The Cloud and Virtualization

Nathan Dunn
CASSPR (ndunn@cas.uoregon.edu)

Craig Rasmussen
CASSPR (rasmus@cas.uoregon.edu)
Overview

• Overview and Comparison
• VirtualBox
• ACISS Openstack Cloud
• Amazon Cloud
Cloud

- Personal super-computer(s)
- Create instances (booted machine) as necessary
- Examples: Amazon and ACISS
- Local Example: Virtual Box (demo)
Cloud

Inactive
- Image
- Snapshot

Active
- Instance(s)
  - Boot / Launch
  - Take Snapshot(s)
  - ~ Close Laptop
  - Relaunch

ssh
web
Cluster

- Shared super-computer
- Configured with job scheduler (qsub)
Cloud / Cluster

Cloud

- Isolated environment
- No timeline
- Better for service / server
- Better for customization
- Can share instances
- Cloudbursting

Cluster

- Shared environment
- Closer to hardware
- Scheduled
- 1 day, 4 days, 2 week
- Better for batch jobs
VirtualBox

- Local virtualization
- Cloud is remote virtualization
VirtualBox
What is ACISS?

- Both Cluster and Cloud?
- For researchers, students, and collaborators
- Free
What is ACISS?

• High Performance Computer:
  • 128 Basic Nodes: 12 cores, 72 GB memory
  • 52 GPU Nodes: Same as basic, plus 3 Nvidia 2070 GPUs
  • 16 Fat Nodes: 32 cores, 384 GB memory
  • 400 TB Usable storage
Cloud Compute Services

- Amazon
- Rackspace
- Azure (Windows only)
- Google Compute
- ... etc. etc.
Amazon Services

• Stock Linux / Windows

• CloVR:
  • http://clovr.org/cloud-only-mode-ec2/

• Galaxy:
  • http://wiki.galaxyproject.org/CloudMan#Galaxy_AMIs
Amazon EC2

- EC2 are the basic instances
- http://aws.amazon.com
  - create account (need credit card)
  - have free credits, email me
Amazon EC2

- Console
- Launch Instance
Amazon EC2

- AMI is image
- **Stock Linux**, Free tier, Pre-built, your own
Amazon EC2

- Launch different types
- Rates:  http://aws.amazon.com/ec2/#pricing
- m1.large ~ laptop: < $0.25 / hour, $2K to $1100
Amazon EC2

- Review and Launch
Amazon EC2

• Copy New Security Key
Amazon EC2

• chmod 600 <file.pem>

• ssh -i class-test.pem
  ubuntu@ec2-54-205-77-5.compute-1.amazonaws.com

• Set password!!

• sudo apt-get install python-pip
Amazon EC2

- Pre-built
Amazon EC2

• e.g., GBrowse

• http://ec2-174-129-161-223.compute-1.amazonaws.com/
Summary

- Cloud is on-demand computing
- Cloud is servers
- Next: Cluster
Select a month to query its usage:

<table>
<thead>
<tr>
<th>April</th>
<th>2012</th>
</tr>
</thead>
</table>

Active Instances: 3 Active Memory: 20GB This Month's VCPU-Hours: 627.73 This Month's GB-Hours: 38639.51

### Usage Summary

<table>
<thead>
<tr>
<th>Instance Name</th>
<th>VCPUs</th>
<th>Disk</th>
<th>RAM</th>
<th>Uptime</th>
</tr>
</thead>
<tbody>
<tr>
<td>blast test</td>
<td>2</td>
<td>50</td>
<td>4GB</td>
<td>1 week, 2 days</td>
</tr>
<tr>
<td>tiny</td>
<td>1</td>
<td>-</td>
<td>512MB</td>
<td>1 week, 2 days</td>
</tr>
<tr>
<td>clovr2</td>
<td>8</td>
<td>170</td>
<td>16GB</td>
<td>6 days, 14 hours</td>
</tr>
</tbody>
</table>

Displaying 3 items
### Floating IPs

<table>
<thead>
<tr>
<th>IP Address</th>
<th>Instance</th>
<th>Floating IP Pool</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>No items to display.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Displaying 0 items</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Security Groups

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>default</td>
<td>default</td>
<td>Edit Rules</td>
</tr>
<tr>
<td>Displaying 1 item</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Keypairs

<table>
<thead>
<tr>
<th>Keypair Name</th>
<th>Fingerprint</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displaying 1 item</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

Saturday, October 12, 13
<table>
<thead>
<tr>
<th>Image Name</th>
<th>Type</th>
<th>Status</th>
<th>Public</th>
<th>Container Format</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ubuntu Server</td>
<td>Image</td>
<td>Active</td>
<td>Yes</td>
<td>BARE</td>
<td>Launch</td>
</tr>
<tr>
<td>ubuntu-initrd.img-3.0.0-12-server</td>
<td>Image</td>
<td>Active</td>
<td>Yes</td>
<td>BARE</td>
<td>Launch</td>
</tr>
<tr>
<td>ubuntu-vmlinux-3.0.0-12-server</td>
<td>Image</td>
<td>Active</td>
<td>Yes</td>
<td>BARE</td>
<td>Launch</td>
</tr>
<tr>
<td>Matlab Scientific Linux 6.2</td>
<td>Image</td>
<td>Active</td>
<td>Yes</td>
<td>BARE</td>
<td>Launch</td>
</tr>
<tr>
<td>Clovr Server</td>
<td>Image</td>
<td>Active</td>
<td>Yes</td>
<td>BARE</td>
<td>Launch</td>
</tr>
<tr>
<td>clovr-initrd.img-2.6.32-21-server</td>
<td>Image</td>
<td>Active</td>
<td>Yes</td>
<td>BARE</td>
<td>Launch</td>
</tr>
<tr>
<td>clovr-vmlinux-2.6.32-21-server</td>
<td>Image</td>
<td>Active</td>
<td>Yes</td>
<td>BARE</td>
<td>Launch</td>
</tr>
<tr>
<td>Scientific Linux 6.2 (devel)</td>
<td>Image</td>
<td>Active</td>
<td>Yes</td>
<td>BARE</td>
<td>Launch</td>
</tr>
<tr>
<td>vmlinux-2.6.32-220.7.1.el6.x86_64</td>
<td>Image</td>
<td>Active</td>
<td>Yes</td>
<td>BARE</td>
<td>Launch</td>
</tr>
<tr>
<td>initramfs-2.6.32-220.7.1.el6.x86_64.img</td>
<td>Image</td>
<td>Active</td>
<td>Yes</td>
<td>BARE</td>
<td>Launch</td>
</tr>
</tbody>
</table>
### Instances

<table>
<thead>
<tr>
<th>Instance Name</th>
<th>IP Address</th>
<th>Size</th>
<th>Status</th>
<th>Task</th>
<th>Power State</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>matlab test</td>
<td>128.223.225.6</td>
<td>2GB RAM</td>
<td>1 VCPU</td>
<td>10GB Disk</td>
<td>% Build</td>
<td>None</td>
</tr>
<tr>
<td>clovr2</td>
<td>128.223.225.5</td>
<td>16GB RAM</td>
<td>8 VCPU</td>
<td>10GB Disk</td>
<td>Active</td>
<td>None</td>
</tr>
<tr>
<td>nathan clovr server</td>
<td>4GB RAM</td>
<td>2 VCPU</td>
<td>10GB Disk</td>
<td>Error</td>
<td>None</td>
<td>No State</td>
</tr>
<tr>
<td>tiny</td>
<td>128.223.225.13</td>
<td>512MB RAM</td>
<td>1 VCPU</td>
<td>0 Disk</td>
<td>Suspended</td>
<td>None</td>
</tr>
<tr>
<td>blast test</td>
<td>128.223.225.12</td>
<td>4GB RAM</td>
<td>2 VCPU</td>
<td>10GB Disk</td>
<td>Active</td>
<td>None</td>
</tr>
</tbody>
</table>

### Volumes

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Size</th>
<th>Status</th>
<th>Attachments</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>disk1</td>
<td>-</td>
<td>10 GB</td>
<td>Available</td>
<td>-</td>
<td>Edit Attachments</td>
</tr>
<tr>
<td>galaxy VM</td>
<td>I will put the galaxy VM here. The minimum size should be 25 GB.</td>
<td>50 GB</td>
<td>Available</td>
<td>-</td>
<td>Edit Attachments</td>
</tr>
</tbody>
</table>