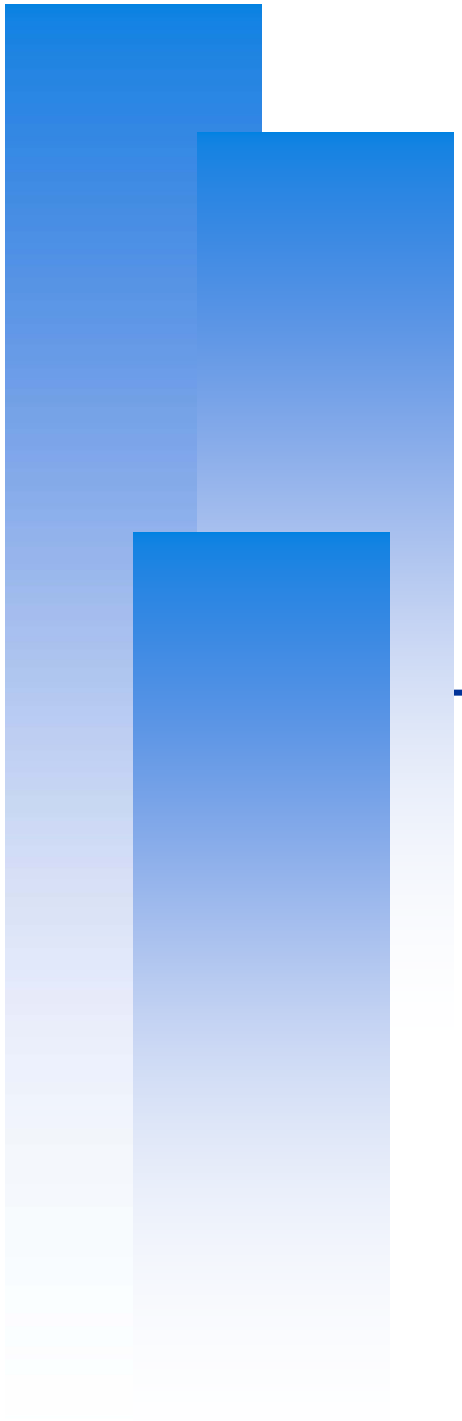


Exercise 2, Part (a) – Build X window

Outline

- X Window System
  - Introduction
  - Architecture
  - X11 implementation
  - The Window Manager
- Steps of Exercise
  - Install X11
  - Configuring X11
  - Install Afterstep
  - Configuring Afterstep
- Appendix
  - Classic S Apps
  - X Startup
  - Remote X client
  - X11 Forwarding

X Window System (1)

❑ Introduction

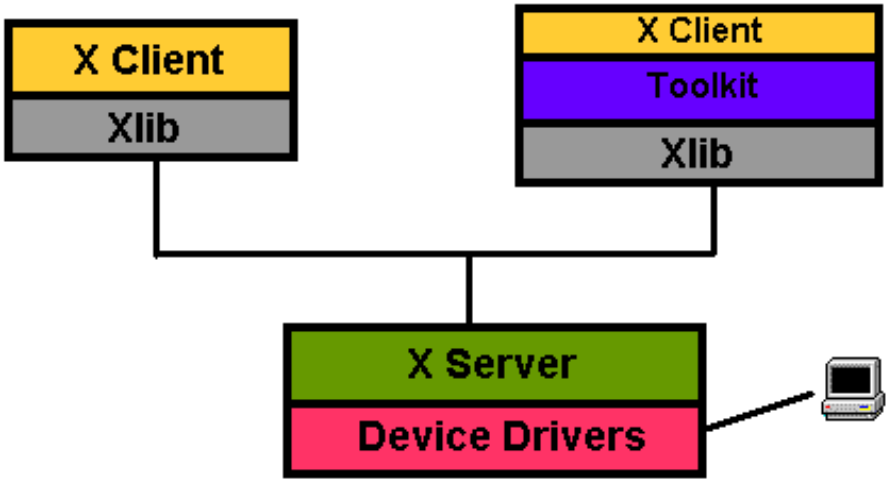
- What is X Window System?
  - The X Windows System, also referred to as ‘X’ or “X11”, is the standard graphical engine for Unix and Linux.
  - It is largely OS and hardware independent, it is network-transparent, and it supports many different desktops.
- History
  - 1984: The X Window system was developed 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
  - 2005/12: X11R7

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
  - X11R7
    - X Window System Version 11 Release 7
- Latest version
  - From X.Org
    - X11R6.9.0 Dec.21 2005
    - X11R7.1 May.22 2006

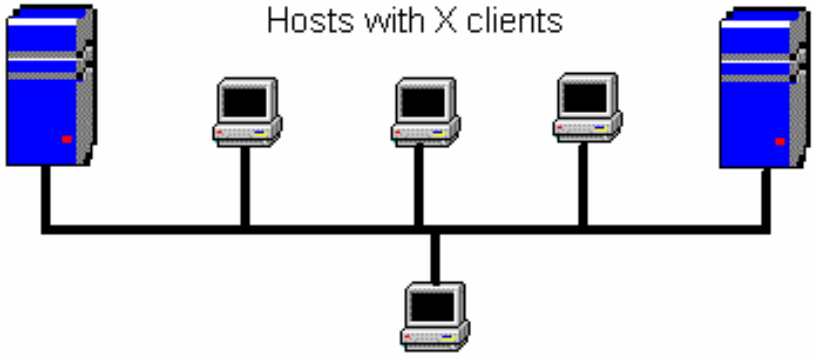
X Window System (3)

- 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)

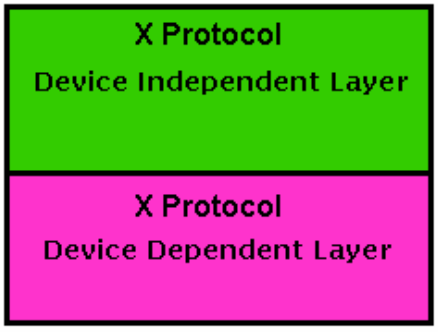
- Client-Server Design
  - **Client**
    - An application written using X libraries (e.g. Xlib)
    - Request service (like create window)
    - Receive events from X server (like mouse input)
  - **Server**
    - Runs locally and accepts multiple X clients
    - Manage the keyboard, mouse and display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

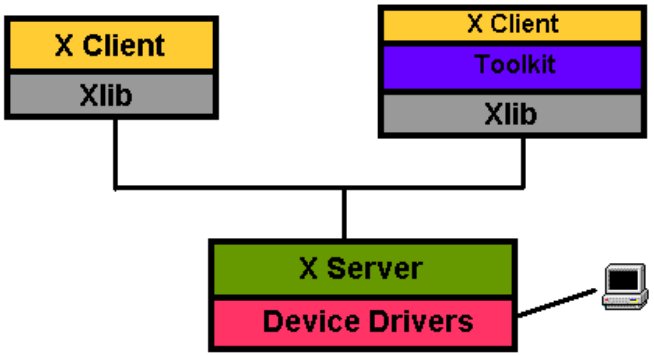


The X server has seamless access to distributed applications.

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: 4.6.0 Mar. 10, 2006

From 1992

  - Xorg foundation
    - X11 official flavor
    - Latest Version: 6.9.0 Dec. 21, 2005
    - Latest Version of R7: 7.1 May.22, 2006

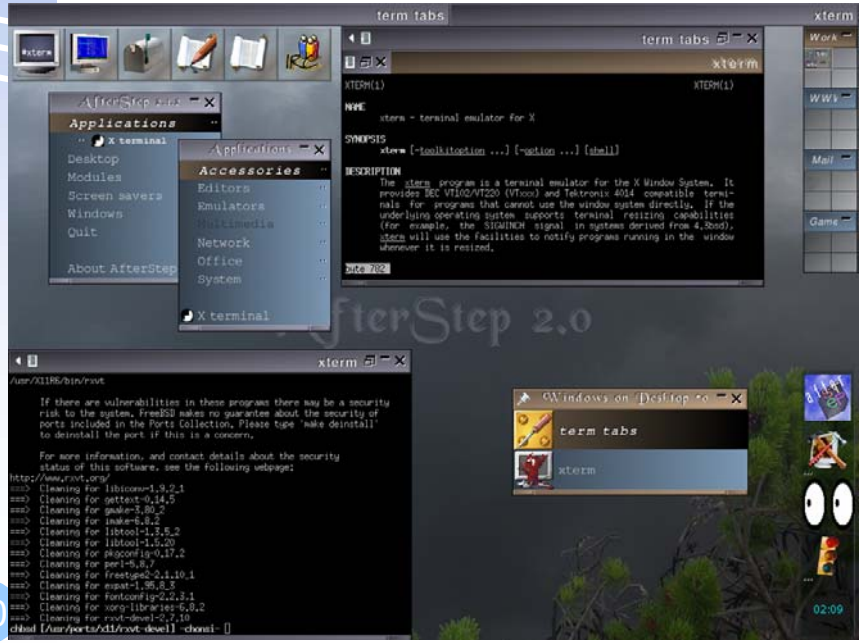
From 2004

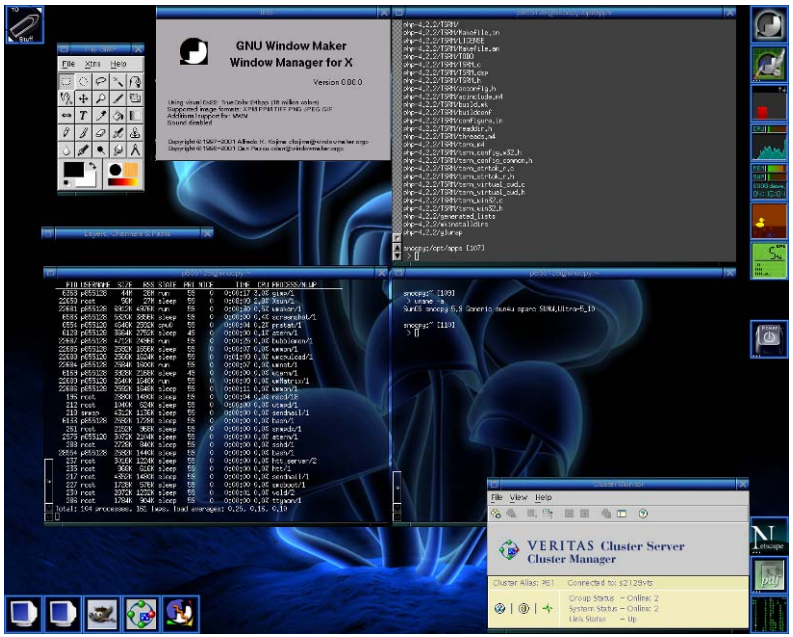
The Window Manager (1)

- 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/bin/csup –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 40 minutes
Athlon64 3500+ 1GB Ram 100MB NIC
Install Xorg needs 4G free space

Configuring X11 (1)

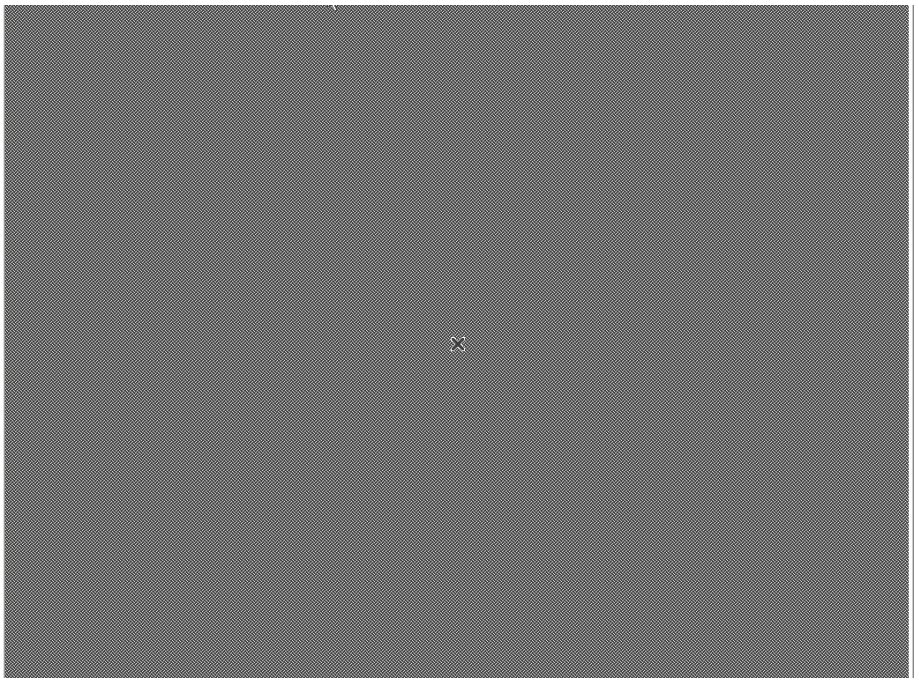
- Pre-step – know your hardware
  - Monitor specifications
    - **Horizon Synchronization frequency**
      - Ex: 31 ~ 81 KHz
    - **Vertical Synchronization frequency**
      - Ex: 56 ~ 76 KHz
  - Video adaptor chipset
    - Ex: ATi Radeon 9200SE
    - Ex: nVIDIA GeFource FX5200
    - Ex: ATI Mobility 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)

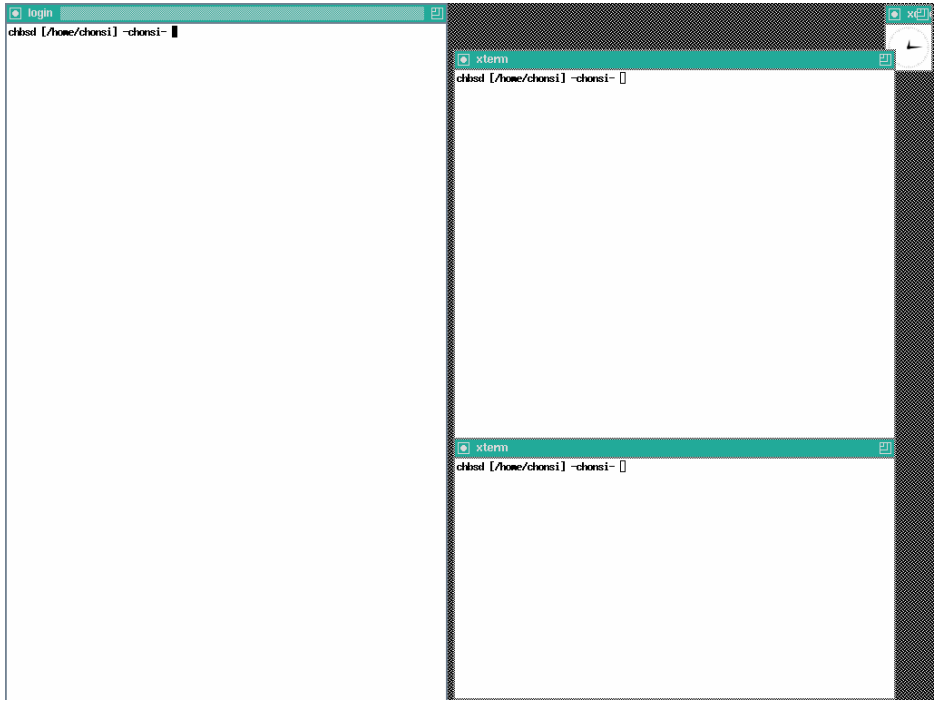
4. Copy configuration file to real place
   - % cp /root/xorg.conf.new /etc/X11/xorg.conf (Xorg)
   - % cp /root/XF86Config.new /etc/X11/XF86Config (XFree86)
5. Startup X window
   - % startx

[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
```

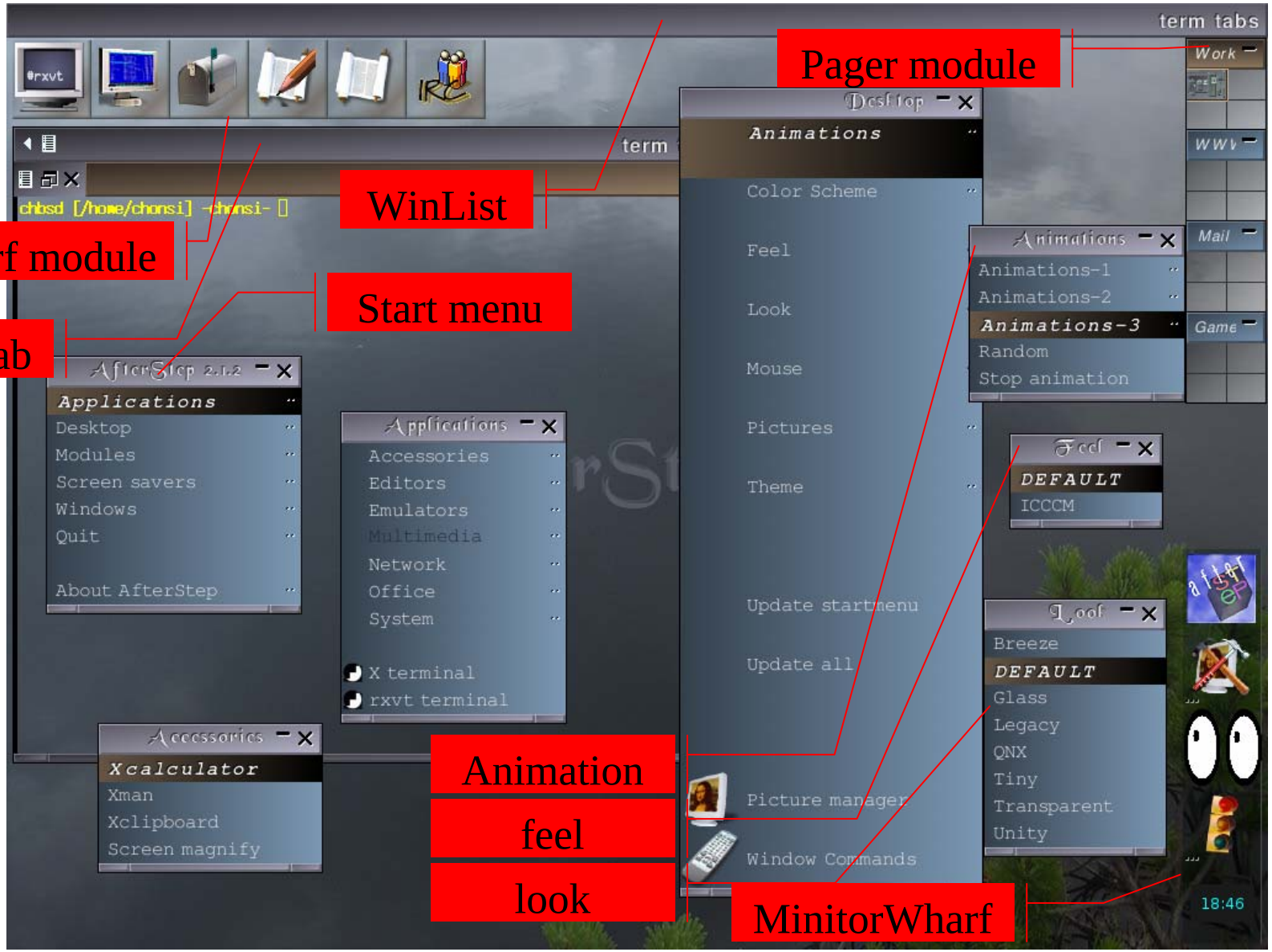
Install Afterstep (3)

- 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

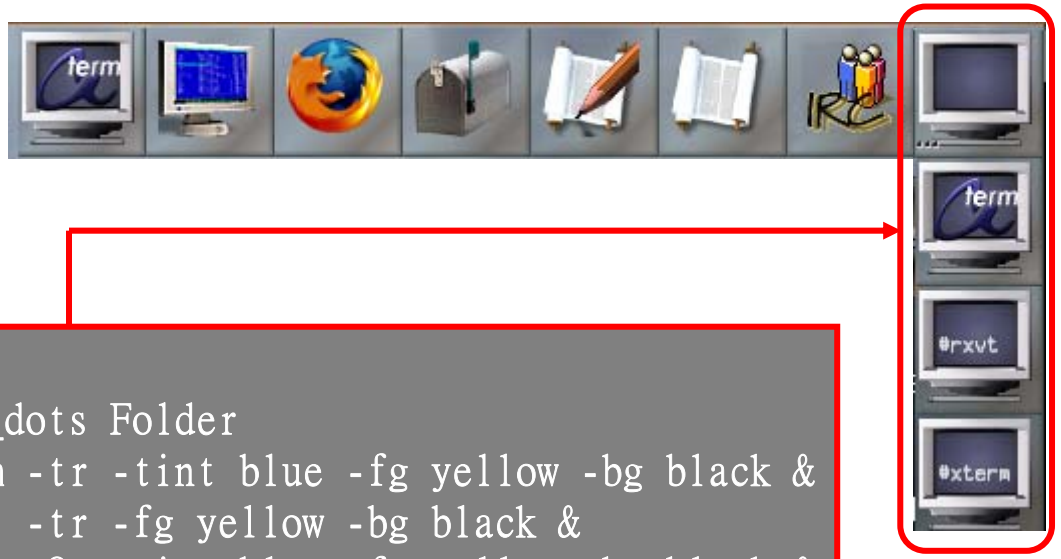

```
% ls
0_Applications   3_Screen_savers 6_nop
1_Desktop        4_Windows       7_About_AfterStep
2_Modules        5_Quit
```

```
% 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)

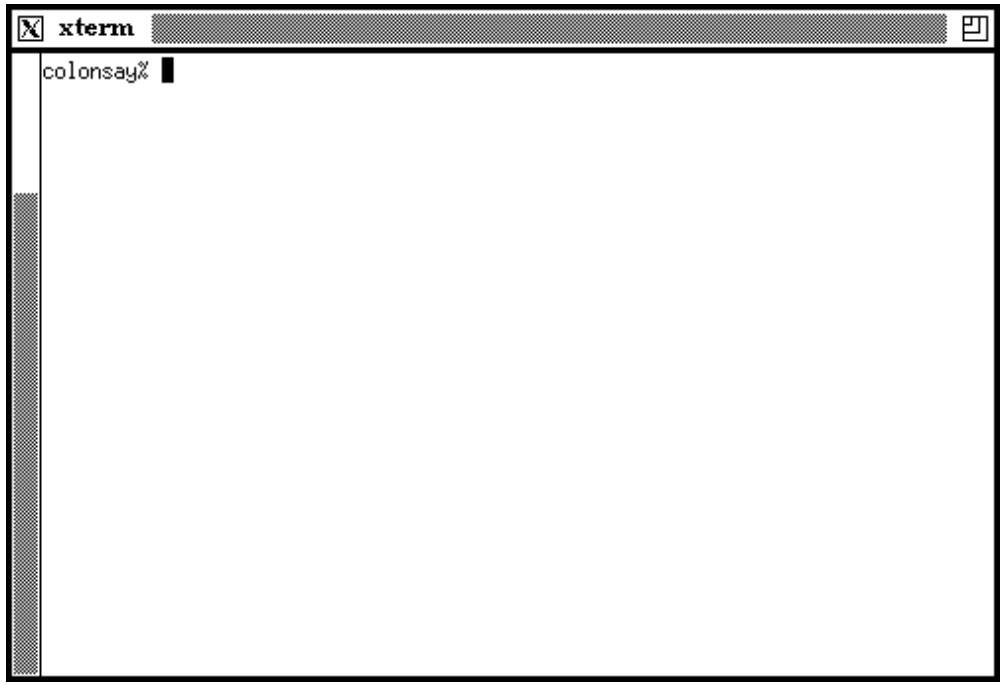
- Add something to wharf module
  - Edit wharf configuration file (ex. add Term Folder)




```
...
*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)

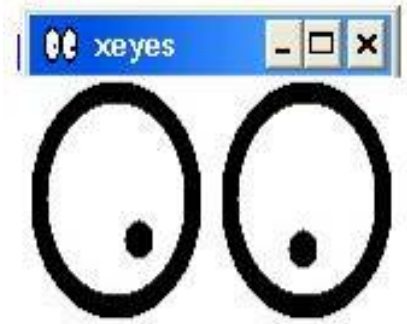
- xterm

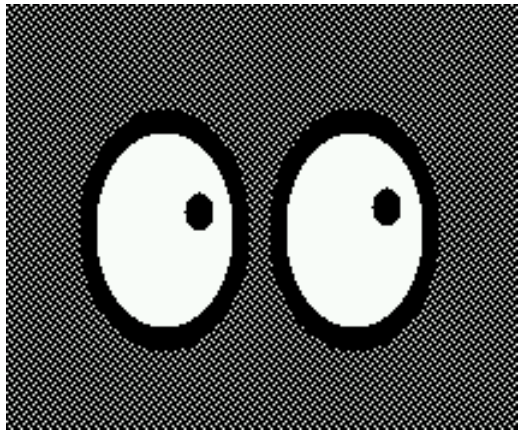


- xclock

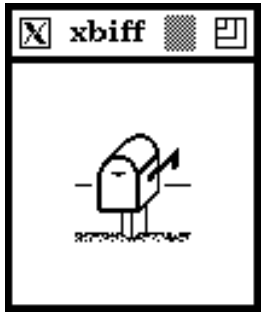
Appendix A: classic x apps (2)

- xeyes

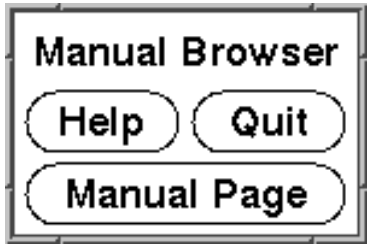




- xbiff



- 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 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 (may be dangerous)
  - 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.