Clearing the Fog! Getting Started on Cumulus: a Near to the Ground On Campus Cloud Solution

Research Computing
UNIVERSITY OF COLORADO **BOULDER**

Be Boulder.

Getting Started on CUmulus

Gerardo Hidalgo-Cuellar
www.rc.colorado.edu
rc-help@colorado.edu

Slides available at:

Tutorial at:

Survey at: http://tinyurl.com/curc-survey18

Outline

- What is CUmulus?

- CUmulus Access
  - Access to CUmulus and the allocation process
  - Logging into Horizon (CUmulus web portal)
  - Creation of an instance
  - Logging into your instance

- Demo workflow one might use on CUmulus:
  - Query Twitter via the Twitter API and store data into a mySql database (using docker containers).

What is CUmulus?

- CUmulus is CU Research Computing's free-to-use on-premise cloud service.
- Supports cases not well-suited for HPC such as
  - web servers
  - databases
  - long-running services
- Provides users with a logically isolated section of the cloud, with their own resources

What is CUmulus?

- You get your own “world” a sandbox environment that can be easily created/deleted.
  - Install Software
  - Administer your instance
  - Run applications and jobs

- You can request specific resources (CPU, storage, memory) and can set up persistent storage.

CUmulus Access

CUmulus Access and Allocation

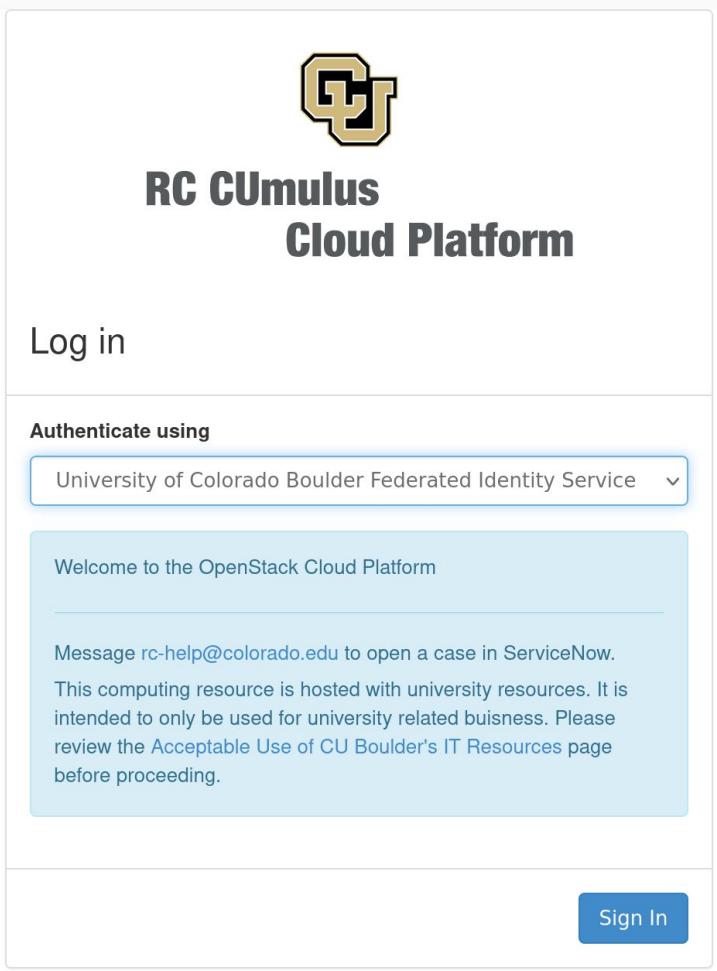
Users will submit a proposal for your use case (email rc-help@colorado.edu):

- Describe your CUmulus workflow
- Describe why your workflow is appropriate for CUmulus
- Estimate the resources you require:
  - operating system, CPU cores, disk space, memory

This is an iterative process where we work with you to make sure the request for resources fits your (and our) needs.

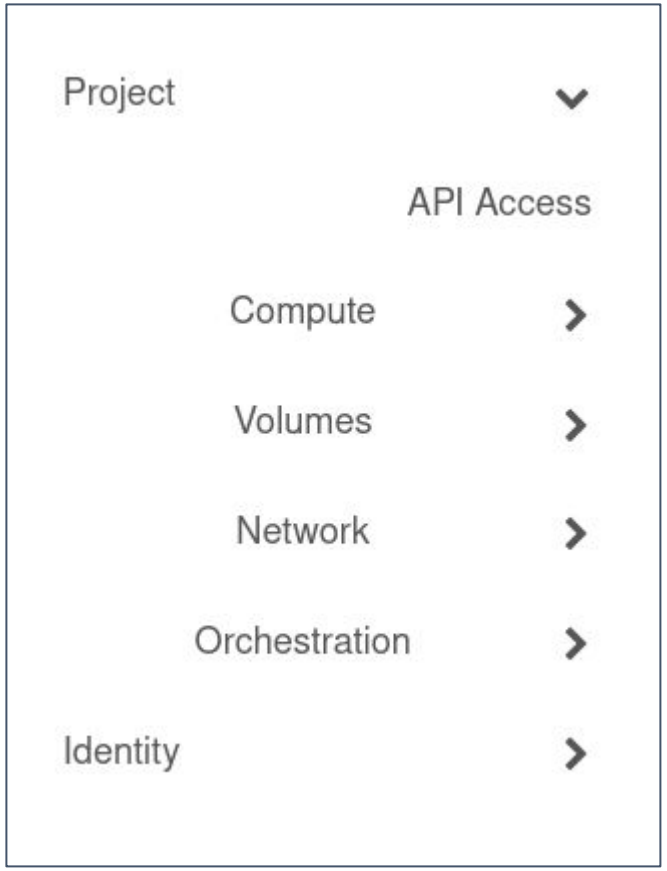
Log in to Horizon

- Horizon is the CUmulus web portal
  - cumulus.rc.colorado.edu/
- Let's take a brief tour of Horizon
- Log in with your institution's credentials:



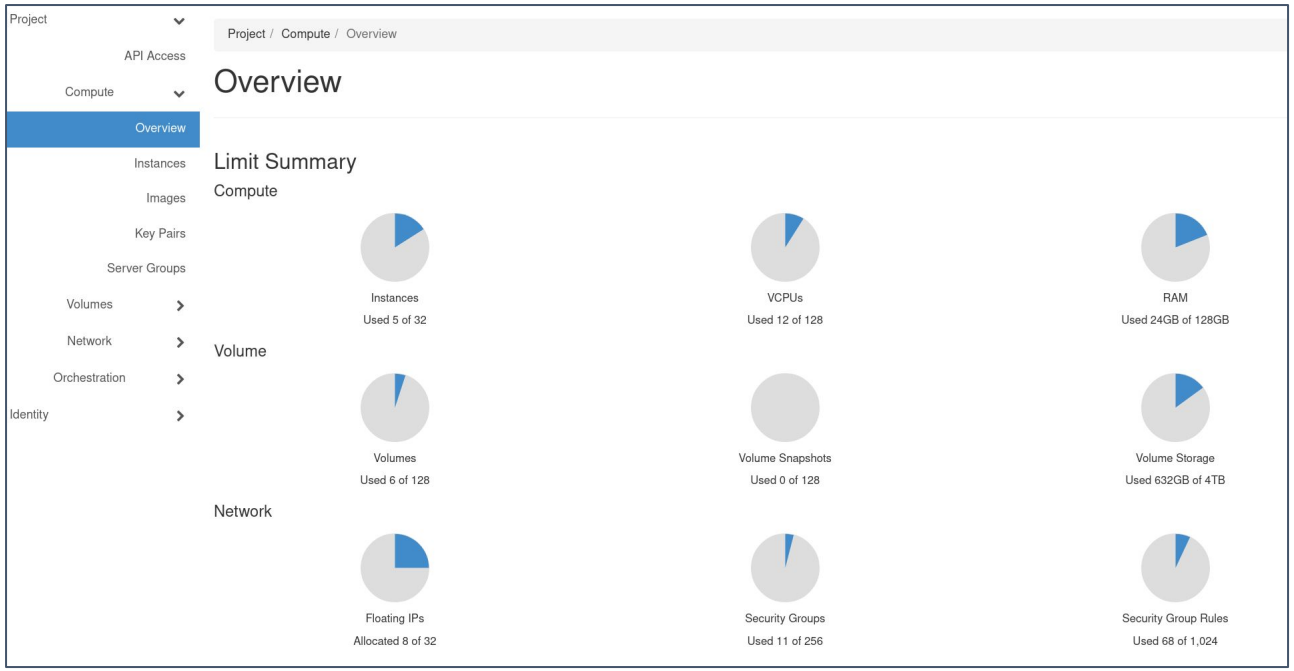
Navigate Horizon

- Choose your project (top left)
  - Generally users only have 1 project
- 4 main sections
  - Compute
  - Volumes
  - Networks
  - Orchestration



Navigate Horizon: Overview

- Land on the Overview page under “Compute”
  - quick summary of your project



Navigate Horizon: Instances

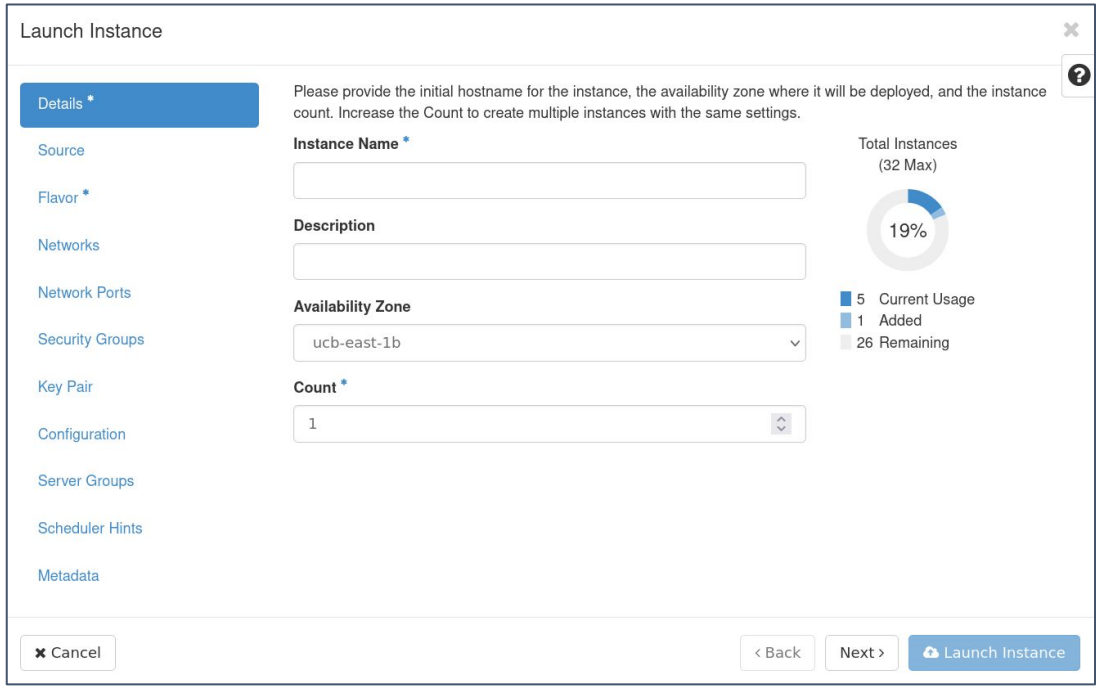
- Navigate to:
  - Project->Compute->Instances

- An Instance is just a digital version of a physical computer.
  - Instances can perform almost all of the same functions as a computer, including running applications and operating systems.

Instance Creation

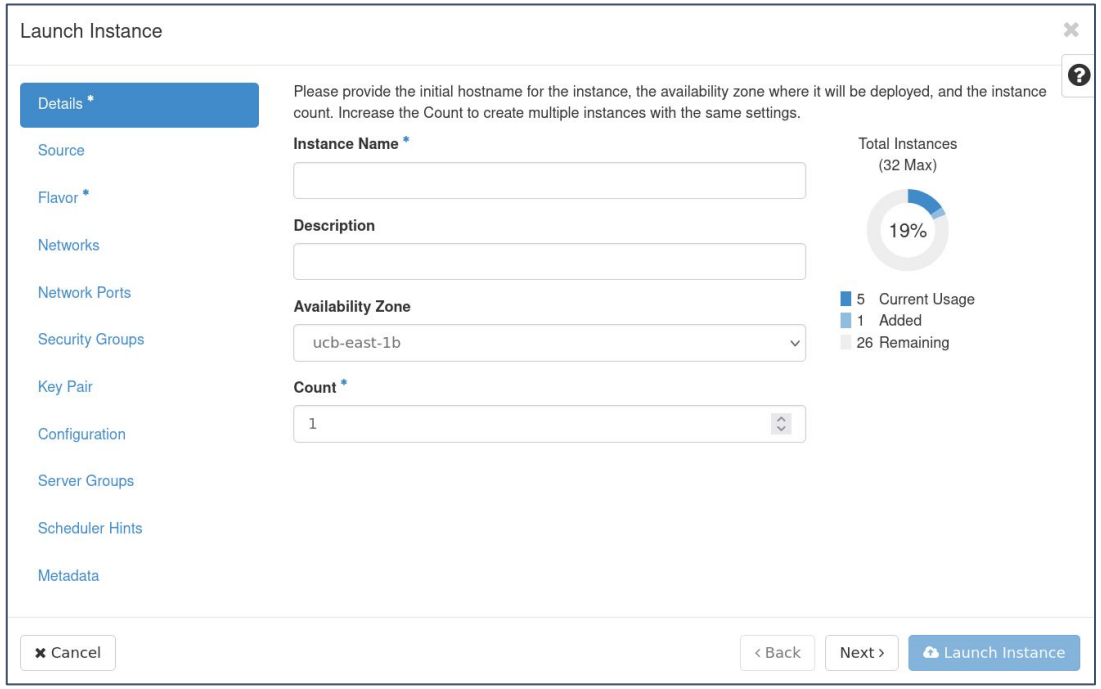
Let’s create a simple instance together

- From the instances page click on “Launch Instance”
- The Instance Creation Launcher will pop up giving us options to create our virtual machine:



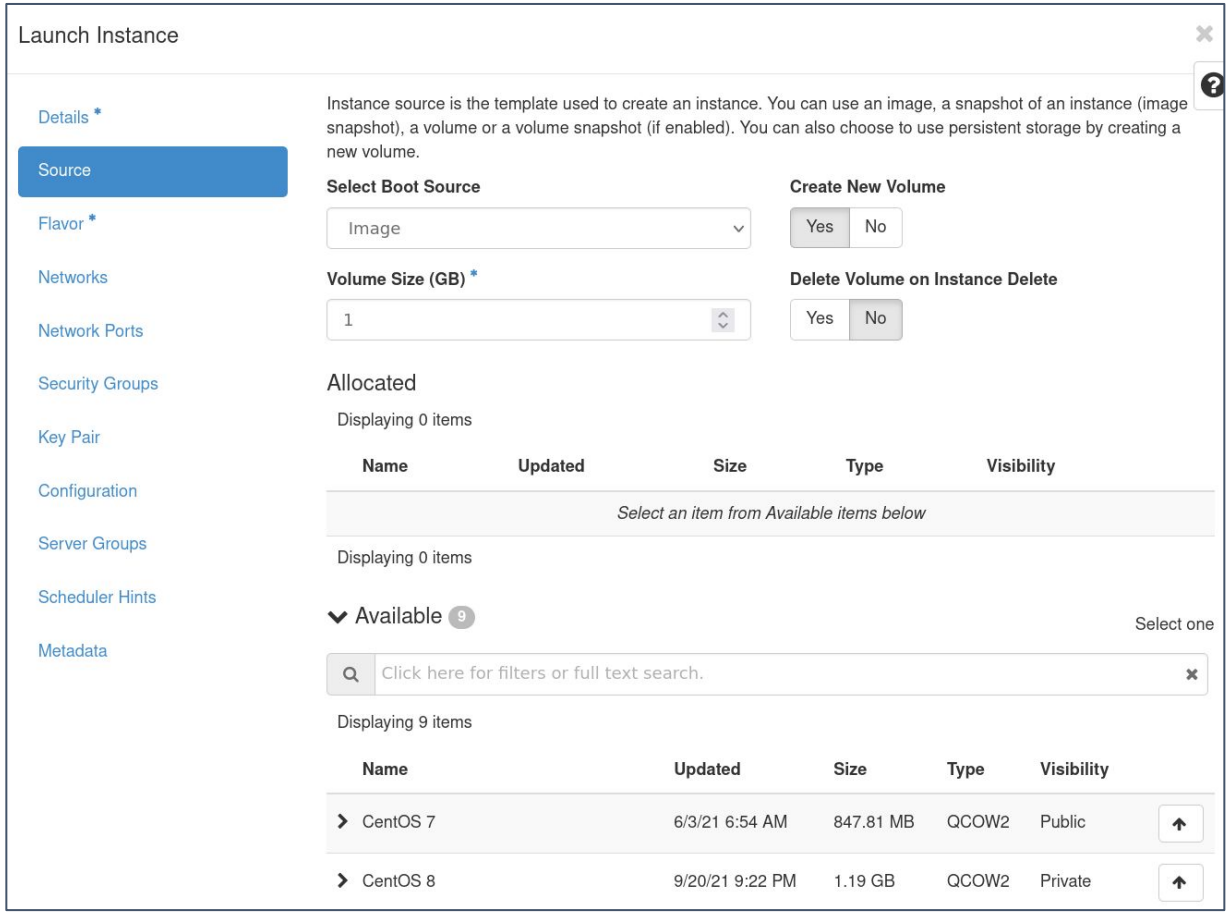
Details

- Fill out Instance details, including a name and description
  - availability zone and count can be left as defaults



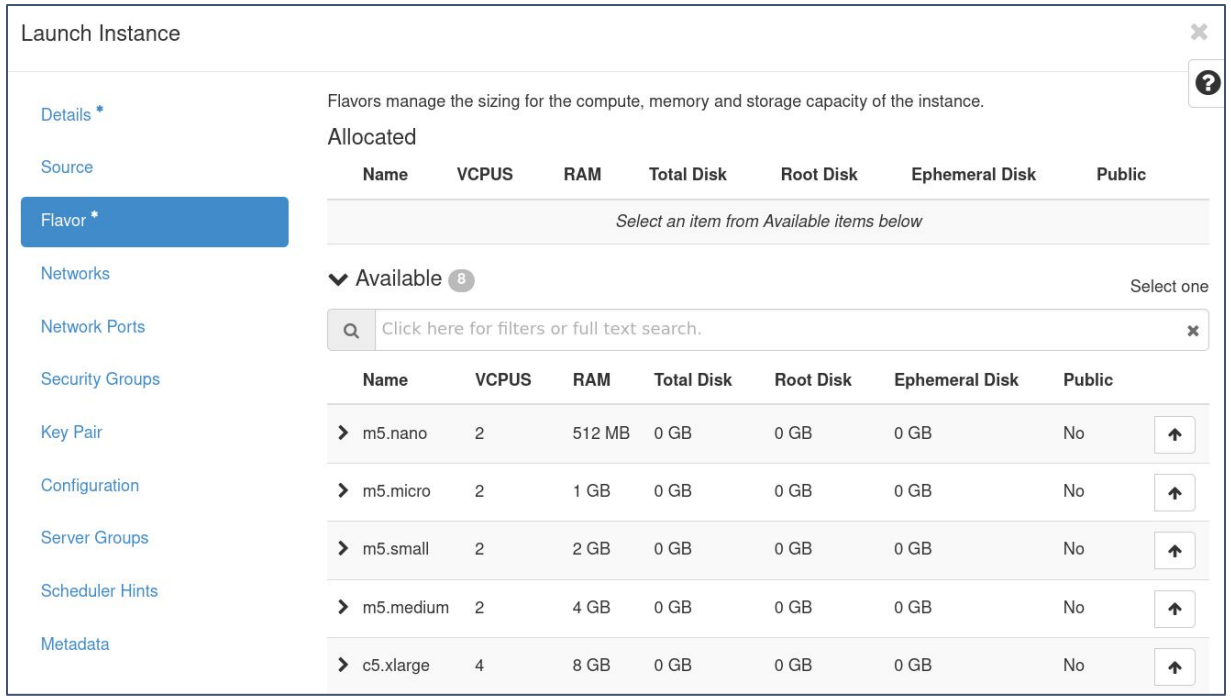
Source

- You can choose an operating system from the images CURC provides
- Choose to have your storage volume deleted on Instance Deletion
  - If you select fno” be aware of “zombie” volumes that will stay around when the instance is deleted



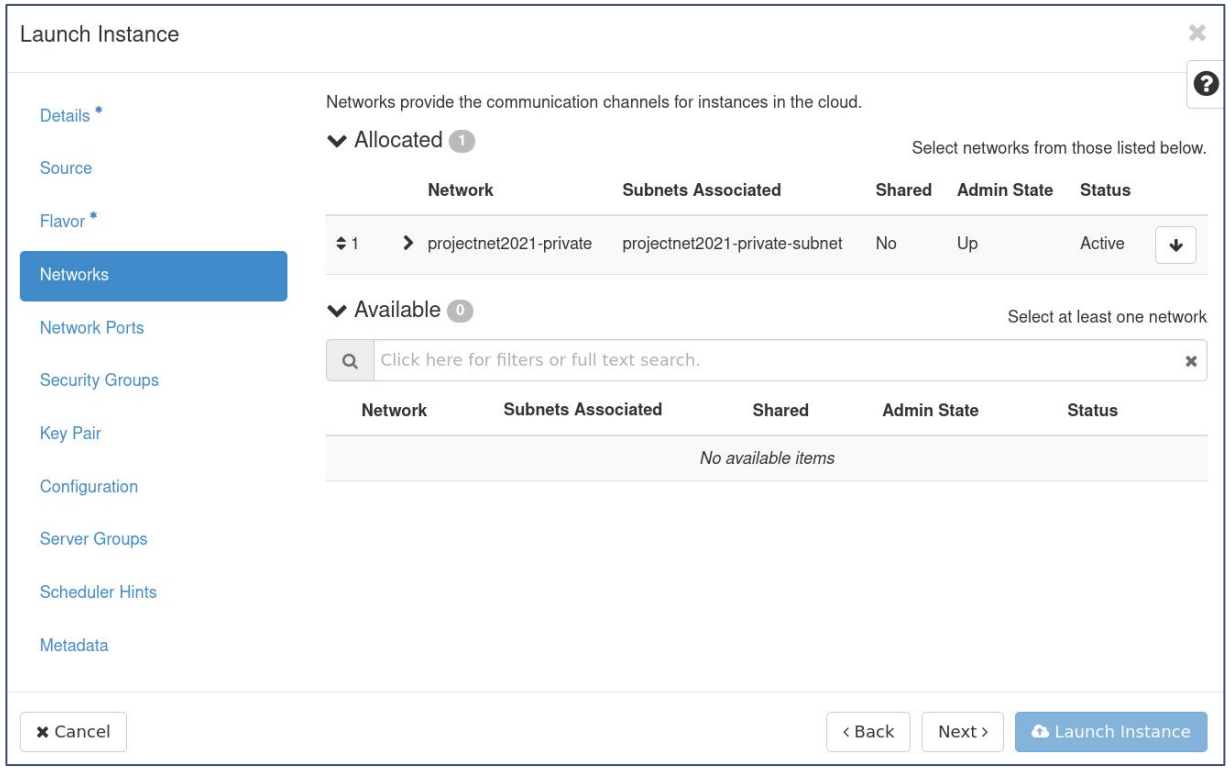
Flavor

- Choose from a list of pre-selected resources:
  - “Flavors” manage the sizing for the compute, memory, and storage of the instance.



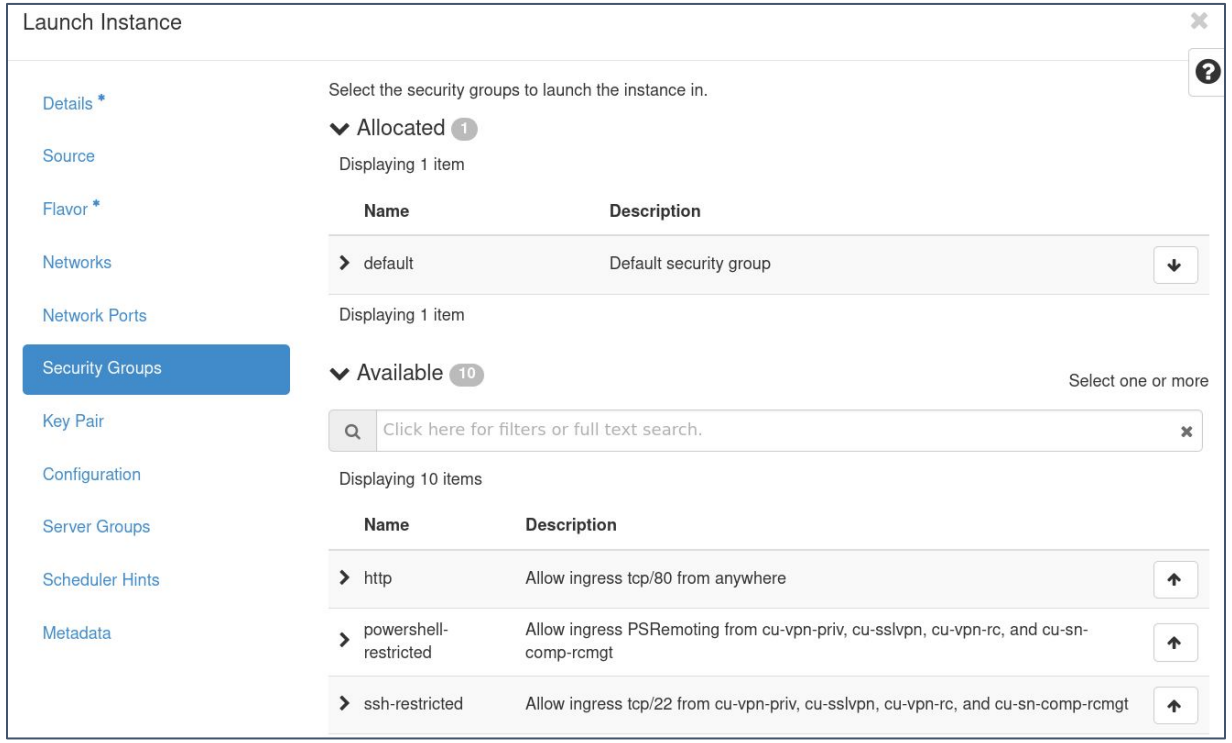
Networks & Network Ports

- Select a project network, which determines routability of either a public/internet or campus/internal floating IP.
  - We'll choose an external network
- Ports provide extra communication channels to your instances.
- You can select ports instead of networks or a mix of both.



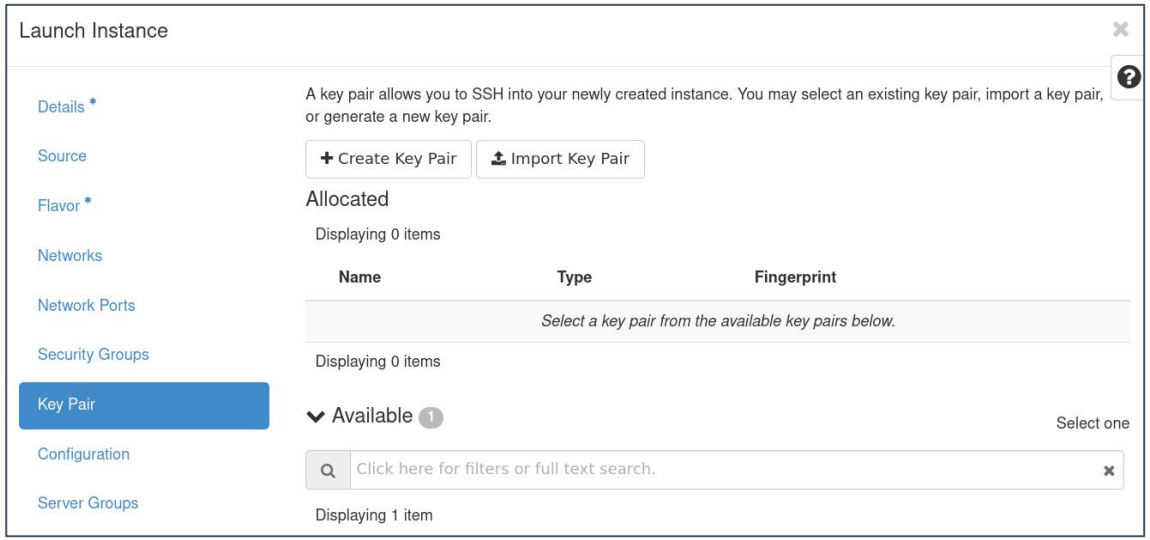
Security Groups

- Security Groups act as a virtual firewall for your instance to control inbound and outbound traffic.
- We'll pick ssh-restricted, http, and https for our demo



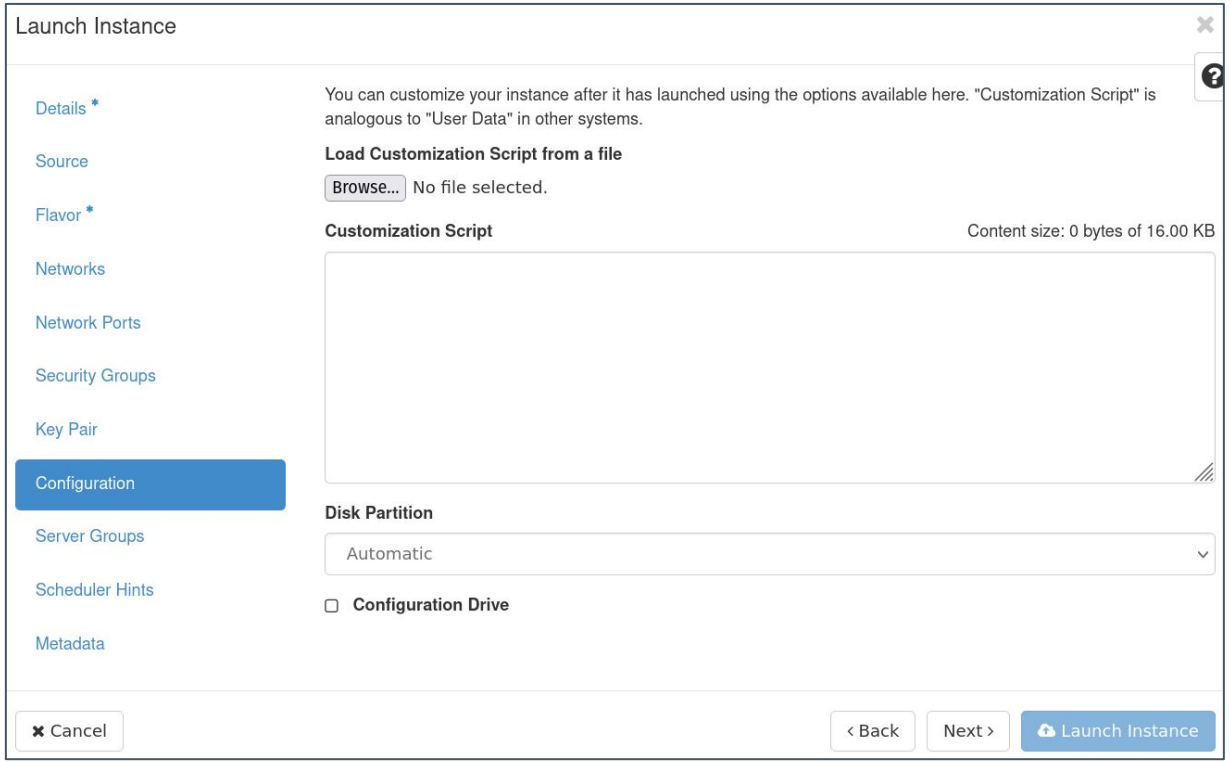
Key Pair

- A key pair allows you to SSH into your new instance.
- You may select an existing key pair, import a key pair, or generate a new key pair.
  - I find it easiest to create a keypair on my local machine and import it
  - https://www.ssh.com/academy/ssh/public-key-authentication



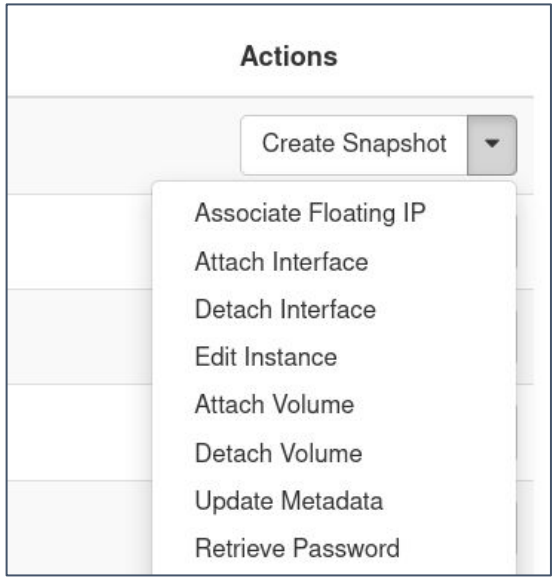
Config, Server Group, Scheduler Hints, and Metadata

- We'll leave these as defaults as they are extra configuration we can provide our instances, but not necessary



Launch Instance and Associate IP

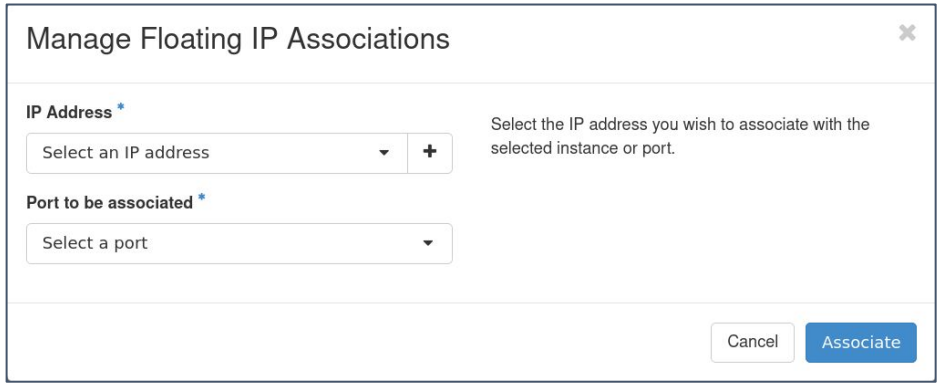
- Launch instance and wait for it to be set up



- We can then associate a Floating IP which will allow us to access the instance from outside of the CU network
  - On the right hand side of the newly created instance choose “Associate Floating IP” under the “actions” dropdown

Associate IP

- Select from available IP addresses
  - If needed you can add a floating IP, but be aware there are limited numbers of floating IPs
- Select port to be associated
  - This should be pre-populated with the internal IP of your new instance



Logging into your Instance

Logging In

- You must be on CU VPN to connect via ssh (CURC restriction)

- Open up an ssh connection providing the identity (key) file:
  - `$ ssh -i ~/.ssh/<private key> <hostname>@<external floating IP>`

- For an ubuntu instance this may look something like:
  - `$ ssh -i ~/.ssh/testkey ubuntu@123.456.789.123`

Logged In

- Congratulations! You are now logged into your instance

- You can now:
  - Install Software
  - Administer your instance
  - Run applications and jobs

Demo

Demo workflow: Twitter API with DB

- There are a (nearly) *infinite* number of workflows you could run on your CUmulus instance

- We'll demo a *potential* workflow: a web application which allows users to query using the Twitter API and store this data persistently to a mysql database.

- This demo showcases a few important features of CUmulus not possible on HPC:
  - A persistent workflow not limited by wall clock times (such as on HPC systems)
  - User administration of compute resources (using root privileges for applications such as Docker)
  - Routable floating IPs available on the internet

Thank you!

- Survey: http://tinyurl.com/curc-survey18
- Contact information: rc-help@Colorado.edu