Access to HPC

To access the HPC systems at your institution, you generally need an account which your HPC authority would create for you.

Once you have obtained an account, the only method available to connect to the HPC is to use a secure shell (`ssh`) client, no matter what operating system you are using. However, note that HPC facilities around the work is generally Linux-based because that makes the building cost cheaper!

Accessing HPC systems on campus

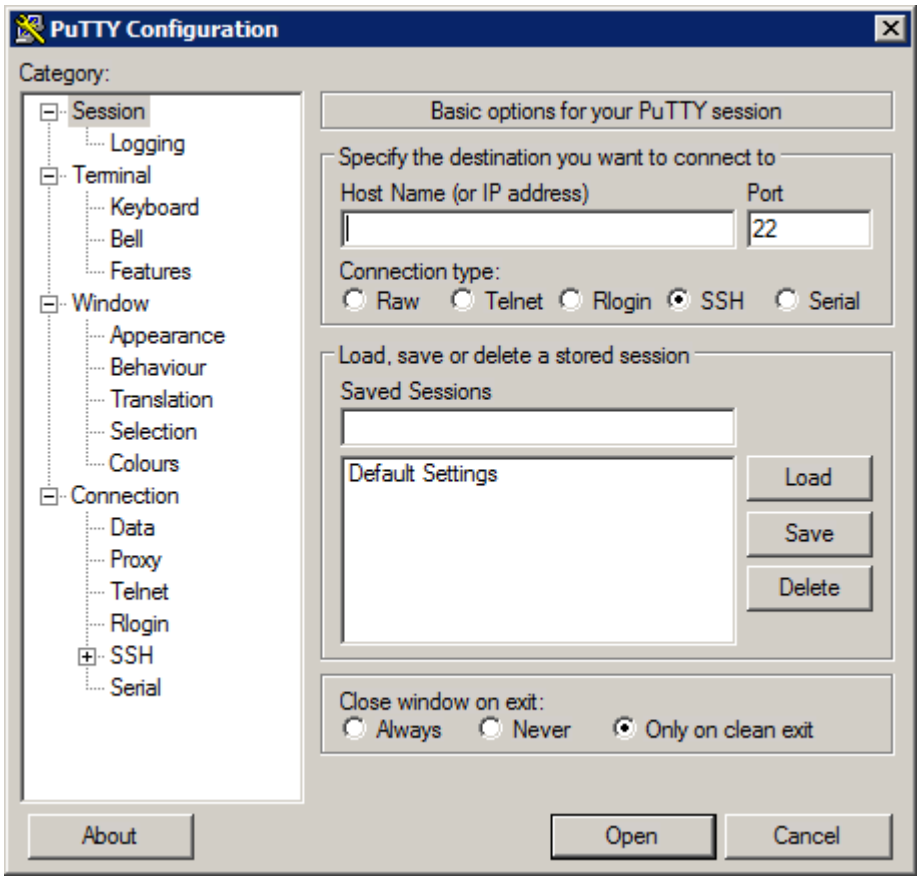
Linux: To connect to the HPC from a Linux based computer, open a terminal window and simply type `ssh hpc-login-node-name` and then press enter.

```
ssh username@login-hostname
```

Windows: To connect to the HPC from a computer using Microsoft Windows requires the use of a `SSH` client, e.g. **PuTTY** or **MobaXterm**.

PuTTY is a free implementation of Telnet and SSH for Windows platforms. It also implements an xterm terminal emulator. However, while using PuTTY, if you need to forward the GUI interfaces from the HPC through the `X11` forwarding, you will also need a software tool called **XMing**. Xming is an X Window Server for Microsoft Windows. XMing is built from the `X.Org` canonical X-server software with modifications so that it can run under Windows. XMing can be used to remotely run Linux programs and display their X-Window output under Windows.

I personally prefer the MobaXterm, as it can provide enhanced terminal for Windows with `X11` server, tabbed `SSH` client, network tools and much more!



PuTTY interface, do not forget to write your HPC systems login node's hostanme

Password-less login: SSH can provide authentication and secure communications over insecure channels. To enable passwordless logins, you have to generate a pair of keys, one public and the other private. The public key authentication practiced on the HPC platforms assumes that the public key is known by the system in order to operate an authentiation based on a challenge/response protocol instead of the classical password-based protocol.

To generate an SSH keys, just use the `ssh-keygen` command, typically as follows:

```
ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/home/user/.ssh/id_rsa):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/user/.ssh/id_rsa.
Your public key has been saved in /home/user/.ssh/id_rsa.pub.
The key fingerprint is:
de:e2:21:df:38:49:3a:99:d7:85:4e:c3:85:c8:24:5b
The key's randomart image is:
+---[RSA 2048]----+
|                 |
|      . E        |
|       *         |
```

```
|      . o . .    |
|       S. o      |
|       .. = .    |
|       =.= o     |
|      * ==o      |
|       B=.o      |
+-----------------+
```

After the execution of ssh-keygen command, the keys are generated and stored in the following files:

- `SSH RSA` Private key: `~/.ssh/id_rsa`. Do not transmit this file
- `SSH RSA` Public key: `~/.ssh/id_rsa.pub`. This file is the file safe to distribute.

Next you should have sent through the account request form by mail and the public key (i.e. `id_rsa.pub`) to your HPC authority, enabling them to configure the `~/.ssh/authorized_keys` file of your account.

Finally, to be able to use your SSH key in a public-key authentication scheme, it must be loaded by an SSH agent. Just execute the following:

```
ssh-add ~/.ssh/id_rsa
```

Acessing HPC systems off campus

Access to HPC systems at your institution from off-campus should be available for staffs and research students via some kinds of VPN services. If you do not know what is this - VPN stands for virtual private network and is a type of network connection that allows users to access computer networks from anywhere in the world. It is also called IP tunneling, is a secure method of accessing your institution's computing resources such as HPC systems.

There are various VPN clients that can you use to tunnel through a VPN. For example, the **Cisco AnyConnect Secure Mobility** client is a web-based VPN client that does not require user configuration. You generally download the client by pointing your browser to vpn.yourinstitution.edu.

Alternatively, in a Linux environment, you can use free VPN clients like **OpenVPN**. On the `Ubuntu` or `Debian` systems, you can install it by typing:

```
sudo apt-get update
sudo apt-get install openvpn
```

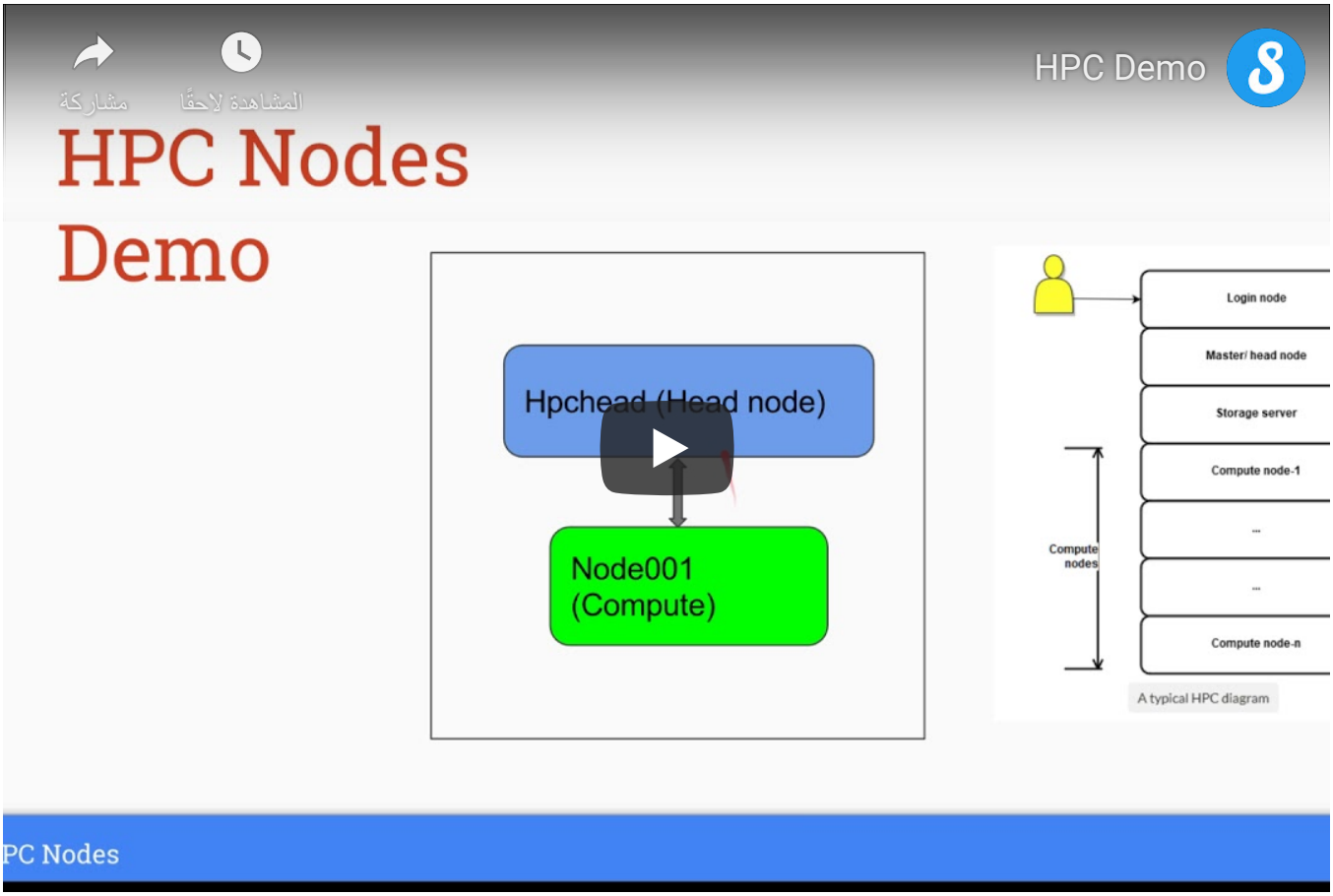
On CentOS/ RedHat systems you can enable the EPEL repositories and then install it by typing:

```
sudo yum install epel-release
sudo yum install openvpn
```

Finally on the Mac OSX systems you can use tools like **Tunnelblick** to create the IP tunnels.

HPC Login Demo

I created a demo HPC with VMWare and two virtual nodes (head and login), please watch the video below:



Summary

Each institution has a different way to access their HPC systems, here I have tried to summarize them in brief, feel free to consult your HPC authority and they should be able to help you to get your access sorted, no matter what OS or terminal you have!