

Exercise 3 – Build X window

Announced Date: 2005/10/27

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- The Window Manager

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- Remote X client
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X Window System (1)

> Introduction

- What is X Window System?
 - The X Windows System, also referred to as ‘X’ or “X11”, is the standard graphical engine for Unix and Linux.
 - It is largely OS and hardware independent, it is network-transparent, and it supports many different desktops.
- 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.
 - 1993: X11R6

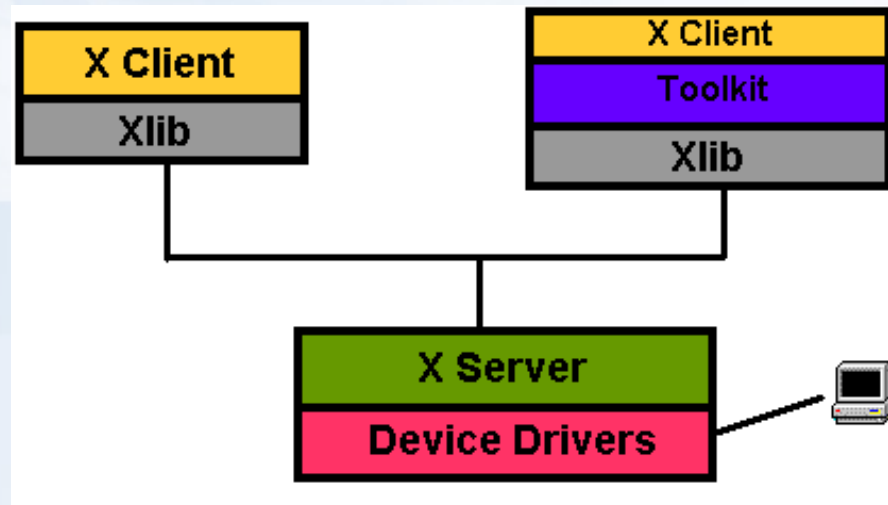
X Window System (2)

- Naming
 - **X Window System**
 - **X Version 11**
 - **X Window System, Version 11**
 - **X11**
- Version
 - **X11R6**
 - > X Window System Version 11 Release 6
- Latest version
 - **From X.Org**
 - > X11R6.8.2 Feb.9 2005

X Window System (3)

> Architecture:

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



X Window System (4)

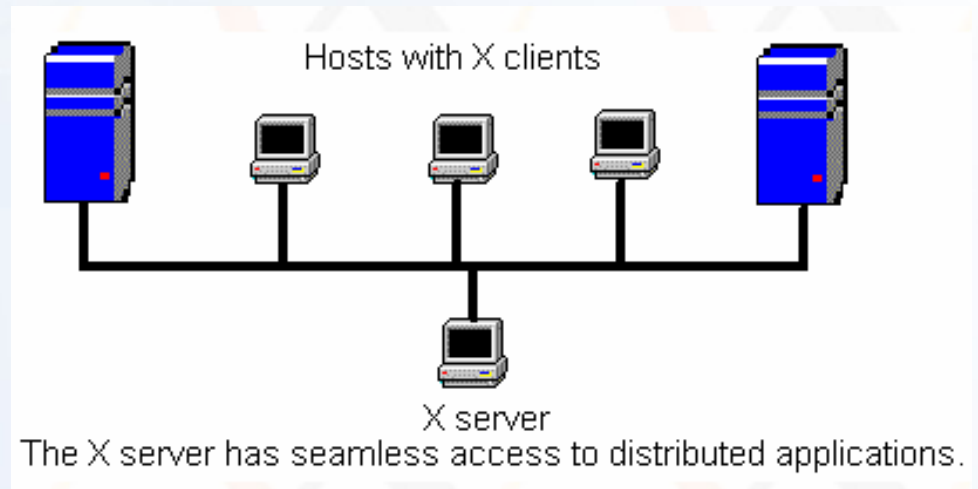
— Client-Server Design

- Client

- > An application written using X libraries (e.g. Xlib)
- > Request service (like create window)
- > Receive events from X server (like mouse input)

- Server

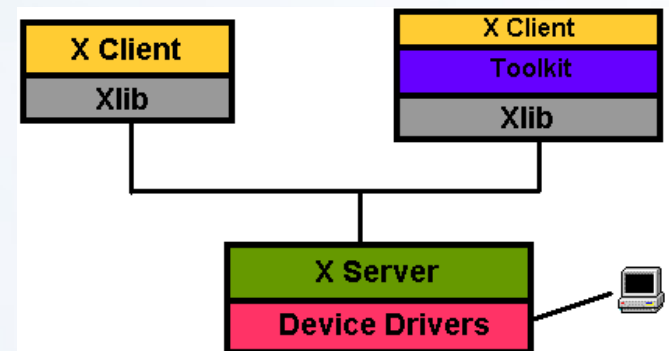
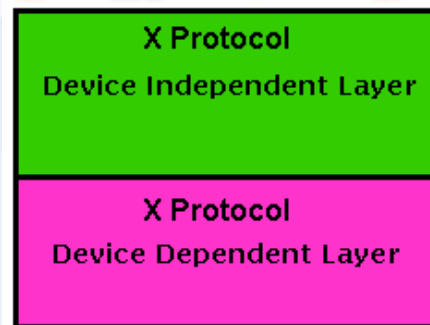
- > Runs locally and accepts multiple X clients
- > Manage the keyboard, mouse and display device
- > Create, draw and destroy graphic objects on screen



X Window System (5)

— 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**
 - > **X support most oriented network protocol**
 - > **Local and network based computing look and feel the same**



X11 implementation

> Open-source implementations of X Window System

- XFree86 project
 - **FreeBSD 4.10-Release, 5.2.1-Release**
 - **Latest Version: 4.5.0 Mar. 16, 2005**

- Xorg foundation
 - **FreeBSD 5.3-Release**
 - **X11 official flavor**
 - **Latest Version: 6.8.2 Feb. 9, 2005**



The Window Manager (1)

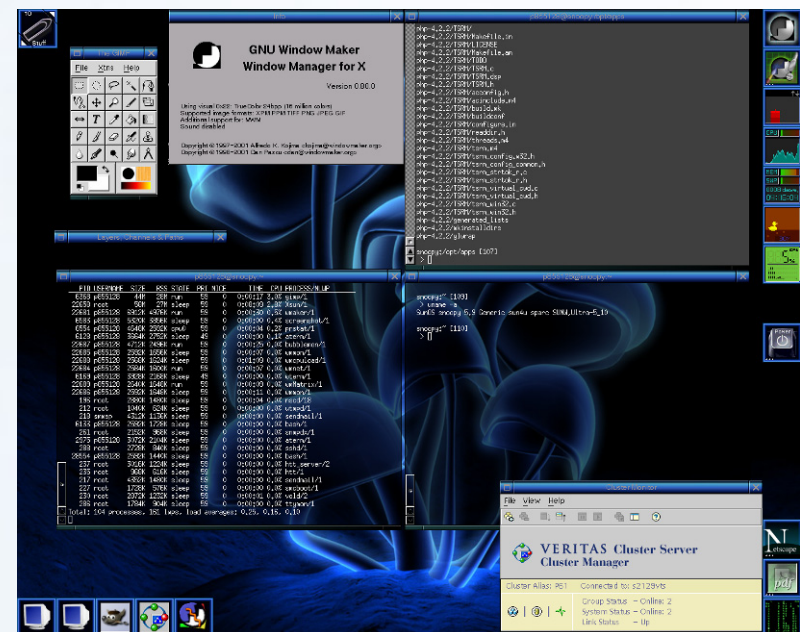
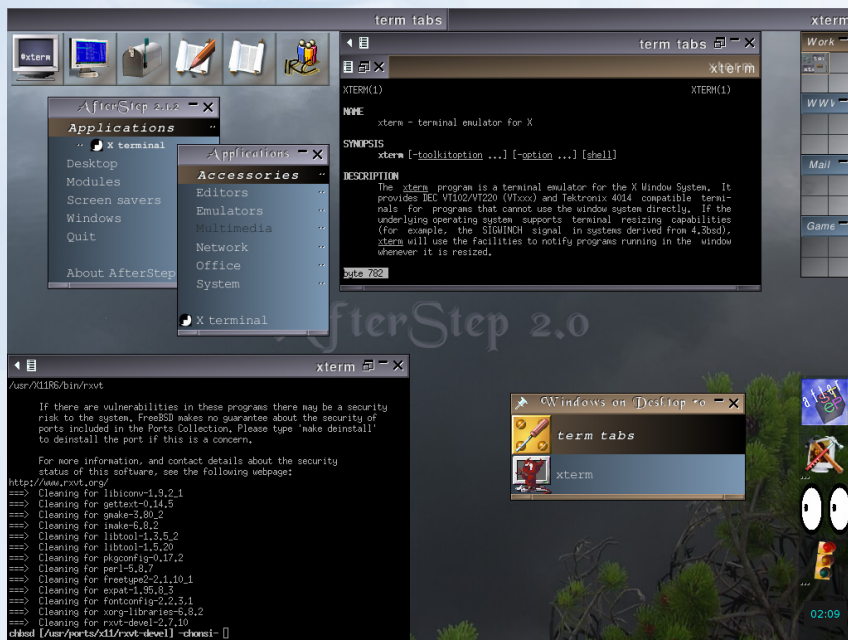
> Window Manager

- 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

The Window Manager (2)

> Examples:

- AfterStep
- Enlightenment
- Window Maker
- Gnome
- KDE
- ...



Steps of this exercise

1. Install X11
2. Configuring X11
3. Install Afterstep
4. Configuring Afterstep

Installing X11 (1)

> Use cvsup to update your ports

- `/usr/local/bin/cvsup -g -L 1 /usr/local/etc/cvsup-ports`

> Pre-steps:

- We use **Xorg** as our X Server
- Add the following line in `/etc/make.conf`
 - > `X_WINDOW_SYSTEM=xorg`
- Do this line
 - > `pkg_delete -f /var/db/pkg/imake-4* /var/db/pkg/XFree86-*`
- Your “PATH” environment variable
 - > Edit `/etc/csh.cshrc`
 - > `set path = (/bin /sbin /usr/bin /usr/sbin /usr/local/bin /usr/X11R6/bin )`

Installing X11 (2)

- > We use Xorg as our X Server
 - To build and install Xorg from the ports
 - **% login as root**
 - **% cd /usr/ports/x11/xorg**
 - **% make install clean**
- > If you want to install XFree86
 - **% login as root**
 - **% cd /usr/ports/x11/XFree86-4**
 - **% make install clean**

It will run about 50 minutes

P4 1.8G 1GB Ram 100MB NIC

Install Xorg needs **4G free space**

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 9200SE
 - > Ex: nVIDIA GeForce FX5200
 - > **Ex: ATI Mobility RADEON 7500 (16M) (IBMT30)**
- Video Adapter Memory
 - > Ex: 128MB

Configuring X11 (2)

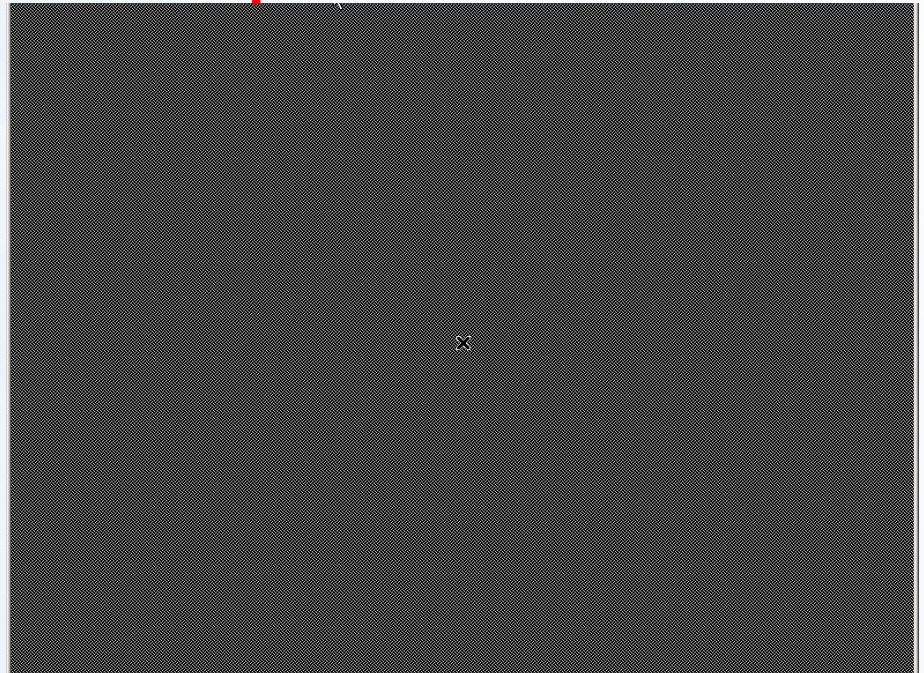
> Steps of X11 configuration

1. Generate an X11 configuration skeleton file
 - **% Xorg –configure (Xorg)**
 - > The file will be put in /root/xorg.conf.new
 - **% XFree86 –configure (XFree86)**
 - > The file will be put in /root/XF86Config.new

Configuring X11 (3)

2. Test the existing configuration

- % Xorg -config /root/xorg.conf.new (Xorg)
- % XFree86 -xf86config /root/XF86Config.new (XFree86)
 - **If a black and grey grid and an X mouse cursor appear, the configuration was successful**
 - **Press “Ctrl+Alt+Backspace” to leave the test**



Configuring X11 (4)

3. Tune Configuration file

- **Edit /root/xorg.conf.new** (Xorg)
- **Edit /root/XF86Config.new** (XFree86)
 - > 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)

4. Copy configuration file to real place
 - **% cp /root/xorg.conf.new /etc/X11/xorg.conf (Xorg)**
 - **% cp /root/XF86Config.new /etc/X11/XF86Config (XFree86)**

5. Startup X window

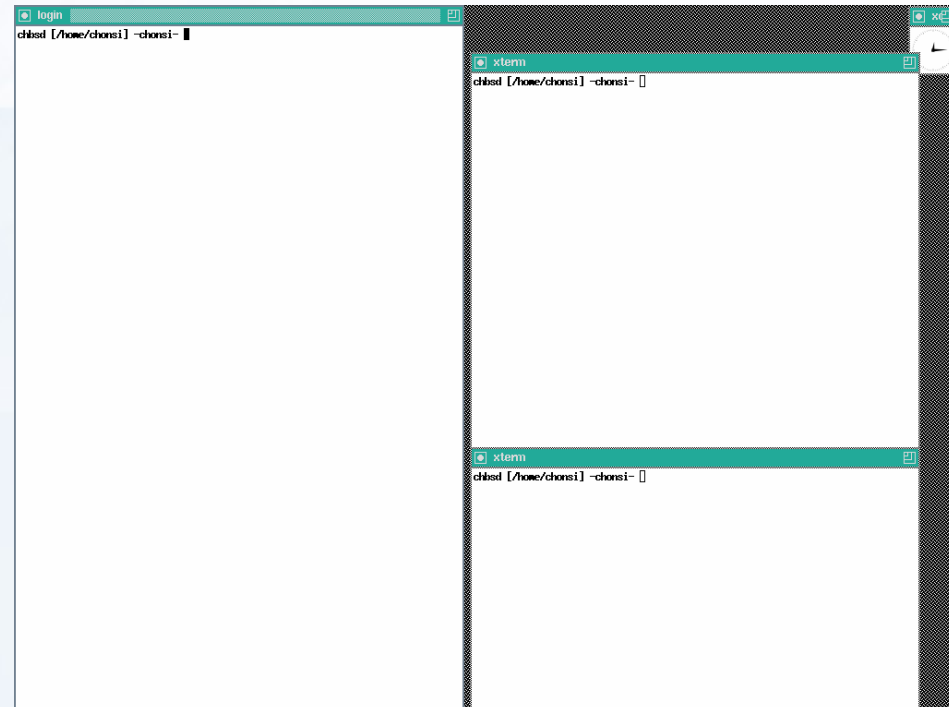
- **% startx**

[Comment]

- **Switch to Virtual Console**
 - > Press "**Ctrl+Alt+F1~F8**"
- **View xinitrc**
 - > /usr/X11R6/lib/X11/xinit/xinitrc

```
# start some nice programs
```

```
twm &  
xclock -geometry 50x50-1+1 &  
xterm -geometry 80x50+494+51 &  
xterm -geometry 80x20+494-0 &  
exec xterm -geometry 80x66+0+0 -name login
```



Install Afterstep (1)

> Here we use afterstep as our WM

– <http://www.afterstep.org/>

> Installation

– % cd /usr/ports/x11-wm/afterstep-stable

– % make -DWITH_DIFFERENT_LOOKNFEELS
–DWITH_SAVEWINDOWS install clean

Install Afterstep (2)

> Configuring X11 to use afterstep

— Edit “xinitrc”

- **File Location:**

- > System Default: /usr/X11R6/lib/X11/xinit/xinitrc

- > Personal: ~/xinitrc

- **Format: just like a shell script!**

System Default

```
# start some nice programs

twm &
xclock -geometry 50x50-1+1 &
xterm -geometry 80x50+494+51 &
xterm -geometry 80x20+494-0 &
exec xterm -geometry 80x66+0+0 -name login
```

To execute afterstep

```
# start some nice programs
exec afterstep
```

Install Afterstep (3)

> Run Your X-Window

- % startx

> Usage

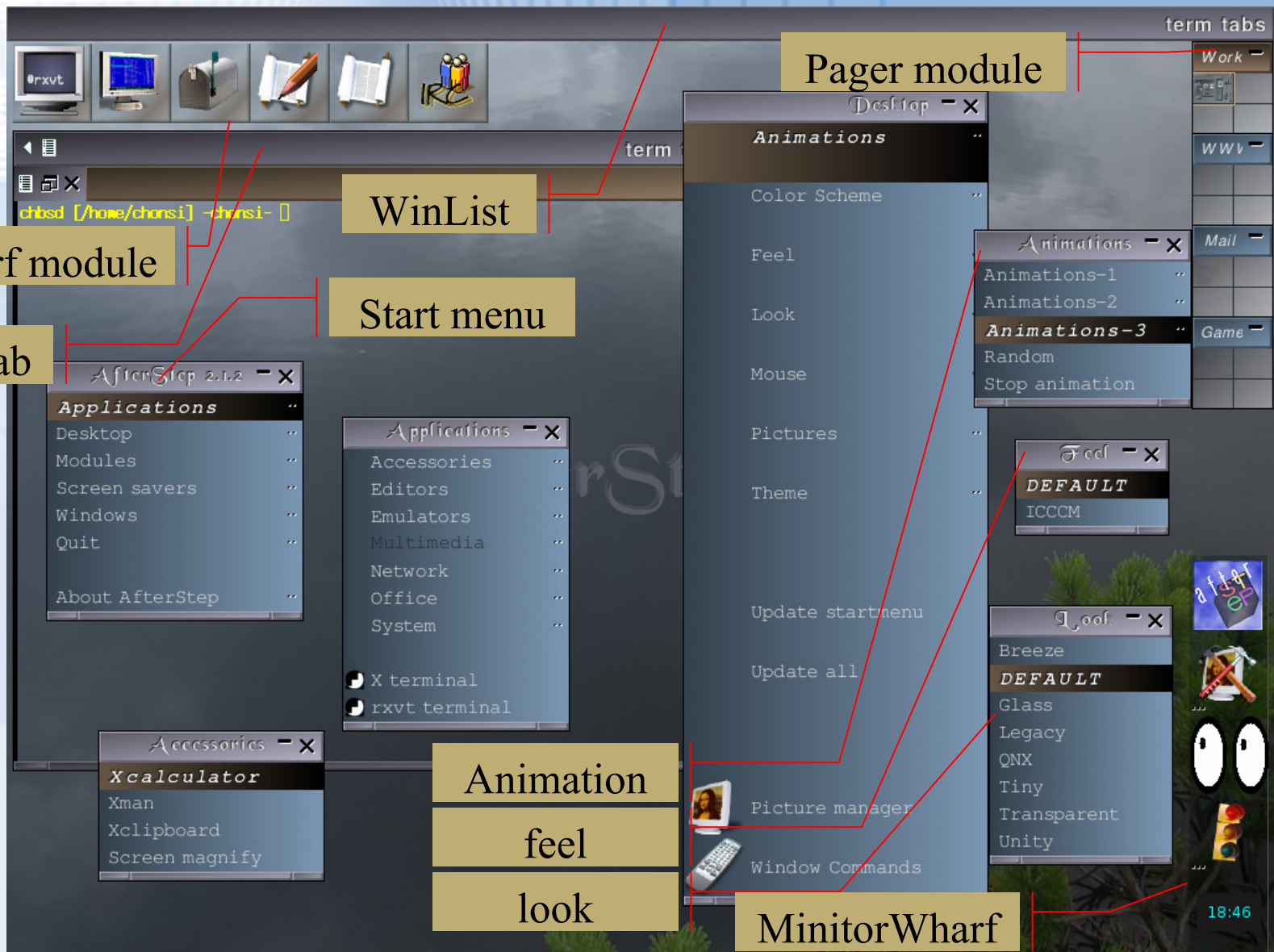
- Ctrl + Alt + Backspace
→ force to quit X
- Left button: copy
- Right button: paste



AfterStep Configuration (1)

- > Location of configuration file
 - Global configuration file directory
 - `/usr/X11R6/share/afterstep/`
 - Personal configuration file directory
 - `~/.afterstep/`
- > When AfterStep starts
 - Personal configuration first
 - **It first tries to read personal configuration files, and then read global configuration files for those not found.**
 - **Follow “.include” configuration**
 - Global configuration if missing personal configuration
- > To make personal configuration
 - Copy what you want to change from global to personal and modify it. And
 - Add “.include” to include other global you need.

AfterStep Configuration (2)



AfterStep Configuration (3)

> Under /usr/X11R6/share/afterstep/

Name	Purpose
base	Afterstep configuration file
autoexec	Define what is run when AfterStep starts and restarts
animate	Animate Module configuration file
pager	Pager module configuration file
wharf	Wharf/MonitorWharf module configuration file
winlist	WinList module configuration file
start/	Start menu when you click left button
feels/	Define how AfterStep feels
looks/	Define how AfterStep looks

AfterStep Configuration (4)

> Steps to add something to start menu

- install your favorite applications first
- Add entry under directory
- Edit the entry file
- Update menu



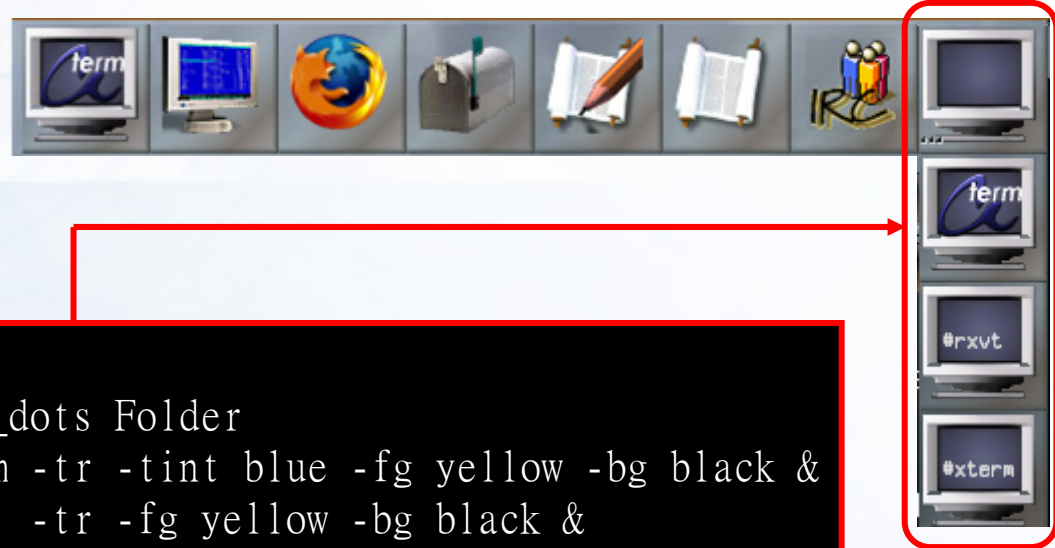
```
% ls
0_Applications  3_Screen_savers  6_nop
1_Desktop      4_Windows        7_About_AfterStep
2_Modules      5_Quit
```

```
% ls
0_Applications  3_Screen_savers  6_nop
1_Desktop      4_Windows        7_About_AfterStep
2_Modules      5_Quit          f_firefox
```

Exec "Firefox" exec firefox &
MiniPixmap "mini-app.xpm"

AfterStep Configuration (5)

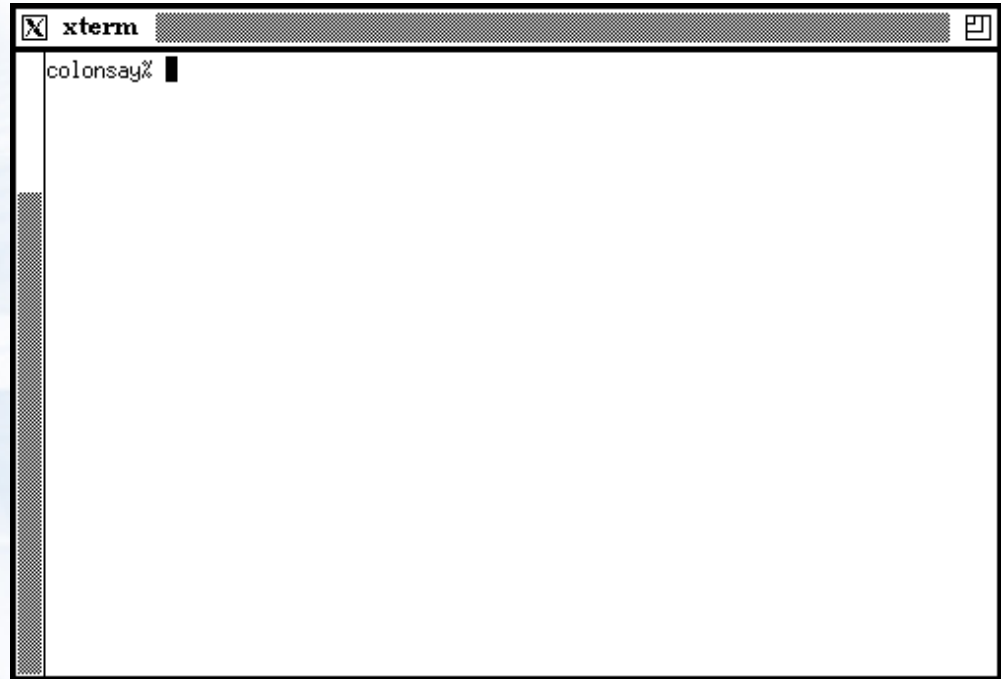
- > Add something to wharf module
 - Edit wharf configuration file (ex. add Term Folder)



```
...
*Wharf Terms large/Monitor1,dots/3_dots Folder
*Wharf  aterm aterm Exec "-" aterm -tr -tint blue -fg yellow -bg black &
*Wharf  rxvt  rxvt  Exec "-" rxvt  -tr -fg yellow -bg black &
*Wharf  eterm eterm Exec "-" Eterm -O --tint blue -fg yellow -bg black &
*Wharf  xterm xterm Exec "-" xterm -fg yellow -bg blue &
*Wharf ~Folder
...
```

Appendix A: classic x apps (1)

> xterm

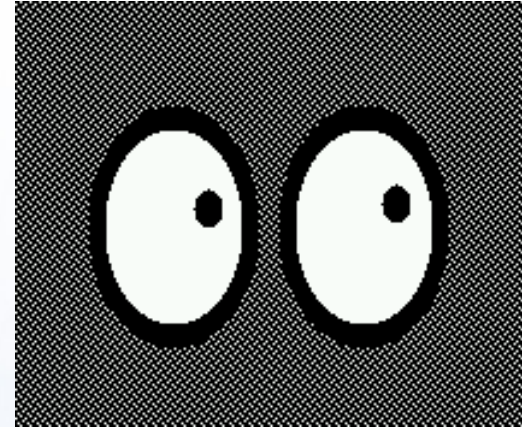
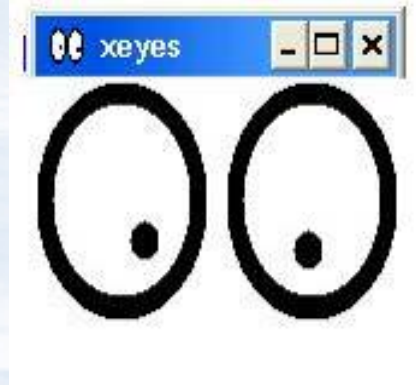


> xclock

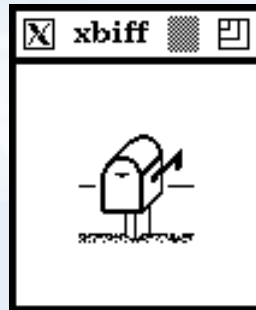


Appendix A: classic x apps (2)

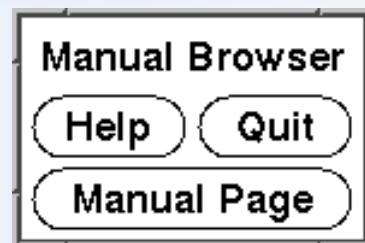
> xeyes



> xbiff



> xman



Not this



Appendix B: X Startup (1)

> xinit - X Window System initializer

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

— Files

- **Default client script:**

- > ~/.xinitrc

- > /usr/X11R6/lib/X11/xinit/xinitrc

(run xterm if .xinitrc does not exist)

- **Default server script:**

- > ~/ .xserverrc

- > /usr/X11R6/lib/X11/xinit/xserverrc

(run X if .xserverrc does not exist)

- **startx:**

- > script to initiate an X session

Appendix B: X Startup (2)

> xdm - X Display Manager

- Xdm provides services similar to those provided by `byinit`, `getty` and `login` on character terminals
- Files:

- **/etc/ttys**

```
ttyv8  "/usr/X11R6/bin/xdm -nodaemon"  xterm  on  secure
```

- **Default script**

> `~/.xsession`

Appendix C: 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
 - **%startx -listen_tcp**
- 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**

[hostname]:displaynumber[.screennumber]

not needed if localhost

“0” in most cases

defaults to “0”

Appendix D: 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`
- Client:
 - **Execute any X clients you want**

⌘Note:

X11 forwarding can represent a security hazard.

X11 forwarding should be enabled with caution. Users with the ability to bypass file permissions on the remote host (for the user's X authorization database) can access the local X11 display through the forwarded connection. An attacker may then be able to perform activities such as keystroke monitoring.