Parallelly Sharing a Linux Computer

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Need for remote access

• Accessing your own machine remotely
• Providing technical support
• Sharing premium computing resources for running computations or builds
• Saving costs in setting up teaching labs
The latest kernel can support over 9000 users at a time

Libraries share memory footprints

Can be used with

- Shell – install ssh server
- GUI desktop interface – explained in this guide
Security Warning

• Enabling remote access to a machine connected to the internet is a security risk
• Most of the methods described here have no encryption and weak passwords
• Either use them through SSH tunnelling or use TeamViewer
• Make sure your router is blocking external access to the ports used here
Part 1 - VNC
VNC

• Virtual Network Computing
• Client-server based
  – VNC Server – runs on the machine being controlled
  – VNC Client – controls the remote
• VNC uses Remote Frame Buffer (RFB) protocol
  – Transmits graphics drawing commands from server to client
    • Can be slow as images are transmitted
    • Speed is improved by mirror drivers which detect and transmit only the changes
VNC Desktop Sharing

- When the server has its own "real" display

- Server's display and local display will be identical, user must already be logged in

- Server side:
  - Ubuntu comes installed with "Desktop Sharing" (vino) application – not turned on by default
  - 'x11vnc' – is a universal alternative

- Client side:
  - Install 'tightvncviewer' (available for Linux/Win/Mac)
  - Multiple clients can view/control the same screen
Server:

- Ubuntu – run 'Desktop Sharing', enable Sharing/Control options, set a password, enable/disable confirmation
- Others – install 'x11vncviewer' package
  - Online guides available
  - Can be set up to autostart

Client:

- Install xtightvncviewer:
  - sudo apt-get install xtightvncviewer
- Run: vncviewer server-address
Remote server does not need a physical display connected

Launching 'vncserver' creates a new virtual desktop/display in the background

Multiple desktops can be launched in parallel
  - Keep in mind the server speed and memory

Sessions continue to run even after logout
  - Each user can log in, start their VNC session, leave
  - Can be started automatically by following these instructions:
    - http://superuser.com/questions/147109/automatically-start-vnc-server-on-startup/421039#421039
Server:

- Install tightvncserver:
  - `sudo apt-get install tightvncserver`

- Launch 'vncserver':
  - `vncserver -geometry 800x600`
  - Specifying geometry is optional, but keep it less than the size of the client's display so it fits
  - On its first run it will ask you to set your password
  - Make a note of the display number:
    - New 'X' desktop is server-name:1

- To shut down the server:
  - `vncserver -kill :1`
VNC Display Numbers

- VNC server listens on TCP port numbers 5900+
- The first session launched on the server is given display number :0, and the port is 5900
- The second session is at display :1, port 5901..
- Each user gets a unique display number
- You can only connect to a session/port if you know it's password
- You can only kill a VNC server if you launched it
On the client

- Make sure xtightvncviewer is installed
- Run: vncviewer server-address:port
  - vncviewer 192.160.10.3:1
  - Enter the password
- Windows users can use TightVNC or UltraVNC
  - Only the 'viewer' executables are needed, so admin privileges not necessary
VNC Security Concerns

- Passwords are only 8 characters long
  - Not difficult to crack
- Someone may listen in on your connection and intercept keystrokes etc
- VNC spinoffs exist that support encryption
- VNC server can be restricted to localhost and ports 5900+ can be tunnelled through SSH
- Still okay to use in a private environment
Alternatives for single user remote access

- TeamViewer
  - Free and available for Linux
  - Fully functional and fast
- Other services like LogMeIn, GoToMeeting etc. do not support Linux at this time.
Part 2 – X Server
Current Linux/Unix display are based on X
- Developed by X Consortium/MIT in 1984

X-server manages the windows on the machine

X-clients can connect to server and perform drawing operations

Connects over TCP ports 6000+

First display is :0, port 6000, second is :1, port 6001 etc.
X Protocol basics

- Client send “Requests” - draw a line, fill a window etc.
- Server sends back “Replies” or “Errors” to these requests
- Client can send keystroke or mouse “Events” to the server
- Server can send back “Events” like window resized, window exposed etc.
Typical usage scenario
Enabling X forwarding in SSH

- In the ssh client, add the -X switch
  - ssh -X user@servername

- Windows: In puTTY configuration, Connection->SSH->X11, enable X11 forwarding

- The ssh server will change the $DISPLAY variable for all programs launched through it and forward them to the ssh client

- The program still gets executed on the server, just the display commands get forwarded
Interpreting forwarded X11 commands

- The client needs to be able to interpret the X11 commands
- In Linux, your existing X-server will do this
- In Windows, you can install an X-server implementation like X-Ming
Comparing to VNC

- With X11 forwarding, you can launch one application at a time, like gedit or xterm, or you can launch the full desktop manager. With VNC you always get the full desktop.

- X11 transmits high level window elements/widgets, which VNC operates on a lower level. So X11 is more bandwidth efficient compared to VNC.

- X11 forwarded applications terminate when the SSH connection drops. You must use a 'screen' type program to keep your session.
Part 3 - XDMCP

- Display manager
  - Provides login screen
  - Upon successful login, it launches the desktop environment
  - Examples are GDM, KDM, LXDM, LightDM (Ubuntu)

- The protocol allows for it to be run with a remote X-server
Warnings

- No encryption and NO SECURITY
- No compression, needs very high bandwidth

- Thus the server function is disabled by default
  - Can be enabled by editing the desktop manager config: https://wiki.ubuntu.com/xdmcp
  - Not recommended, use X11 forwarding over ssh instead