

X Window System

Outline

❑ X Window System

- Introduction
- Architecture
- X11 Implementation
- The Window Manager

❑ Steps of exercise

- Install and Configuring X11
- Install Window Manager

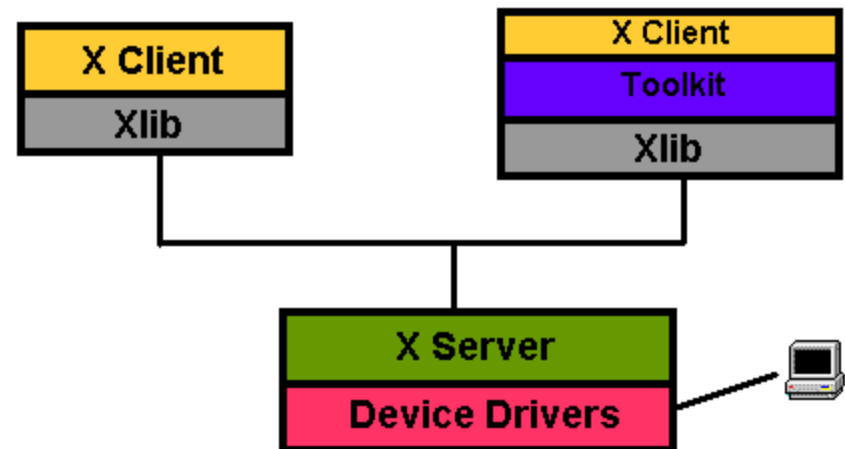
X Window System (1)

- Introduction
 - X can be called "X"、"X11"、"X Window", using to provides a graphical user interface (GUI).
 - X was designed from the beginning to be network-centric, and adopts a "client-server" model.
- History
 - 1984: The X Window system was developed as part of Project Athena at MIT.
 - 1987: X Version 11 is released. X is now controlled and maintained by the Open Group.
 - 2005/12: X11R7
 - 2009/10: X11R7.5
 - 2010/11: X11R7.6
 - 2012/6: X11R7.7
 - 2013/??: X11R7.8

X Window System (2)

□ Architecture:

- A client-server architecture
 - The X client request display service
 - The X server provide display service
 - Communicate with X Protocol



X Window System (3)

- Client-Server Design
 - Client
 - An application written using X libraries (e.g. Xlib)
 - Request service (like create window)
 - Receive events from X server (like mouse input)
 - Server
 - Runs locally and accepts multiple X clients
 - Manage the keyboard, mouse and display device
 - Create, draw and destroy graphic objects on screen

X Window System (4)

❑ X Protocol

- The X Protocol is also divided into device dependent and device independent layers.
- Advantages of X protocol
 - The X server is highly portable (various OS, Language)
 - The X Clients also have high portability
 - Local and network based computing look and feel the same

X11 Implementation

❑ Open-source implementations of X Window System



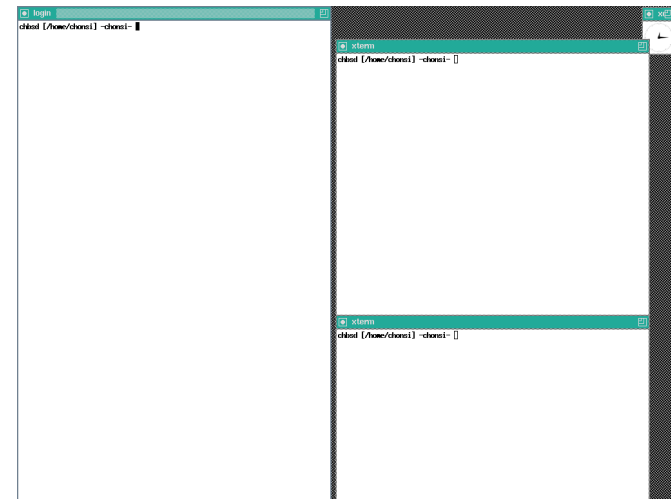
- XFree86 project
 - Latest Version: 4.8.0 Dec. 15, 2008



- Xorg foundation
 - X11 official flavor
 - Latest Version: 7.7 June 6, 2012

The Window Manager (1)

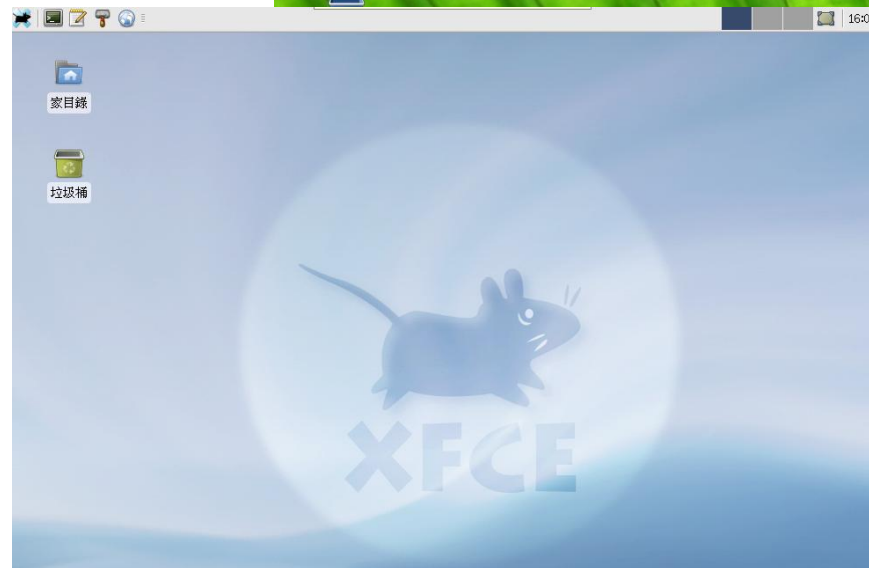
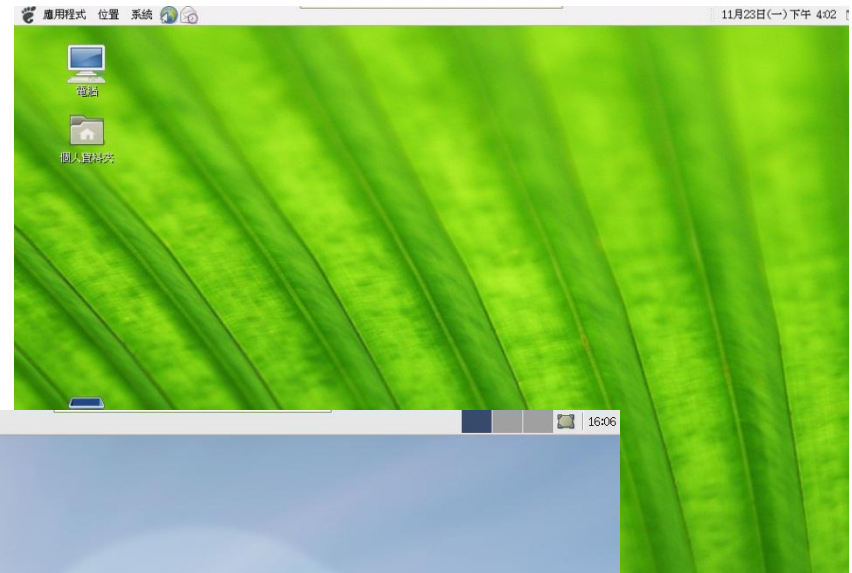
- Window Manager
 - A special kind of "X Client" provides certain look-and-feel window in front of you.
 - Background, desktop, theme
 - Virtual desktop
 - Window attributes and operations size:
 - resize, minimize, maximize
 - position: overlap, move
 - Interactions between X server and X client will be redirected to a window manager.



The Window Manager (2)

❑ Some Popular Window Managers

- Gnome
- KDE
- Lxde
- Xfce
- Afterstep
- etc..



Steps of exercise

- Install X11
- Configuring X11
- Install Window Manager
- Configuring Window Manager

Install X11

❑ We use Xorg as our X Server

- To build and install Xorg from the ports
 - Login as root
 - `/usr/ports/x11/xorg`
 - `# portmaster x11/xorg (7.7)`
- To build Xorg in its entirety, be sure to have at least 4 GB of free space available.

Configuring X11 (1)

- Pre-step – know your hardware
 - Monitor specifications
 - Horizon Synchronization frequency
 - Ex: 31 ~ 81 KHz
 - Vertical Synchronization frequency
 - Ex: 56 ~ 76 KHz
 - Video adaptor chipset
 - Ex: ATI Radeon 4670EAH
 - Ex: nVIDIA GeForce 9800GT
 - Ex: ATI Mobility RADEON 7500 (16M) (IBMT30)
 - Video Adapter Memory
 - Ex:128MB

Configuring X11 (2)

- ❑ Starting with version 7.4, Xorg can use HAL (Hardware Abstraction Layer) to autodetect keyboards and mice.
 - Install the following ports
 - sysutils/hal
 - devel/dbus
 - And adding the following lines into `/etc/rc.conf`
 - `hald_enable="YES"`
 - `dbus_enable="YES"`

Configuring X11 (3)

- Steps of X11 configuration
 - As of version 7.3, Xorg often work without any configuration file.
 - # startx
 - X11 configuration
 - Generate an X11 configuration skeleton file
 - # Xorg -configure
 - The file will be put in /root/xorg.conf.new
 - Test the existing configuration
 - # Xorg -config /root/xorg.conf.new
 - If a black and grey grid and an X mouse cursor appear, the configuration was successful



Configuring X11 (4)

❑ Tune Configuration file (optional)

- Edit /root/xorg.conf.new
 - Section Monitor
 - Section Screen
 - Section InputDevice

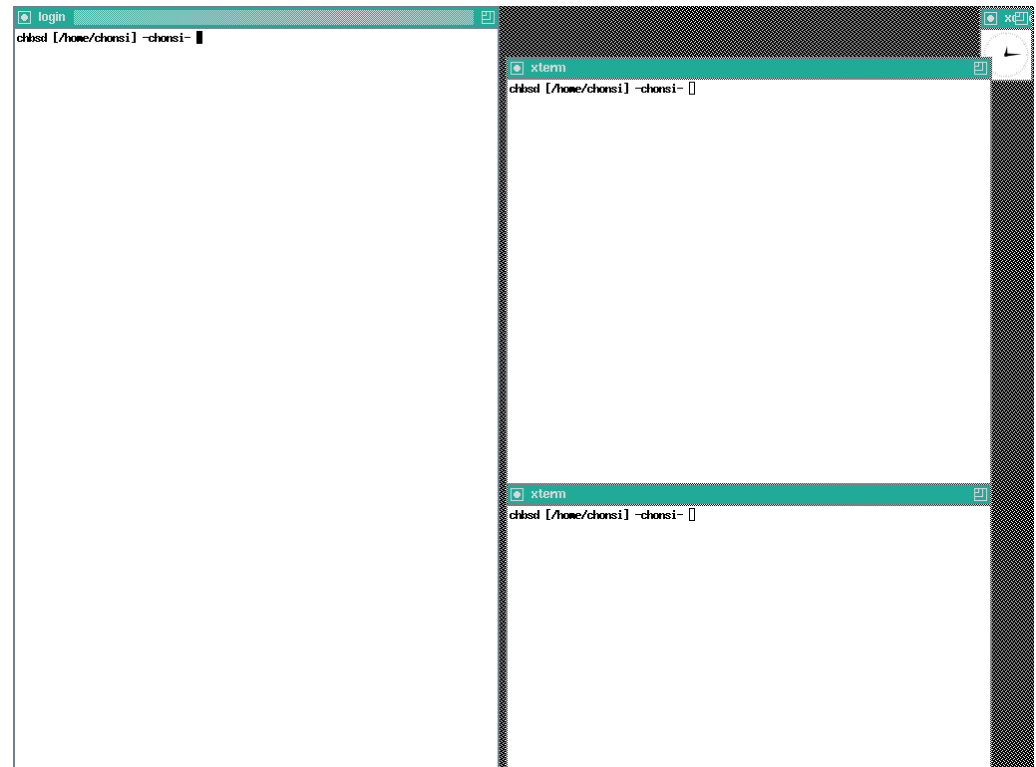
```
Section "Screen"  
  Identifier "Screen0"  
  Device "Card0"  
  Monitor "Monitor0"  
  DefaultDepth 24  
  SubSection "Display"  
    Viewport 0 0  
    Depth 24  
    Modes "1280x1024" "1024x768"  
  EndSubSection  
EndSection
```

```
Section "InputDevice"  
  Identifier "Mouse0"  
  Driver "mouse"  
  Option "Protocol" "auto"  
  Option "Device" "/dev/sysmouse"  
  Option "ZAxisMapping" "4 5"  
EndSection
```

```
Section "Monitor"  
  Identifier "Monitor0"  
  VendorName "Monitor Vendor"  
  ModelName "Monitor Model"  
  HorizSync 31.0 - 81.0  
  VertRefresh 56.0 - 76.0  
EndSection
```

Configuring X11 (5)

- ❑ Copy the configuration file to real place
 - % `cp /root/xorg.conf.new /etc/X11/xorg.conf`
- ❑ Start X
 - % `startx`



Install Window Manager (1)

❑ Here we use xfce4 as our WM

- <http://www.xfce.org>

❑ Installation

- x11-wm/xfce4
- # portmaster x11-wm/xfce4

Install Window Manager (2)

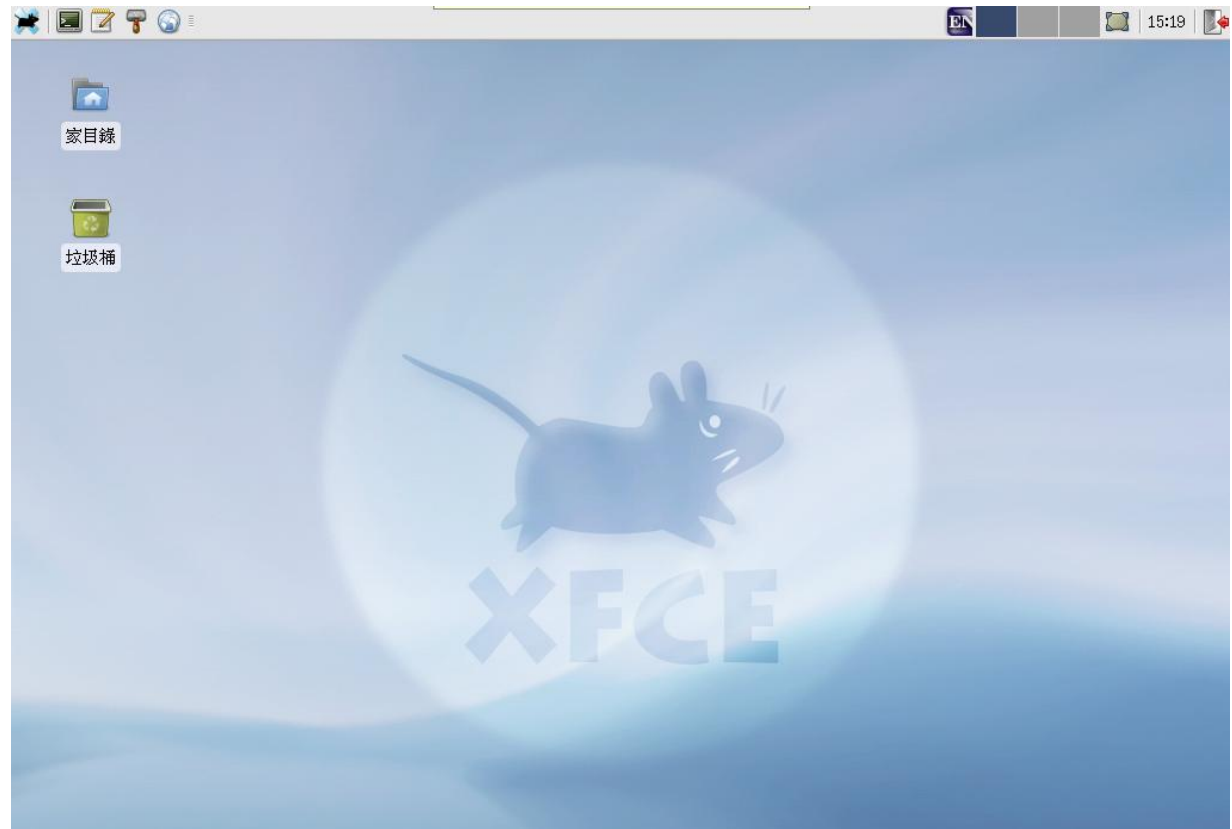
❑ Configuring X11 to use Xfce4

- Edit "xinitrc"
 - File Location:
 - System Default: `/usr/local/lib/X11/xinit/xinitrc`
 - Personal: `~/.xinitrc`
 - Format: just like a shell script!
 - `exec /usr/local/bin/xfce4-session`
 - `echo "/usr/local/bin/startxfce4" > ~/.xinitrc`

Install Window Manager (3)

Run your X Window

- % startx



Appendix A: X Startup (1)

❑ xinit - X Window System initializer

- `xinit [[client] options] [-- [server] [display] options]`

➤ Files

- Default client script:

- » `~/.xinitrc`

- » `/usr/local/lib/X11/xinit/xinitrc`

(run `xterm` if `.xinitrc` does not exist)

- Default server script:

- » `~/ .xserverrc`

- » `/usr/local/lib/X11/xinit/xserverrc`

(run `X` if `.xserverrc` does not exist)

❑ startx:

- script to initiate an X session

Appendix A: X Startup (2)

❑ Xdm - X Display Manager

- Xdm provides services similar to those provided by init, getty and login on character terminals
 - x11/xdm
 - Other display manager
 - gdm, kdm
- Files:
 - /etc/ttys

```
ttyv8 "/usr/local/bin/xdm -nodaemon" xterm on secure
```

- Default script
 - ~/.xsession

Appendix B: Remote X client

- ❑ To launch an X client from a remote host for display on the local X server, you need to do following steps:
 - Start X Server with tcp connection support
 - % X
 - Permit for the remote host to display X clients on the local machine.
 - % xhost +remotehost
 - Set DISPLAY for remote X clients
 - % setenv DISPLAY server:display

Appendix C: X11 forwarding

❑ To forward X11 connection

- Connection to X11 DISPLAY can be forward by ssh, any X11 programs started will go through the encrypted channel.
- Server:
 - Enables X11 forwarding: `ssh -X`
 - Enables trusted X11 forwarding: `ssh -Y` (may be dangerous)
- Client:
 - Execute any X clients you want
- ※Note:
 - X11 forwarding can represent a security hazard.

Appendix D: VNC

- ❑ VNC is a graphical desktop sharing system to remotely control another computer.
 - Start VNC Server (and input a connection password)
 - % vncserver
 - VNC startup script
 - ~/.vnc/xstartup (just like ~/.xinitrc)
 - Than you can connect to vnc server by a vnc client
 - Common VNC Client
 - RealVNC
 - UltraVNC

Reference

- ❑ <http://www.x.org/wiki/>
- ❑ http://en.wikipedia.org/wiki/X_Window_System
- ❑ <http://www.xfce.org>
- ❑ <http://www.freebsd.org/doc/handbook/x11.html>
- ❑ http://www.freebsd.org/doc/zh_TW/books/handbook/x11.html
- ❑ http://linux.vbird.org/linux_basic/0590xwindow.php