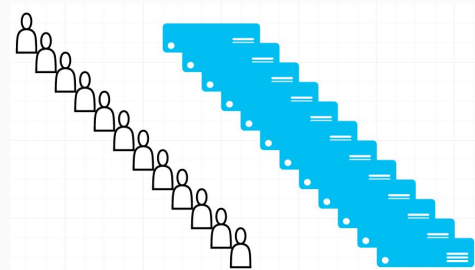# SHARCNET Cloud

What is Cloud Computing ?

- Traditional Computing
    - User needs computing resources
    - A physical server is purchased
    - New user = New server
- Problems
    - Management of physical servers
    - Expansion (space, power, cooling…)
    - Resource utilization

Computing Virtualization

- Virtualization
    - A virtual server instead of a physical server
    - Many VMs on the same physical server
    - Space and power needed are reduced
    - Resource utilization increased
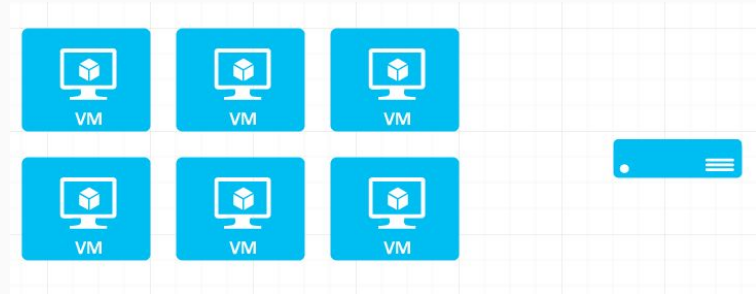
Is that sufficient ?

Whether Physical or Virtual servers:

- Human factor
    - Provisioning physical servers
    - Creating VMs, configuring network ...etc
- Users with security/isolation requirements
    - Do not share the same network . i.e. isolated networks
    - Require firewalling (VMs on the same host)

Cloud computing

- Virtualization of Infrastructure with
    - Self service model
        - Users create VMs using a web portal
    - Isolated virtual networks
        - Users can't reach each other's networks
    - Virtual firewalling between VMs and each other & public networks
        - Security group concept
        - Defines what traffic can flow ingress and egress (inbound and outbound) and from where

Openstack

- Cloud enabling framework
- Opensource, community driven
- Many industry and research/academic adopters
- Self service web portal called horizon
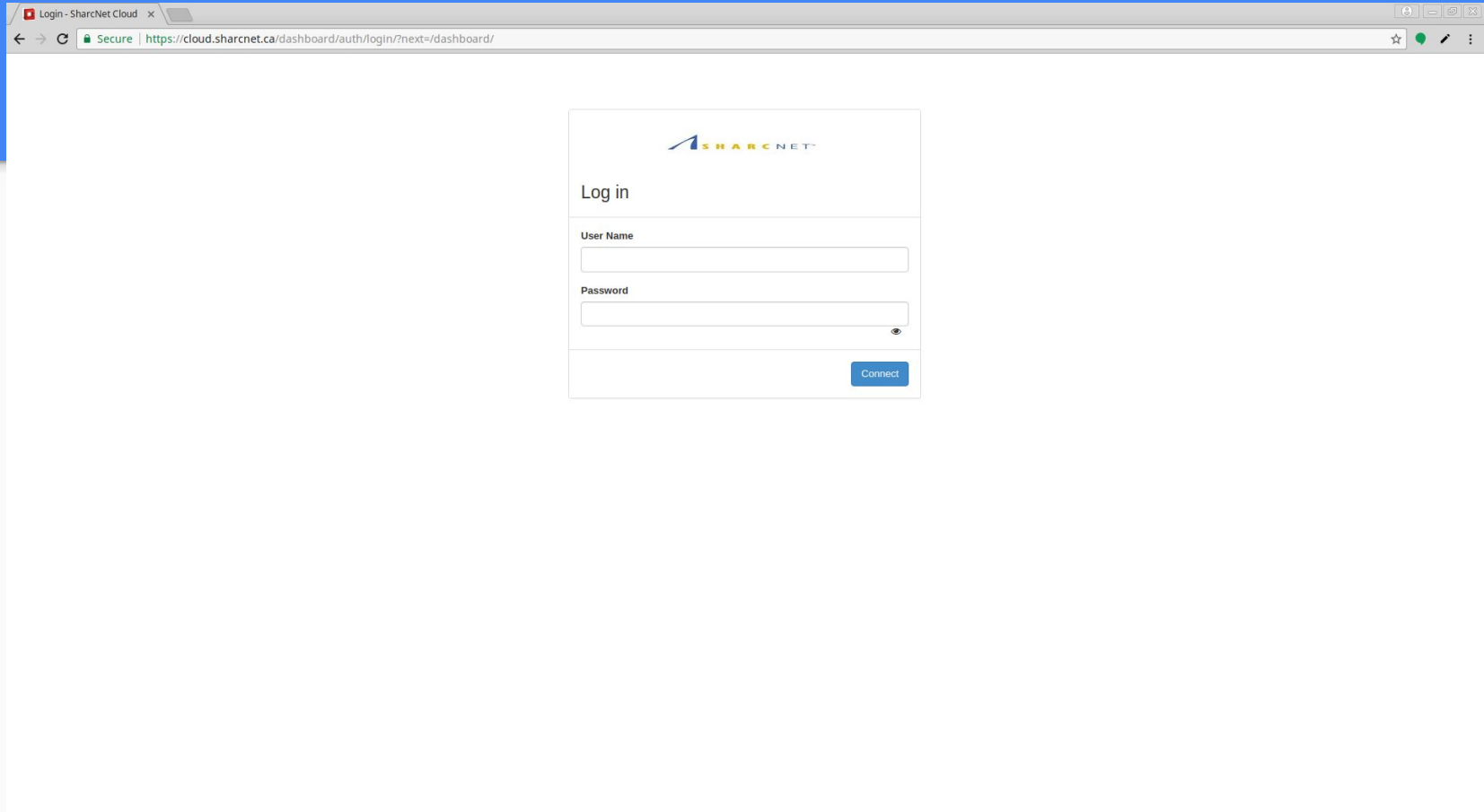
SHARCNET Cloud

- https://cloud.sharcnet.ca/dashboard/
- By request only
- Default allocation
  - 4 cores
  - 8 GB memory
  - 50 GB persistent storage
  - 1 Floating IP

How to request access ?

- Open a ticket
    - help@sharcnet.ca
    - Portal
- What needs to be included in the ticket ?
    - Use case for the cloud
    - Your PC/Laptop public IP (google what is my ip)
    - How long is the account and VMs needed for ?

How does it look like ?

← → C 🔒 Secure | https://cloud.sharcnet.ca/dashboard/project/ ☆

SHARCNET™ ▤ demo ▾

Project ▾

  Compute ▾

    Overview

    Instances

    Volumes

    Images

    Access & Security

  Network ›

  Orchestration ›

Identity ›

Project / Compute / Overview

Overview

Limit Summary

Instances	**VCPUs**	**RAM**	**Floating IPs**	**Security Groups**	**Volumes**
Used 0 of 10	Used 0 of 10	Used 0Bytes of 50GB	Used 0 of 3	Used 1 of 10	Used 0 of 10

Volume Storage
Used 0Bytes of 400GB

Usage Summary

Select a period of time to query its usage:

From: 2017-09-20 **To:** 2017-09-21 [Submit] The date should be in YYYY-MM-DD format.

Active Instances: 0 **Active RAM:** 0Bytes **This Period's VCPU-Hours:** 0.00 **This Period's GB-Hours:** 0.00 **This Period's RAM-Hours:** 0.00

Usage

⬇ Download CS...

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

Concepts

- Instances
    - VMs that consume CPU and Memory resources
    - Can be ephemeral or persistent
        - Ephemeral: Storage on the compute host
        - Persistent: Storage on a backend storage server (more reliable)
- To specify CPU/Memory for Instances
    - Flavors are used
    - Flavors are defined by the Cloud Administrator
    - A flavor specifies: # of cores, Size of memory and disk (for ephemeral VMs)

Volumes

- Persistent storage on the storage backend
- 3 replicas are maintained
- More reliable than ephemeral storage
- Limited capacity
- Could be slower

Floating IPs

- 1 Floating IP per user (public IP)
- Private IPs are assigned to instances automatically
- Public IPs to assign to VMs manually by the user
- This is how you reach your VMs
- IPs start with 199.241.164.xx
- Floating IPs are assigned to VMs after they are created

Security Groups

- Virtual firewall rules
- Applied to instances
- Define what traffic can flow in/out
- Define what IPs can communicate in/out
- Users can create multiple security groups
- Default security group is created when a project is created

Keypairs

- For Linux VMs , a keypair needs to be generated
- Keypairs have two components
    - Public portion: injected into the VM
    - Private portion: Exists at the user's side

← → C 🔒 Secure | https://cloud.sharcnet.ca/dashboard/project/ ☆

SHARCNET™

▤ demo ▾

Project ▾

   Compute ▾

      Overview

      Instances

      Volumes

      Images

      Access & Security

   Network ▸

   Orchestration ▸

Identity ▸

Project / Compute / Overview

Overview

Limit Summary

Instances	VCPUs	RAM	Floating IPs	Security Groups	Volumes
Used 0 of 10	Used 0 of 10	Used 0Bytes of 50GB	Used 0 of 3	Used 1 of 10	Used 0 of 10

Volume Storage
Used 0Bytes of 400GB

Usage Summary

Select a period of time to query its usage:

From: 2017-09-20   **To:** 2017-09-21   [Submit]   The date should be in YYYY-MM-DD format.

Active Instances: 0 **Active RAM:** 0Bytes **This Period's VCPU-Hours:** 0.00 **This Period's GB-Hours:** 0.00 **This Period's RAM-Hours:** 0.00

Usage

⬇ Download CS

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

Instances

Project
Compute
Overview
Instances
Volumes
Images
Access & Security
Network
Orchestration
Identity

| Instance Name = ▾ | | Filter | ☁ Launch Instance |

Instance Name	Image Name	IP Address	Size	Key Pair	Status	Availability Zone	Task	Power State	Time since created	Actions
					No items to display.					

Launch Instance

Details *

Source *

Flavor *

Networks *

Network Ports

Security Groups

Key Pair

Configuration

Server Groups

Scheduler Hints

Metadata

Please provide the initial hostname for the instance, the availability zone where it will be deployed, and the instance count. Increase the Count to create multiple instances with the same settings.

Instance Name *

Availability Zone

nova ▾

Count *

1

Total Instances (10 Max)

10%

■ 0 Current Usage
■ 1 Added
□ 9 Remaining

✖ Cancel

< Back

Next ›

☁ Launch Instance

Launch Instance

Instance source is the template used to create an instance. You can use a snapshot of an existing instance, an image, or a volume (if enabled). You can also choose to use persistent storage by creating a new volume.

Details

Source *

Flavor *

Networks

Network Ports

Security Groups

Key Pair

Configuration

Server Groups

Scheduler Hints

Metadata

Select Boot Source

| Image | ▼ |

Volume Size (GB) *

| 1 |

Create New Volume

| Yes | No |

Delete Volume on Instance Delete

| Yes | No |

Allocated

Name	Updated	Size	Type	Visibility
	Select an item from Available items below			

∨ Available 5

Select one

| 🔍 | Click here for filters. | ✕ |

Name	Updated	Size	Type	Visibility	
❯ CentOS-7_1704_x86_64	8/26/17 1:33 PM	1.29 GB	qcow2	Public	+
❯ Ubuntu-stock	9/12/17 12:57 PM	304.88 MB	raw	Public	+
❯ VirtIO	3/9/17 3:43 PM	53.96 MB	iso	Public	+
❯ Fedora-23-x86_64	3/9/17 3:43 PM	223.51 MB	qcow2	Public	+
❯ Cirros	3/9/17 3:43 PM	12.67 MB	qcow2	Public	+

| ✖ Cancel | | ‹ Back | Next › | ☁ Launch Instance |

Launch Instance

Instance source is the template used to create an instance. You can use a snapshot of an existing instance, an image, or a volume (if enabled). You can also choose to use persistent storage by creating a new volume.

Details

Source *

Flavor *

Networks

Network Ports

Security Groups

Key Pair

Configuration

Server Groups

Scheduler Hints

Metadata

Select Boot Source

| Image | ▼ |

Volume Size (GB) *

| 1 |

Create New Volume

| Yes | No |

Delete Volume on Instance Delete

| Yes | No |

Allocated

Name	Updated	Size	Type	Visibility
		Select an item from Available items below		

⌄ Available 5   Select one

🔍 | Click here for filters. | ✖

Name	Updated	Size	Type	Visibility	
❯ CentOS-7_1704_x86_64	8/26/17 1:33 PM	1.29 GB	qcow2	Public	+
❯ Ubuntu-stock	9/12/17 12:57 PM	304.88 MB	raw	Public	+
❯ VirtIO	3/9/17 3:43 PM	53.96 MB	iso	Public	+
❯ Fedora-23-x86_64	3/9/17 3:43 PM	223.51 MB	qcow2	Public	+
❯ Cirros	3/9/17 3:43 PM	12.67 MB	qcow2	Public	+

✖ Cancel   ‹ Back | Next › | ☁ Launch Instance

Launch Instance

Details

Source *

Flavor *

Networks

Network Ports

Security Groups

Key Pair

Configuration

Server Groups

Scheduler Hints

Metadata

Flavors manage the sizing for the compute, memory and storage capacity of the instance.

Allocated

Name	VCPUS	RAM	Total Disk	Root Disk	Ephemeral Disk	Public
		Select an item from Available items below				

∨ Available ⑤

Select one

🔍 Click here for filters.   ✕

	Name	VCPUS	RAM ▲	Total Disk	Root Disk	Ephemeral Disk	Public	
❯	P-2C-4G	2	4 GB	0 GB	0 GB	0 GB	No	+
❯	2C-4G-20G	2	4 GB	20 GB	20 GB	0 GB	No	+
❯	4C-8G-40G	4	8 GB	40 GB	40 GB	0 GB	No	+
❯	8C-16G-80G	8	16 GB	80 GB	80 GB	0 GB	No	+
❯	4C-16G-40G	4	16 GB	40 GB	40 GB	0 GB	No	+

✖ Cancel

‹ Back   Next ›   ☁ Launch Instance

Launch Instance

Details *

Source *

Flavor *

Networks

Network Ports

Security Groups

Key Pair

Configuration

Server Groups

Scheduler Hints

Metadata

Networks provide the communication channels for instances in the cloud.

Select networks from those listed below.

⌄ Allocated ①

	Network	Subnets Associated	Shared	Admin State	Status	
⇅ 1 ❯	demo-tenant-net	demo-tenant-subnet	No	Up	Active	−

⌄ Available ⓪

Select at least one network

🔍	Click here for filters.	✖

Network ▲	Subnets Associated	Shared	Admin State	Status
		No available items		

✖ Cancel

‹ Back **Next ›** **☁ Launch Instance**

Launch Instance

- Details
- Source *
- Flavor *
- Networks *
- Network Ports
- **Security Groups**
- Key Pair
- Configuration
- Server Groups
- Scheduler Hints
- Metadata

Select the security groups to launch the instance in.

∨ Allocated ①

Name ▲	Description	
❯ default	Default security group	−

∨ Available ⓪   Select one or more

🔍 Click here for filters. ✖

Name ▲	Description
No available items	

✖ Cancel   ‹ Back   Next ›   ☁ Launch Instance

Launch Instance

A key pair allows you to SSH into your newly created instance. You may select an existing key pair, import a key pair, or generate a new key pair.

+ Create Key Pair   **⬆ Import Key Pair**

Allocated

Name	Fingerprint
Select a key pair from the available key pairs below.	

Displaying 0 items

∨ Available 21   Select one

🔍 | Click here for filters.   ✖

Name	Fingerprint

Launch Instance

Details

Source

Flavor

Networks

Network Ports

Security Groups

Key Pair

Configuration

Server Groups

Scheduler Hints

Metadata

This step allows you to add Metadata items to your instance.

You can specify resource metadata by moving items from the left column to the right column. In the left column there are metadata definitions from the Glance Metadata Catalog. Use the "Custom" option to add metadata with the key of your choice.

Available Metadata

Filter

| Custom | | + |

No available metadata

Existing Metadata

Filter

No existing metadata

Click each item to get its description here.

✖ Cancel

‹ Back   Next ›   ⬆ Launch Instance

Project / Compute / Instances

Instances

	Instance Name	Image Name	IP Address	Size	Key Pair	Status	Availability Zone	Task	Power State	Time since created	Actions
☐	test	-	• 192.168.2.7	P-2C-4G	student1	Active	nova	None	Running	1 minute	Create Snapshot ▾

Displaying 1 item

Project ⌄

  Compute ⌄

    Overview

    Instances

    Volumes

    Images

    Access & Security

  Network ›

  Orchestration ›

Identity ›

Instance Name = ▾   Filter   ☁ Launch Instance   🗑 Delete Instances   More Actions ▾

Instances

Instance Name = [ ] [   ] Filter | Launch Instance | Delete Instances | More Actions ▾

	Instance Name	Image Name	IP Address	Size	Key Pair	Status	Availability Zone	Task	Power State	Time since created	Actions
☐	test	-	• 192.168.2.7	P-2C-4G	student1	Active	nova	None	Running	1 minute	Create Snapshot ▾

Associate Floating IP
Attach Interface
Detach Interface
Edit Instance
Attach Volume
Detach Volume
Update Metadata
Edit Security Groups
Console
View Log
Pause Instance
Suspend Instance
Shelve Instance
Resize Instance
Lock Instance
Unlock Instance
Soft Reboot Instance
Hard Reboot Instance
Shut Off Instance
Rebuild Instance
Delete Instance

Displaying 1 item

Manage Floating IP Associations

IP Address *

| No floating IP addresses allocated | ▼ | ➕ |

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

Port to be associated *

| No ports available | ▼ |

Cancel   **Associate**

Allocate Floating IP

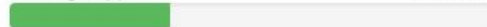**Pool** *

public-network-199

Description:

Allocate a floating IP from a given floating IP pool.

Project Quotas

Floating IP (0)   3 Available

Cancel   Allocate IP

Manage Floating IP Associations

IP Address *

199.241.164.90

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

Port to be associated *

test: 192.168.2.7

Cancel

Associate

Project / Compute / Instances

Instances

	Instance Name	Image Name	IP Address	Size	Key Pair	Status	Availability Zone	Task	Power State	Time since created	Actions
☐	test	-	• 192.168.2.7 Floating IPs: • 199.241.164.90	P-2C-4G	student1	Active	nova	None	Running	9 minutes	Create Snapshot

Displaying 1 item

ssh -i privatekey.pem ubuntu/centos/fedora@publicIP

Project ⌄

    Compute ⌄

        Overview

        Instances

        Volumes

        Images

        Access & Security

    Network ❯

    Orchestration ❯

Identity ❯

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

Manage Security Group Rules: default (208839ac-ab05-48fe-acc5-269e01a9eef6)

+ 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	IPv4	Any	Any	0.0.0.0/0	-	Delete Rule
☐	Egress	IPv6	Any	Any	::/0	-	Delete Rule
☐	Ingress	IPv4	Any	Any	-	default	Delete Rule
☐	Ingress	IPv4	TCP	22 (SSH)	0.0.0.0/0	-	Delete Rule

Displaying 5 items

Compute ⌄
- Overview
- Instances
- Volumes
- Images
- Access & Security

Network ›

Orchestration ›

Identity ›

Add Rule

Rule *

Custom TCP Rule ▼

Direction

Ingress ▼

Open Port *

Port ▼

Port ❓

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.

Cancel | Add

Edit Instance

×

Information * Security Groups

Add and remove security groups to this instance from the list of available security groups.

All Security Groups	Filter 🔍
No security groups found.	

Instance Security Groups	Filter 🔍
default	-

Cancel Save

Instances

Filter · Launch Instance · Delete Instances · More Actions ▾

☐	Instance Name	Image Name	IP Address	Size	Key Pair	Status	Availability Zone	Task	Power State	Time since created	Actions
☐	test	-	• 192.168.2.7 Floating IPs: • 199.241.164.90	P-2C-4G	student1	Active	nova	None	Running	9 minutes	Create Snapshot ▾

Displaying 1 item

Common notes about the cloud

- No Backups are taken to VMs or attached storage
- Compute/Network usage under University acceptable usage policy
- Non mission critical applications