Using NeCTAR Cloud Virtual Machines

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Using a NeCTAR Cloud Virtual Machine

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- Installing packages with a package manager
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- Running the program "Structure" using "Parallel"

Launch a Virtual Machine (Instance)

This tutorial will provide an overview of launching and accessing a virtual machine (VM) in NeCTAR. These processes are covered in depth on the NeCTAR website Training Modules http://training.nectar.org.au/ , and Support Pages https://support.nectar.org.au/support/home

1. Log on to the NeCTAR dashboard
   https://dashboard.rc.nectar.org.au/project
2. Select the correct project allocation in the top bar (if it starts with "pt-", it is your default trial allocation)

3. Select "**Access & Security**" under the "Compute" subheading in the left side main menu.

   ▶ Click "Create Security Group"
   ▶ Name the security group 'SSH', with the description "port 22 for SSH". Click "Create Security Group"
   ▶ Click "**Manage Rules**" in the "Actions" drop-down menu. Click "**Add Rule**".

- Type "22" under "**Port**".
  Under "**CIDR**", you choose a range of IP adresses that can access your VM through port 22.
  If you keep it as "0.0.0.0/0", you can access your VM from any computer, but others might find a way to access it also.
  Here are the IP ranges for SA University networks. Use one of these, and the VM can only be accessed form a University computer (including an external computer using a VPN to access the University network).

  - 129.127.0.0/16 - University of Adelaide
  - 129.96.0.0/16 - Flinders
  - 130.220.0.0/16 - UniSA

- Select "**Key Pairs**" and use "**Import Key Pair**" to upload the public key of a keypair you have created in Putty (Windows users) or with `ssh-keygen -f ~/.ssh/keyname`.

4. Select "**Instances**" in the left side main menu. Click "**Launch Instance**".
5. Give your VM a name, choose a "**Flavor**" (size of the VM), and select an Image (pre-loaded operating system, e.g. NeCTAR Ubuntu 14.04).
6. Select the "**Access & Security**" tab. Select your Key Pair name, and select the "**SSH**" security group.
7. If you are going to use a volume storage attachment, select the "**Availability Zone**" and choose "**sa**" from the drop-down menu.
8. Click "**Launch**". It may take a few minutes for the instance to boot.

Connect to your VM

See the support page:
`https://support.nectar.org.au/support/solutions/`
`articles/6000055446-accessing-instances`

- ► Copy the IP Address of the instance.
    - ► Windows - Set up a PuTTY connection with the IP address
    - ► Mac/Linux - In the terminal app, enter `ssh -i <keyname>`
      `ubuntu@<IPaddress>`

Downloading and Installing

- ▶ Try some commands to look around the VM
  - ▶ `ps ; df -hT ; top`
- ▶ Install "**htop**"
  - ▶ `apt-cache search htop`
  - ▶ `sudo apt-get install htop`
  - ▶ `htop`
- ▶ Connect to the VM with FileZilla to visualise the file structure and contents.
  `https://support.nectar.org.au/support/solutions/`
  `articles/6000085114-transferring-data-to-your-vm#`
  `filezilla`

- Run these commands periodically to update the package manager and the installed packages.
    - `sudo apt-get update`
    - `sudo apt-get upgrade` - (this one can be time-consuming, so don't run it during the workshop)

- To download "Structure", copy the URL for the latest release
  `http://pritchardlab.stanford.edu/structure_`
  `software/release_versions/`

  - Then use the "wget" command to download the tar.gz file. e.g.

  `wget http://pritchardlab.stanford.edu/`
  `structure_software/release_versions/v2.3.4/release/`
  `structure_linux_console.tar.gz`

  - Decompress the archived folder with:

  `tar -zxvf structure_linux_console.tar.gz`

- Download today's tutorial file:
  ```
  wget https://github.com/joeygerlach
  /structure_parallel/archive/master.zip
  ```
- Use the *unzip* command to decompress the tutorial file
  ```
  sudo apt-get install zip unzip
  unzip master.zip
  ls
  ls -lh structure_parallel-master
  ```

- Always perform analyses in a larger storage disc, not the primary (root) disc. In this tutorial we will use the secondary (ephemeral) disc, but it is recommended that users request volume storage to use for running analyses instead because the data will be more secure.
- First, we make the mounted storage disc writable:
  ```
  sudo chown ubuntu /mnt
  ```
- Copy the tutorial files to the mounted disc:
  ```
  cp -r ~/structure_parallel-master/
  /mnt/structure_run1/
  cd /mnt/structure_run1
  ```
- Look at the files (you may wish to use FileZilla for this)

- Look at the support page on running jobs on a VM:
  `https://support.nectar.org.au/support/solutions/`
  `articles/`
  `6000089713-tips-for-running-jobs-on-your-vm`
- Install the task manager "GNU Parallel"
  `sudo apt-get install parallel`
- Run Structure using "GNU parallel" by calling the shell script:
  `bash Parallel_Structure.sh`

- Look at the processes running:
  htop
- Because we used the **nohup** command, we can close the window and the process will continue running. Try closing your terminal, then re-connecting to the VM. Enter htop.

Transferring files

We have created a folder of results files. We will transfer them to your computer, or to a remote data storage server.

First, we can zip the results folder into a single file.

```
zip structure_1.zip results/
```

OR

```
tar -zcvf structure_1.tar.gz results/
```

Three options for transferring data

1. Filezilla

Drag and drop files between your VM and your local computer.

2. Secure Copy

I have data stored in the /data folder in the eRSA remote storage server "sftp.ersa.edu.au". I am going to use **scp** to copy the results files to this storage.

```
scp <Path_To_Source_File> <Path_to_Destination>

scp structure_1.zip jgerlach@sftp.ersa.edu.au:/home/users/j

scp jgerlach@sftp.ersa.edu.au:/home/users/jgerlach/test.txt
```

3. Secure File Transfer Protocol

Use the **sftp** command to access a remote computer, then use "get" or "put" to download or upload files.

```
sftp jgerlach@sftp.ersa.edu.au

get test.txt ./

put test.tar.gz ./

quit
```