LPIC-1 102-400 – Lesson 3

106.1 Install and configure X11

The X Window System (X11)

- The *X Window System* (X11 or simply X) is a windowing system traditionally used on Graphical Linux Installations

- *X.Org* (Xorg) is the most popular implementation of the X11 standard. Other implementations are the *XFree86* and *Xwin* for MS Windows.

- It uses the *client-server model*. That means it has to be paired with a *Window Manager* (client). By default that Window Manager is TWM.

- Because of various design limitations it is gradually being replaced by the *Wayland* display server protocol

Installing X.Org

- Installing Xorg on Debian/Ubuntu:

  ```
  $ sudo apt install xorg # Full
  $ sudo apt install xserver-xorg-core # Server only
  ```

- Installing Xorg on RedHat/CentOS/Fedora:

  ```
  $ sudo yum groupinstall "X Window System" # replace
  yum with dnf of Fedora and recent versions of RedHat/
  CentOS
  ```

Starting X

- To start the Graphical Environment on a CLI-only Linux system, we have to run **X** or **startx**

- **X** is usually a symlink to the **Xorg** executable. We usually avoid runnin **X** directly. Running **startx** is preferable.

- **startx** is a script that prepares the environment to allow **X** to start.

- If **X** fails to start a *.xsession-errors* file will be created under your home directory.

The Xorg configuration

- Usually under */etc/X11/xorg.conf*

- You can also create your own custom configuration files under */etc/X11/xorg.conf.d* (ending in .conf)

- A new sample xorg.conf can be generated on a Gui-less terminal (ex. Ctrl-Alt-F2) with:

```
$ sudo X :1 -configure

$ sudo ls -l /root/xorg.conf.new
-rw-r--r-- 1 root root 3306 Nov  26 10:08 /root/xorg.conf.new
```

Xorg Configuration Sections

- **Section "Files"**: Files (usually fonts) to load

- **Section "Module"**: Modules to be loaded

- **Section "InputDevice"**: Input devices like keyboard/Mouse

- **Section "Device"**: Graphics card

- **Section "Monitor"**: Monitor Definition

- **Section "Screen"**: Screen definition (resolution etc)

- There are some other less definitions as well. Have a look at the *xorg.conf* file under **Lesson3**

The *$DISPLAY* environment variable

- The **$DISPLAY** environment variable sets the display used by the system. It is possible to set a different display for remote access or have two displays on a system, ex. :0.0 and :0.1

- **$ echo $DISPLAY** # show the $DISPLAY variable
  :0.0 # :0.1, :0, :1 are other possible choices
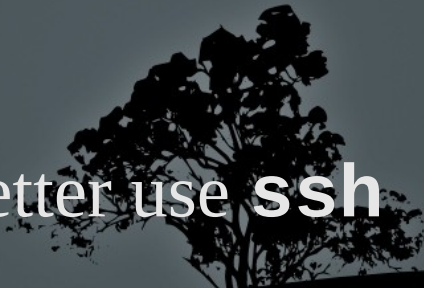
- If you want to use the display on another computer:

  $ **export DISPLAY=remote.cut.edu:0.0**

Accessing a remote X server using *xhost*

- **root@host1 # xhost +host2** # the remote host **host2** is granted the right to use the X server on **host1**

- **root@host1 # xhost +10.0.0.10** # we can also use the ip address of **host2**

- **root@host2 # export DISPLAY=host1:0.0** # we can also use the IP of **host1,** ex:
  export DISPLAY=10.0.0.11:0.0

- **root@host2 # gedit** # the **gedit** graphical application runs on **host2** but displayed on **host1**

  NOTE: This method is very insecure. Better use **ssh -X** instead

Other authentication methods

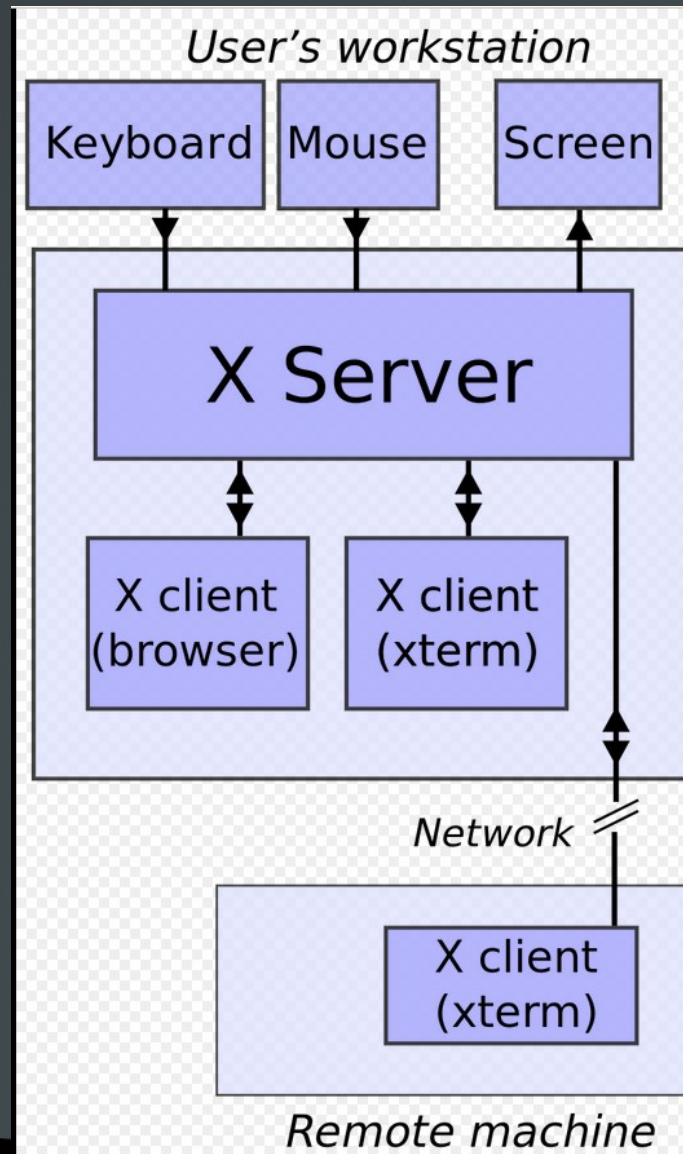- SSH X11 Tunneling: This is the most secure method as it uses the SSH protocol for tunneling:

  ```
  local~$ ssh -X user@remote.system

  remote~$ xeyes
  ```

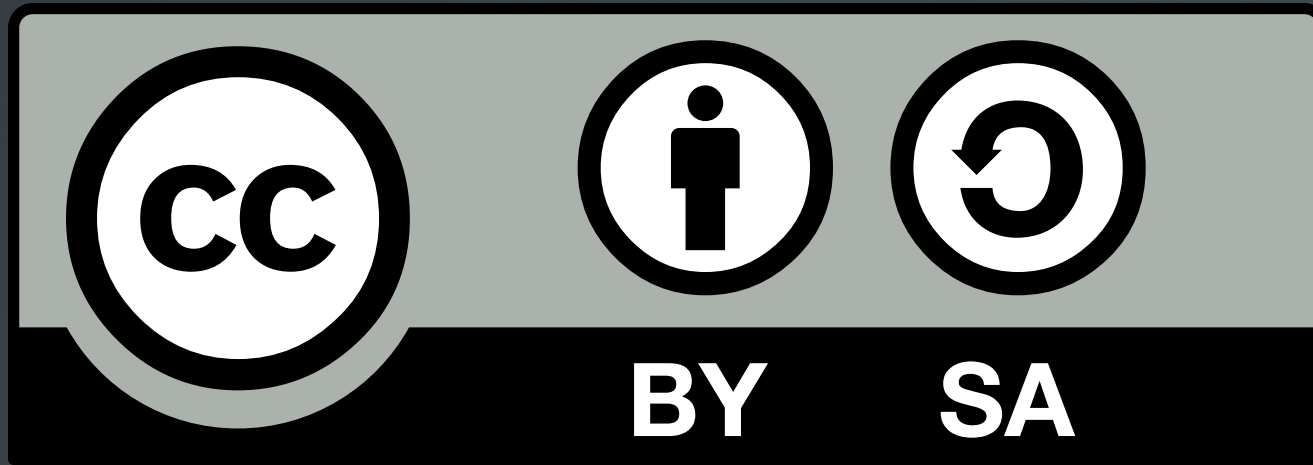 In this example xeyes runs on remote but displayed on the X11 server of local

- Xauth is another authentication mechanism for X. It uses "magic cookies" but it is not very secure, so not recommended.

Acecssing a remote X server using *xhost*

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