The State of ChameleonCloud at NCAR

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Thunder Nodes

- Thunder nodes consist of
  - Five nodes featuring Marvell’s ThunderX2 Arm processors
    - Use the aarch64 instruction set
  - Four nodes have 256GB of memory
  - One node has 128GB of memory
  - A 100Gbe Cumulus-based interconnect

- Used to test the Arm processor as a candidate for a future NCAR supercomputer
  - All users were able to get their NCAR codes to run
  - Performance was good

- Infiniband NICs on the nodes as well, but they are not cabled to anything currently
ChameleonCloud

•  https://chameleoncloud.org

A configurable experimental environment for large-scale edge to cloud research

Get started

Recent news

Chameleon Wins Best Paper Award at PEARC ’22
June 28, 2022 by Adam Cooper

Chameleon was recently awarded the Best Paper Award at PEARC ’22.
Creating an Account

- Click “Log in”
Creating an Account

- Login using your UCAR Google account
Creating an Account

• On the Globus screen, just choose “Google” again

• The first time you login, you’ll have to accept the EULA
Accessing CHI@NCAR

- Creates an account called {username}@ucar.edu@accounts.google.com
- NCAR has an NCARExplore project
- Email hpcrd@ucar.edu to get added to the project
Accessing CHI@NCAR

• Once you’ve been added to the project, you can go to the CHI@NCAR site either by choosing “CHI@NCAR” under “Experiment” or just by going to https://chi.hpc.ucar.edu/
Leasing Nodes

- Lease nodes by choosing “Leases” under “Reservations”
Leasing Nodes

- Create a new lease by clicking on “Create Lease”
Creating Leases

- Enter a Lease Name
- Enter the Start Date and Time (default: today and now)
- Enter the Lease Length in days (default: 1)
- Enter a specific End Time (default: current time)
- Click “Next”
Creating Leases

- Check the “Reserve Hosts” box to reserve a host
- Select Min and Max Number of Hosts (default: 1 and 1)
- We only have one type of Resource Properties for Hosts, so ignore that
- Click “Next”
Creating Leases

- We only no tenant networking yet, so don’t select “Reserve Network”
- Check the “Reserve Floating IPs” box and select the Number of Floating IP Addresses Needed. You’ll need at least one.
- Click “Create”
Launching Instances

- Once your lease is “ACTIVE”, you can launch an instance
- Select “Instances” under “Compute"
• Click on “Launch Instance”
Launching Instances

- Under the “Details” section:
  - Enter Instance Name
  - Select the lease reservation we made from the previous steps
  - Enter the Count which is the number of instances to start
• Under the "Source" section:
  – click the button labelled with an “up arrow” to select the standard Chameleon Cloud Ubuntu 20.04 ARM64 image
Launching Instances

Source

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

Select Boot Source

Flavor

Image

Allocated

Displaying 1 item

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<th>Size</th>
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<th>Visibility</th>
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Available 1

Displaying 1 item

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<td>1.30 GB</td>
<td>QCOW2</td>
<td>Shared</td>
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</tbody>
</table>
Launching Instances

- Under the “Key Pair” section
  - Upload a public key pair for logging into your instance later
    - You can click on “Create Key Pair” to have the CHI@NCAR site generate a new key pair for using with CHI@NCAR
    - You can click on “Import Key Pair” to import a public key
  - If you have already uploaded a public key to CHI@NCAR, it will already be selected in the “Allocated” section
Launching Instances

Once you have filled in all the sections, click “Launch Instance”.
• It’ll take about 10 minutes for the image to be written to the hard drive and your instance to be “Running”
Accessing Instances

- Once your instance is running you can attach your Floating IP
- Select “Floating IPs” under “Network”
Accessing Instances

- Your Floating IP will be listed under “IP Address”
- Select your instance as the “Port to be associated”
- Click on “Associate”
Accessing Instances

- Wait for your Floating IP association to be "Active"
Accessing Instances

• You can now “ssh” to your instance using the “cc” account and your Floating IP

```
cisl-pierz:~ jtilott$ ssh cc@128.117.250.24
The authenticity of host '128.117.250.24 (128.117.250.24)' can't be established.
ECDSA key fingerprint is SHA256:rcTrOceFpG6WwVE5L5jysb0hzN21XkV0Xp+FXa3nc.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '128.117.250.24' (ECDSA) to the list of known hosts.
Welcome to Ubuntu 20.04.3 LTS (GNU/Linux 5.4.0-91-generic aarch64)

* Documentation: https://help.ubuntu.com
* Management: https://landscape.canonical.com
* Support: https://ubuntu.com/advantage

System information as of Tue Sep 20 00:51:51 UTC 2022

System load: 0.13 Processes: 2337
Usage of /: 0.2% of 1.71TB Users logged in: 1
Memory usage: 1% IPV4 address for eno2: 172.40.0.248
Swap usage: 0% IPV4 address for enp145s0f1: 10.18.250.76
Temperature: 48.3 C

* Super-optimized for small spaces – read how we shrank the memory footprint of MicroK8s to make it the smallest full K8s around.

https://ubuntu.com/blog/microk8s-memory-optimisation

222 updates can be applied immediately.
164 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

The list of available updates is more than a week old.
To check for new updates run: sudo apt update
New release '22.04.1 LTS' available.
Run 'do-release-upgrade' to upgrade to it.

Last login: Tue Sep 20 00:51:23 2022 from 75.70.96.198
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.
```
Future Work

• Setup tenant network
  – There is a physical, high speed network connected to a Cumulus switch
  – Currently works, but is getting IP addresses from a central NCAR DHCP server
  – Need to create VLAN create/destroy scripts and setup a DHCP server inside CHI@NCAR

• RoCE over the Internet
  – Working on getting a Layer 2 connection/RDMA to machines at other Chameleon sites

• Specialized images
  – Have a JBOD for storing images that needs setup
  – Create some specialized images for NCAR users
Questions?