

X Window System

The X Window system is a principal way to get GUI access to the clusters. The **X Window System** (commonly known as **X11**, based on its current major version being 11, or shortened to simply **X**, and sometimes informally **X-Windows**) is a computer software system and network protocol that provides a basis for graphical user interfaces (GUIs) and rich input device capability for networked computers.

The X display forwarding must be activated and the X server running on client side

X display

In order to display graphical user interface GUI of various software tools, you need to enable the X display forwarding. On Linux and Mac, log in using the -X option to the ssh client:

```
local $ ssh -X username@cluster-name.it4i.cz
```

X Display Forwarding on Windows

On Windows use the PuTTY client to enable X11 forwarding. In PuTTY menu, go to Connection->SSH->X11, mark the Enable X11 forwarding checkbox before logging in. Then log in as usual.

To verify the forwarding, type

```
$ echo $DISPLAY
```

if you receive something like

```
localhost:10.0
```

then the X11 forwarding is enabled.

X Server

In order to display graphical user interface GUI of various software tools, you need running X server on your desktop computer. For Linux users, no action is required as the X server is the default GUI environment on most Linux distributions. Mac and Windows users need to install and run the X server on their workstations.

X Server on OS X

Mac OS users need to install XQuartz server.

X Server on Windows

There are variety of X servers available for Windows environment. The commercial Xwin32 is very stable and rich featured. The Cygwin environment provides fully featured open-source XWin X server. For simplicity, we recommend open-source X server by the Xming project. For stability and full features we recommend the XWin X server by Cygwin

|How to use Xwin |How to use Xming | | — | — | |Install CygwinFind and execute XWin.exeto start the X server on Windows desktop computer.If no able to forward X11 using PuTTY to CygwinX |

Use Xlaunch to configure the Xming.

Run Xmingto start the X server on Windows desktop computer. |

Read more on http://www.math.umn.edu/systems_guide/putty_xwin32.html

Running GUI Enabled Applications

Make sure that X forwarding is activated and the X server is running.

Then launch the application as usual. Use the & to run the application in background.

```
$ module load intel (idb and gvim not installed yet) $ gvim &
```

```
$ xterm
```

In this example, we activate the intel programing environment tools, then start the graphical gvim editor.

GUI Applications on Compute Nodes

Allocate the compute nodes using -X option on the qsub command

```
$ qsub -q qexp -l select=2:ncpus=24 -X -I
```

In this example, we allocate 2 nodes via qexp queue, interactively. We request X11 forwarding with the -X option. It will be possible to run the GUI enabled applications directly on the first compute node.

Better performance is obtained by logging on the allocated compute node via ssh, using the -X option.

```
$ ssh -X r24u35n680
```

In this example, we log in on the r24u35n680 compute node, with the X11 forwarding enabled.

HTML commented section #1 (no GUI on Compute nodes - Xvfb)

The Gnome GUI Environment

The Gnome 2.28 GUI environment is available on the clusters. We recommend to use separate X server window for displaying the Gnome environment.

Gnome on Linux and OS X

To run the remote Gnome session in a window on Linux/OS X computer, you need to install Xephyr. Ubuntu package is xserver-xephyr, on OS X it is part of XQuartz. First, launch Xephyr on local machine:

```
local $ Xephyr -ac -screen 1024x768 -br -reset -terminate :1 &
```

This will open a new X window with size 1024x768 at DISPLAY :1. Next, ssh to the cluster with DISPLAY environment variable set and launch gnome-session

```
local $ DISPLAY=:1.0 ssh -XC yourname@cluster-name.it4i.cz -i ~/.ssh/path_to_your_key  
... cluster-name MOTD...  
yourname@login1.cluster-namen.it4i.cz $ gnome-session &
```

On older systems where Xephyr is not available, you may also try Xnest instead of Xephyr. Another option is to launch a new X server in a separate console, via:

```
xinit /usr/bin/ssh -XT -i .ssh/path_to_your_key yourname@cluster-namen.it4i.cz  
gnome-session -- :1 vt12
```

However this method does not seem to work with recent Linux distributions and you will need to manually source /etc/profile to properly set environment variables for PBS.

Gnome on Windows

Use Xlaunch to start the Xming server or run the XWin.exe. Select the "One window" mode.

Log in to the cluster, using PuTTY. On the cluster, run the gnome-session command.

```
$ gnome-session &
```

In this way, we run remote gnome session on the cluster, displaying it in the local X server

Use System->Log Out to close the gnome-session