X Window System: A Description

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BACKGROUND

The X Window System (or X) evolved out of a project (Athena) at the Massachusetts Institute of Technology (MIT). The goal of this project was to use the networked graphic workstation as a teaching aid. With the support of some corporate sponsors, notably Digital Equipment Corporation (DEC), the X has become the de-facto graphics and windowing standard.

X is being developed by a consortium of industry and academic members under the auspicies of MIT. Apple is a member of the X Consortium.

X's principal benefit is that it allows workstation interoperability between different vendors, regardless of hardware platform and operating system.

X WINDOW SYSTEM ARCHITECTURE

The X Window System is based on the server-client model. The server is a shared display. This display comprises a keyboard, pointing device like a mouse, and multiple screens (monitors). The display server can support simultaneously multiple number of clients from different hosts.

Unlike other server-client models like AppleShare, the location of the server is reversed (from the user's perspective). In AppleShare, the server is accessed by the user's workstation over the network. In X, the user works at the server (where the information is being shown on the shared display).

Also, the server only provides the mechanism for information to be draw in window. "Policy" is how a user interacts with the windows like moving, resizing, and iconifying them. The policy ("look and feel") is handled by a client application called the X window manager. This separation of the policy functionality lets X avoid standardizing on any particular user interface.

X clients are applications. X clients are designed, so they can run locally with the server (if the computer supports preemptive multitasking) or remotely over a network.

These clients are designed in a layered fashion. Clients access an X toolkit. The toolkit is a collection of graphical procedures which generate object like scroll bars and buttons. There are a variety of toolkits available. In turn, the procedures in the X toolkit call a standard set of primitive graphics functions stored in a library called Xlib. These Xlib functions provide operations such as drawing a rectangle or filling a box. Xlib functions generate X protocol streams.

X protocol is a low-level protocol used to connect servers and clients together. This protocol which makes it possible for different vendors to communicate with a standard language. X protocol also permits network transparency. Like the AppleTalk protocols stack, by changing the transport layers, X can be run over a variety of physical networking standards.

Portability was a major design criteria for X. X Window System was originally developed in the UNIX and C environment. With it's layered design, it was very easy to transport X to other systems. With Xlib now available in FORTRAN, MODULA-2, PASCAL and Ada, many other environments develop X applications.

REFERENCE

There is a growing number of books on the X Window System. In addition, documentation can be obtained directly from the X Consortium at the MIT Software Center. Search the Tech Info Library under "MIT Software Center" for more information:

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