

# Connecting to BioHPC from outside of Cornell without Cornell NetID or Cornell VPN

**NOTE:** This way of connecting to BioHPC Lab is for external users that do not have an active Cornell NetID. If you have Cornell NetID, we recommend using Cornell VPN.

**NOTE:** There are three login servers available: [cbsulogin.biohpc.cornell.edu](http://cbsulogin.biohpc.cornell.edu), [cbsulogin2.biohpc.cornell.edu](http://cbsulogin2.biohpc.cornell.edu), and [cbsulogin3.biohpc.cornell.edu](http://cbsulogin3.biohpc.cornell.edu). The examples below use [cbsulogin](http://cbsulogin.biohpc.cornell.edu), but any of these three may be used.

## 1. Set up 2-factor authentication with BioHPC

BioHPC requires two-factor authentication (2FA) for logins outside the Cornell network; the 2FA protocol is different from what is used by other Cornell services. Rather than a push notification, you will need to supply a time-based one-time password (TOTP) as well as your BioHPC username/password. The TOTP is provided by an app installed on your smartphone and linked to your BioHPC account (the app can also be installed on laptops/desktops/browsers if you prefer). To enroll in two-factor authentication, and for more details, visit [http://biohpc.cornell.edu/lab/2fa\\_setup.aspx](http://biohpc.cornell.edu/lab/2fa_setup.aspx). This only needs to be done once, though you can re-visit this site to link additional devices to your BioHPC account. Linking a second device may be useful, in case the first is lost.

When connecting to BioHPC login machines or the BioHPC webpage, you will be prompted for a TOTP after providing your BioHPC password, but this is only required once per week per IP address. There are a few applications that do not support 2FA – such as when using ‘QuickConnect’ in FileZilla. In this case, we recommend first logging into the BioHPC website ([https://biohpc.cornell.edu/login\\_bio.aspx](https://biohpc.cornell.edu/login_bio.aspx)). You will supply your TOTP there, and then will be able to use other apps without needing a TOTP from that IP address for the next week.

## 2. Connecting from Windows Computers.

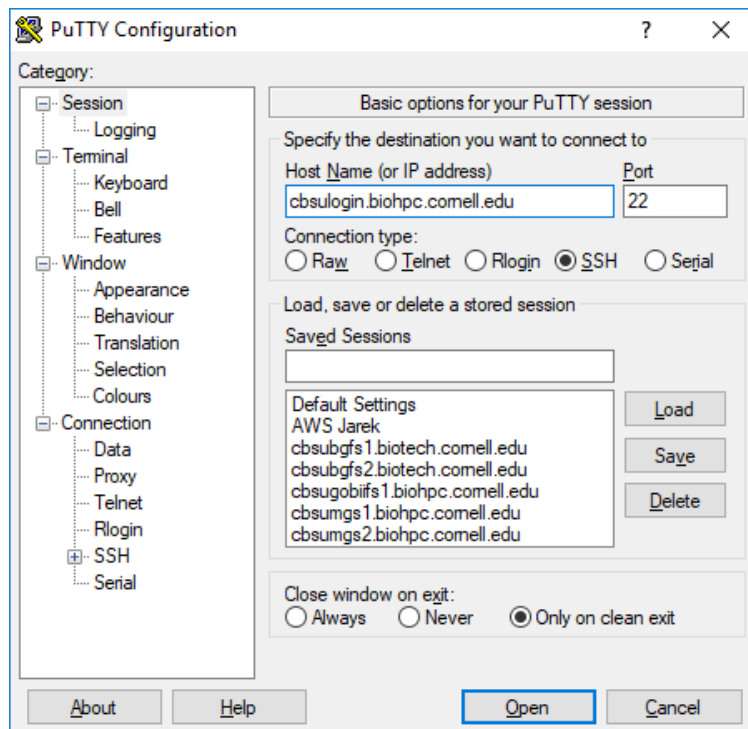
First, install software needed to connect to BioHPC Lab as described in our online documentation (Putty for connecting to workstations, FileZilla or WinSCP for file transfer, MobaXterm for X-Windows). You may want to install RealVNC VNC Viewer (Free edition) if you prefer to have access to the fully functional Linux desktop environment.

Reserve a workstation you want to use via our webpage (<http://biohpc.cornell.edu/lab/labres.aspx>). In this document we will assume your workstation is `cbsum1c2b001`, please substitute the name of your reserved workstation when setting up the connection.

There are three scenarios, depending on the software you will use.

### (a) Using terminal and command line software only

Set up your Putty to connect to the login node, [cbsulogin.biohpc.cornell.edu](http://cbsulogin.biohpc.cornell.edu)



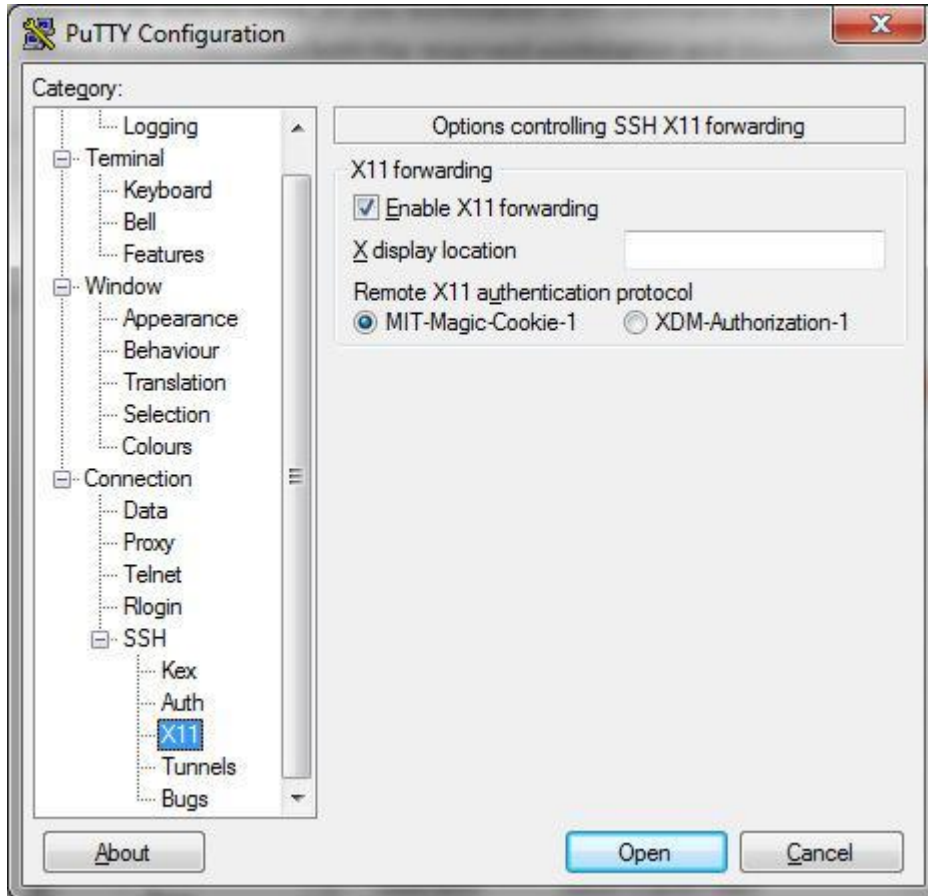
You will be asked for user id and password, and possibly a one-time password from your two-factor authentication app (unless you have already provided one from the same IP that day). Once your terminal session on the login node is established, type the command

```
ssh cbsum1c2b001
```

which will connect you to your reserved workstation (you will be asked for your BioHPC password again). Remember to substitute the example workstation name with your reserved workstation name! Now you will be able to work on your workstation with command line software. Once you are done, please disconnect from both the reserved workstation and cbsulogin (press “Ctrl-D” twice).

**(b) Using command line software and X-Windows software with MobaXterm.**

Set up your Putty to connect to cbsulogin.biohpc.cornell.edu as above, but before connecting scroll down the left panel, expand :”Connection”, “SSH”. Click on “X11” and make sure “Enable X11 forwarding” is checked:



Click "Open". Once connected to the login node (cbsulogin.biohpc.cornell.edu), type the command

```
ssh -X cbsum1c2b001
```

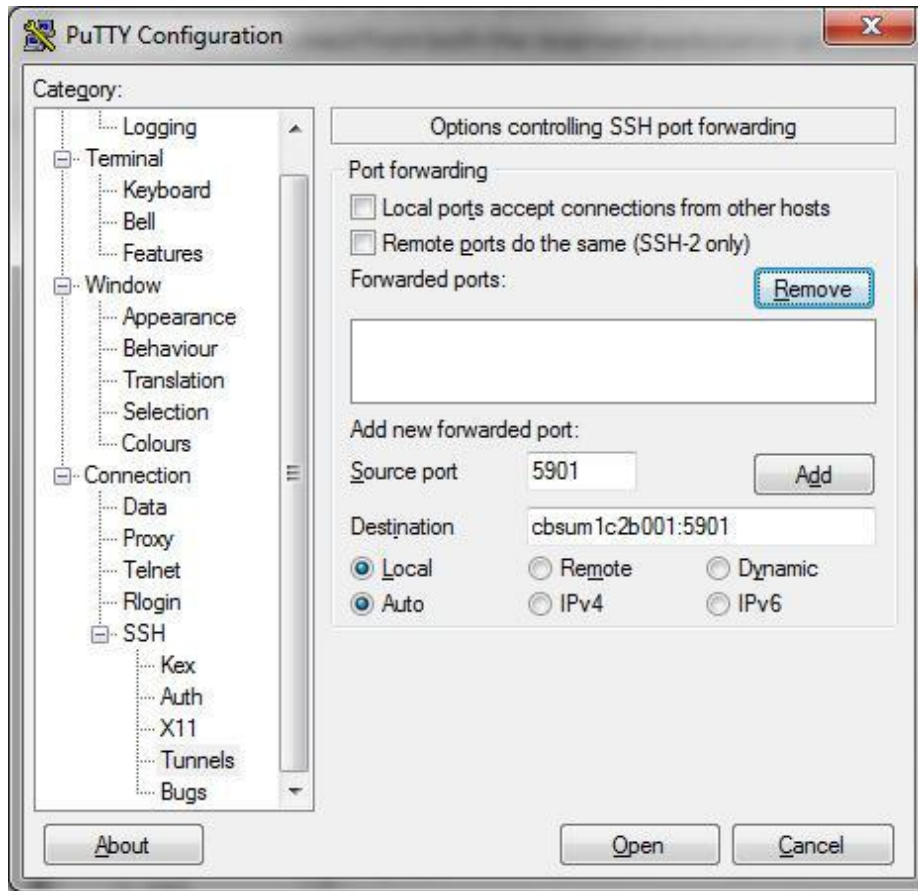
which will connect you to your reserved workstation (you will be asked password again). Remember to substitute example workstation name with your reserved workstation name! Now you will be able to work on your workstation with command line software and X-Windows software, just start MobaXterm on your local computer and then GUI software on BioHPC Lab machine. Once you are done, please disconnect from both the reserved workstation and cbsulogin (press "Ctrl-D" twice).

**(c) Using VNC connection (Linux remote desktop).**

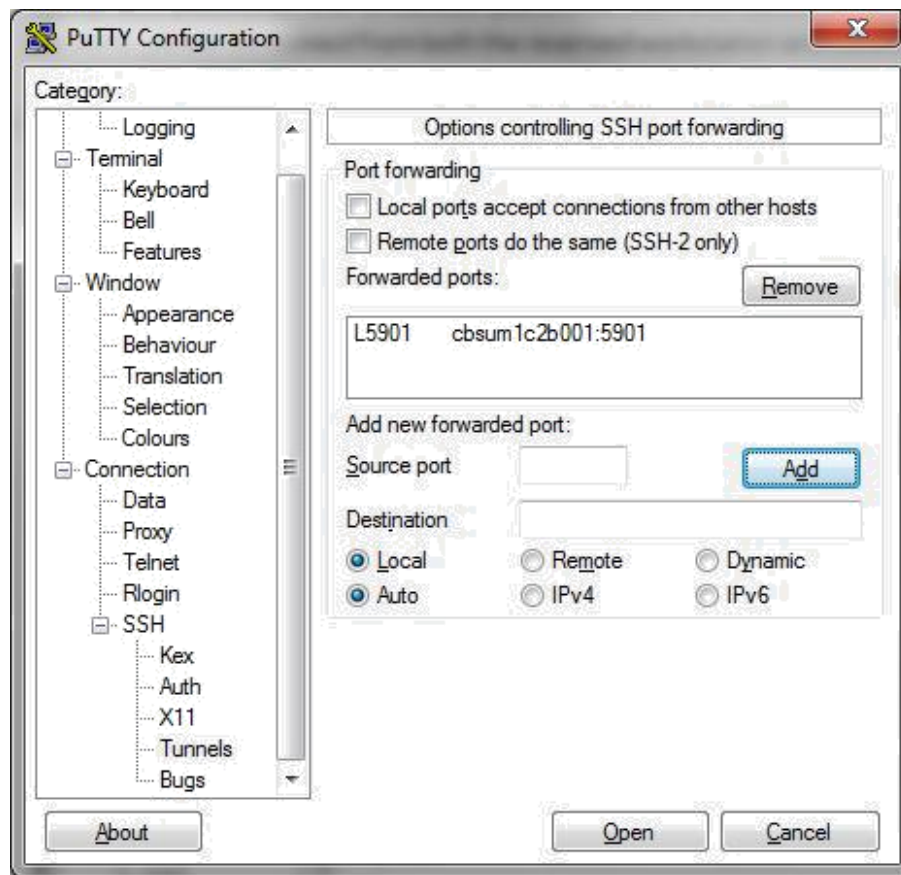
Navigate to the 'My Reservations' site (<https://biohpc.cornell.edu/lab/labresman.aspx>) on the BioHPC webpage. Start your VNC connection by clicking on "Connect\_VNC" on the 'Action' column of your reservations list. You may first want to choose a screen resolution for your VNC session, this is in a drop-down menu under your list of reservations. After clicking 'Connect VNC', a port number will be displayed in the right-most column of the Reservations table. Note the port number, you will need this in the next step.

Set up your Putty to connect to cbsulogin.biohpc.cornell.edu as above, but before connecting scroll down the left panel, expand "Connection", "SSH". Click on "Tunnels", and fill tunneling

information as below (remember to substitute workstation name, and use the port number from the webpage instad of 5901):



Click "Add" and Putty will display forwarding information as below:



Click “Open” to connect to the login node (cbsulogin.biohpc.cornell.edu). Once connected, type the command

```
ssh cbsum1c2b001
```

which will connect you to your reserved workstation (you will be asked password again). Remember to substitute example workstation name with your reserved workstation name! Now you will be able to work on your workstation with command line software and X-Windows software. Once you are done, please disconnect from both the reserved workstation and cbsulogin (press “Ctrl-D” twice).

In the RealVNC Viewer type “localhost:5901” as the address and connect. Replace 5901 with the port number displayed on the rightmost column in the “My Connections” page for your reservation.

#### (d) Using other network services restricted to Cornell campus.

There are a lot of services that are restricted to Cornell campus network for security reasons, for example R-Studio servers, custom websites run on reserved or hosted workstations. You can access them with ssh tunneling from your external computer. For example, R-Studio server on

BioHPC computers (if started) uses network port 8015. Other services use different ports – in the examples below simply substitute port 8015 with the port of your service.

Set up your Putty to connect to one of the login nodes, cbsulogin.biohpc.cornell.edu (or cbsulogin2, cbsulogin3).

Click “Open” to connect to the login node (cbsulogin.biohpc.cornell.edu). Once connected, type the command:

```
ssh cbsum1c2b001
```

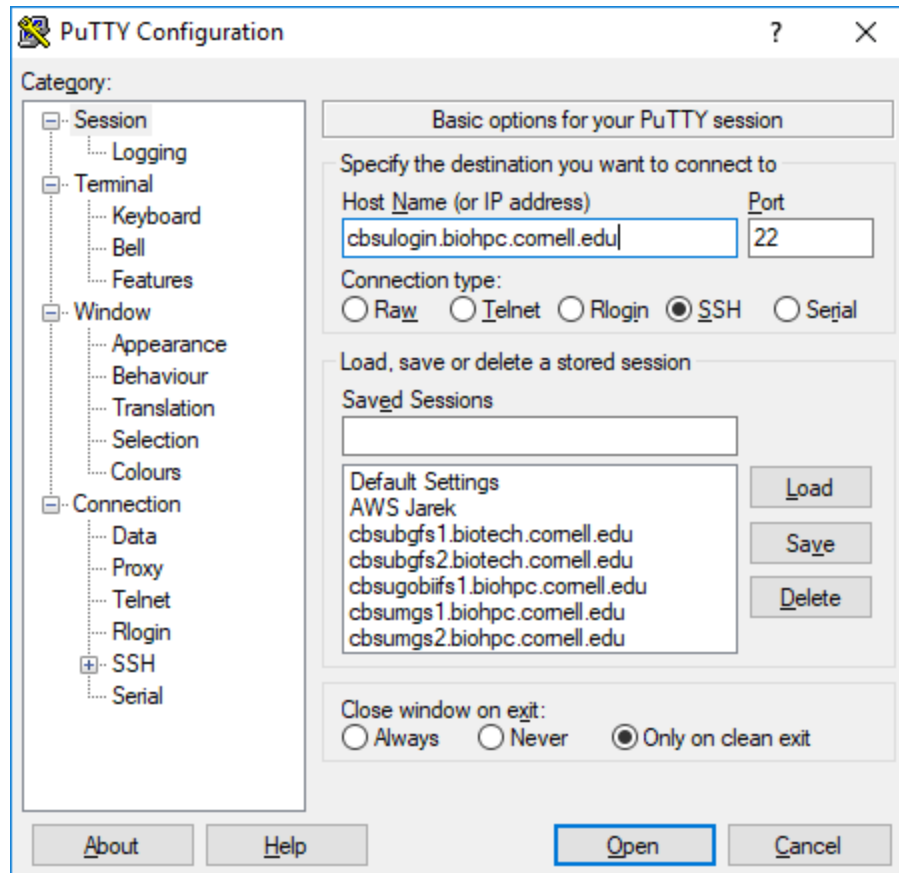
which will connect you to your reserved workstation (you will be asked password again). Remember to substitute example workstation name with your reserved workstation name! Now you will be able to work on your workstation with command line software and X-Windows software. Once you are done, please disconnect from both the reserved workstation and cbsulogin (press “Ctrl-D” twice).

In the RealVNC Viewer type “localhost:5901” as the address and connect. Replace 5901 with the port number displayed on the rightmost column in the “My Connections” page for your reservation.

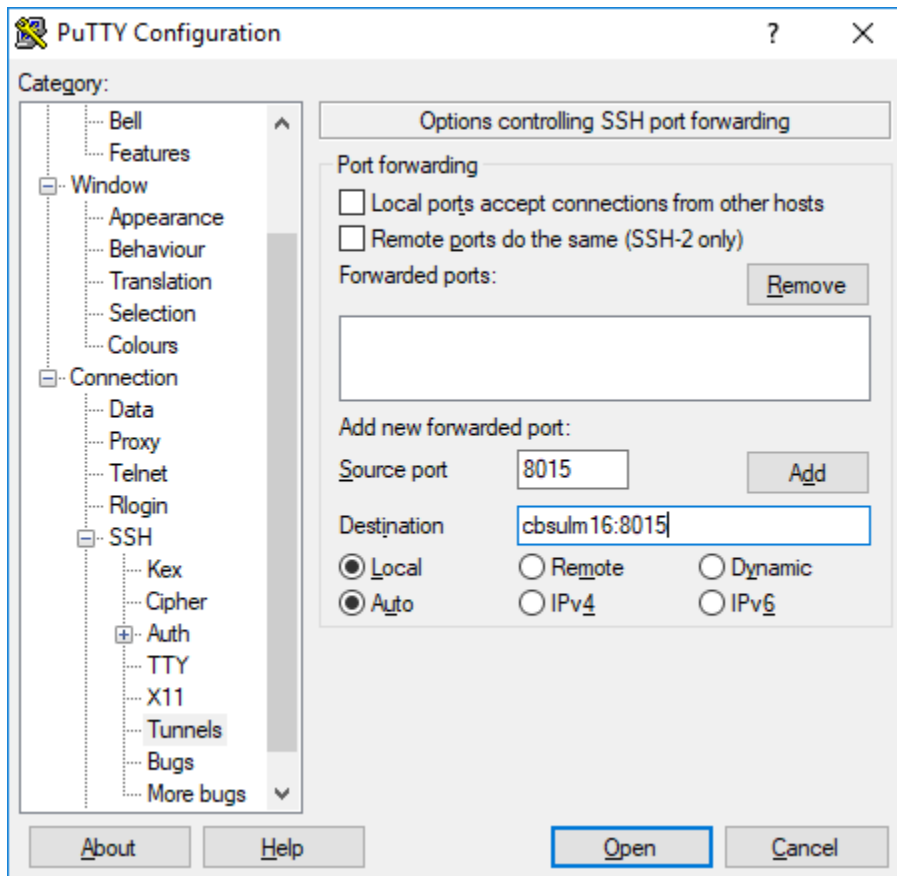
**(e) Using other network services restricted to Cornell campus.**

There are a lot of services that are restricted to Cornell campus network for security reasons, for example R-Studio servers, custom websites run on reserved or hosted workstations. You can access them with ssh tunneling from your external computer. For example, R-Studio server on BioHPC computers (if started) uses network port 8015. Other services use different ports – in the examples below simply substitute port 8015 with the port of your service.

Set up your Putty to connect to one of the login nodes, cbsulogin.biohpc.cornell.edu (or cbsulogin2, cbsulogin3).

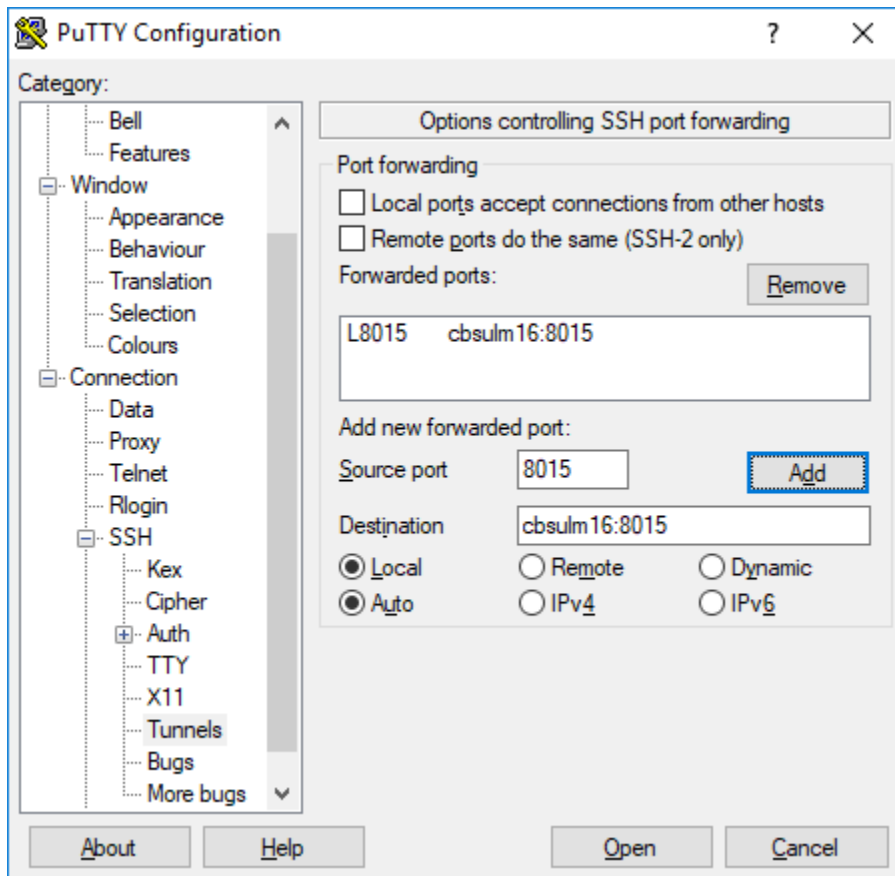


Before connecting scroll down the left panel, expand: "Connection", "SSH". Click on "Tunnels", and fill tunneling information as below (remember to substitute server name with your server!):



Click “Add”, and the information will be added to the tunneling.





Now you can click “Open” and proceed as usual with PuTTY ssh connection. Once connected you can use local port 8015 as a gateway to your R-Studio server on cbsulm16 port 8015, to use it just enter <http://localhost:8015/> in your local web browser. NOTE: local port number may be different than the remote port number, the remote port number must correspond to the network service port number, but the local one is arbitrary.

### 3. Connecting from Unix Computers (Linux, Mac).

Reserve the workstation you want to use via our web pages (<http://biohpc.cornell.edu/lab/labres.aspx>), just as any user. For this document let’s assume your workstation is cbsum1c2b001, please substitute your workstation name when setting up the connection.

#### (a) Using terminal and command line software only

Connect to cbsulogin.biohpc.cornell.edu using ssh (replace “mylabid” with your BioHPC user id):

```
ssh mylabid@cbsulogin.biohpc.cornell.edu
```

Once connected, type second ssh command:

```
ssh cbsum1c2b001
```

Remember to substitute example workstation name with your reserved workstation name!  
You are now ready to work with command line programs. Once done, please disconnect both connections.

**(b) Using command line software and X-Windows software.**

Note: if logging in from a Mac, you will need to install XQuartz on your machine (<https://www.xquartz.org/>).

Connect to cbsulogin.biohpc.cornell.edu using ssh:

```
ssh -X -t -t -t mylabid@cbsulogin.biohpc.cornell.edu "ssh mylabid@cbsum1c2b001 -X"
```

You will be asked for password twice, as well as a one-time password from your 2FA app. Remember to substitute example workstation name with your reserved workstation name and "mylabid" with your Lab ID! You are now ready to work with command line and X-Windows programs. Once done, please disconnect both connections.

**(c) Using network services restricted to Cornell campus.**

There are a lot of services that are restricted to Cornell campus network for security reasons, for example R-Studio servers, custom websites run on reserved or hosted workstations and VNC. You can access them with ssh tunneling from your external computer. For example, R-Studio server on BioHPC computers (if started) uses network port 8015. Other services use different ports – in the examples below simply substitute port 8015 with the port of your service.

To tunnel to R-Studio server running on cbsulm16.biohpc.cornell.edu on port 8015 you need to open a terminal window and type the following command

```
ssh -N -L 8015:cbsulm16:8015 biohpcid@cbsulogin.biohpc.cornell.edu
```

Of course you need to substitute cbsulm16 with your server name, biohpcid with your BioHPC user id and you may replace cbsulogin with cbsulogin2 or cbsulogin3. After connection is established you can access R-Studio server by typing url <http://localhost:8015/> in your local computer web browser. You can use different port number for local port, for example you can use 8080 if you want, and the command will be then

```
ssh -N -L 8080:cbsulm16:8015 biohpcid@cbsulogin.biohpc.cornell.edu
```

The local url will be then <http://localhost:8080/>