: Active Instances: 1, This month's VCPU-Hours: 272.9, and This month's GB-Hours: 5458.8. A "Server Usage Summary" table is also present, with a "Download CSV" link.

Tenant	Instances	VCPU	Disk	RAM	VCPU CPU-Hours	Disk GB-Hours
2	1	1	20.0GB	2GB	272.9	5458.8

- Assign physical resources to an image
 - Physical CPU core
 - Physical RAM
 - Storage from node hardware

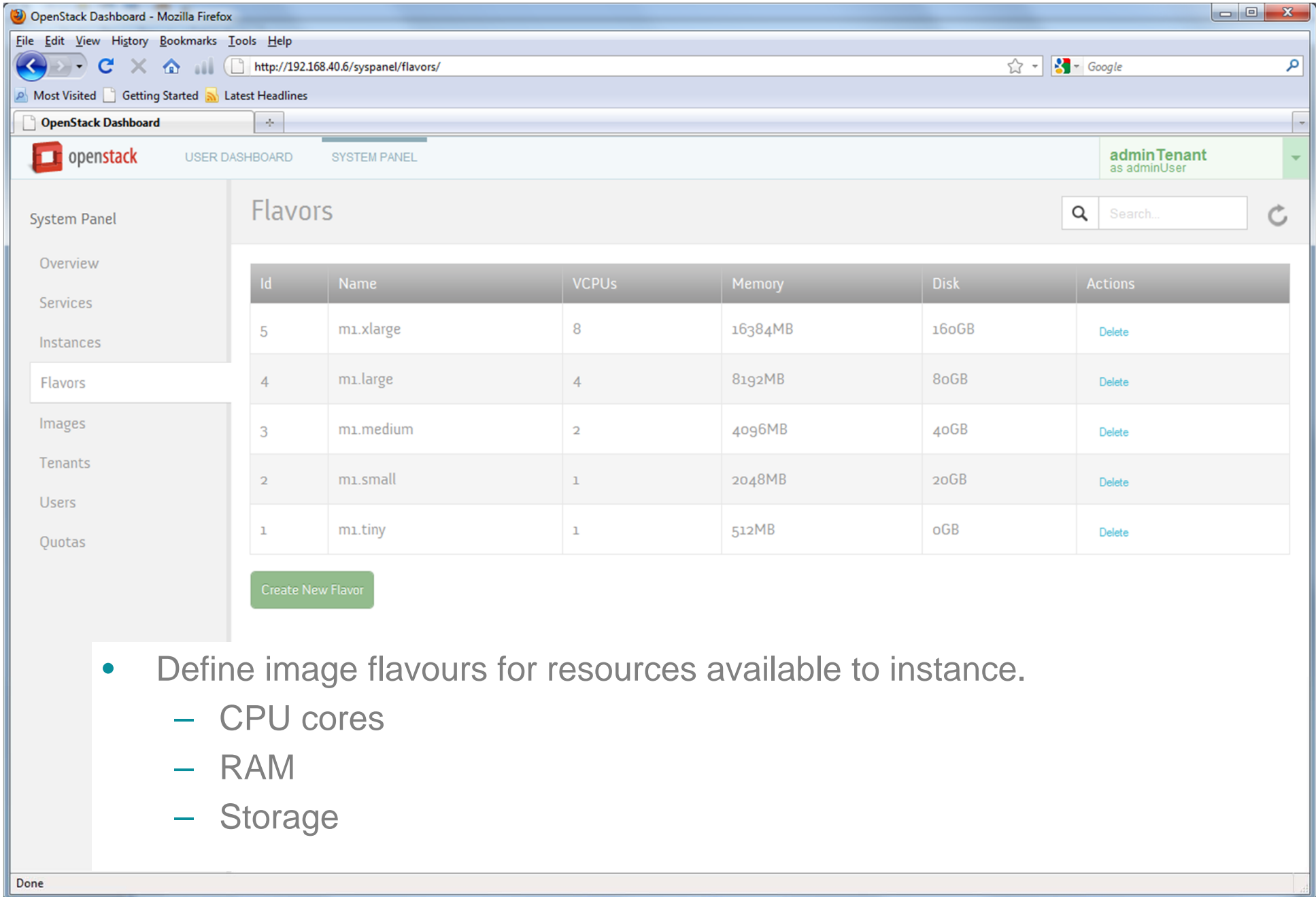
Openstack DIABLO: Services

The screenshot shows the OpenStack Dashboard interface in a Mozilla Firefox browser. The page title is "OpenStack Dashboard - Mozilla Firefox" and the URL is "http://192.168.40.6/syspanel/services/". The dashboard is for the "adminTenant" as "adminUser". The "Services" page is active, showing a table of services. The table has the following data:

Service	System Stats	Enabled	Up	Actions
nova-compute (PoC6)	<ul style="list-style-type: none">Hypervisor: QEMU(rdtscp, xtpr, tm2, est, vmx, ds_cpl, monitor, pbe, tm, ht, ss, acpi, ds, vme)Allocable Cores: 16 (0 Used, 8 Physical/Virtual)Allocable Storage: 9.8TB (15.0GB Used, 264.0GB Physical)System Ram: 7GB (528MB Used)	Enabled	True	Disable
nova-network (PoC6)	-	Enabled	True	Disable
nova-scheduler (PoC6)	-	Enabled	True	Disable
nova-vncproxy (PoC6)	-	Enabled	True	Disable
compute (192.168.40.6)	-	Enabled	True	
identity (192.168.40.6)	-	Enabled	True	
image (192.168.40.6)	-	Enabled	True	

- Compute, network and schedule services available in dashboard.

Openstack DIABLO: Flavours (Assigned Resources)



The screenshot shows the OpenStack Dashboard interface. The browser address bar indicates the URL is `http://192.168.40.6/syspanel/flavors/`. The dashboard header includes the OpenStack logo, navigation tabs for 'USER DASHBOARD' and 'SYSTEM PANEL', and a user profile for 'adminTenant as adminUser'. The left sidebar contains a 'System Panel' menu with options: Overview, Services, Instances, Flavors (selected), Images, Tenants, Users, and Quotas. The main content area is titled 'Flavors' and features a search bar and a table of flavor configurations.

Id	Name	VCPUs	Memory	Disk	Actions
5	m1.xlarge	8	16384MB	160GB	Delete
4	m1.large	4	8192MB	80GB	Delete
3	m1.medium	2	4096MB	40GB	Delete
2	m1.small	1	2048MB	20GB	Delete
1	m1.tiny	1	512MB	0GB	Delete

Below the table is a green button labeled 'Create New Flavor'.

- Define image flavours for resources available to instance.
 - CPU cores
 - RAM
 - Storage

Openstack DIABLO: Images and Snapshots

The screenshot shows the OpenStack Dashboard in a Mozilla Firefox browser window. The URL is `http://192.168.40.6/syspanel/images/`. The dashboard header includes the OpenStack logo, navigation tabs for 'USER DASHBOARD' and 'SYSTEM PANEL', and a user profile for 'adminTenant as adminUser'. The main content area is titled 'Images' and features a search bar and a refresh button. Below this is a table listing four images:

ID	Name	Size	Public	Created	Updated	Status	
4	PocTest1 - 30.2	10.0 GB	False	04/30/12 at 13:42:16	04/30/12 at 13:44:28	Active	Delete Edit
3	tty	24.0 MB	True	04/30/12 at 10:36:46	04/30/12 at 10:36:47	Active	Delete Edit
2	tty-ramdisk	5.6 MB	True	04/30/12 at 10:35:56	04/30/12 at 10:35:56	Active	Delete Edit
1	tty-kernel	4.2 MB	True	04/30/12 at 10:35:13	04/30/12 at 10:35:13	Active	Delete Edit

The left sidebar contains a 'System Panel' menu with the following items: Overview, Services, Instances, Flavors, Images (highlighted), Tenants, Users, and Quotas. The bottom status bar shows 'Done'.

- Different image types and snapshots
 - Linux, Windows and AWS EC2 images
- Different container types, e.g.
 - Single container (OVF), components (AMI, ARI, AKI)

Openstack DIABLO: Launching an Instance

OpenStack Dashboard - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://192.168.40.6/dash/2/images/4/launch

OpenStack Dashboard

openstack USER DASHBOARD SYSTEM PANEL adminTenant as adminUser

Launch Instance

Manage Compute

- Overview
- Instances
- Images
- Snapshots
- Keypairs
- Floating IPs
- Security Groups

Manage Object Store

- Containers

Server Name: PoCTest2

User Data

Flavor: m1.small (1vcpu / 20GB Disk / 2048MB Ram)

Key Name: PoCTest

Security Groups: default

Launch Instance

Description:

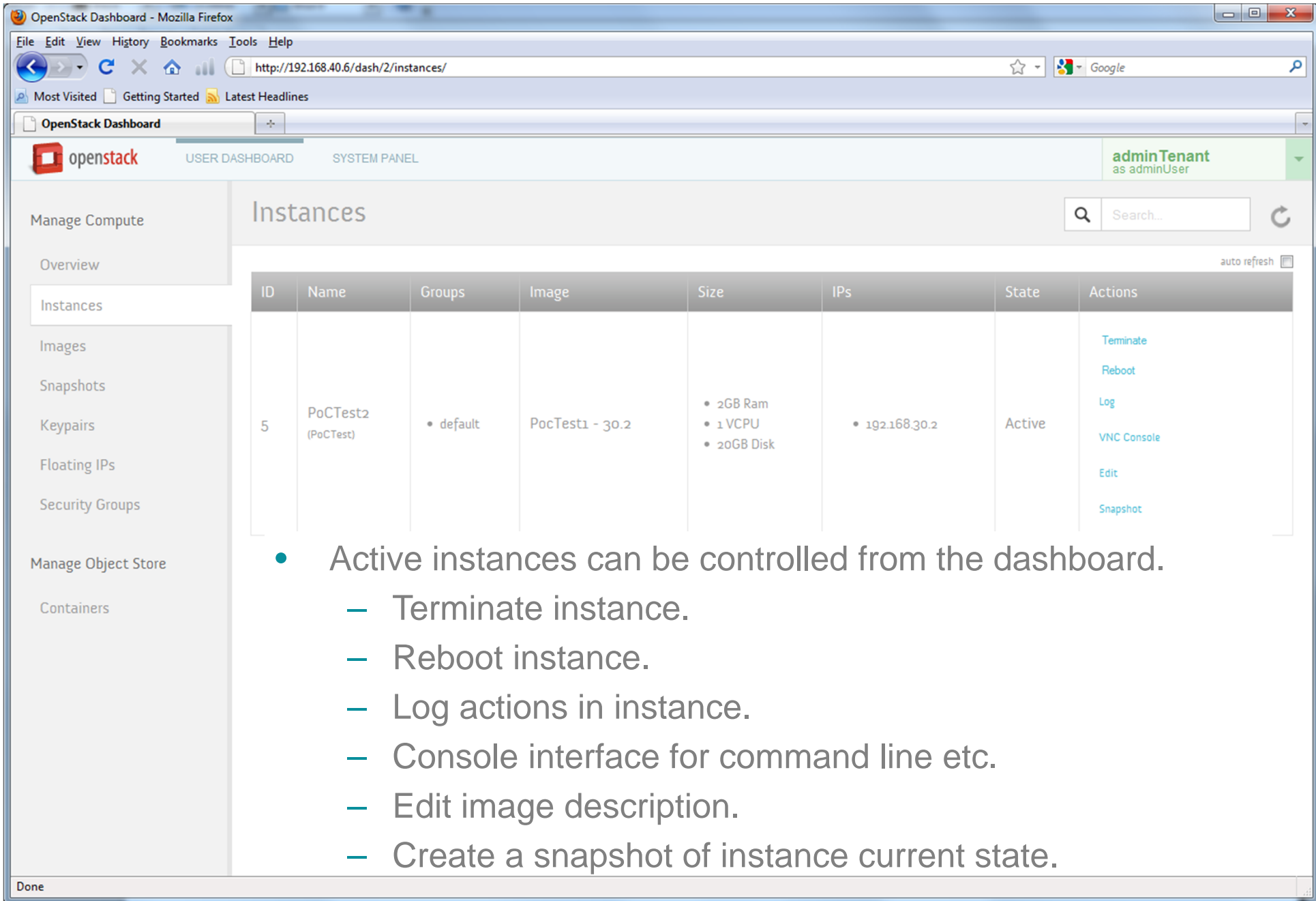
Specify the details for launching an instance. Also please make note of the table below; all tenants have quotas which define the limit of resources you are allowed to provision.

Quota Name	Limit
RAM (MB)	512MB
Floating IPs	10
Instances	10
Volumes	10
Gigabytes	1000GB

Done

- Launch image with flavour (resources) and security key pair.

Openstack DIABLO: Active Instance

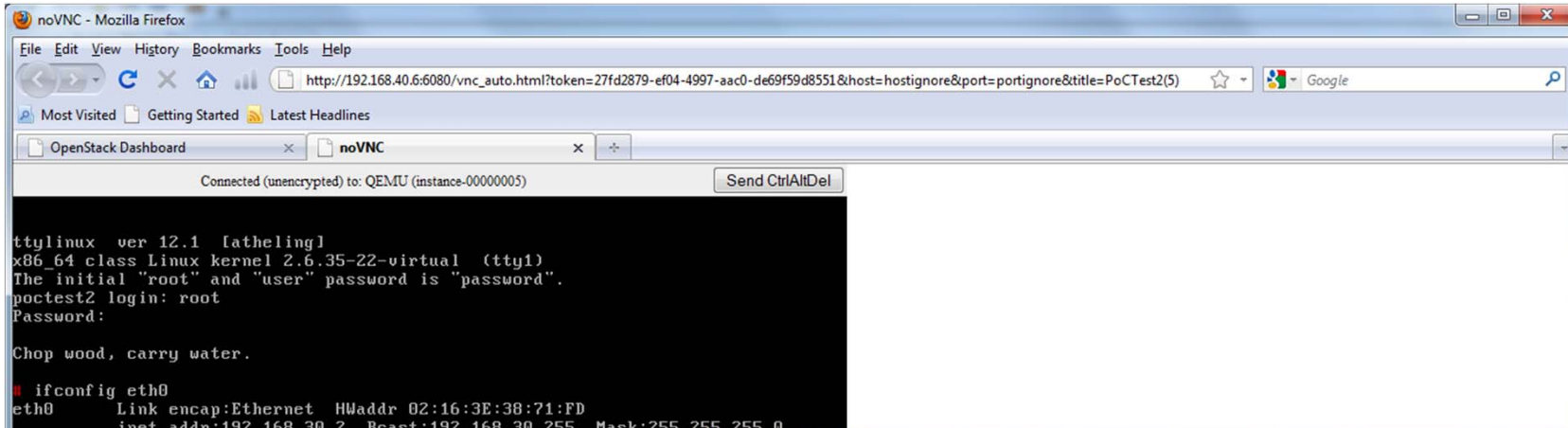


The screenshot shows the OpenStack Dashboard in a Mozilla Firefox browser window. The URL is <http://192.168.40.6/dash/2/instances/>. The user is logged in as 'adminTenant as adminUser'. The main content area displays a table of instances under the heading 'Instances'. The table has columns for ID, Name, Groups, Image, Size, IPs, State, and Actions. One instance is listed with ID 5, Name PoCTest2 (PoCTest), Group default, Image PocTest1 - 30.2, Size 2GB Ram, 1 VCPU, 20GB Disk, IP 192.168.30.2, and State Active. The Actions column for this instance includes Terminate, Reboot, Log, VNC Console, Edit, and Snapshot.

ID	Name	Groups	Image	Size	IPs	State	Actions
5	PoCTest2 (PoCTest)	• default	PocTest1 - 30.2	• 2GB Ram • 1 VCPU • 20GB Disk	• 192.168.30.2	Active	Terminate Reboot Log VNC Console Edit Snapshot

- Active instances can be controlled from the dashboard.
 - Terminate instance.
 - Reboot instance.
 - Log actions in instance.
 - Console interface for command line etc.
 - Edit image description.
 - Create a snapshot of instance current state.

Openstack DIABLO: Console and logging

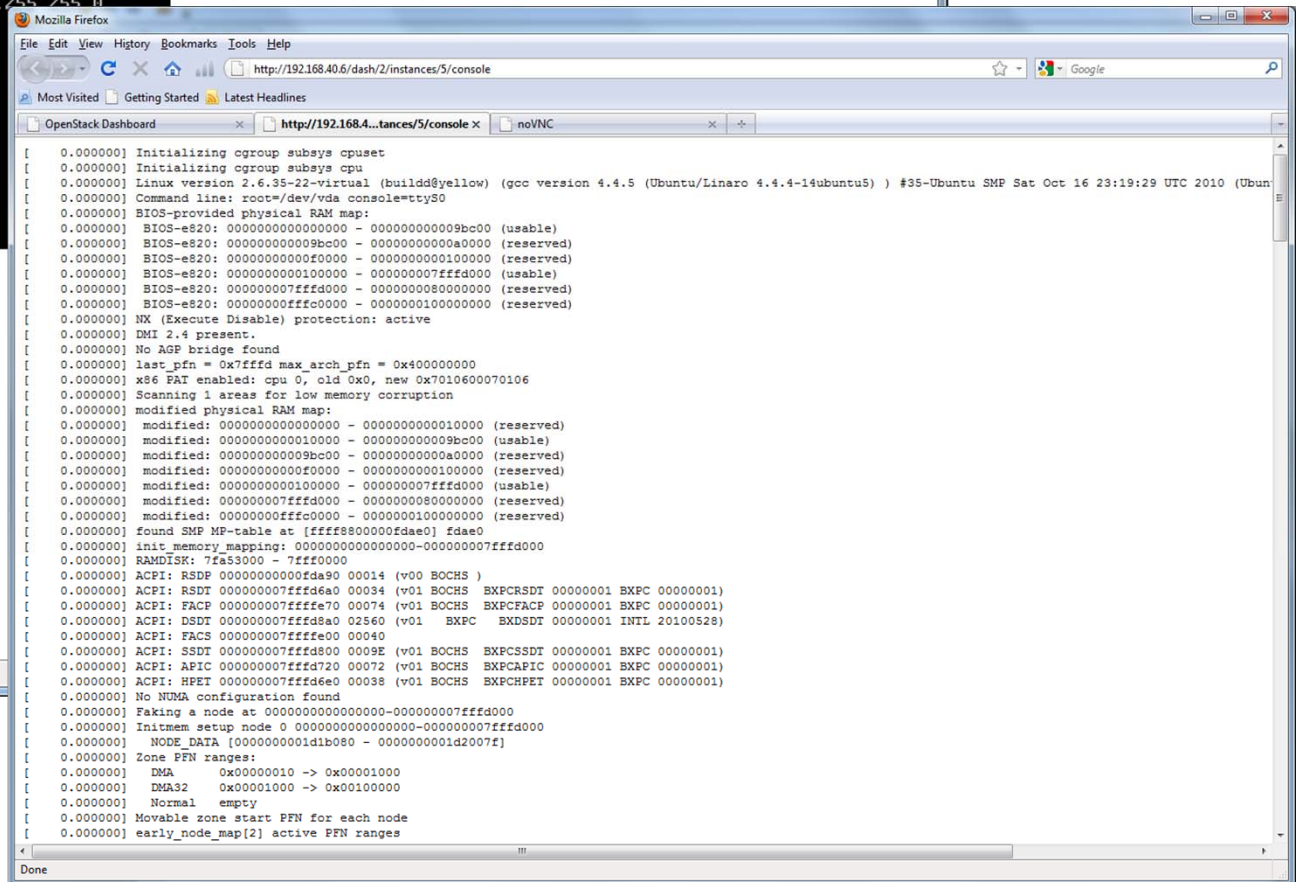


```
noVNC - Mozilla Firefox
http://192.168.40.6:6080/vnc_auto.html?token=27fd2879-ef04-4997-aa0-d69f59d8551&host=hostignore&port=portignore&title=PoCTest2(5)
OpenStack Dashboard
noVNC
Connected (unencrypted) to: QEMU (instance-00000005)
Send CtrlAltDel

ttylinux ver 12.1 [atheling]
x86_64 class Linux kernel 2.6.35-22-virtual (tty1)
The initial "root" and "user" password is "password".
pocctest2 login: root
Password:

Chop wood, carry water.

# ifconfig eth0
eth0  Link encap:Ethernet HWaddr 02:16:3E:38:71:FD
      inet addr:192.168.30.2 Bcast:192.168.30.255 Mask:255.255.0
      UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
      RX packets:2185 errors:0 dropped:0 overruns:0 frame:0
      TX packets:69 errors:0 dropped:0 overruns:0 carrier:0
      collisions:0 txqueuelen:1000
      RX bytes:104844 (102.3 KiB) TX bytes:8096 (7.9 KiB)
      Interrupt:11 Base address:0x8000
```



```
Mozilla Firefox
http://192.168.40.6/dash/2/instances/5/console
OpenStack Dashboard
http://192.168.40.6/dash/2/instances/5/console
noVNC

[ 0.000000] Initializing cgroup subsys cpuset
[ 0.000000] Initializing cgroup subsys cpu
[ 0.000000] Linux version 2.6.35-22-virtual (build@yellow) (gcc version 4.4.5 (Ubuntu/Linaro 4.4.4-14ubuntu5) ) #35-Ubuntu SMP Sat Oct 16 23:19:29 UTC 2010 (Ubuntu
[ 0.000000] Command line: root=/dev/vda console=ttyS0
[ 0.000000] BIOS-e820: 0000000000000000 - 00000000009bc000 (usable)
[ 0.000000] BIOS-e820: 00000000009bc000 - 0000000000a00000 (reserved)
[ 0.000000] BIOS-e820: 0000000000f00000 - 0000000000100000 (reserved)
[ 0.000000] BIOS-e820: 0000000000100000 - 000000007fffd000 (usable)
[ 0.000000] BIOS-e820: 000000007fffd000 - 0000000080000000 (reserved)
[ 0.000000] BIOS-e820: 00000000fffc0000 - 0000000100000000 (reserved)
[ 0.000000] NX (Execute Disable) protection: active
[ 0.000000] DMI 2.4 present.
[ 0.000000] No AGP bridge found
[ 0.000000] last_pfn = 0x7fffd max_arch_pfn = 0x400000000
[ 0.000000] x86 PAT enabled: cpu 0, old 0x0, new 0x7010600070106
[ 0.000000] Scanning 1 areas for low memory corruption
[ 0.000000] modified physical RAM map:
[ 0.000000] modified: 0000000000000000 - 0000000000010000 (reserved)
[ 0.000000] modified: 0000000000010000 - 000000000009bc00 (usable)
[ 0.000000] modified: 000000000009bc00 - 00000000000a0000 (reserved)
[ 0.000000] modified: 00000000000f0000 - 0000000000010000 (reserved)
[ 0.000000] modified: 0000000000100000 - 000000007fffd000 (usable)
[ 0.000000] modified: 000000007fffd000 - 0000000080000000 (reserved)
[ 0.000000] modified: 00000000fffc0000 - 0000000100000000 (reserved)
[ 0.000000] Found SMP MP-table at [ffff80000fd8e0] fd8e0
[ 0.000000] init memory mapping: 0000000000000000-000000007fffd000
[ 0.000000] RAMDISK: 7fa53000 - 7fff0000
[ 0.000000] ACPI: RSDP 0000000000fd8e0 00014 (v00 BOCHS )
[ 0.000000] ACPI: RSDT 000000007fffd8e0 00034 (v01 BOCHS BXPCRSDT 00000001 BXPC 00000001)
[ 0.000000] ACPI: FACP 000000007fffe70 00074 (v01 BOCHS BXPCFACP 00000001 BXPC 00000001)
[ 0.000000] ACPI: DSDT 000000007fffd8e0 02560 (v01 BXPC BXDSDT 00000001 INTL 20100528)
[ 0.000000] ACPI: FACS 000000007fffe00 00040
[ 0.000000] ACPI: SSDT 000000007fffd800 0009E (v01 BOCHS BXPCSSDT 00000001 BXPC 00000001)
[ 0.000000] ACPI: APIC 000000007fffd720 00072 (v01 BOCHS BXPCAPIC 00000001 BXPC 00000001)
[ 0.000000] ACPI: HPET 000000007fffd6e0 00038 (v01 BOCHS BXPCHPET 00000001 BXPC 00000001)
[ 0.000000] No NUMA configuration found
[ 0.000000] Faking a node at 0000000000000000-000000007fffd000
[ 0.000000] Initmem setup node 0 0000000000000000-000000007fffd000
[ 0.000000] NODE_DATA [0000000001d1b080 - 0000000001d2007f]
[ 0.000000] Zone PFN ranges:
[ 0.000000]   DMA      0x000000100 -> 0x000001000
[ 0.000000]   DMA32    0x00001000 -> 0x001000000
[ 0.000000]   Normal    empty
[ 0.000000] Movable zone start PFN for each node
[ 0.000000] early_node_map[2] active PFN ranges
```


Openstack ESSEX: Services

ubuntu[®] OpenStack Dashboard

Logged in as: adminUser Settings Sign Out

Project Admin

System Panel

- Overview
- Instances
- Services
- Flavors
- Images
- Projects
- Users
- Quotas

Services

Filter Filter

Name	Service	Host	Enabled
nova	compute	192.168.40.205	Enabled
glance	image	192.168.40.205	Enabled
swift	storage	127.0.0.1	Enabled
volume	volume	192.168.40.205	Enabled
ec2	ec2	192.168.40.205	Enabled
keystone	identity (native backend)	192.168.40.205	Enabled

Displaying 6 items

- Updates to existing services.
 - Nova compute and network.
 - Glance (image) and keystone (identity).
- Added services.
 - Swift (virtual object store).
 - Nova volumes (attached storage).
 - Ec2 (amazon image configuration).

Openstack ESSEX: Launching an Image

Launch Instances

Server Name
PoCTest1

User Data

Flavor
m1.tiny (1VCPU / 0GB Disk / 512MB Ram)

Keypair
PoCTest

Instance Count
1

Security Groups
 default

Boot From Volume

Volume or Volume Snapshot
vol3 - 20 GB (Volume)

Device Name
vda

Delete on Terminate

Description:
Specify the details for launching an instance. The chart below shows the resources used by this project in relation to the project's quotas.

Project Quotas

Instance Count (1)	9 Available
VCPUs (1)	19 Available
Disk (0 GB)	1000 GB Available
Memory (512 MB)	50688 MB Available

Cancel Launch Instance

- Flavours
 - Virtual CPU
 - Disk space
 - Memory
- Key pair
- Security groups
- Boot from Volumes
 - Storage
 - Snapshot

Openstack ESSEX: Instance and volumes

The screenshot displays the OpenStack Dashboard interface. The top navigation bar includes the 'ubuntu' logo, 'OpenStack Dashboard', and user information: 'Logged in as: adminUser', 'Settings', and 'Sign Out'. The left sidebar shows navigation options: 'Project' (Admin), 'PROJECT openstackDemo', 'Manage Compute' (Overview, Instances & Volumes, Images & Snapshots, Access & Security). The main content area is titled 'Instances & Volumes' and is divided into two sections: 'Instances' and 'Volumes'.

Instances Section:

- Buttons: Launch Instance, Terminate Instances
- Table:

<input type="checkbox"/>	Instance Name	IP Address	Size	Status	Task	Power State	Actions
<input type="checkbox"/>	PocTest1	192.168.30.2	512MB RAM 1 VCPU 0 Disk	Active	None	Running	Edit Instance

Displaying 1 item

Volumes Section:

- Buttons: Create Volume, Delete Volumes
- Table:

<input type="checkbox"/>	Name	Description	Size	Status	Attachments	Actions
<input type="checkbox"/>	vol2	-	2 GB	Available	-	Edit Attachments
<input type="checkbox"/>	vol3	20GB	20 GB	Available	-	Edit Attachments

Displaying 2 items

- Control, edit and launch instances
- Create, edit and assign storage volumes.

Openstack: Setup

<http://docs.openstack.org/essex/openstack-compute/install/apt/content/>

1. Update all packages
2. Enable Virtualisation Technology in BIOS
3. Install the network time package (ntp).
4. Install the database (MySQL).
5. Install the Identity Service (Keystone).
6. Configure the Identity Service and Endpoints.
7. Install the Image Service (Glance).
8. Configure the Image Service.
9. Install Compute (Nova).
10. Configure Compute networking
11. Create and initialize the Compute database with MySQL.
12. Create and add VM images.
13. (Optional) Install Openstack Object Storage (Swift).
14. Install the Openstack Dashboard.

Complexity: Identify service

Create Tenants, Users and Roles

```
# Create a default tenant, openstackDemo
$ keystone --token SECRET1234TOKEN --endpoint http://192.168.0.210:35357/v2.0 tenant-create --name openstackDemo --description "Default Tenant" --enabled true

# Create a default user named adminUser
$ keystone --token SECRET1234TOKEN --endpoint http://192.168.0.210:35357/v2.0 user-create --tenant_id dd4a5cd309cf4ae2be0560e6968f88c5 --name adminUser --pass password --enabled true

# Create the default role, admin
$ keystone --token SECRET1234TOKEN --endpoint http://192.168.0.210:35357/v2.0 role-create --name admin
```

Create Services and Endpoints

```
$ keystone --token SECRET1234TOKEN --endpoint http://192.168.0.210:35357/v2.0/ service-create --name=keystone --type=identity --description="Keystone Identity Service"

$ keystone --token SECRET1234TOKEN --endpoint http://192.168.0.210:35357/v2.0/ endpoint-create --region RegionOne --service_id=fc2a447e542d4f209c5b34a707a641ef --publicurl=http://192.168.0.210:5000/v2.0 --internalurl=http://192.168.0.210:5000/v2.0 --adminurl=http://192.168.0.210:35357/v2.0
```

Create Tokens

```
$ curl -d '{"auth": {"tenantName": "adminTenant", "passwordCredentials": {"username": "adminUser", "password": "password"}}}' -H "Content-type: application/json" http://192.168.0.210:35357/v2.0/tokens | python -mjson.tool
{
  "access": {
    "serviceCatalog": {},
    "token": {
      "expires": "2012-05-11T11:22:38Z",
      "id": "d8510902060f497a92f52aec2777c5d1"
    }
  },
}
```

Complexity: Starting multiple services

```
sudo start nova-network
source ~/creds/openrc
sudo service mysql restart
sudo service keystone restart
sudo service glance-registry restart
sudo service glance-api restart
sudo service rabbitmq-server restart
sudo service iscsitarget start
sudo service open-iscsi start
sudo restart nova-api
sudo restart nova-compute
sudo restart nova-network
sudo restart nova-scheduler
sudo restart nova-consoleauth
sudo restart nova-volume
sudo restart nova-cert
sudo restart libvirt-bin
sudo /etc/init.d/rabbitmq-server restart
```

```
sudo nova-manage service list
```

Binary	Host	Zone	Status	State	Updated_At
nova-consoleauth	PoC5	nova	enabled	:-)	2012-05-29 15:40:54
nova-compute	PoC5	nova	enabled	:-)	2012-05-29 15:40:59
nova-network	PoC5	nova	enabled	:-)	2012-05-29 15:40:56
nova-scheduler	PoC5	nova	enabled	:-)	2012-05-29 15:40:54
nova-volume	PoC5	nova	enabled	:-)	2012-05-29 15:40:56
nova-cert	PoC5	nova	enabled	:-)	2012-05-29 15:40:59

```
sudo service rsync restart
sudo swift-init main restart
sudo swift-init rest restart
sudo /etc/init.d/apache2 restart
sudo restart nova-api
```

Summary

- Openstack is in use now for real commercial services.
- Functionality is increasing with each new version.
- Supports different hypervisors and containers.
- Compatible with AWS ec2 images.
- Complex to setup.
- Most public cloud offerings use openstack components.
- Some private clouds support or plan to support openstack images.
- Openstack is becoming an open standard?

Questions

Testing your own storage using Media Storage Meter

The screenshot shows the SourceForge project page for 'Media storage meter'. The page layout includes a top navigation bar with the SourceForge logo and search bar, and a secondary navigation bar with links like 'Browse', 'Blog', 'Support', etc. The main content area is divided into several sections: a project summary with a 'Download' button for 'CtrlApp_2.0.5_win32_source.zip', a 'Description' section stating it's an application for testing network attached storage, a 'User Reviews' section with a 'Write a Review' link, and a right-hand sidebar with 'Additional Project Details' (including last update, platform, categories, license, languages, audience, and interface) and 'Recommended Projects' (listing 7-Zip and VLC media player). The footer contains status, terms, privacy, and copyright information.

SourceForge Find Open Source Software Browse Blog Support Jobs Newsletters Resources Register Log In

Home / Browse / Networking / Media storage meter

Summary Files Reviews Support Develop Tracker Mailing Lists Forums

Media storage meter **Beta**

davepb, m97lrs

Add a Review

1 Download (This Week)

Download CtrlApp_2.0.5_win32_source.zip

Browse All Files

Description

An application for the testing of network attached storage, originally assumed to be used for the streaming of media.

Media storage meter Web Site >

User Reviews Write a Review >

Be the first to post a review of Media storage meter!

Additional Project Details

Last Update 2011-07-20

Platform(s) Available

Categories Networking

Registered 2006-04-19

License GNU General Public License (GPL)

Languages English

Intended Audience Developers, End Users/Desktop, Quality Engineers

User Interface Command-line, Win32 (MS Windows)

Programming Language C++

Report inappropriate content

Recommended Projects

7-Zip

VLC media player

Status Terms Privacy Advertise About HTML5 Center SourceForge.JP © 2012 Geeknet, Inc.

<http://sourceforge.net/projects/msmeter/>