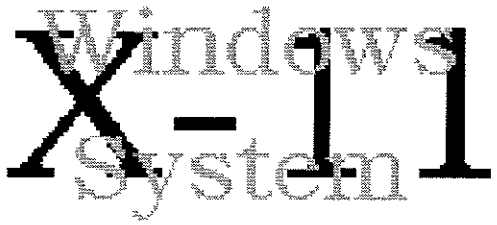
www.cs.uidaho.edu/mis/trainins/x11



What is X Windows ?

History of X Windows

X Window System Concepts

The X Protocol & Xlib

What is X11

X is a distributed, intelligent, device independent, operating system independent, windowing system.

It's Parts are: X-Protocol, X-Server, X-Clients, and the Xlib routines.

The X Window System permits a user sitting at one machine to run programs on a remote machine but still interact with the program locally. X is in effect one way for different systems to interface with each other. It will let a program run on one computer and yet display its output on another computer, even when the other computer is of a different *species*. The program will display its output on the local machine, accept keyboard and mouse input from the local machine, but will execute on the CPU of the remote machine.

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History of X11

Developed by MIT's "Project Athena Group & Digital Equipment Crop.

- 1986 - Version 10.4
- 1987 - Version 11.1
- 1988 - Version 11.2 (Control pass from MIT to the X-Consortium)
- 1989 - Version 11.3
- 1990 - Version 11.4
- 1991 - Version 11.5
- 1994 - Version 11.6

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X Window System Concepts

Display

A workstation with a key-board, pointing device, & bitmap display

X-Server

The X Display Server offers graphic display services to X-Clients that send X-Protocol request to it.

1. Controlling Program that talks to hardware (graphic, keyboard & mouse)
2. Allows access to the display by multiple clients.
3. Does two-dimensional drawing, freeing up the client from processor intensive graphics.
4. Keeps track of resources (such as windows, cursors, fonts and graphics contexts) that are shared between clients.
5. Allows distributed processing via the X-protocol.

X-Client

1. Application Programs that make request to X-Servers
2. These could be running n the same workstation or at another location.
3. Gives way to Distributed Computing.

X Window Manager

1. Controls screen layout and appearance.
2. Allows users to move, resize, and start clients.

- twm - part of the X11 package
- olwm - "Open Look" from Sun and AT&T
- mwm - "Motif" from the Open Software Foundation

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X-11 Protocol

In the X protocol, data is exchanged in an asynchronous manner over a two-way communication path that allows transmission of a stream of eight-bit bytes. Clients communicate with the server (be it local or not) via X-lib calls. There are 4 types of packets:

1. requests
2. replies
3. events
4. errors

X-lib

A sec of "C" language routines that are translated to protocol requests and sent via TCP/IP to the server.

The Display environment variable (my-host:0:n)

1. **Hostname** - 'the network name of the machine which is running the desired X server, eg lust. For TCP/IP networks you can also use the Internet address, eg. 134.7.1.5'
2. **Special character** - 'a separator character, usually a colon, which indicate what kind of network connection to use. One colon indicates **ethernet**, while two colons indicate **DECnet.**'
3. **X server #** - 'the number of the X server on the display node. In theory you could have many X servers running. In practise, I have not seen this situation. Usually you wish to connect to the first server which is number 0, eg. lust:0'
4. **Screen number** - if the server is controlling more than one screen you will need to specify which screen you wish to display on. If there is only one screen you do not need to specify this number.

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