Compute Canada Cloud

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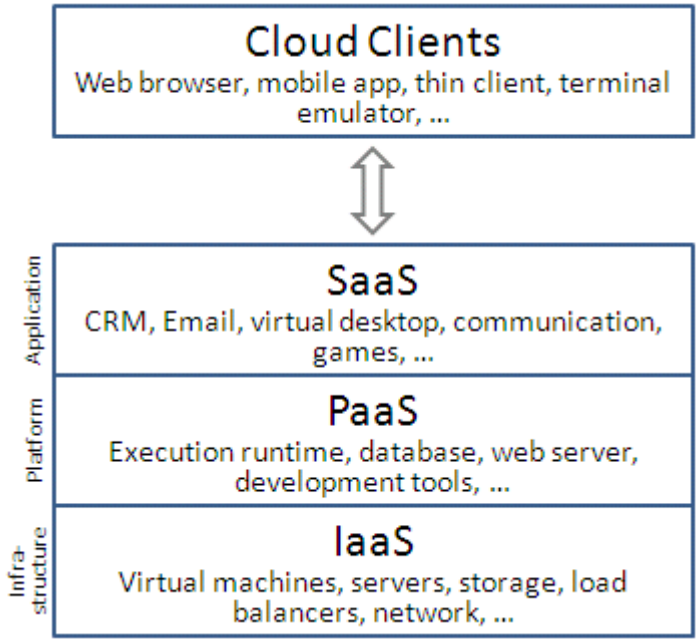
Introduction

https://en.wikipedia.org/wiki/Cloud_Computing_(horse)#/media/File:142nd_Preakness_Stakes_Pimlico_Race_Course_(34783544586).jpg

Introduction (cont.)

- Delivers high level services and access to system resources over the Internet.
- Services: collaboration (E-mail, calendaring, etc.), web, Dropbox-like file hosting, etc.
- System resources i.e. infrastructure: compute, disk, networking, load balancing, etc.

Introduction (cont.)



https://en.wikipedia.org/wiki/Cloud_computing#/media/File:Cloud_computing_layers.png

Compute Canada Cloud

- Compute Canada has deployed 2 IaaS clouds in Western and Eastern Canada.

- Victoria Cloud West:
  - 40 Compute Nodes
    - 2x Intel E5-2650v2
    - 32 x 256GB RAM
    - 8 x 512GB RAM
  - ~200TB usable @ 3x replication factor

Compute Canada Cloud (cont.)

- Sherbrooke Cloud East:
  - 36 Compute Nodes
    - 2x Intel E5-2650v2
    - 36 x 128GB RAM
  - ~100TB usable @ 3x replication factor

- There is also the OwnCloud service which provides 50GB of backed up Dropbox-like storage (https://www.westgrid.ca/resources_services/data_storage/cloud_storage)

Compute Canada Cloud (cont.)

- The IaaS clouds are built on OpenStack.
- OpenStack is a open-source software platform for deploying clouds i.e. build your own cloud environment.
- Can work with a variety of hardware, network switches, hypervisors.

Compute Canada Cloud (cont.)

- Various commercial vendors provide OpenStack:
  - SUSE
  - Redhat
  - Ubuntu
  - Huawei
  - Mirantis

- Also exists a free implementation called OpenStack-Ansible which is in use by Compute Canada:
  - https://github.com/openstack/openstack-ansible

Cloud Resources

- Default allocation is:
  - 2 instances (Virtual Machine)
  - 1 public IP
  - 15G of RAM
  - 4 VCPUs
  - 40G of permanent storage
  - 2 volumes
  - 2 snapshots

Cloud Resources (cont.)

- You can request more resources via the Rapid Access Service (RAS) or Resource Allocation Competition (RAC):

- https://www.computecanada.ca/research-portal/accessing-resources/rapid-access-service/

Cloud Resources (cont.)

Compute Cloud – Max Allowed

VCPUs	Instances	Volumes	Volume snapshots	RAM (MB)	Floating IP	Total size of Volumes and Snapshots (GB)	Default r enewal	Maximum duration
80	20	2	2	307200	2	1000	April	1 month

Cloud Resources (cont.)

Persistent Cloud – Max Allowed

VCPUs	Instances	Volumes	Volume snapshots	RAM (MB)	Floating IP	Cloud storage (GB)	Default renewal
10	5	5	5	45000	2	1000	*April

Other Free Services

- https://www.infoworld.com/article/3179785/cloud-computing/aws-vs-azure-vs-google-cloud-which-free-tier-is-best.html
- Google: 20% of 1 VCPU
- AWS, Azure: No VMs in the always free tier.
- Data downloads are charged.

Time to login

- https://west.cloud.computecanada.ca
- Use the guest account “wguestX”.
- Password will be provided in class.
- Don’t use Safari; use Firefox or Chrome.

Hands-On

Overview

Limit Summary

Instances
Used 0 of 100

VCPUs
Used 0 of 100

RAM
Used 0Bytes of 400GB

Floating IPs
Allocated 1 of 100

Security Groups
Used 1 of 2

Volumes
Used 0 of 100

Volume Storage
Used 0Bytes of 3.9TB

Usage Summary

Select a period of time to query its usage:

From: 2018-06-01 **To:** 2018-06-13 Submit The date should be in YYYY-mm-dd format.

Active Instances: 0 **Active RAM:** 0Bytes **This Period's VCPU-Hours:** 0.32 **This Period's GB-Hours:** 15.96 **This Period's RAM-Hours:** 2451.20

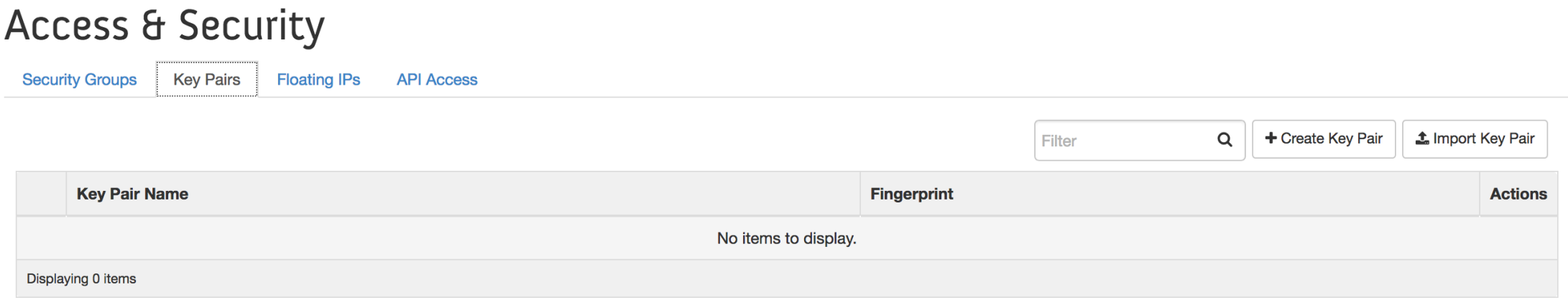
Usage

Download CSV Summary

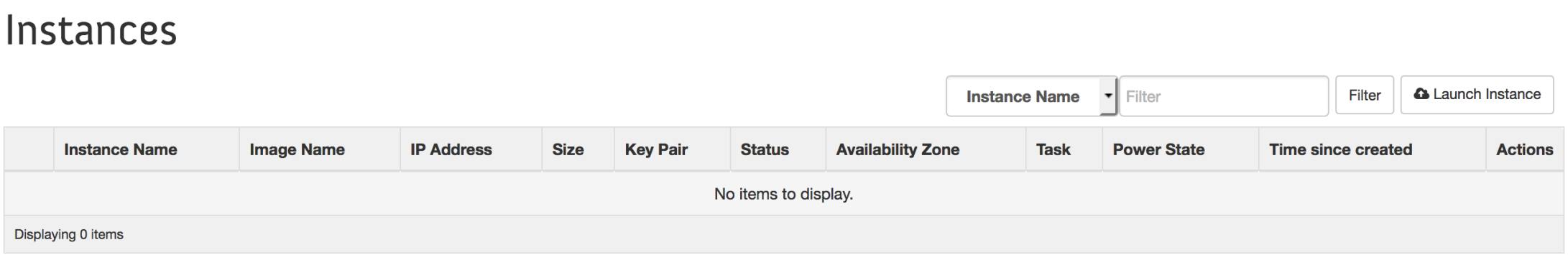
Instance Name	VCPUs	Disk	RAM	Time since created
No items to display.				

Displaying 0 items

Create SSH Key Pair and Download Private Key



Launch Instance of a Virtual Machine



Launch Instance

Details * | Access & Security | Networking * | Post-Creation | Advanced Options

Availability Zone

nova

Instance Name *

myinstance

Flavor *

c1-7.5gb-30

Instance Count *

1

Instance Boot Source *

Boot from image

Image Name *

CentOS-7-x86_64-GenericCloud-1801-01 (379.1 I

Specify the details for launching an instance.

The chart below shows the resources used by this project in relation to the project's quotas.

Flavor Details

Name	c1-7.5gb-30
VCPUs	1
Root Disk	20 GB
Ephemeral Disk	30 GB
Total Disk	50 GB
RAM	7,680 MB

Project Limits

Number of Instances 0 of 100 Used

Number of VCPUs 0 of 100 Used

Total RAM 0 of 409,600 MB Used

Cancel | Launch

Launch Instance

Details * | Access & Security | Networking * | Post-Creation | Advanced Options

Key Pair

mykey

Control access to your instance via key pairs, security groups, and other mechanisms.

Security Groups

- [x] default

Cancel | Launch

Launch Instance

Details * | Access & Security | Networking * | Post-Creation | Advanced Options

Selected networks

NIC:1 wgsum-2018_network (fb2765dd-2f50-4ea7-9ac6-1bbd6c1ccc56) -

Available networks

Choose network from Available networks to Selected networks by push button or drag and drop, you may change NIC order by drag and drop as well.

Cancel | Launch

Launch the Instance

- Click launch to launch the virtual machine. Make sure to note the name of your instance.
- OpenStack will boot the VM and insert the SSH key into it.
- Once the VM is booted, we can try to access it remotely.
- But need to configure security and public networking first.

Configuring Remote Access

Instances

Instance Name | Filter | Filter | Launch Instance | Terminate Instances | More Actions

Instance Name	Image Name	IP Address	Size	Key Pair	Status	Availability Zone	Task	Power State	Time since created	Actions
myinstance	CentOS-7-x86_64-GenericCloud-1801-01	192.168.247.5	c1-7.5gb-30	mykey	Active	nova	None	Running	0 minutes	Create Snapshot

Displaying 1 item

Instances

Instance Name | Filter | Filter | Launch Instance | Terminate Instances | More Actions

Instance Name	Image Name	IP Address	Size	Key Pair	Status	Availability Zone	Task	Power State	Time since created	Actions
myinstance	CentOS-7-x86_64-GenericCloud-1801-01	192.168.247.5	c1-7.5gb-30	mykey	Active	nova	None	Running	2 minutes	Create Snapshot

Displaying 1 item

- Associate Floating IP
- Disassociate Floating IP
- Edit Instance
- Retrieve Password
- Edit Security Groups
- Console
- View Log
- Pause Instance
- Suspend Instance
- Resize Instance
- Lock Instance
- Unlock Instance
- Soft Reboot Instance
- Hard Reboot Instance
- Shut Off Instance
- Rebuild Instance
- Terminate Instance

Manage Floating IP Associations

IP Address *

IP Address *

206.12.102.153

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

Port to be associated *

myinstance3: 192.168.247.7

Cancel Associate

Access & Security

Security Groups | Key Pairs | Floating IPs | API Access

Filter | + Create Security Group | Delete Security Groups

	Name	Description	Actions
☐	default	Default security group	Manage Rules

Displaying 1 item

Add Rule

Rule *

SSH

Remote * ?

CIDR

CIDR ?

0.0.0.0/0

Description:

Rules define which traffic is allowed to instances assigned to the security group. A security group rule consists of three main parts:

Rule: You can specify the desired rule template or use custom rules, the options are Custom TCP Rule, Custom UDP Rule, or Custom ICMP Rule.

Open Port/Port Range: For TCP and UDP rules you may choose to open either a single port or a range of ports. Selecting the "Port Range" option will provide you with space to provide both the starting and ending ports for the range. For ICMP rules you instead specify an ICMP type and code in the spaces provided.

Remote: You must specify the source of the traffic to be allowed via this rule. You may do so either in the form of an IP address block (CIDR) or via a source group (Security Group). Selecting a security group as the source will allow any other instance in that security group access to any other instance via this rule.

Add

Manage Security Group Rules: default (4fc62205-14d3-4380-905b-88d7cf61fa6b)

+ Add Rule | Delete Rules

Direction	Ether Type	IP Protocol	Port Range	Remote IP Prefix	Remote Security Group	Actions
Ingress	IPv6	Any	Any	-	default	Delete Rule
Egress	IPv6	Any	Any	::/0	-	Delete Rule
Egress	IPv4	Any	Any	0.0.0.0/0	-	Delete Rule
Ingress	IPv4	Any	Any	-	default	Delete Rule
Ingress	IPv4	TCP	22 (SSH)	0.0.0.0/0	-	Delete Rule
Ingress	IPv4	TCP	80 (HTTP)	0.0.0.0/0	-	Delete Rule
Ingress	IPv4	TCP	443 (HTTPS)	0.0.0.0/0	-	Delete Rule

Displaying 7 items

Connect to the Instance via SSH

```
ssh -i <key>.pem centos@<public ip>

sudo su

setenforce 0
```

If using MobaXTerm, see:

https://docs.computecanada.ca/wiki/Connecting_with_MobaXTerm#Using_a_Key_Pair

Installing Apache HTTPD

```
yum -y install httpd
systemctl enable httpd
systemctl start httpd

yum -y install nano
nano /etc/httpd/conf/httpd.conf

<Directory />
    AllowOverride All
    Require all denied
</Directory>

systemctl restart httpd
```

Installing MariaDB

```
yum -y install mariadb-server mariadb

systemctl enable mariadb
systemctl start mariadb

mysql_secure_installation
// set the root password and answer Y to everything else
// remember the root password!
```

Installing PHP

```
yum -y install php php-mysql php-gd php-ldap
php-odbc php-pear php-xml php-xmlrpc php-
mbstring php-snmp php-soap curl
```

Creating the Wordpress DB

```
mysql -u root -p

MariaDB [(none)]> CREATE DATABASE wordpress;
Query OK, 1 row affected (0.00 sec)

CREATE USER wordpressuser@localhost IDENTIFIED BY
'passw0rd';
GRANT ALL PRIVILEGES ON wordpress.* TO
wordpressuser@localhost IDENTIFIED BY 'passw0rd';
FLUSH PRIVILEGES;
exit;
```

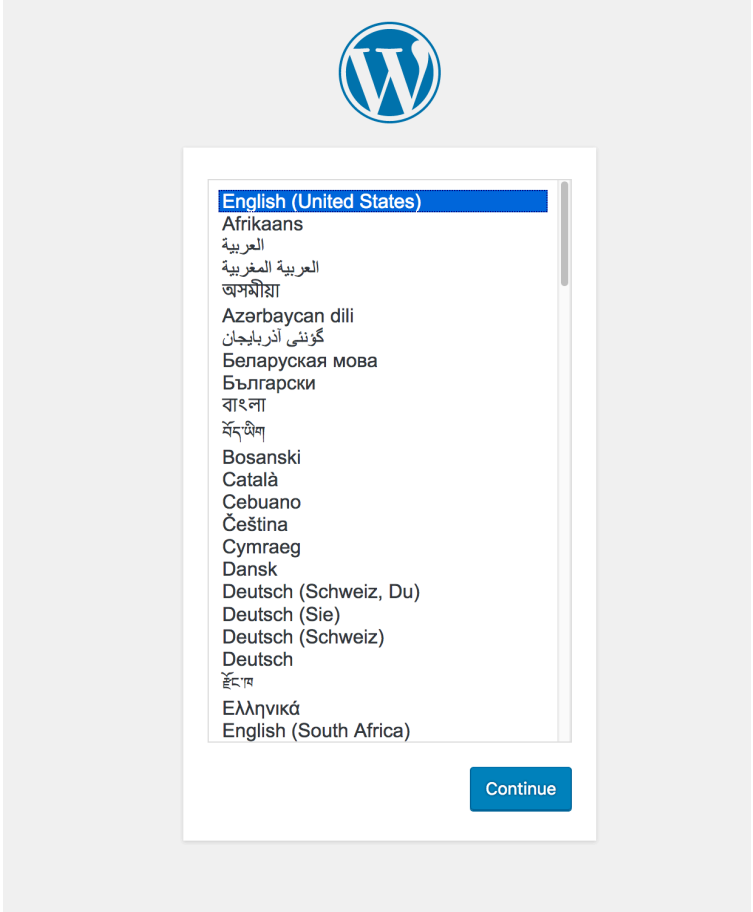
Installing Wordpress

```
cd ~
yum -y install wget
wget http://wordpress.org/latest.tar.gz
tar zxvf latest.tar.gz
// you will now have a wordpress directory

cp -avr wordpress /var/www/html
cd /var/www/html/
chmod -R 755 wordpress
chown -R apache:apache wordpress
cd wordpress
cp wp-config-sample.php wp-config.php
nano wp-config.php
```

Installing Wordpress (cont.)

```
/** The name of the database for WordPress */
define('DB_NAME', 'wordpress');

/** MySQL database username */
define('DB_USER', 'wordpressuser');

/** MySQL database password */
define('DB_PASSWORD', 'passw0rd');

chown apache:apache wp-config.php

systemctl restart httpd
//navigate to <public ip>/wordpress in your web browser
```

Almost Done


English (United States)
Afrikaans
العربية
العربية المغربية
অসমীয়া
Azərbaycan dili
گؤنئی آذربایجان
Беларуская мова
Български
বাংলা
བོད་ཡིག
Bosanski
Català
Cebuano
Čeština
Cymraeg
Dansk
Deutsch (Schweiz, Du)
Deutsch (Sie)
Deutsch (Schweiz)
Deutsch
ཇོང་ཁ
Ελληνικά
English (South Africa)
Continue

Welcome

Welcome to the famous five-minute WordPress installation process! Just fill in the information below and you'll be on your way to using the most extendable and powerful personal publishing platform in the world.

Information needed

Please provide the following information. Don't worry, you can always change these settings later.

Site Title test site

Username wpuser

Usernames can have only alphanumeric characters, spaces, underscores, hyphens, periods, and the @ symbol.

Password summerschool2018 Hide

Medium

Important: You will need this password to log in. Please store it in a secure location.

Your Email

Double-check your email address before continuing.

Search Engine Visibility Discourage search engines from indexing this site

It is up to search engines to honor this request.

Install WordPress

Success!

WordPress has been installed. Thank you, and enjoy!

Username	wpuser
Password	*Your chosen password.*

Log In

Configuring HTTPS

```
yum -y install mod_ssl openssl
cd ~
openssl genrsa -out ca.key 2048
openssl req -new -key ca.key -out ca.csr
openssl x509 -req -days 365 -in ca.csr -signkey ca.key
-out ca.crt

cp ca.crt /etc/pki/tls/certs/
cp ca.key /etc/pki/tls/private/ca.key
cp ca.csr /etc/pki/tls/private/ca.csr
```

Configuring HTTPS (cont.)

```
nano /etc/httpd/conf.d/ssl.conf

SSLCertificateFile /etc/pki/tls/certs/ca.crt
SSLCertificateKeyFile /etc/pki/tls/private/ca.key

systemctl restart httpd

// navigate to https://<public ip>/wordpress
```

Maintaining Your Instance

- Install updates to the OS, e.g. for CentOS do “yum -y update”.
- Install application updates regularly for Wordpress and other applications.

Resources

- Compute Canada Cloud
  - https://www.computecanada.ca/research-portal/national-services/compute-canada-cloud/
  - https://docs.computecanada.ca/wiki/Creating_a_Linux_VM

- UBC Advanced Research Computing
  - https://www.arc.ubc.ca