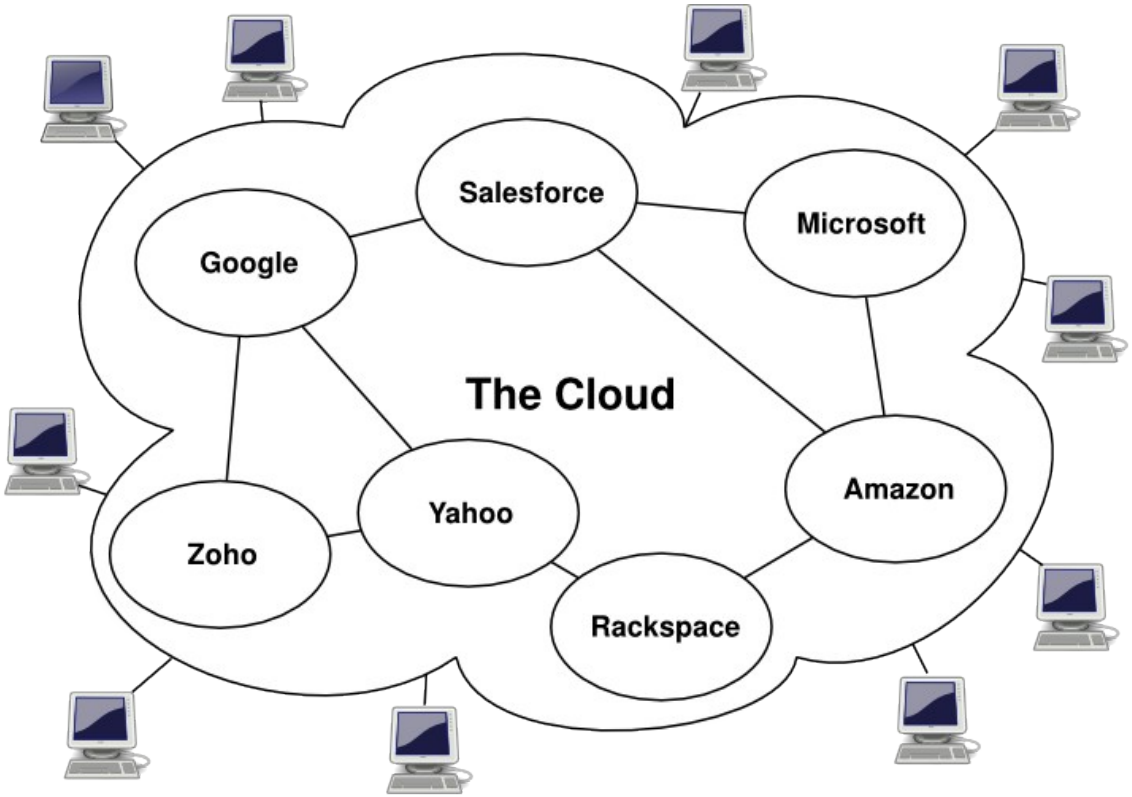
# UAB Research Cloud an Update

## UAB IT Food For Thought
## July 17, 2013

John-Paul Robinson
UAB IT Research Computing

# Back in 2010....

# What's a Cloud?

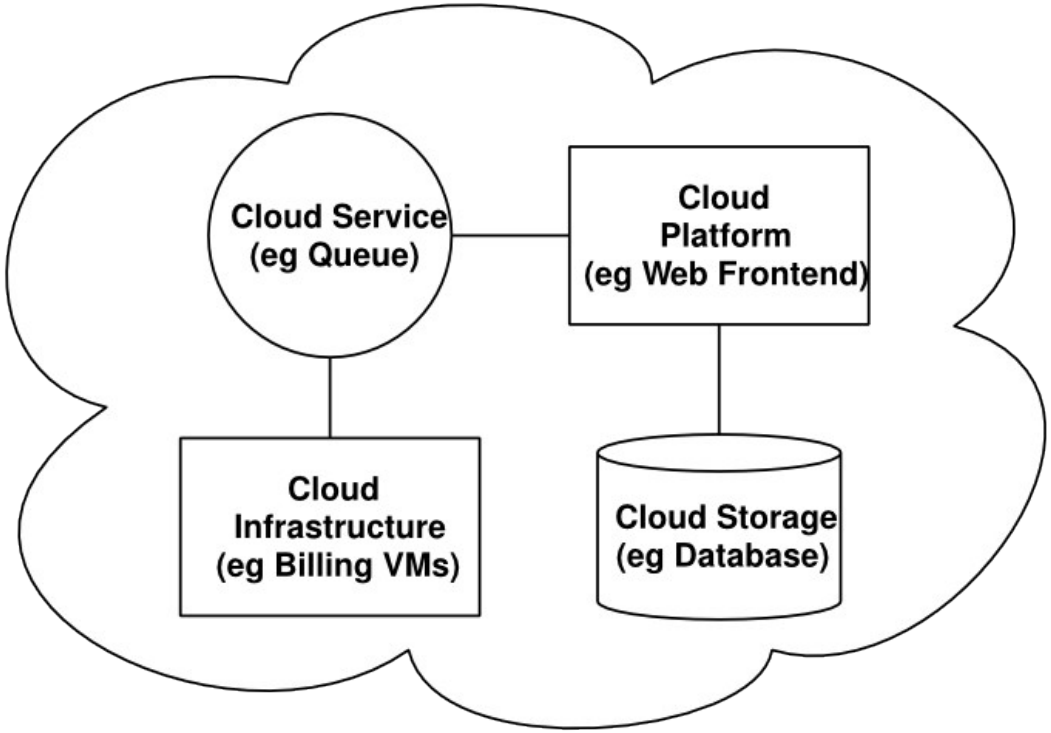



***Wikipedia Sez:***

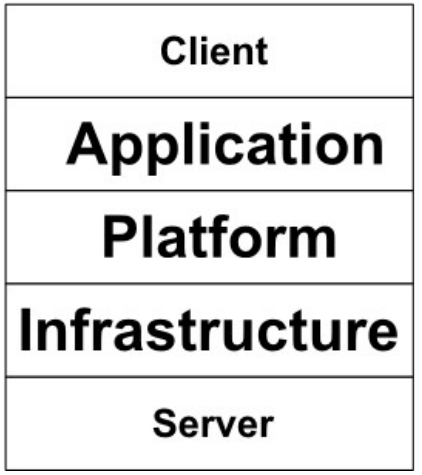
*Cloud computing is Internet-based computing, whereby shared resources, software, and information are provided to computers and other devices on demand, like the electricity grid.*

# The Stuff of Clouds

*Clouds have services....*




*...and clouds have structure*




*Picture credits to this point...Wikipedia: Cloud Computing*

# The “aaS” of Clouds

- SaaS – Software as a Service
  - This  is the application layer.  It’s what the ordinary consumer of cloud services sees, typically via their web browser or a dedicated app.
- PaaS – Platform as a Service
  - This is the layer on which applications are built.  It’s what the ordinary consumer of developer services uses to build the applications delivered in the SaaS layer.
- IaaS – Infrastructure as a Service
  - This is the layer that makes everything possible. It’s deep in the stack and not typically seen by the consumer, but it’s the layer we’re leveraging to build a coherent service stack.

# What does it mean to use the cloud today?

- It's not always about being “out there”
- It's about autonomy
- It's about choice
- It's about self direction
- It's about a lot of things that we do already
- It's about how we can work *with* technology

# What are the Apps?

# I really rather buy this...

# Like DropBox...

## Wherever you are

Put your stuff in Dropbox and get to it from your computers, phones, or tablets. Edit docs, automatically add photos, and show off videos from anywhere.

## Share with confidence

Share photos with friends. Work with your team like you're using a single computer. Everything's automatically private, so you control who sees what.

## Safe and secure

Even if your phone goes for a swim, your stuff is always safe in Dropbox and can be restored in a snap. Dropbox secures your files with AES-256 bit encryption and two-step verification.

DURACLOUD™

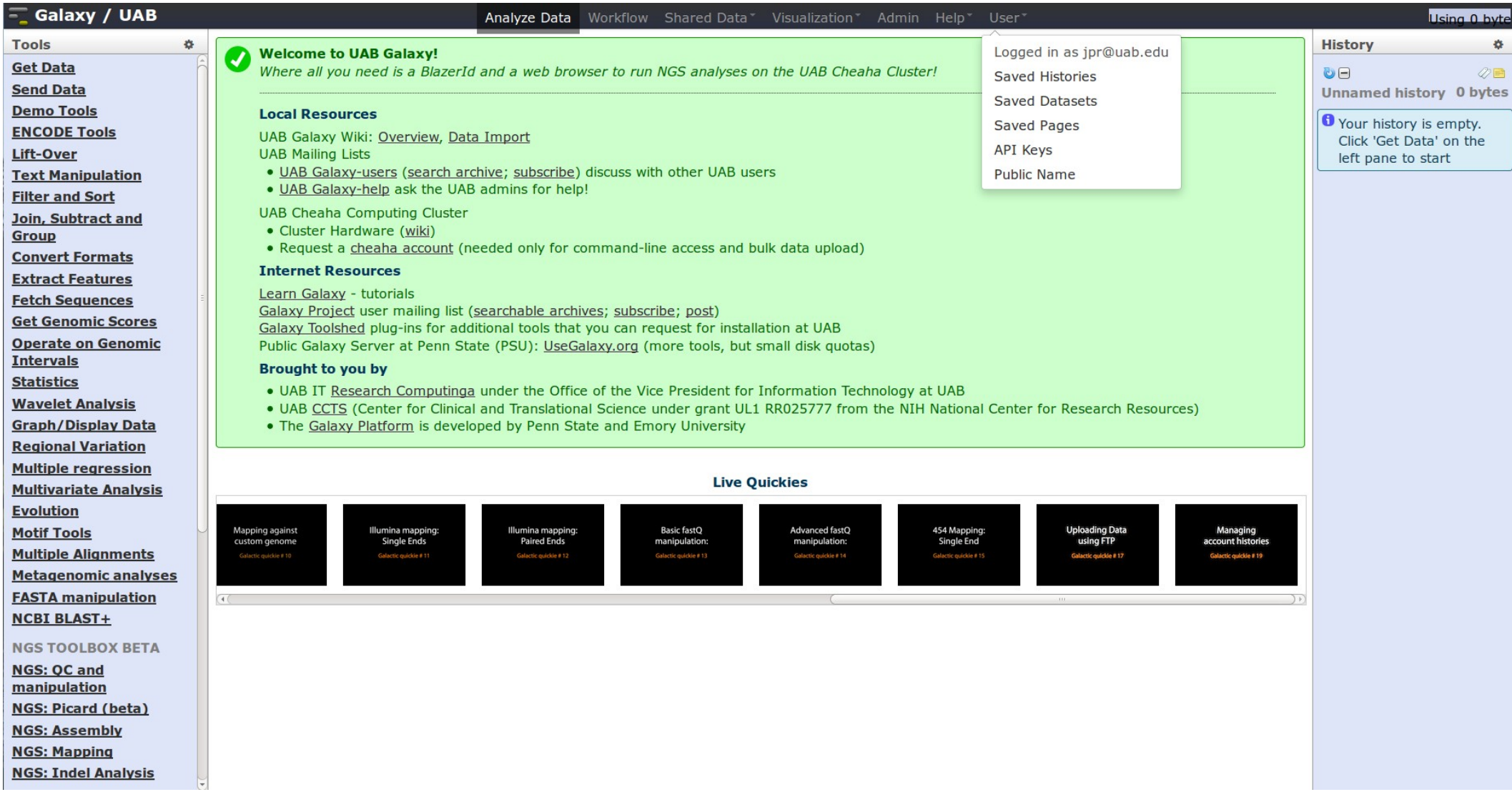



- NO WAITING: TRY IT NOW
  - FIND OUT MORE
- PURCHASE
  - NEW LOW-COST STORAGE

VISIT SPECTRUM OF DURACLOUD USE CASES

**See** comparisons of costs vs benefits
**Find** a use case similar to your institution
**Look** at simple vs robust use cases

# UAB Galaxy Platform for NextGen Sequencing



# CLC GENOMICS SERVER

A flexible enterprise level infrastructure and analysis backbone for next generation sequencing data analysis.

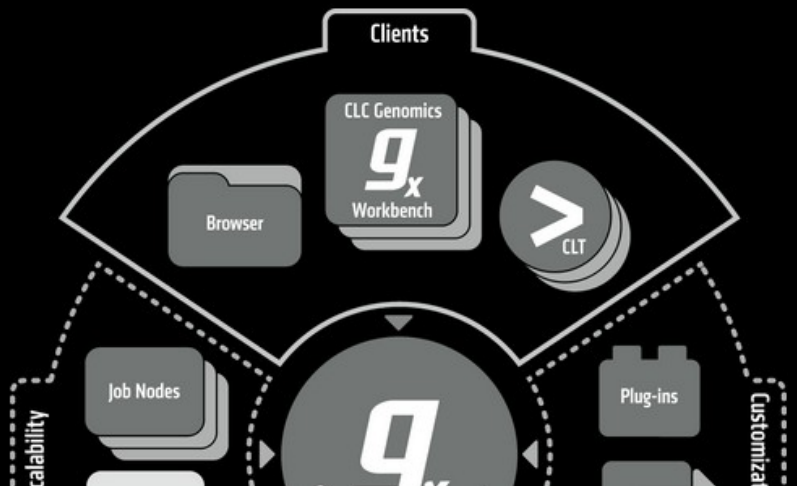


*Overview*

## GENOMICS SERVER

### Centralized Bioinformatics Analyses

CLC Genomics Server is an advanced high-throughput sequencing focused three-tier solution offering secure, powerful, and flexible bioinformatics computing on a server-architecture located centrally in your organization.

# ssglabvm

UAB DEPARTMENT OF BIOSTATISTICS
SECTION ON STATISTICAL GENETICS

## Overview

This is the home page of the Section on Statistical Genetics (SSG) Mobile Lab Virtual Machine we call *ssglabvm*. If you are unfamiliar with the concept of virtualization, you can think of this "virtual" machine as a custom computer for statistical genetics research, analysis, and demonstration that you can run on your own computer.

## What programs are installed?

Here is a short, representative, but non-exhaustive list:

- PLINK
- R
- Bioconductor
- Bowtie
- SAMtools
- Haploview
- R/maanova
- minimac
- PLINK/SEQ
- MACS
- CpGassoc
- R/qtlbim
- HDBSTAT
- The Power Atlas

## Why a virtual machine?

While it is true that anyone can download and install these freely available programs themselves on their own computers, doing so takes time and in some cases, specialized system administration or programming expertise. Though many software come with pre-compiled binaries for different operating systems, some statistical genetics programs may require non-trivial effort to compile and install. Furthermore, after the initial installation, the software should ideally be rigorously tested, by both the system administrator and by the data analyst or statistical programmer. These challenges make the creation and availability of an installed, tested, and reliable collection of statistical genetics programs a worthwhile exercise for us.

Join
Oracle ACE Program
User Groups
Developer Day
Women in Technology
TechCasts
Pre-Built Developer VMs
Java Magazine


## Pre-Built Developer VMs (for Oracle VM VirtualBox)

Learning your way around a new software stack is challenging enough without having to spend multiple cycles on the install process. Instead, we have packaged such stacks into pre-built Oracle VM VirtualBox appliances that you can download, install, and experience as a single unit. Just downloaded/assemble the files, import into VirtualBox (available for free), import, and go (but not for production use or redistribution)!

Some of these VMs are designed to support Developer Day workshops, and have specific hands on labs embedded in them, but they're available to all.) Be sure to install VirtualBox first.

See also: Oracle VM Templates for use with Oracle VM (production use and redistribution are OK)

**VM's on this page include:**

- Database App Development VM
- Enterprise Java Development VM
- Oracle VM Manager & Server VMs
- Solaris 11 Admin VM
- Oracle Tuxedo Web Application Server Demo VM
- Oracle Business Intelligence SampleAppV305
- SOA & BPM Development VM
- Enterprise PHP Development VM

**Popular Downloads**

- Berkeley DB
- Enterprise Manager
- Database EE and XE
- Developer VMs
- Enterprise Pack for Eclipse
- Java
- JDeveloper and ADF
- Oracle Linux and Oracle VM
- MySQL
- NetBeans IDE
- NoSQL Database
- Solaris
- SQL Developer
- VirtualBox
- WebLogic Server

**Related Communities**

Java.net
MySQL.com
NetBeans.org
Java Community Process Program
AskTom

# Splunk Hadoop Connect

## Reliable Interoperability between Splunk and Hadoop

Developing Hadoop applications is time consuming. Finding or training data scientists to get value from your data is also challenging. As a result, most Hadoop-related projects can take a long time to develop and require specialized knowledge to adapt to new requirements.

Deploy Splunk Enterprise quickly for real-time collection, indexing, analysis and visualizations and then reliably forward events to Hadoop for long-term archiving and additional batch analytics. With Splunk Hadoop Connect, you can stand up reliable, secure, enterprise-grade big data projects in days instead of months.

Get Splunk Hadoop Connect.

Overview | Why Splunk | Features

### Overview

With bi-directional data integration, Splunk Hadoop Connect lets you move data between Splunk Enterprise and Hadoop easily and reliably.

Splunk Hadoop Connect enables you to benefit from the best of both worlds. Quickly deploy Splunk Enterprise for real-time collection, indexing, analysis and visualizations and then reliably forward events to Hadoop for long-term archiving and additional batch analytics. Further leverage Splunk software by importing and indexing data already stored in Hadoop.

- Export events collected and aggregated in Splunk Enterprise reliably to HDFS
- Explore and browse HDFS directories and files
- Import and index data from HDFS for secure searching, reporting, analysis and visualizations in Splunk

BIG DATA

Hunk Beta

**Splunk Hadoop Connect**

Splunk App for Hadoop Operations

Splunk DB Connect

Next Steps

FACT SHEET
Splunk Hadoop Connect

SOLUTIONS GUIDE
Splunk for Big Data

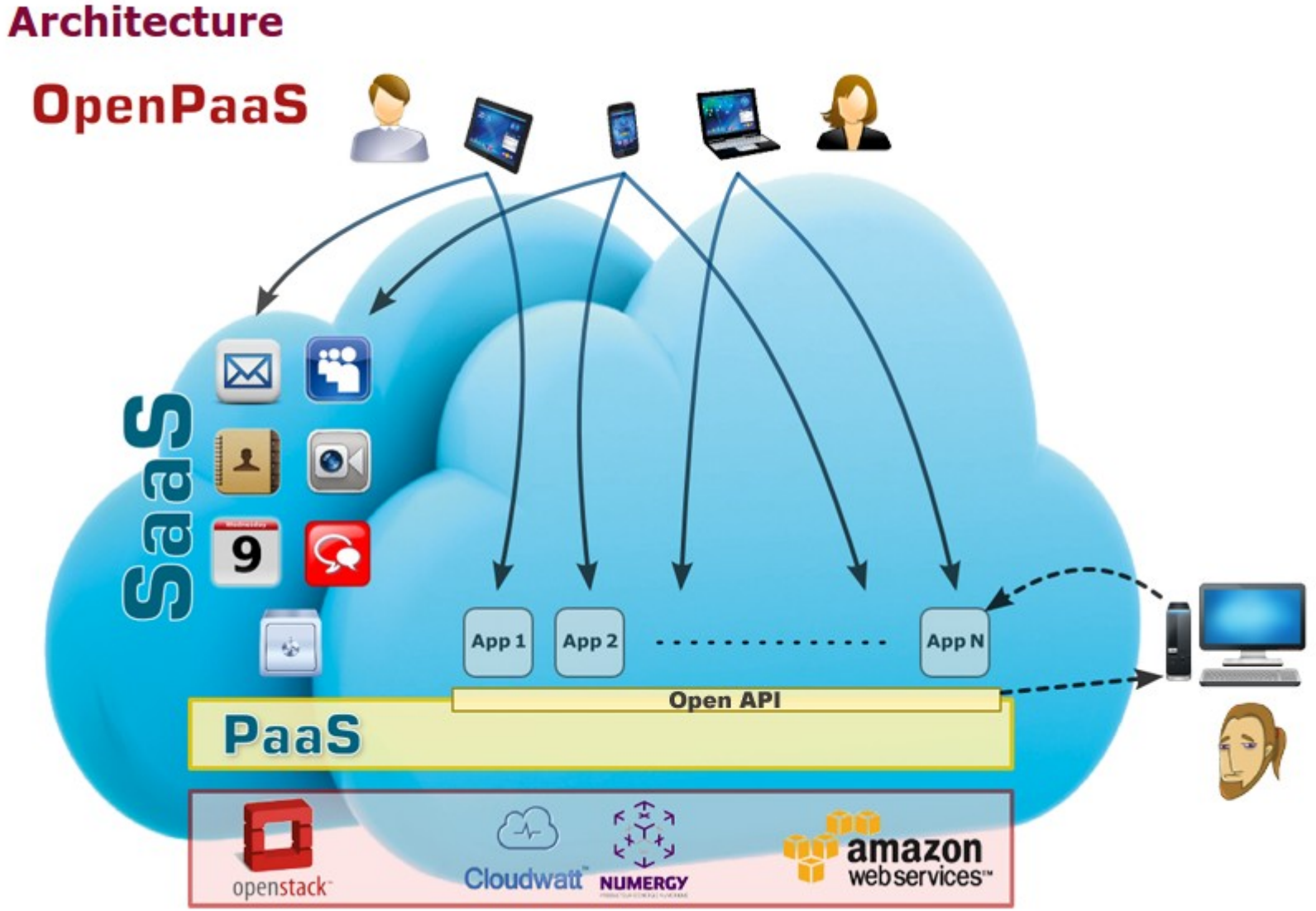
DOCUMENTATION
Splunk Hadoop Connect

Get Splunk Hadoop Connect

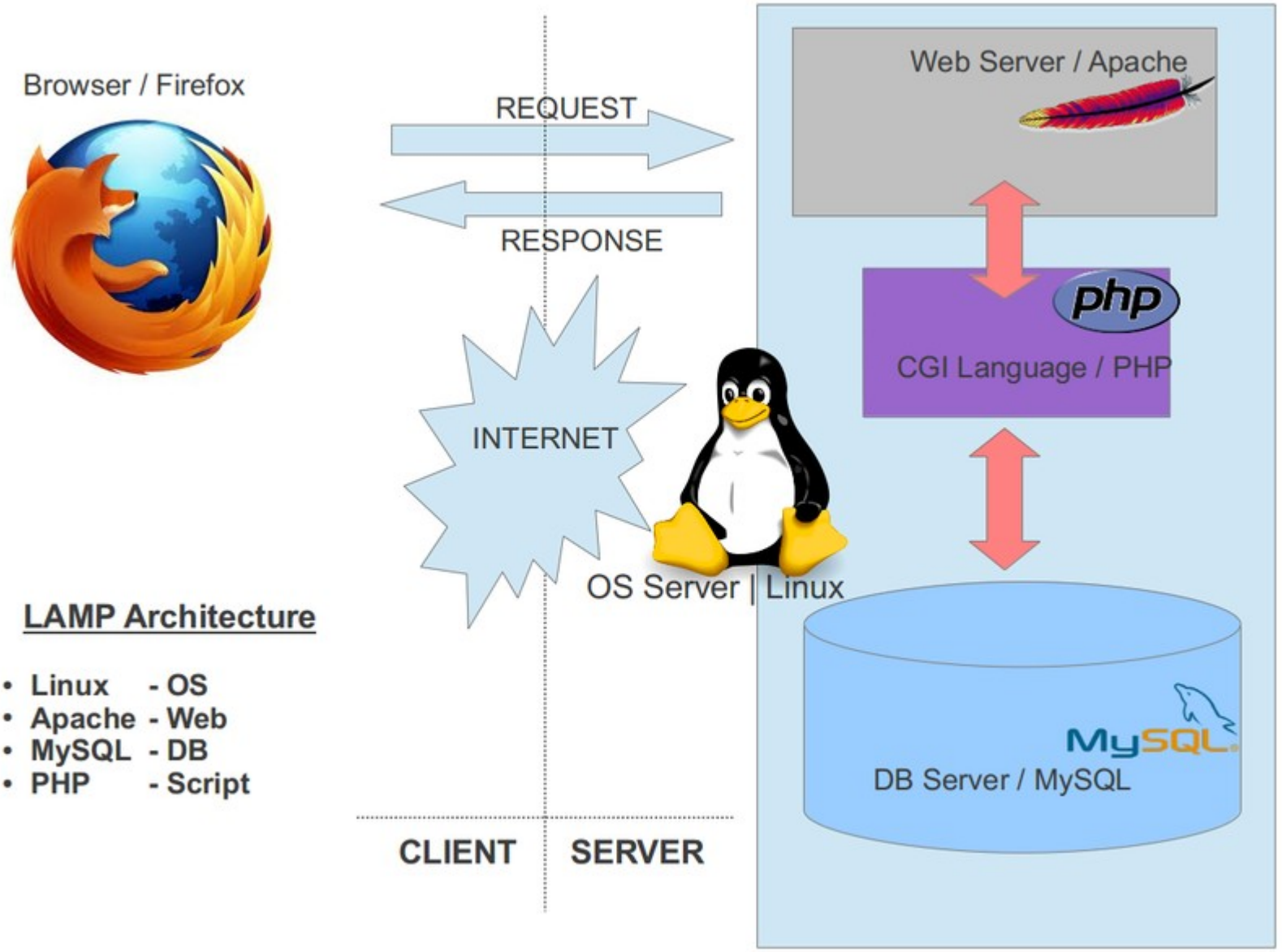
Download Splunk Hadoop Connect from our community site for free.

Free Download

# Platform as a Service (PaaS)



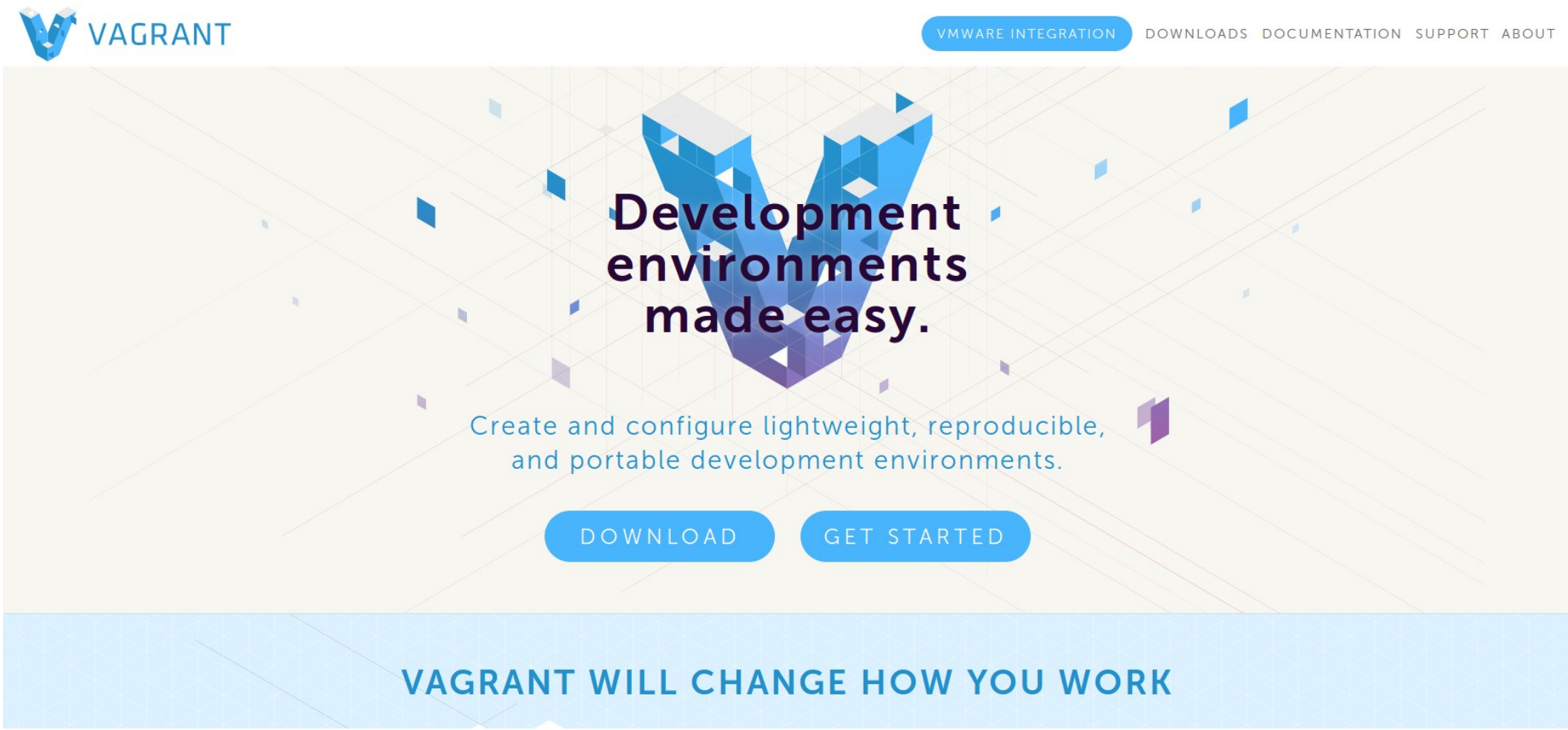
# Building and Using LAMP Stacks



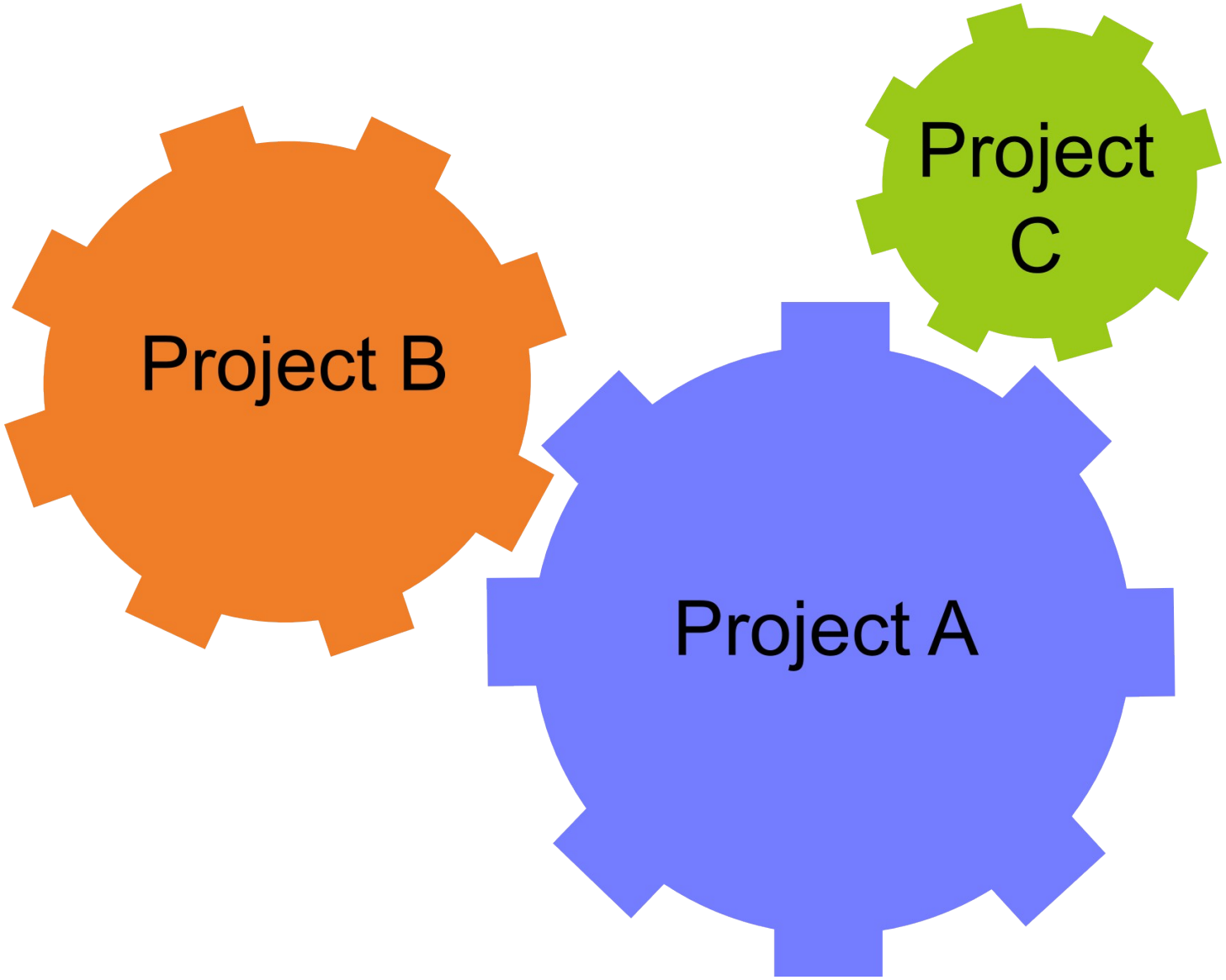

**LAMP Architecture**

- **Linux - OS**
- **Apache - Web**
- **MySQL - DB**
- **PHP - Script**

# Tools to Build Cloud-ready Systems



# Free Downstream Developers to Build at the Speed of Research



# What's It Look Like?

TightVNC: cheaha.uabgrid.uab.edu:2 (jpr)

Applications Places System 7:11 AM

Instance Overview – OpenStack Dashboard - Mozilla Firefox (on rcs-srv-02.uabgrid.uab.edu)

File Edit View History Bookmarks Tools Help

Instance Overview - OpenSta...

172.22.0.10/nova/

Google

openstack DASHBOARD

Project

PROJECT admin

Manage Compute

- Overview
- Instances & Volumes
- Images & Snapshots
- Access & Security

# Overview

Logged in as: jpr Settings Sign Out

**Select a month to query its usage:**

July 2013 Submit

**Active Instances:** 5 **Active Memory:** 7GB **This Month's VCPU-Hours:** 2045.29 **This Month's GB-Hours:** 39511.72

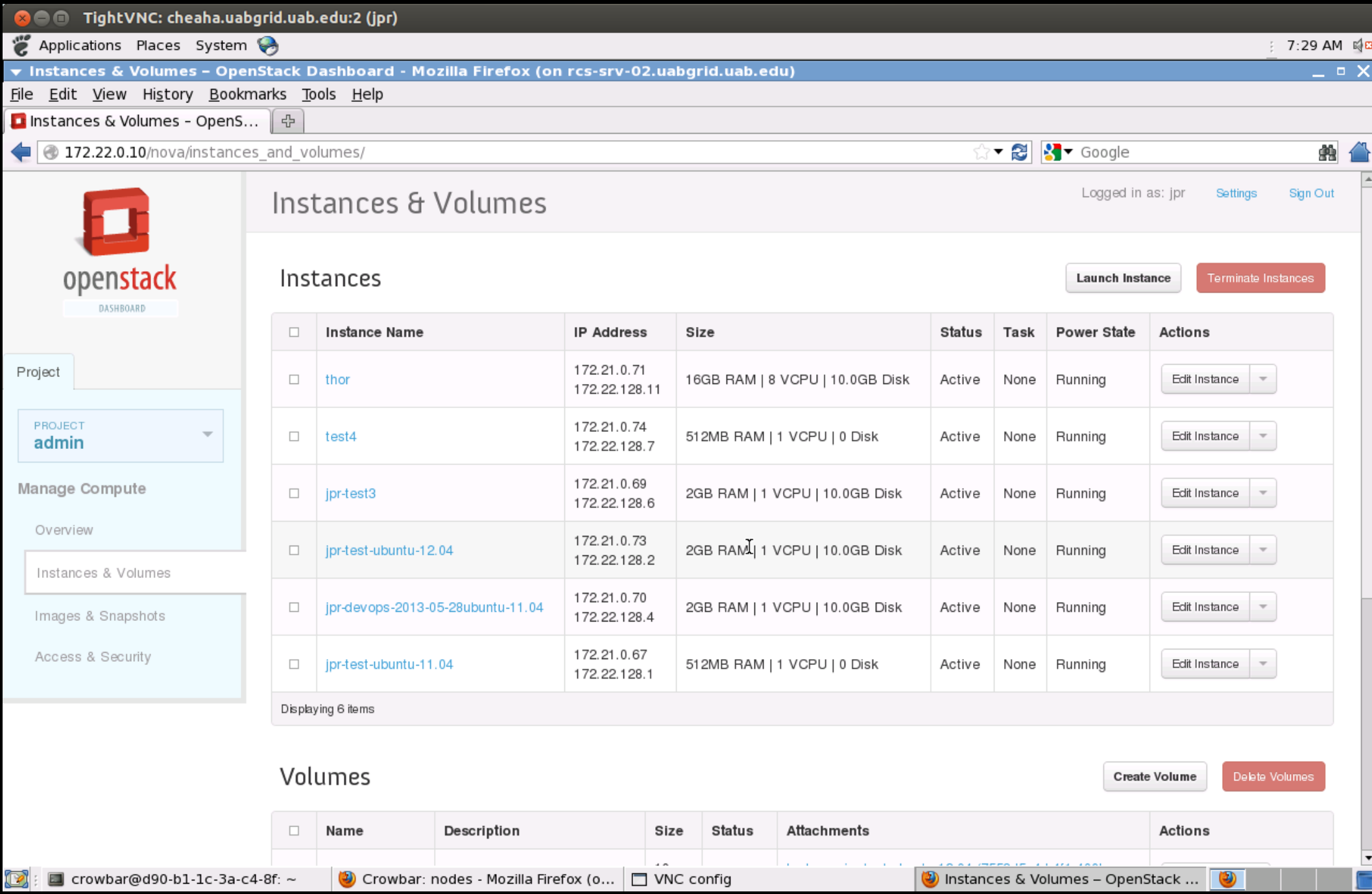
## Usage Summary

Download CSV Summary

| Instance Name | VCPUs | Disk | RAM | Uptime |
|---|---|---|---|---|
| jpr-test-ubuntu-11.04 | 1 | - | 512MB | 2 months |
| jpr-devops-2013-05-28ubuntu-11.04 | 1 | 30 | 2GB | 1 month, 2 weeks |
| jpr-test-ubuntu-12.04 | 1 | 30 | 2GB | 1 month, 2 weeks |
| jpr-test3 | 1 | 30 | 2GB | 1 month, 2 weeks |
| test4 | 1 | - | 512MB | 1 month |

Displaying 5 items

crowbar@d90-b1-1c-3a-c4-8f: ~ | Chef Server - Mozilla Firefox (on rc... | VNC config | Instance Overview – OpenStack Da...


TightVNC: cheaha.uabgrid.uab.edu:2 (jpr)
Applications Places System
7:29 AM
Instances & Volumes – OpenStack Dashboard - Mozilla Firefox (on rcs-srv-02.uabgrid.uab.edu)
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Instances & Volumes - OpenS...
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Manage Compute
Overview
Instances & Volumes
Images & Snapshots
Access & Security
Instances & Volumes
Logged in as: jpr
Settings
Sign Out
Instances
Launch Instance
Terminate Instances
Instance Name
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172.21.0.71
172.22.128.11
16GB RAM | 8 VCPU | 10.0GB Disk
Active
None
Running
Edit Instance
test4
172.21.0.74
172.22.128.7
512MB RAM | 1 VCPU | 0 Disk
Active
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Running
Edit Instance
jpr-test3
172.21.0.69
172.22.128.6
2GB RAM | 1 VCPU | 10.0GB Disk
Active
None
Running
Edit Instance
jpr-test-ubuntu-12.04
172.21.0.73
172.22.128.2
2GB RAM | 1 VCPU | 10.0GB Disk
Active
None
Running
Edit Instance
jpr-devops-2013-05-28ubuntu-11.04
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172.22.128.4
2GB RAM | 1 VCPU | 10.0GB Disk
Active
None
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Edit Instance
jpr-test-ubuntu-11.04
172.21.0.67
172.22.128.1
512MB RAM | 1 VCPU | 0 Disk
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Edit Instance
Displaying 6 items
Volumes
Create Volume
Delete Volumes
Name
Description
Size
Status
Attachments
Actions
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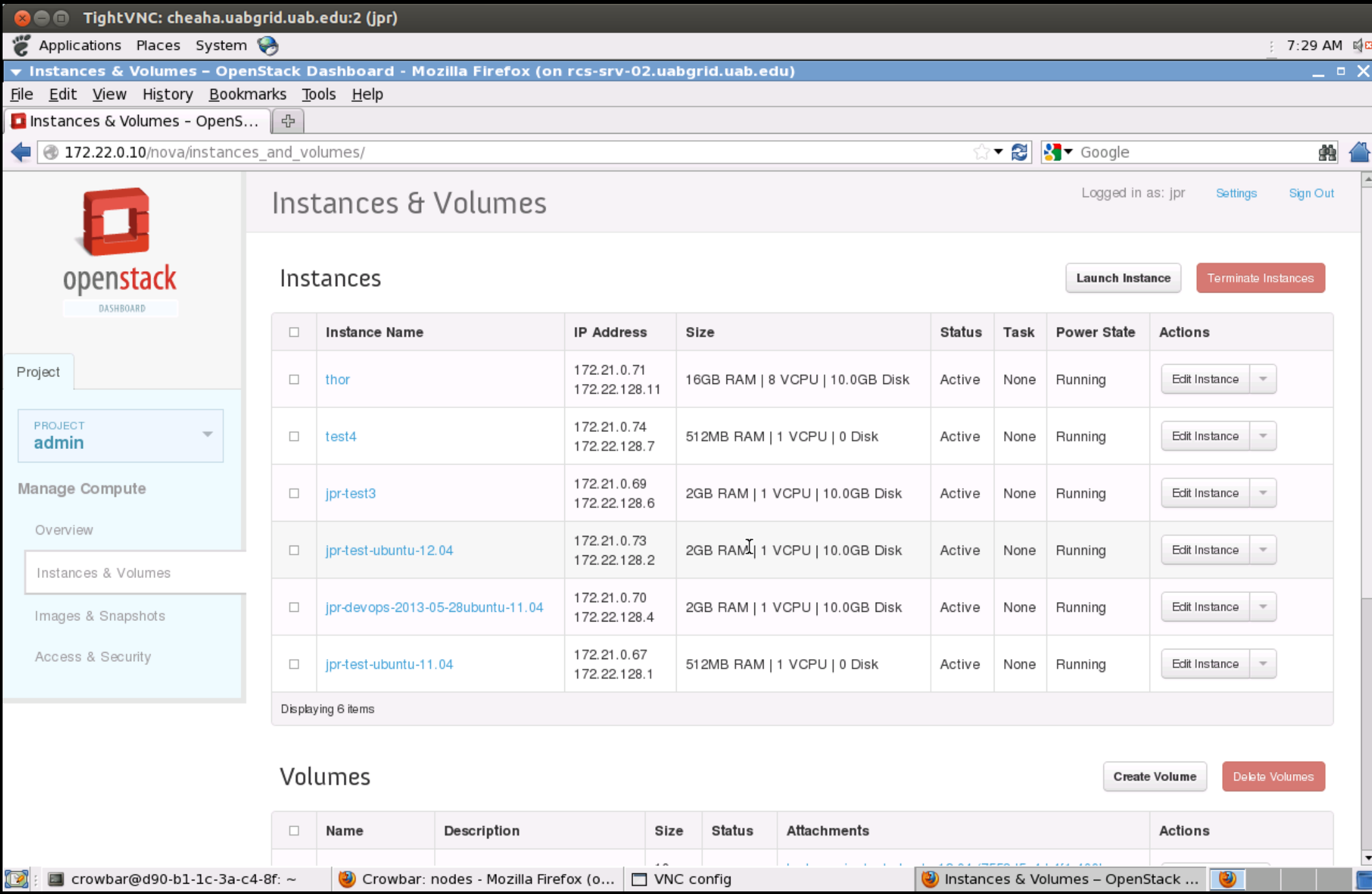
Crowbar: nodes - Mozilla Firefox (o...
VNC config
Instances & Volumes – OpenStack ...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2GB RAM | 1 VCPU | 10.0GB Disk
Active
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172.22.128.2
2GB RAM | 1 VCPU | 10.0GB Disk
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jpr-devops-2013-05-28ubuntu-11.04
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172.22.128.4
2GB RAM | 1 VCPU | 10.0GB Disk
Active
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Edit Instance
jpr-test-ubuntu-11.04
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512MB RAM | 1 VCPU | 0 Disk
Active
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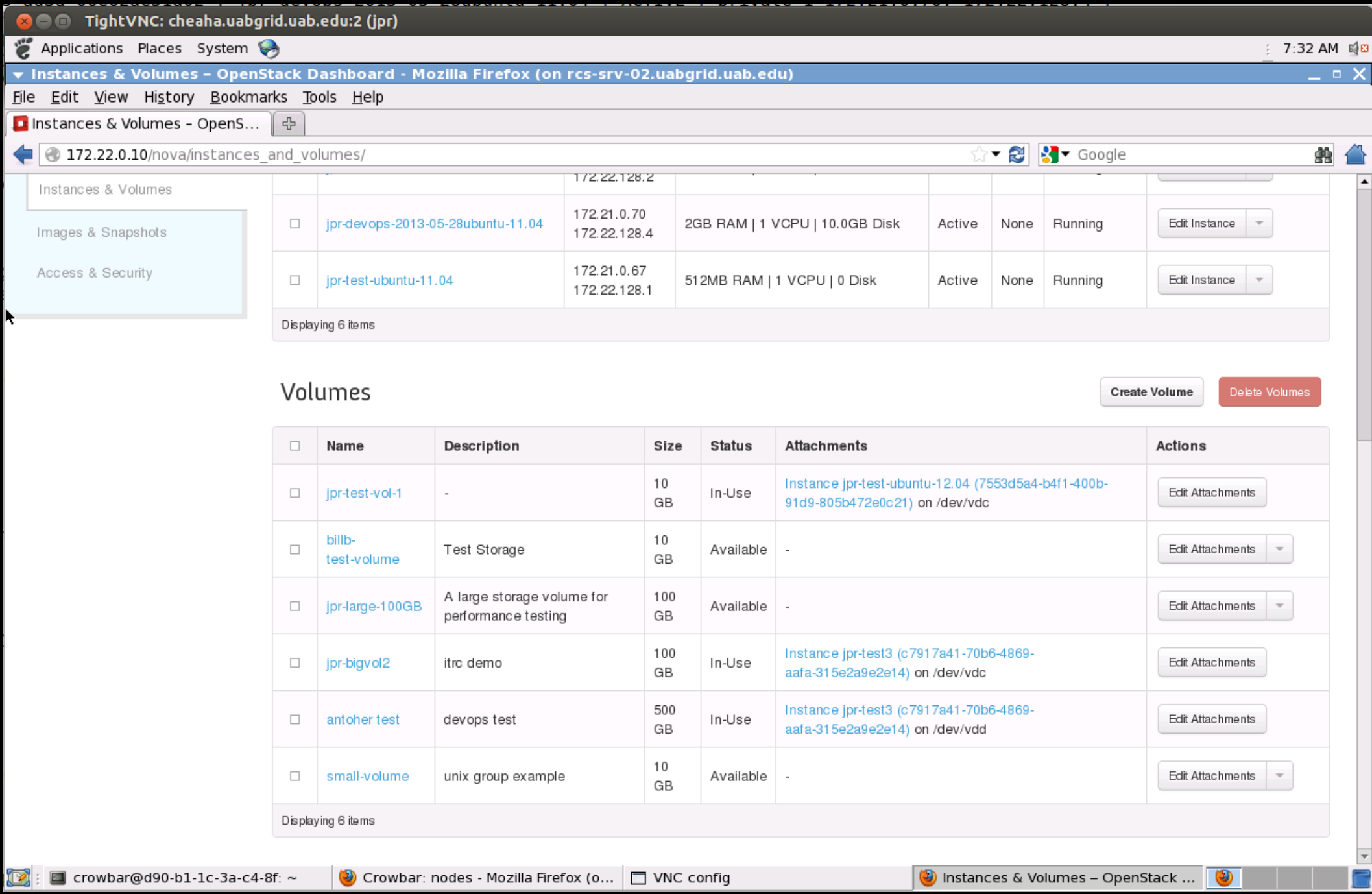
Edit Instance
Displaying 6 items
Volumes
Create Volume
Delete Volumes
Name
Description
Size
Status
Attachments
Actions
crowbar@d90-b1-1c-3a-c4-8f: ~
Crowbar: nodes - Mozilla Firefox (o...
VNC config
Instances & Volumes – OpenStack ...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Applications Places System
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Instances & Volumes – OpenStack Dashboard - Mozilla Firefox (on rcs-srv-02.uabgrid.uab.edu)
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Volumes
Create Volume
Delete Volumes
Name
Description
Size
Status
Attachments
Actions
jpr-test-vol-1
-
10 GB
In-Use
Instance jpr-test-ubuntu-12.04 (7553d5a4-b4f1-400b-91d9-805b472e0c21) on /dev/vdc
Edit Attachments
billb-test-volume
Test Storage
10 GB
Available
-
Edit Attachments
jpr-large-100GB
A large storage volume for performance testing
100 GB
Available
-
Edit Attachments
jpr-bigvol2
itrc demo
100 GB
In-Use
Instance jpr-test3 (c7917a41-70b6-4869-aafa-315e2a9e2e14) on /dev/vdc
Edit Attachments
antoher test
devops test
500 GB
In-Use
Instance jpr-test3 (c7917a41-70b6-4869-aafa-315e2a9e2e14) on /dev/vdd
Edit Attachments
small-volume
unix group example
10 GB
Available
-
Edit Attachments
Displaying 6 items
crowbar@d90-b1-1c-3a-c4-8f: ~
Crowbar: nodes - Mozilla Firefox (o...
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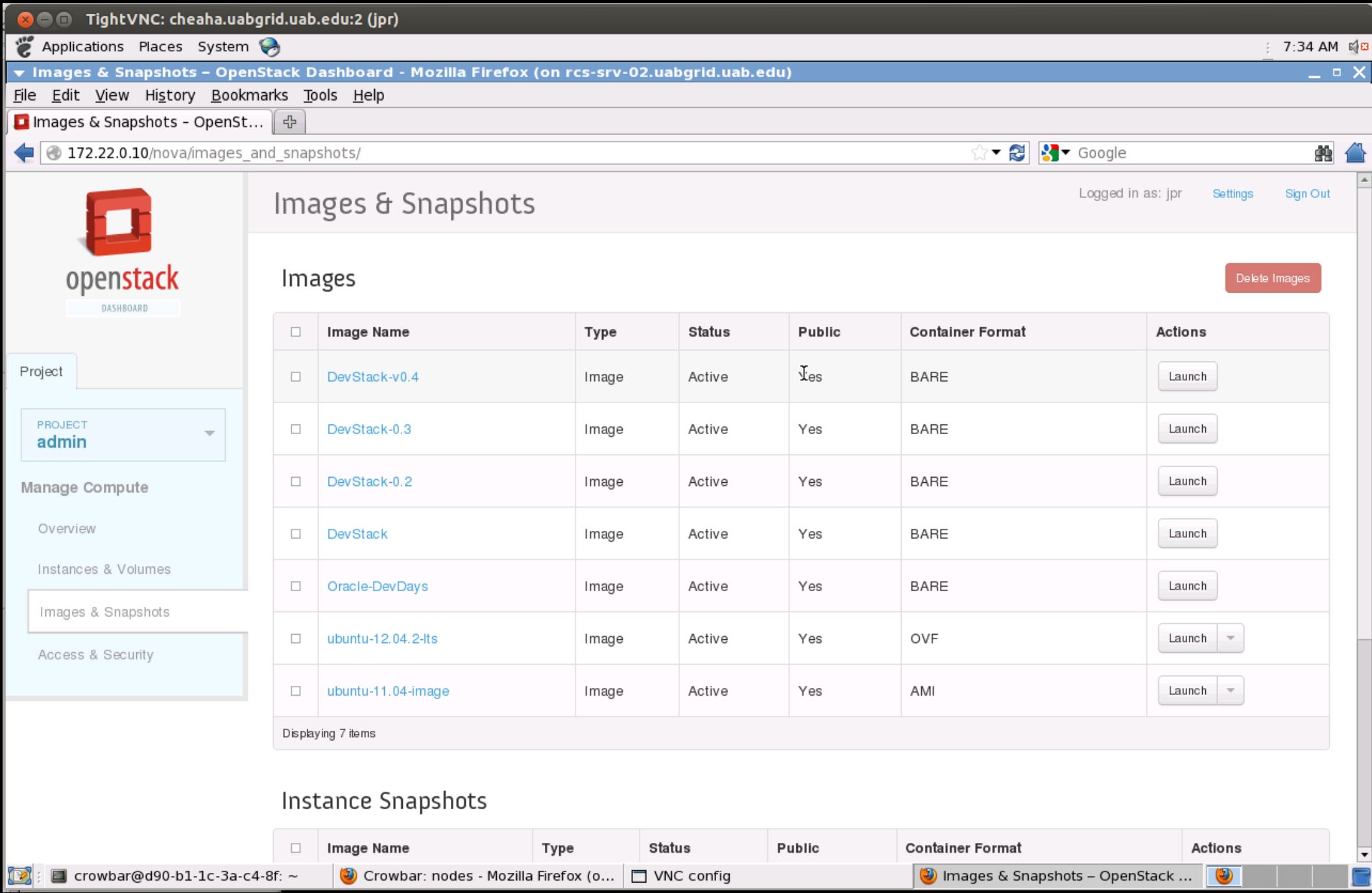
Instances & Volumes – OpenStack ...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DevStack-0.3 Image Active Yes BARE Launch
DevStack-0.2 Image Active Yes BARE Launch
DevStack Image Active Yes BARE Launch
Oracle-DevDays Image Active Yes BARE Launch
ubuntu-12.04.2-lts Image Active Yes OVF Launch
ubuntu-11.04-image Image Active Yes AMI Launch
Displaying 7 items
Instance Snapshots
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Container Format
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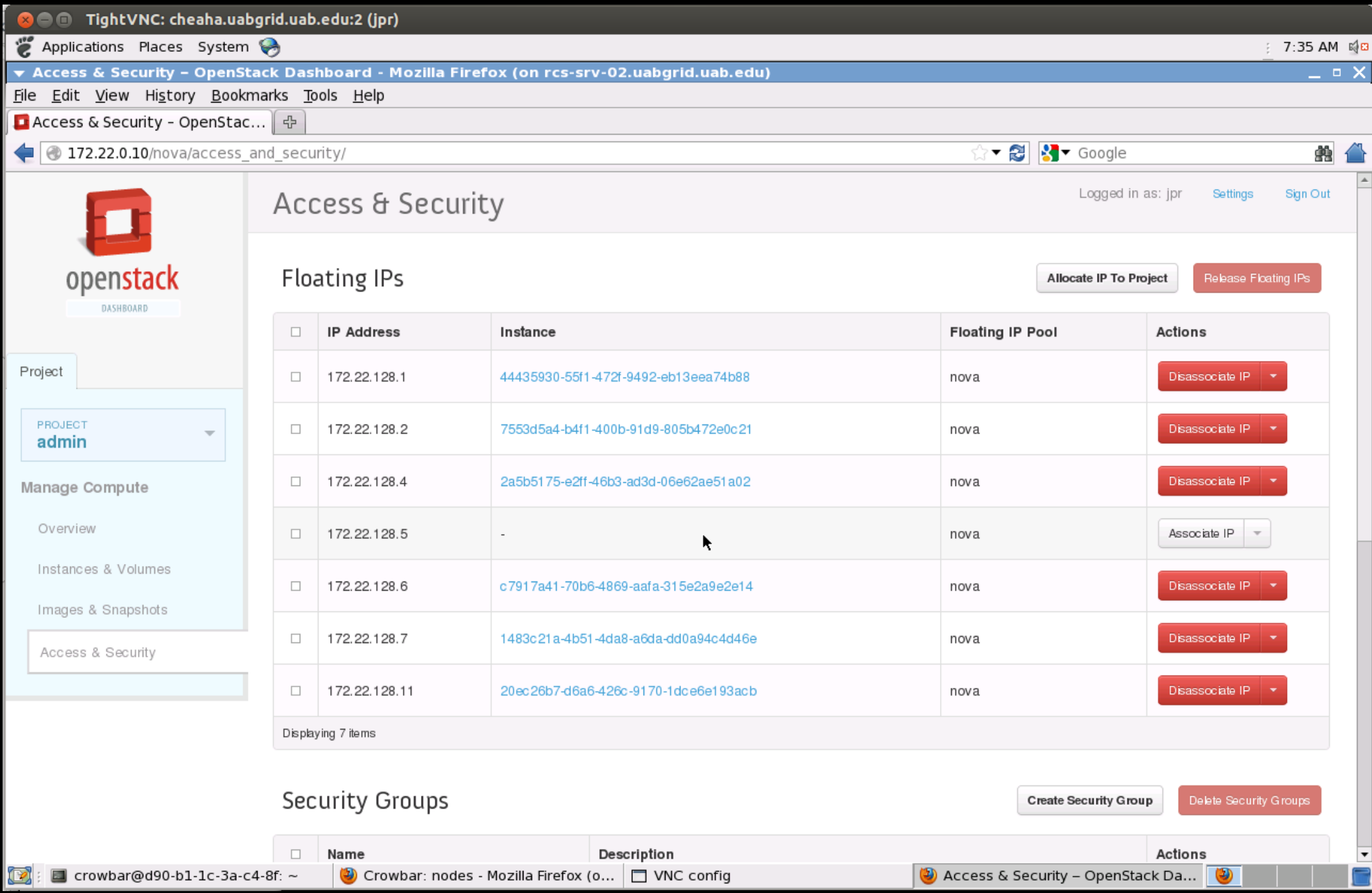
VNC config
Images & Snapshots – OpenStack ...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Sign Out
Floating IPs
Allocate IP To Project
Release Floating IPs
IP Address
Instance
Floating IP Pool
Actions
172.22.128.1
44435930-55f1-472f-9492-eb13eea74b88
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Disassociate IP
172.22.128.2
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Disassociate IP
172.22.128.5
-
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Associate IP
172.22.128.6
c7917a41-70b6-4869-aafa-315e2a9e2e14
nova
Disassociate IP
172.22.128.7
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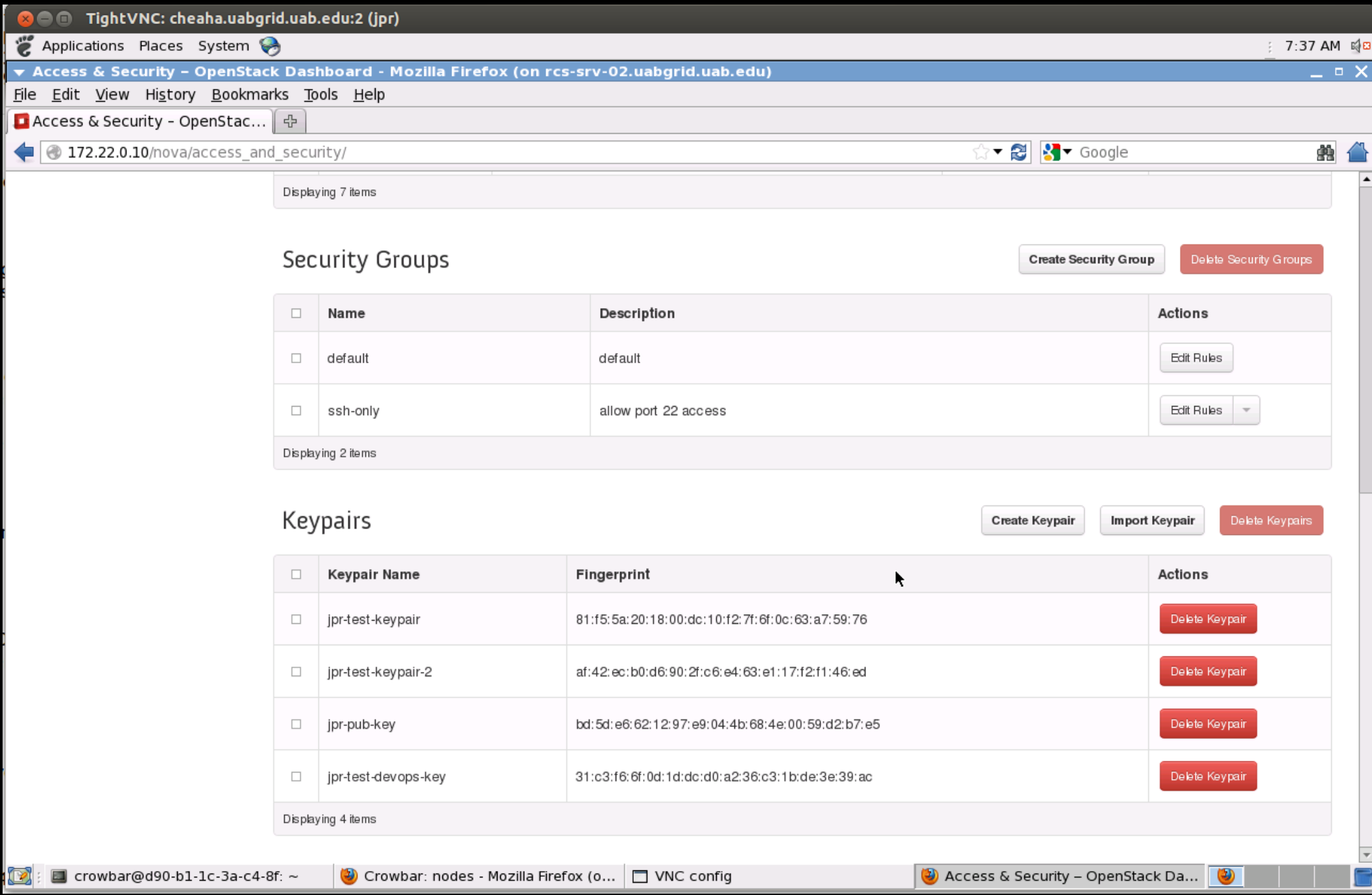
nova
Disassociate IP
172.22.128.11
20ec26b7-d6a6-426c-9170-1dce6e193acb
nova
Disassociate IP
Displaying 7 items
Security Groups
Create Security Group
Delete Security Groups
Name
Description
Actions
crowbar@d90-b1-1c-3a-c4-8f: ~
Crowbar: nodes - Mozilla Firefox (o...
VNC config
Access & Security – OpenStack Da...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Access & Security – OpenStack Dashboard - Mozilla Firefox (on rcs-srv-02.uabgrid.uab.edu)
File Edit View History Bookmarks Tools Help
Access & Security - OpenStac...
172.22.0.10/nova/access_and_security/
Google
Displaying 7 items
Security Groups
Create Security Group
Delete Security Groups
Name
Description
Actions
default
default
Edit Rules
ssh-only
allow port 22 access
Edit Rules
Displaying 2 items
Keypairs
Create Keypair
Import Keypair
Delete Keypairs
Keypair Name
Fingerprint
Actions
jpr-test-keypair
81:f5:5a:20:18:00:dc:10:f2:7f:6f:0c:63:a7:59:76
Delete Keypair
jpr-test-keypair-2
af:42:ec:b0:d6:90:2f:c6:e4:63:e1:17:f2:f1:46:ed
Delete Keypair
jpr-pub-key
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Delete Keypair
jpr-test-devops-key
31:c3:f6:6f:0d:1d:dc:d0:a2:36:c3:1b:de:3e:39:ac
Delete Keypair
Displaying 4 items
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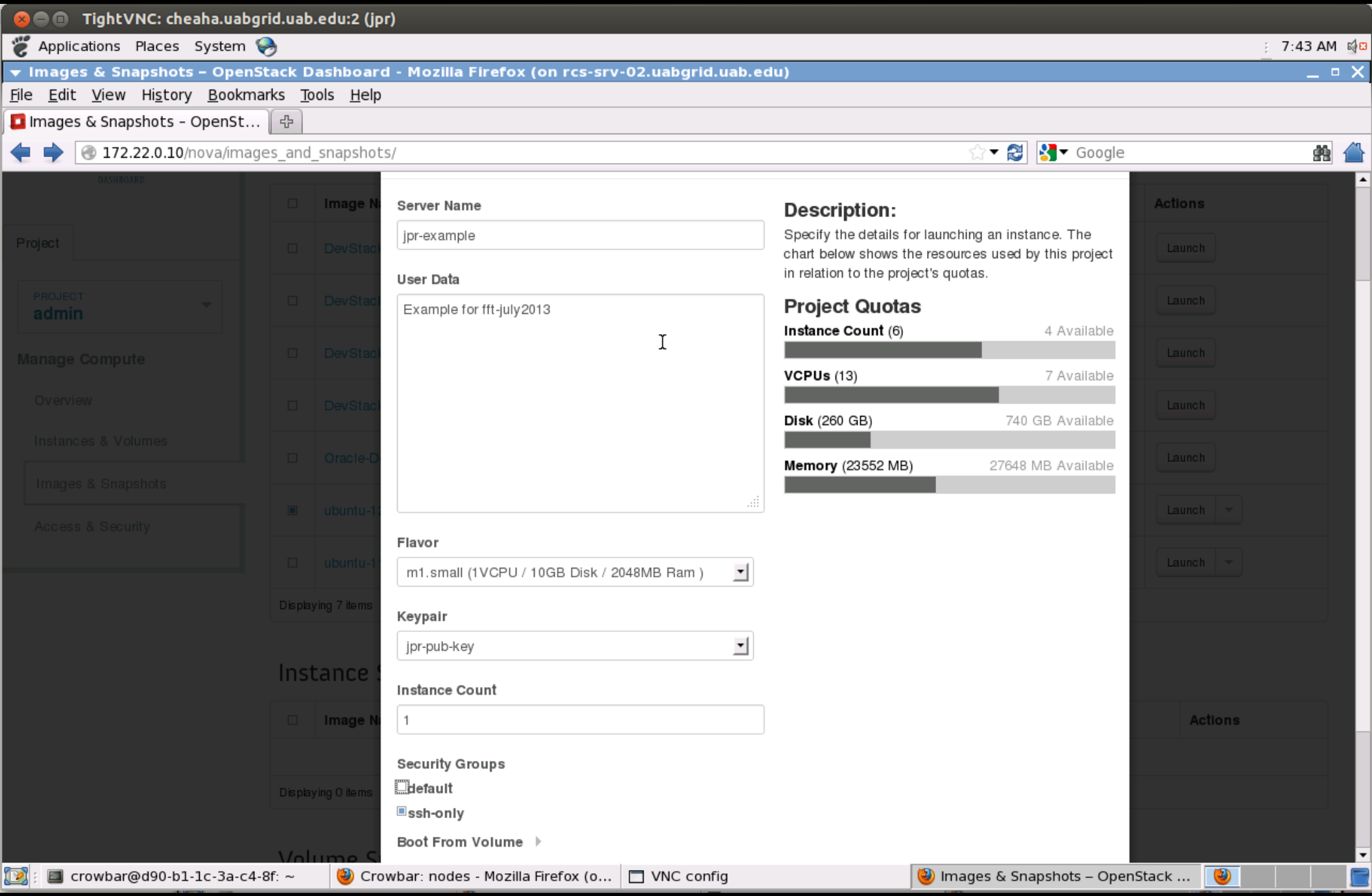
Crowbar: nodes - Mozilla Firefox (o...
VNC config
Access & Security – OpenStack Da...


TightVNC: cheaha.uabgrid.uab.edu:2 (jpr)
Applications Places System
7:43 AM
Images & Snapshots – OpenStack Dashboard - Mozilla Firefox (on rcs-srv-02.uabgrid.uab.edu)
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Images & Snapshots - OpenSt...
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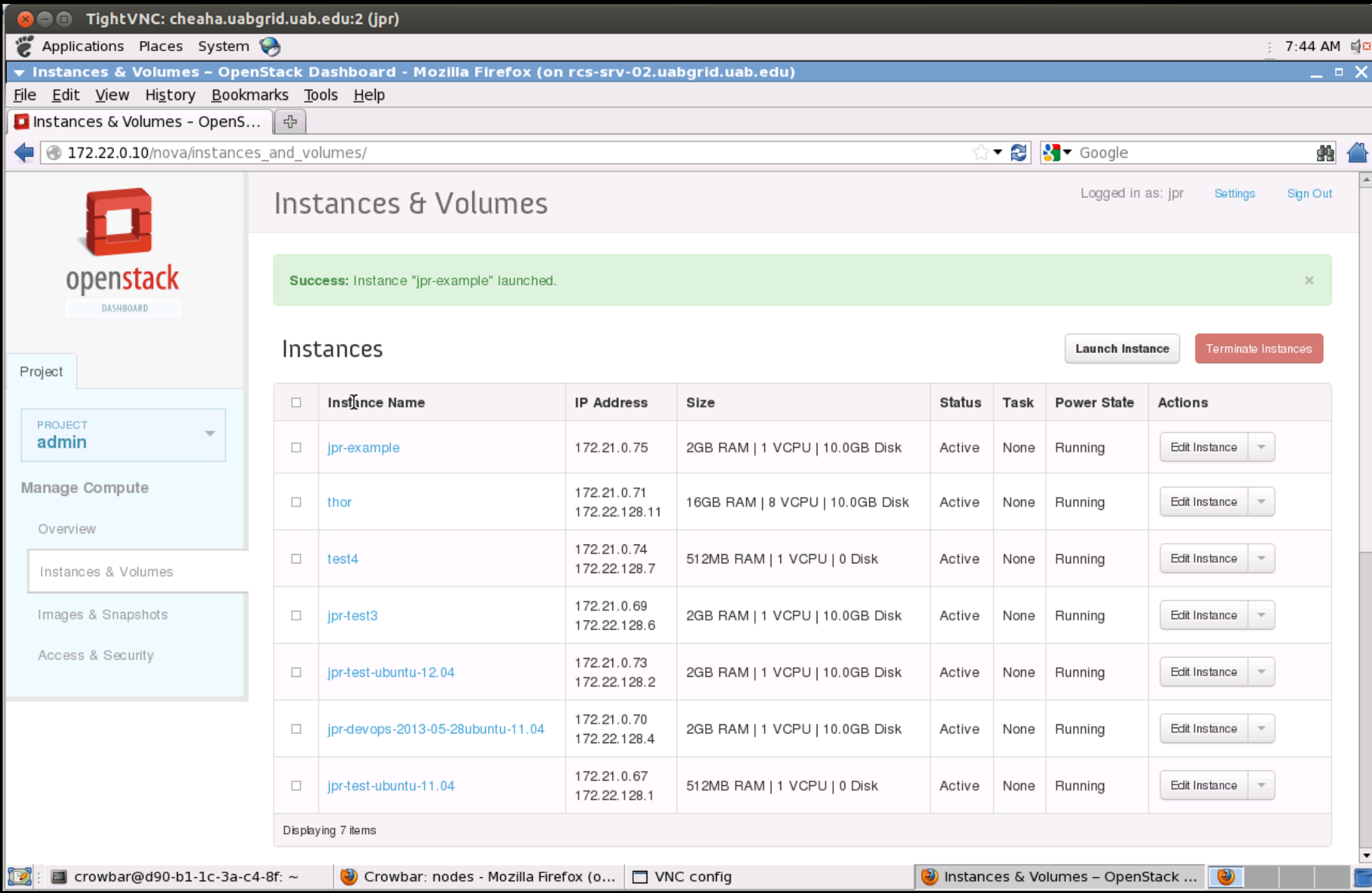
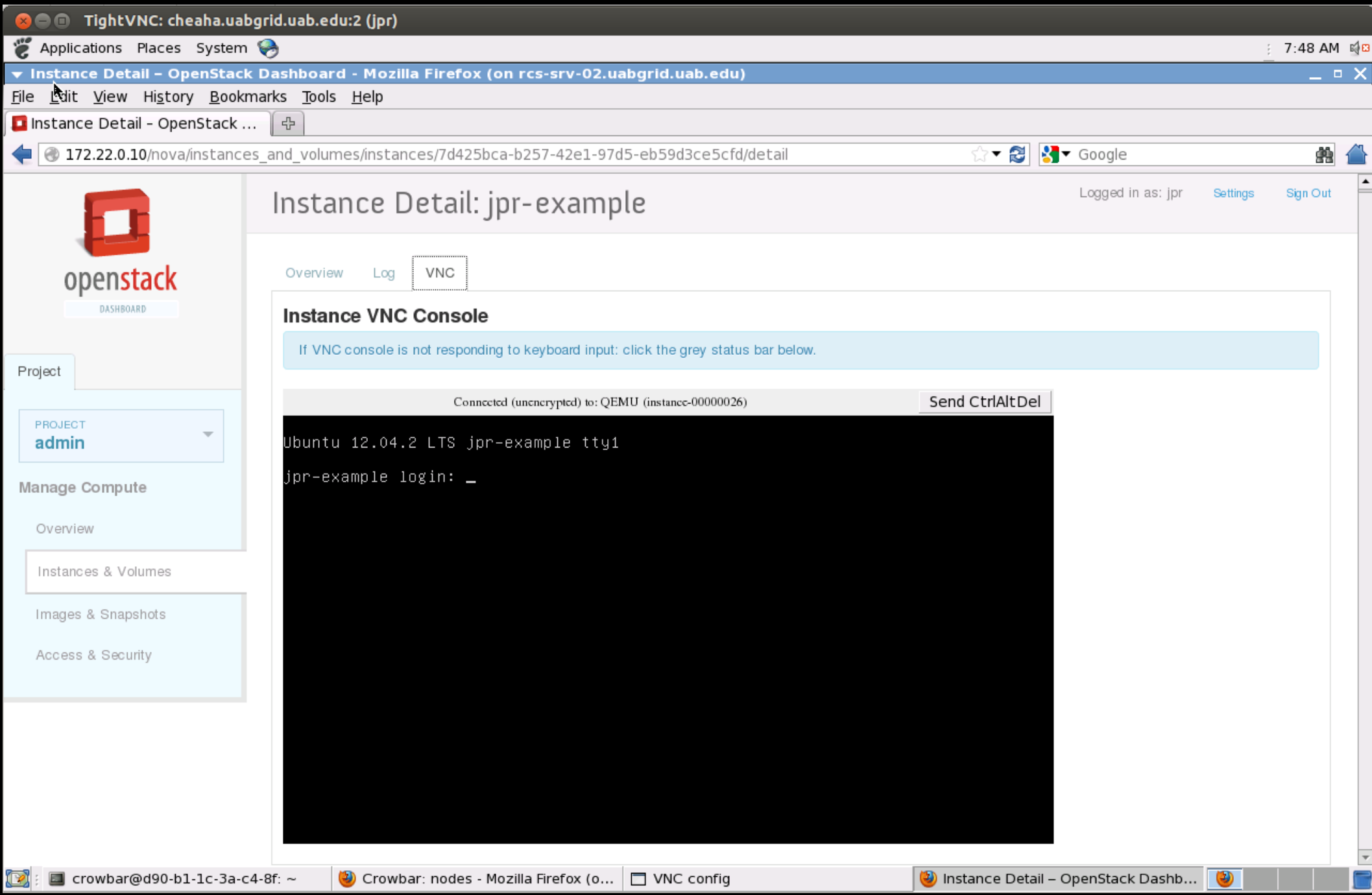
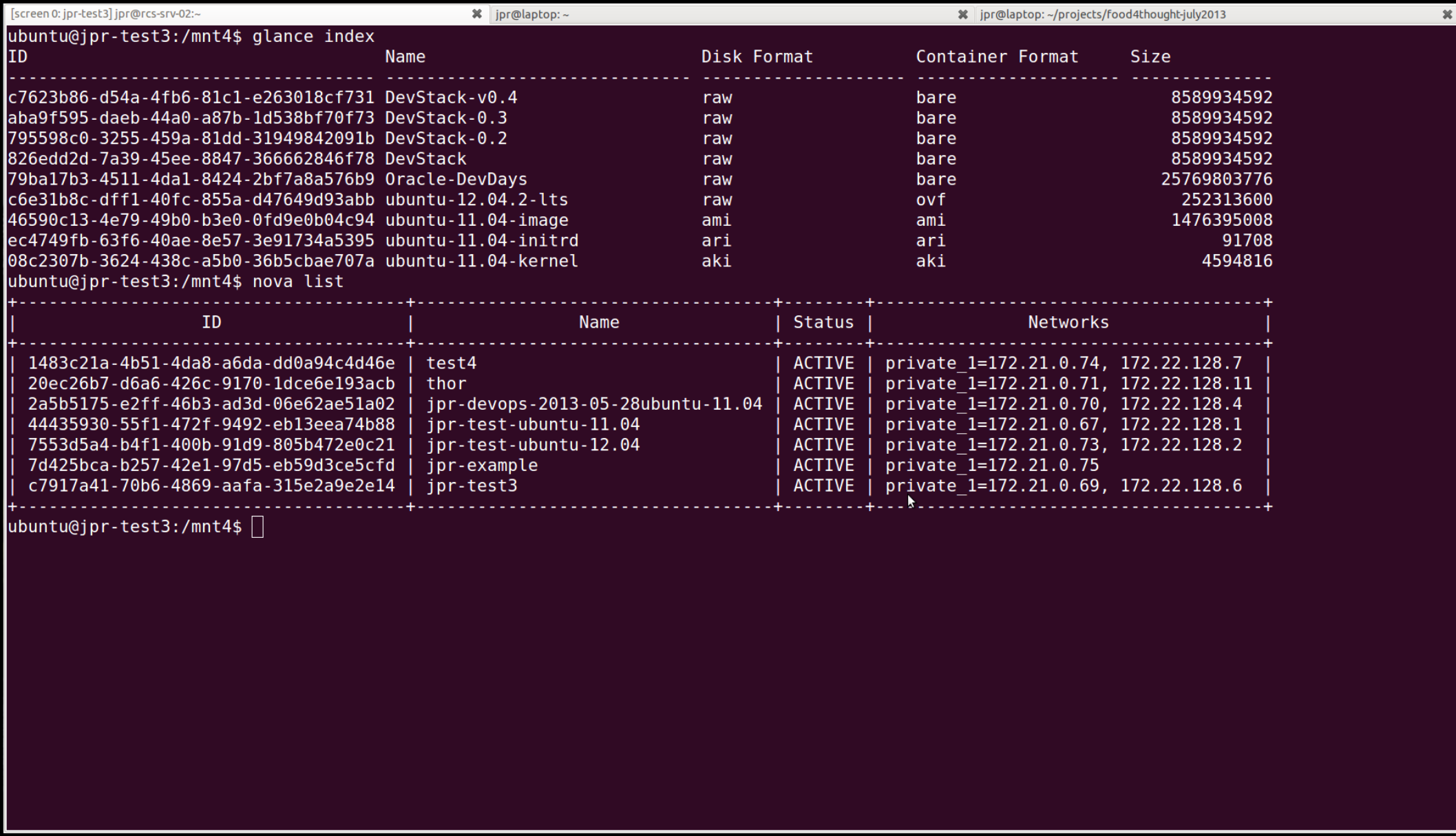
Manage Compute
Overview
Instances & Volumes
Images & Snapshots
Access & Security
Actions
Launch
Displaying 7 items
Displaying 0 items
Server Name
jpr-example
User Data
Example for fft-july2013
Flavor
m1.small (1VCPU / 10GB Disk / 2048MB Ram )
Keypair
jpr-pub-key
Instance Count
1
Security Groups
default
ssh-only
Boot From Volume
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 (6) 4 Available
VCPUs (13) 7 Available
Disk (260 GB) 740 GB Available
Memory (23552 MB) 27648 MB Available
crowbar@d90-b1-1c-3a-c4-8f: ~
Crowbar: nodes - Mozilla Firefox (o...
VNC config
Images & Snapshots – OpenStack ...


TightVNC: cheaha.uabgrid.uab.edu:2 (jpr)
Applications Places System
7:44 AM
Instances & Volumes – OpenStack Dashboard - Mozilla Firefox (on rcs-srv-02.uabgrid.uab.edu)
File Edit View History Bookmarks Tools Help
Instances & Volumes - OpenS...
172.22.0.10/nova/instances_and_volumes/
Google
openstack
DASHBOARD
Project
PROJECT
admin
Manage Compute
Overview
Instances & Volumes
Images & Snapshots
Access & Security
Instances & Volumes
Logged in as: jpr
Settings
Sign Out
Success: Instance "jpr-example" launched.
Instances
Launch Instance
Terminate Instances
Instance Name
IP Address
Size
Status
Task
Power State
Actions
jpr-example
172.21.0.75
2GB RAM | 1 VCPU | 10.0GB Disk
Active
None
Running
Edit Instance
thor
172.21.0.71
172.22.128.11
16GB RAM | 8 VCPU | 10.0GB Disk
Active
None
Running
Edit Instance
test4
172.21.0.74
172.22.128.7
512MB RAM | 1 VCPU | 0 Disk
Active
None
Running
Edit Instance
jpr-test3
172.21.0.69
172.22.128.6
2GB RAM | 1 VCPU | 10.0GB Disk
Active
None
Running
Edit Instance
jpr-test-ubuntu-12.04
172.21.0.73
172.22.128.2
2GB RAM | 1 VCPU | 10.0GB Disk
Active
None
Running
Edit Instance
jpr-devops-2013-05-28ubuntu-11.04
172.21.0.70
172.22.128.4
2GB RAM | 1 VCPU | 10.0GB Disk
Active
None
Running
Edit Instance
jpr-test-ubuntu-11.04
172.21.0.67
172.22.128.1
512MB RAM | 1 VCPU | 0 Disk
Active
None
Running
Edit Instance
Displaying 7 items
crowbar@d90-b1-1c-3a-c4-8f: ~
Crowbar: nodes - Mozilla Firefox (o...
VNC config
Instances & Volumes – OpenStack ...


TightVNC: cheaha.uabgrid.uab.edu:2 (jpr)
Applications Places System
7:48 AM
Instance Detail – OpenStack Dashboard - Mozilla Firefox (on rcs-srv-02.uabgrid.uab.edu)
File Edit View History Bookmarks Tools Help
Instance Detail - OpenStack ...
172.22.0.10/nova/instances_and_volumes/instances/7d425bca-b257-42e1-97d5-eb59d3ce5cfd/detail
Google
openstack
DASHBOARD
Instance Detail: jpr-example
Logged in as: jpr
Settings
Sign Out
Overview
Log
VNC
Instance VNC Console
If VNC console is not responding to keyboard input: click the grey status bar below.
Connected (unencrypted) to: QEMU (instance-00000026)
Send CtrlAltDel
Ubuntu 12.04.2 LTS jpr-example tty1
jpr-example login:
Project
PROJECT
admin
Manage Compute
Overview
Instances & Volumes
Images & Snapshots
Access & Security
crowbar@d90-b1-1c-3a-c4-8f: ~
Crowbar: nodes - Mozilla Firefox (o...
VNC config
Instance Detail – OpenStack Dashb...


[screen 0: jpr-test3] jpr@rcs-srv-02:~
jpr@laptop: ~
jpr@laptop: ~/projects/food4thought-july2013
ubuntu@jpr-test3:/mnt4$ glance index
ID Name Disk Format Container Format Size
c7623b86-d54a-4fb6-81c1-e263018cf731 DevStack-v0.4 raw bare 8589934592
aba9f595-daeb-44a0-a87b-1d538bf70f73 DevStack-0.3 raw bare 8589934592
795598c0-3255-459a-81dd-31949842091b DevStack-0.2 raw bare 8589934592
826edd2d-7a39-45ee-8847-366662846f78 DevStack raw bare 8589934592
79ba17b3-4511-4da1-8424-2bf7a8a576b9 Oracle-DevDays raw bare 25769803776
c6e31b8c-dff1-40fc-855a-d47649d93abb ubuntu-12.04.2-lts raw ovf 252313600
46590c13-4e79-49b0-b3e0-0fd9e0b04c94 ubuntu-11.04-image ami ami 1476395008
ec4749fb-63f6-40ae-8e57-3e91734a5395 ubuntu-11.04-initrd ari ari 91708
08c2307b-3624-438c-a5b0-36b5cbae707a ubuntu-11.04-kernel aki aki 4594816
ubuntu@jpr-test3:/mnt4$ nova list
| ID | Name | Status | Networks |
| 1483c21a-4b51-4da8-a6da-dd0a94c4d46e | test4 | ACTIVE | private_1=172.21.0.74, 172.22.128.7 |
| 20ec26b7-d6a6-426c-9170-1dce6e193acb | thor | ACTIVE | private_1=172.21.0.71, 172.22.128.11 |
| 2a5b5175-e2ff-46b3-ad3d-06e62ae51a02 | jpr-devops-2013-05-28ubuntu-11.04 | ACTIVE | private_1=172.21.0.70, 172.22.128.4 |
| 44435930-55f1-472f-9492-eb13eea74b88 | jpr-test-ubuntu-11.04 | ACTIVE | private_1=172.21.0.67, 172.22.128.1 |
| 7553d5a4-b4f1-400b-91d9-805b472e0c21 | jpr-test-ubuntu-12.04 | ACTIVE | private_1=172.21.0.73, 172.22.128.2 |
| 7d425bca-b257-42e1-97d5-eb59d3ce5cfd | jpr-example | ACTIVE | private_1=172.21.0.75 |
| c7917a41-70b6-4869-aafa-315e2a9e2e14 | jpr-test3 | ACTIVE | private_1=172.21.0.69, 172.22.128.6 |
ubuntu@jpr-test3:/mnt4$

# Meat for Carnivores...

# OpenStack+Ceph

## Overview and Backgroud



The research computing system (RCS) is built on a collection of distinct hardware systems designed to provide specific services to applications. The RCS hardware includes dedicated compute fabrics that support high performance computing (HPC) applications where hundreds of compute cores can work together on a single application. These clusters of commodity compute hardware make it possible to do data analysis and modelling work in hours, work that would have taken months using a single computer. The clusters are connected with dedicated high bandwidth, low latency networks for applications to efficiently coordinate their actions across many computers and access a shared high speed storage system for working efficiently with terabytes of data.

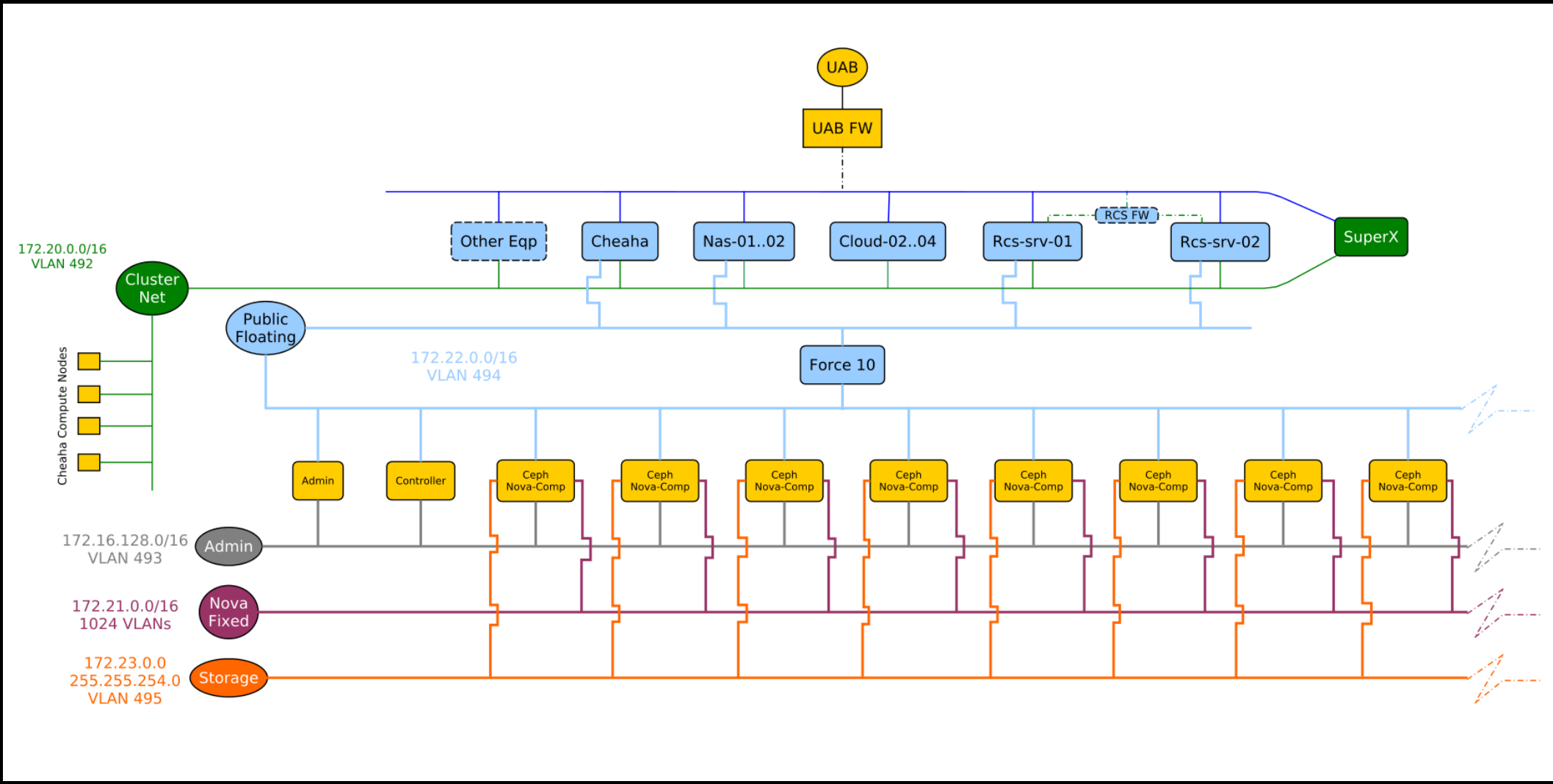
Our newest hardware fabric, acquired 2012Q4, is designed to support emerging data intensive scientific computing and virtualization paradigms. This hardware is very similar to the commodity computers used by our traditional HPC fabrics, however, in addition to having many compute cores and lots of RAM, each individual computer contains 36TB of built in disk storage. Taken together, this newest hardware fabric adds 192 cores, 1TB RAM, and 420TB of storage to the RCS.

The built in disk storage is designed to support applications running local to each computer. The data intensive computing paradigm exchanges the external storage networks of traditional HPC clusters with the native, very high speed system buses that provide access to local hard disks in each computer. Large datasets are distributed across these computers and then applications are assigned to run on the specific computer that stores the portion of the dataset it has been assigned to analyze. The hardware requirements for data intensive computing closely resemble the requirements for virtualization and can benefit tremendously from the configuration flexibility that a virtualization fabric offers.

In order to enhance flexibility and further improve support for scaling research applications, we are engineering our latest hardware cluster to act as a virtualized storage and compute fabric. This enables support for a wide variety of storage and compute use cases, most prominently, ample storage capacity for reliably housing large research data collections and flexible application development and deployment capabilities that allow direct user control over all aspects of the application environment.

In short, we are tooling this hardware to build a cloud computing environment.

We are building this cloud using OpenStack for compute virtualization and Ceph for storage virtualization. Crowbar will provision the raw hardware fabric. This approach is very similar to the mode we have been following with our traditional ROCKS-based HPC cluster environment. The new approach enhances our ability to automatically provision hardware and further improve the economics large scale computing.


UAB
UAB FW
RCS FW
Other Eqp
Cheaha
Nas-01..02
Cloud-02..04
Rcs-srv-01
Rcs-srv-02
SuperX
172.20.0.0/16
VLAN 492
Cluster Net
Public Floating
172.22.0.0/16
VLAN 494
Force 10
Cheaha Compute Nodes
Admin
Controller
Ceph Nova-Comp
172.16.128.0/16
VLAN 493
Admin
172.21.0.0/16
1024 VLANs
Nova Fixed
172.23.0.0
255.255.254.0
VLAN 495
Storage

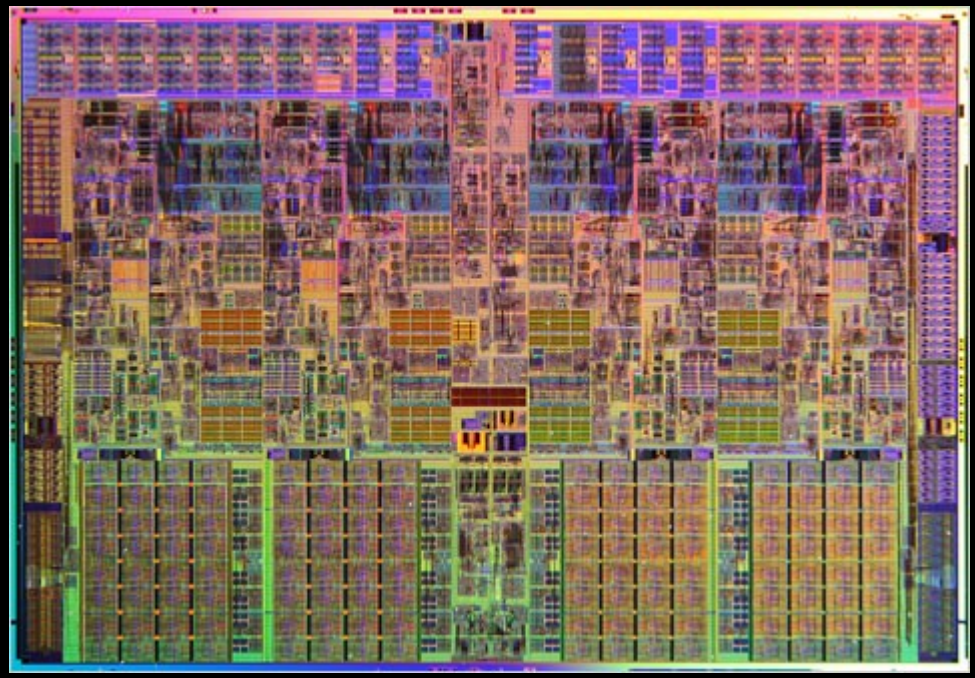
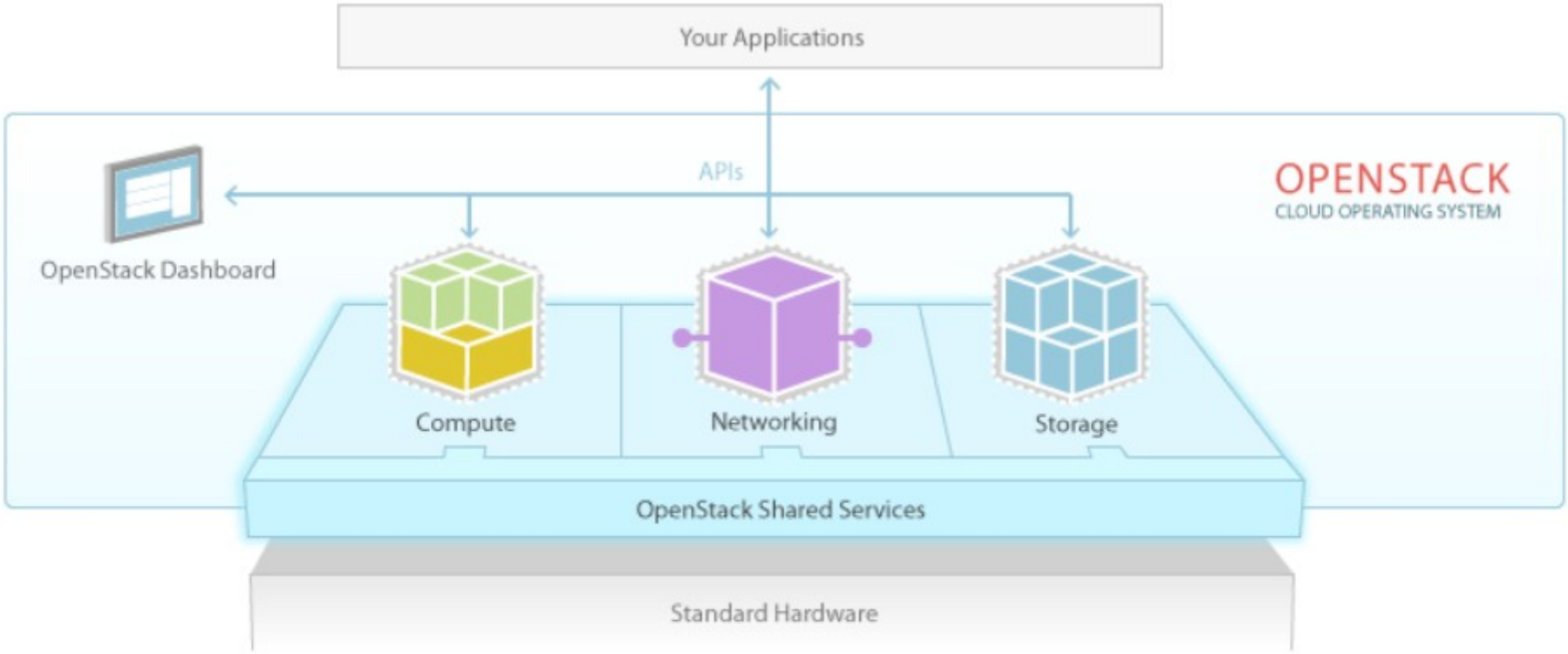


Image: nytimes.com

# OpenStack: The Open Source Cloud Operating System




## About OpenStack

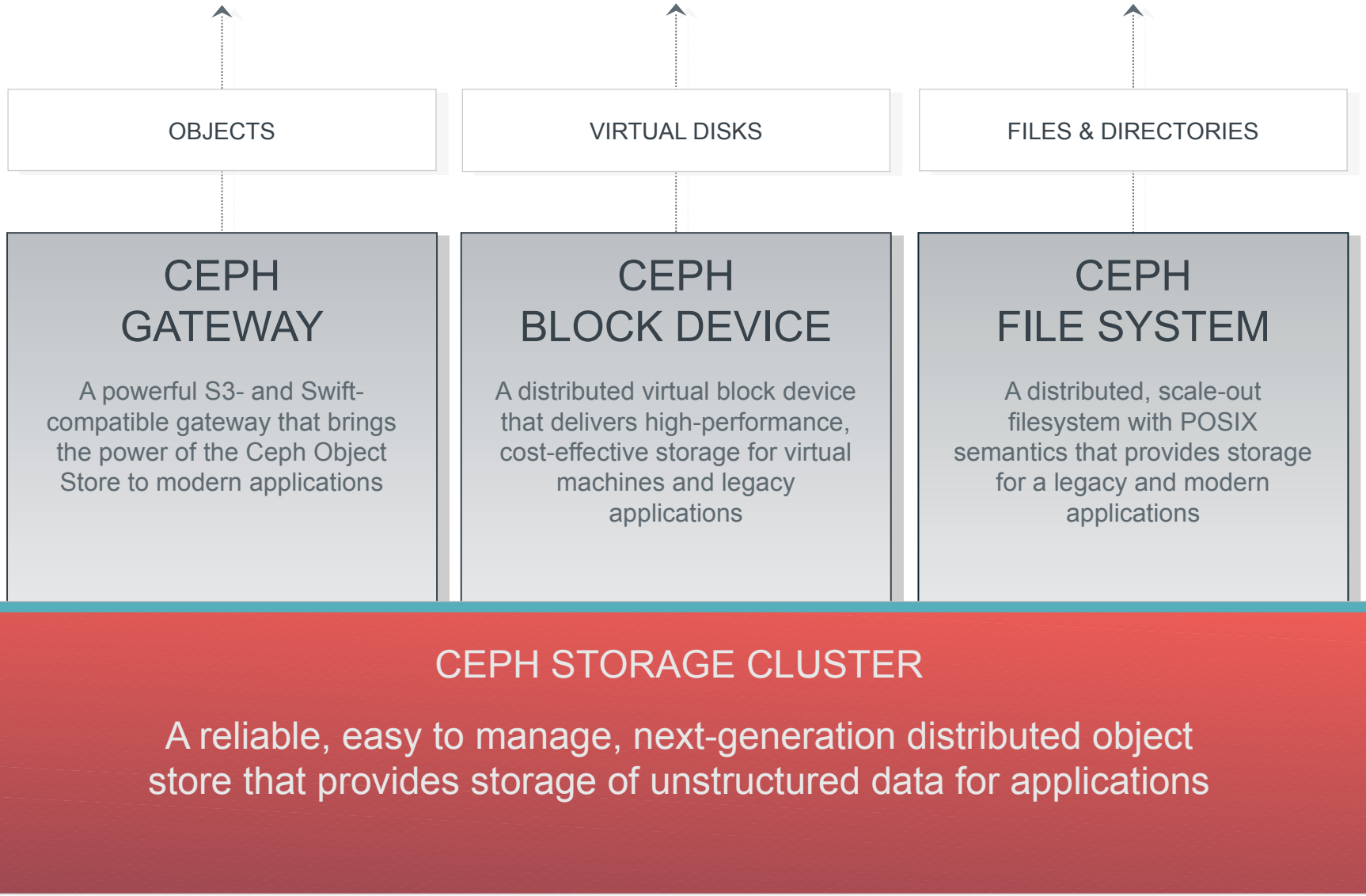
OpenStack is a cloud operating system that controls large pools of compute, storage, and networking resources throughout a datacenter, all managed through a dashboard that gives administrators control while empowering their users to provision resources through a web interface.

THE SEVENTH OPENSTACK RELEASE

GRIZZLY

A QUICK VIDEO OVERVIEW

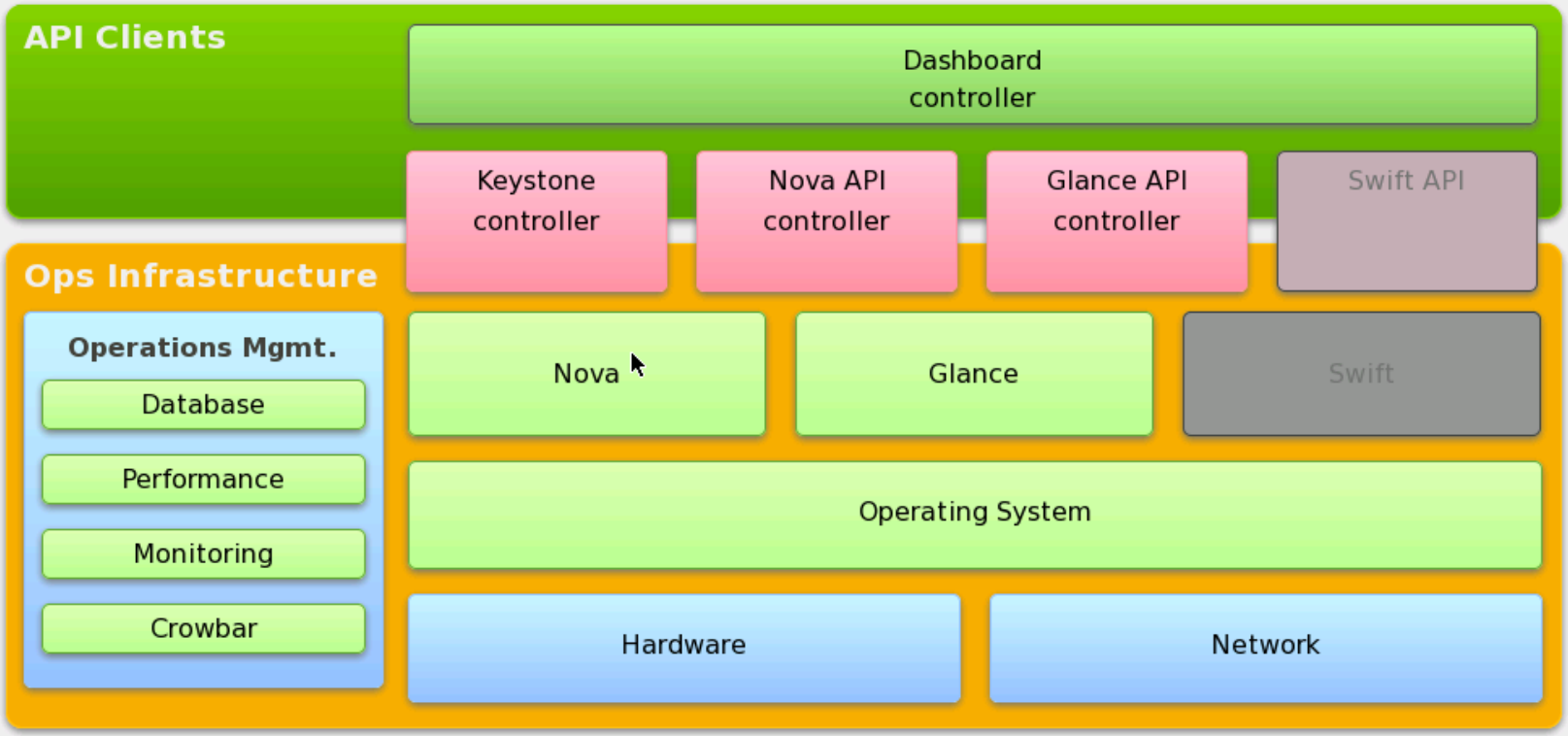
# Ceph Unified Storage Platform

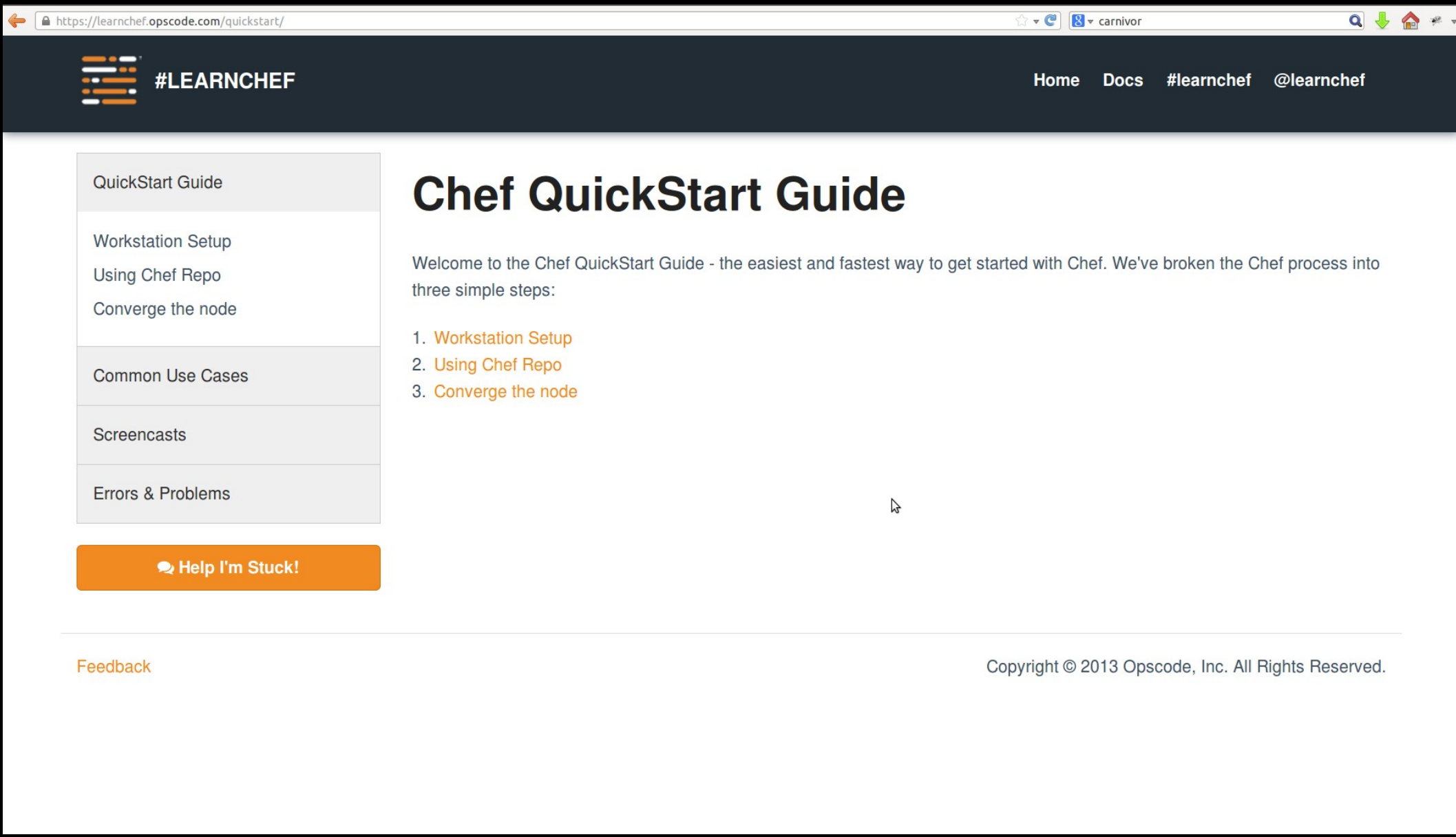


CROWBAR
The cloud *un*boxer.

Overview Nodes Network Barclamps Utilities EULA Help

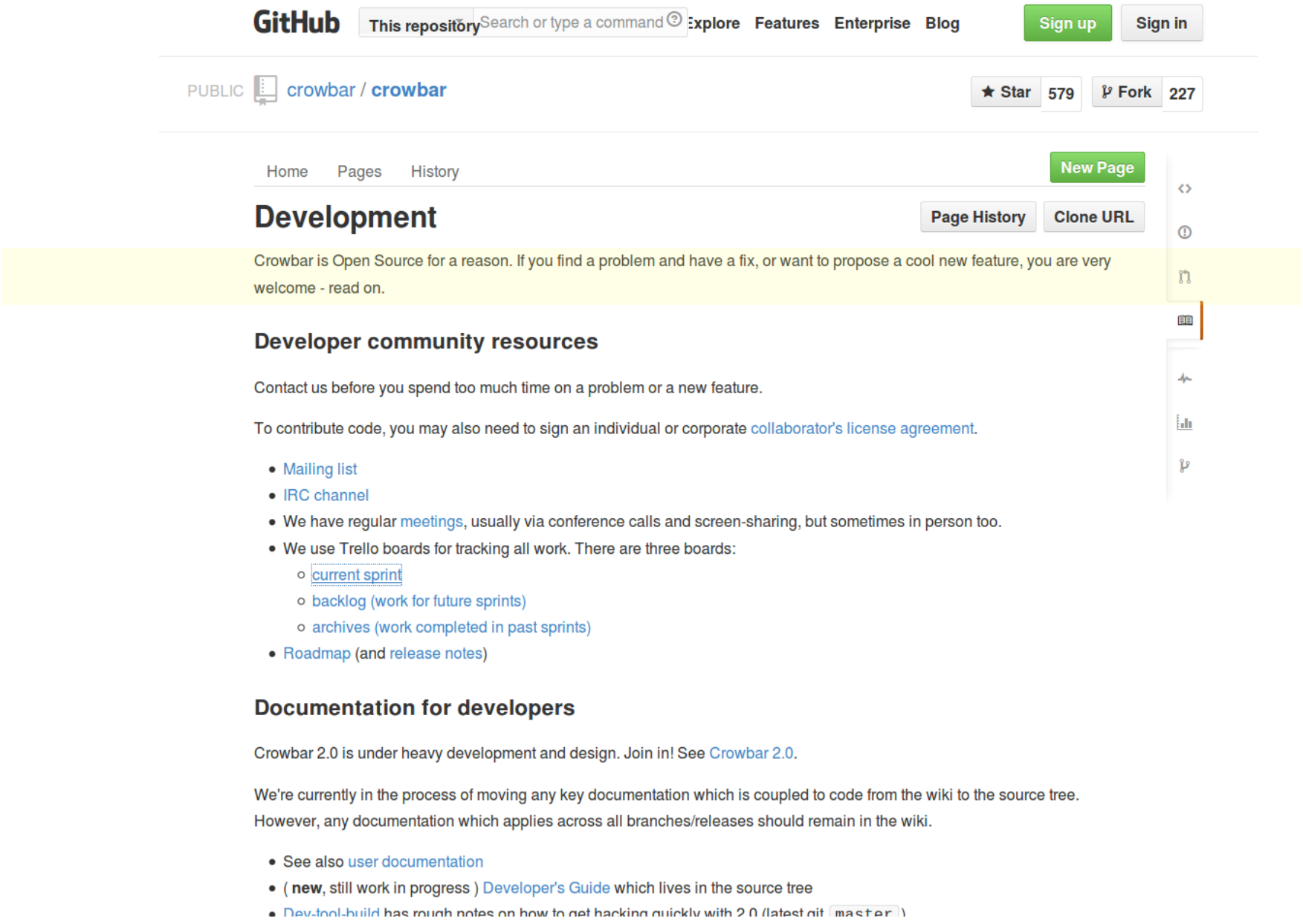
# OpenStack Overview






# Turn Infrastructure into Code

# Extend the Platform with Upstream Developers



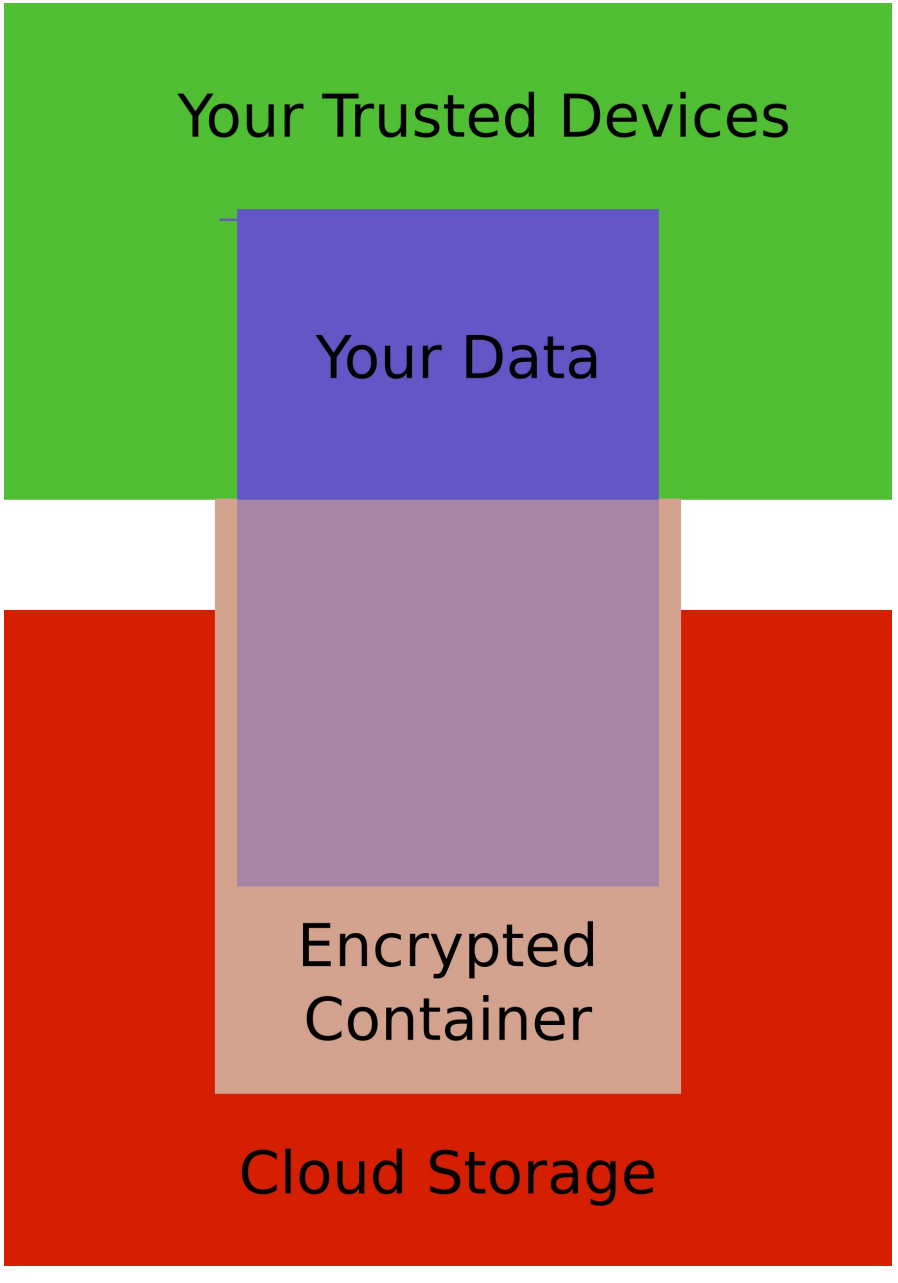
# Beware!

# Beware!

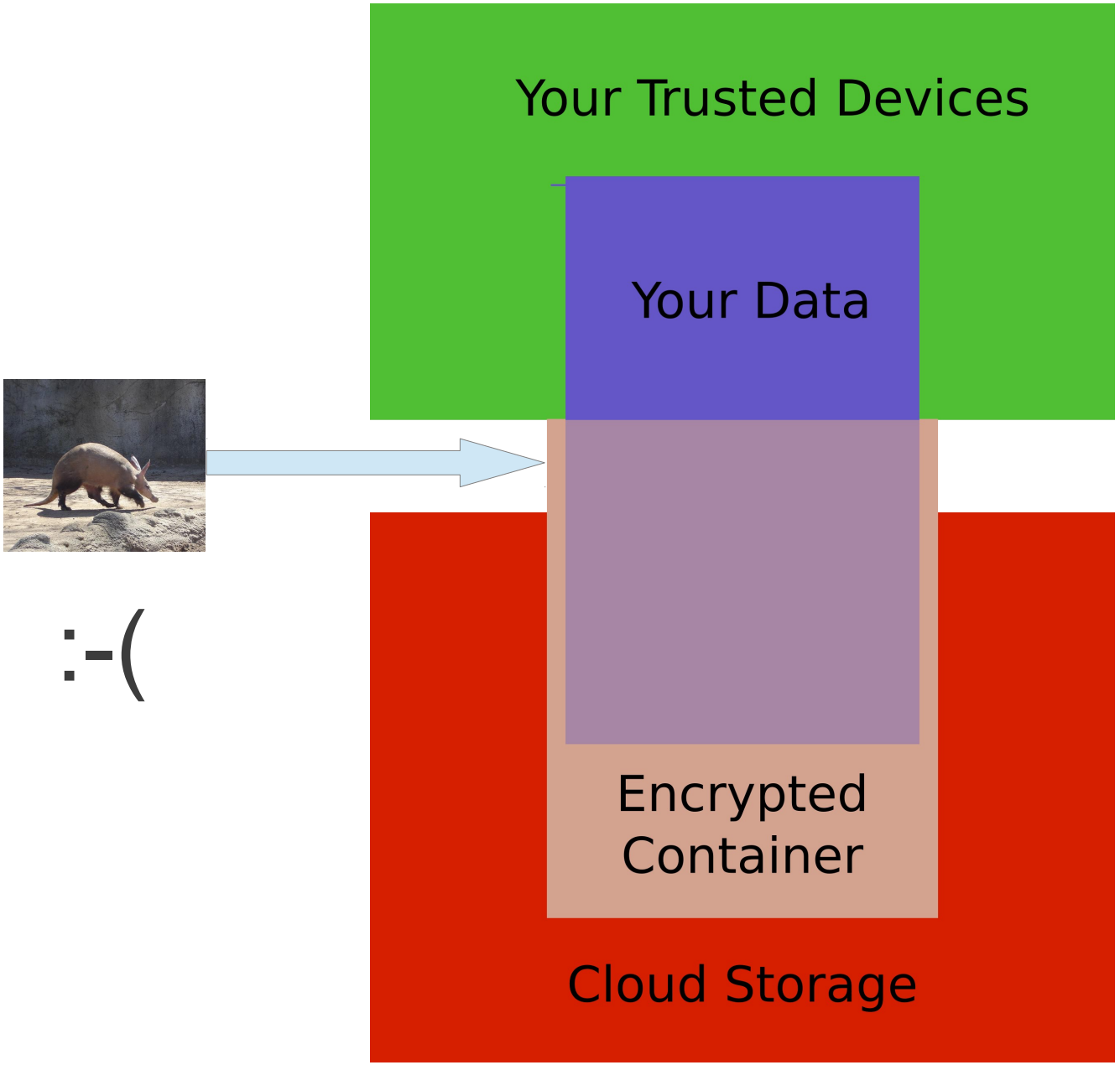
# Beware!

**N**otorious **S**niffing ***A***ardvark

# Secure Containers



# Secure Containers



# Going Forward

- UAB's cloud is here
- It's ready for the explorers
- It'll be easier to get to once we expose campus IPs
- Our first cloud app is “research storage” – targeted for Fall 2013
- Join us – google “uab openstack plus ceph”

# Thanks All Around IT!

- VPIT – funding :)
- Enterprise Infrastructure Services
  - Hardware
  - People
  - Projects
  - Desktop
- Business & Resource Management
  - Storage billing
  - Research Associate position
- Enterprise Information Security
  - Early engagement
  - Patience with our experiments :)
- Academic Technology & Relationship Management
  - MATLAB ancontract help
  - Cloud contract review
-