TNE30019/TNE80014 – Unix for Telecommunications

Presenting a User Interface to the World

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Outline

- Console and multiple consoles/terminals
- Virtual Terminals
- GUI on Unix

Multiple Terminals

- Console is default terminal
- OS will echo any system messages to console
- Even on servers, people realised advantages of multiple terminals
- Unix systems run multiple virtual terminals (BSD: 8, Linux: 6)

Applications running on virtual terminal

- Take input from `stdin` on virtual terminal
- Output `stdout` to virtual terminal device

Virtual Terminals

- On BSD `/dev/ttyv0` through `/dev/ttyv7` (Linux `/dev/tty0` through `/dev/tty5`)
- On BSD switch between terminals using Alt-F1 to Alt-F8 (Linux Alt-F1 through Alt-F6)
- Use Ctrl-Alt-F? when switching from GUI

Switching virtual terminals will

- Connect keyboard to `stdin` on currently selected terminal
- Connect monitor/display to `stdout` on currently selected virtual terminal
- Input to other virtual terminals will block until they are enabled and user enters input
- Output to other virtual terminals will be buffered until they are enabled and then displayed to user

Virtual Terminals

- Virtual terminals are not restricted to keyboard and monitor connected to computer
- Other terminals: **telnet** or **ssh**

telnet/ssh network daemon will

- Accept connection
- Create virtual terminal tied to network connection
- Input from remote computer will be redirected to `stdin`
- `stdout` will be redirected to remote computer
- login process will be started on new virtual terminal
- login process will(may) start shell on virtual terminal
- User types and sees on their local computer but commands are executed on remote computer

Virtual Terminals

- Similar process with terminal window under Unix GUI
- Virtual terminal is created running instance of shell
- No `login` process – user is already logged on
- When terminal program (**xterm**) is active input is redirected from keyboard to virtual terminal
- Output from virtual terminal is buffered and displayed by X-Windows Manager

Virtual Terminals are an abstraction of a generic console

X-Windows – Server

- **X Window System** is Unix's GUI
- Based on generic modular approach of Unix applications

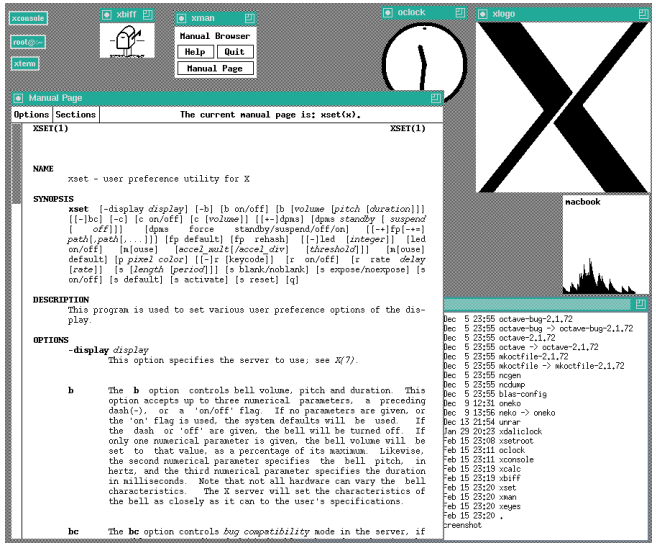
X Server responsible for

- Managing display of information
- Managing input from input devices to multiple windows
- NOT
  - Look and feel
  - Audio

X Display Manager dictates the look

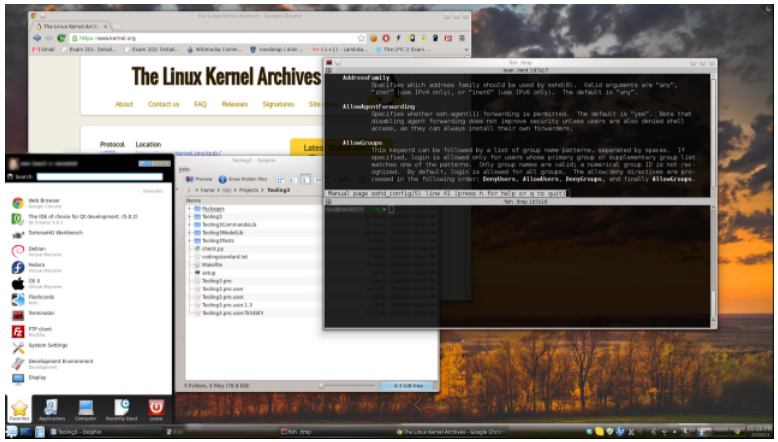
- Many different display managers
  - KDE
  - Gnome
  - Enlightenment
  - ...

X-Windows – Historic Window Manager twm



http://en.wikipedia.org/w/index.php?title=X_Window_System&oldid=617939694

X-Windows – Modern Window Manager KDE



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X-Windows – Server Configuration

- X.Org project provides open source X Window System

/etc/X11/xorg.conf

- Defines hardware configuration of machine
- Specifies graphics card
- Keyboard and mouse type
- Specifies available display resolutions
- Creates "screen" for X to use

- Recent versions of Xorg are *configuration free*

X-Windows – Client/Server Model

X-Windows designed as networkable GUI from start

- More flexible and generic
- Run graphical applications on multiple different machines and have all display on one screen
- Traditionally allows applications on central server – users access server to run applications
- CPU intensive applications could be run on more powerful workstations

- In general users use **client** to connect to remote **server**
- Need to **invert** this paradigm for X-Windows

X-Windows – Client/Server Model

Server

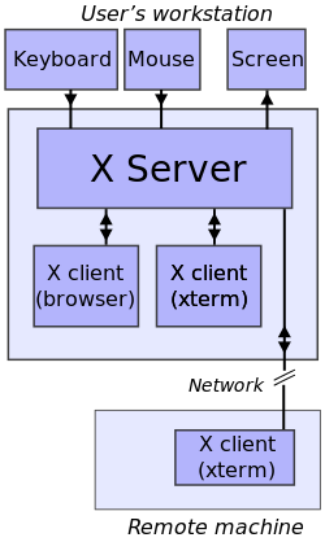
- Manages display
- Since display is where user is – server runs on local computer

Client

- Application run by user
- Talks to server to receive input and display output
- Runs on remote computer

- Desktop use – both server and client run on local machine and talk to each other using **localhost**

X-Windows – Client/Server Model



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