

Basic UNIX 4: More on the GUI

Information Technology Services
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Basic UNIX 4: More on the GUI

- How X works
- Window and desktop managers
- File managers
- Common tasks
- System administration tools

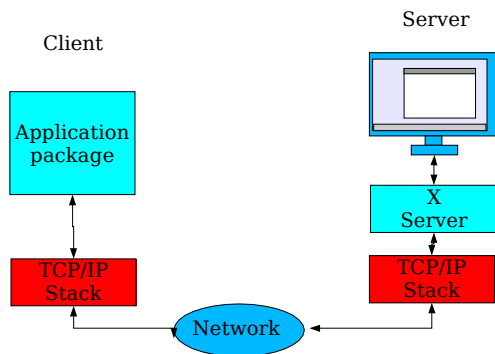
In this module, we'll look at how X, the most graphical user interface for Linux and UN*X in general, works, and the various components involved. We'll find out about window managers and desktop environments, file managers, and how we do day-to-day management tasks and just a bit of system administration from the graphical desktop.

How X works

- X server (X)
 - Provides tools for drawing graphics on a display
 - X applications send commands to the X server via TCP/IP
- X client
 - Machine running the software that wants to draw graphics
 - Usually the machine running the server, but doesn't have to be!

Historically, UNIX started with text terminals connected to a central server machine. Later on, people wanted to do graphics, and X Windows (or just X) was developed to connect graphical terminals to the server machine. X requires two pieces: an X server and an X client. The X server machine (aka X terminal) draws graphics on a display from commands received over the network via TCP port 6000. The X client runs the application, which sends X commands to the X server. Nowadays, the X server and X client usually run on the same computer, but not necessarily!

How this looks



Here's a graphical representation of how it all works. The client application talks to the TCP/IP software stack, which sends commands to the server over the network. The server machine receives those commands and figures out how to draw the graphics the client is asking for.

If the client and server are running on the same machine, the TCP/IP software knows that it doesn't have to put commands destined for "localhost" out on the network wire; it processes them internally.

Why is this good?

- Applications are independent of graphics hardware, window manager and even hardware platform
- Server and client do not have to be on the same machine; applications can be run remotely
 - Licensing considerations
 - Horsepower restrictions

You might run applications remotely because:

The software vendor wants to handle licensing by keeping the software on a single machine and letting workstations display the output. SAS 9.1 is like that.

A small workstation (even diskless) can run software too large for it by displaying output from software run on another machine. The Linux Terminal Server Project uses this idea to get several workstations for the price of one: see www.ltsp.org for more info.

Running X applications remotely

- Connect to a remote machine using ssh with the -X option (**not** -x)

```
ssh -X netid@sas.iastate.edu
```

- Start the application

```
sas
```

X is normally insecure, and baddies can either snoop on your X session or display bad stuff on your machine. The “-X” option tells ssh to create a secure network tunnel for the normally insecure X protocol. Don't use “-x”; that's the flag that tells ssh *not* to allow X tunneling. [Exercise:

1. Open a shell window.
2. At the shell prompt, type

```
ssh -X netid@sas.iastate.edu
```

 where “netid” is your ISU NetID.
3. Once logged in, type

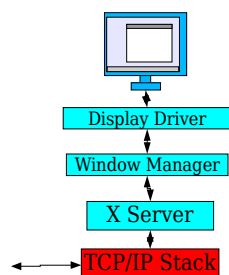
```
sas
```

 to start the SAS program.
4. Close all the SAS windows and press <Ctrl/D> to log out.]

Window managers

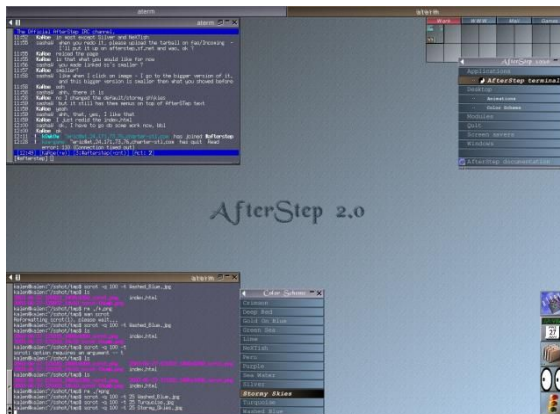
- Manages positioning of windows on the screen, virtual desktops, running applications; may include menus

- AfterStep
- Blackbox
- Enlightenment
- FVWM
- IceWM
- Sawfish
- etc., etc., etc., etc.

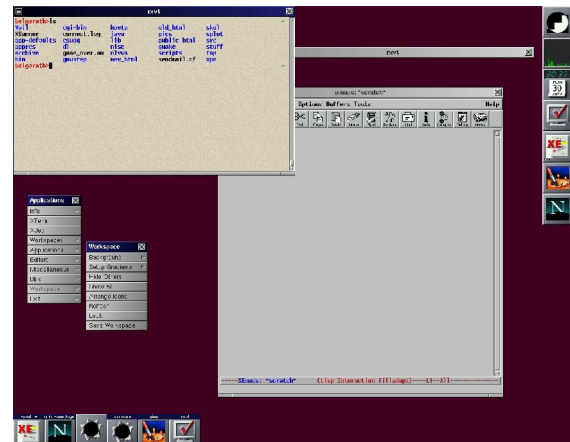


The window manager is the software responsible for drawing and positioning windows and other objects on the desktop and managing virtual desktops (if they're available). It may also handle creating menus, copy-and-paste and other niceties.

KDE and the Gnome Desktop are very MS Windows-like, mostly because MS Windows is much like Motif, an earlier UNIX window manager. However, the window manager can be very much unlike Motif, as the following examples show.



AfterStep 2.0, an easily configurable window manager.



WindowMaker, a good choice for smaller machines (we'll see more of it later).

Desktop Environments

- Window management + system utilities + standard applications + games + menuing system + ????????
- K Desktop Environment (KDE)
- GNOME Desktop
- Microsoft Windows

A desktop environment goes beyond window management to include its own GUI system utilities, standard applications and other goodies. Microsoft Windows is really a desktop environment. KDE and Gnome Desktop are the most well-developed and popular desktop environments for Linux.

[Exercise: log in to the K Desktop Environment and examine some of the choices in the Accessories, Games, Graphics, Internet, Office and “Sound & Video” menus. Bear in mind that almost all of this software was installed from the Red Hat CDs and is included at no extra charge.]

What you'll have to get used to...

- Users have a choice of window/desktop manager (even in the stock RedHat install)
- Many desktop managers are themeable, i.e., FVWM may look completely different from FVWM on another machine depending on the choice of theme

If you're a system administrator, you'll have to get used to the fact that, within the limits you set, your users will have lots of choices of desktop appearance and behavior. Not only can they choose window manager, but they can choose themes that can make one machine look completely different from another machine running the same window manager. Of course, they can only do that if you allow them to install the window manager and/or themes. Since you have more control over that with Linux, you can be more restrictive if you want to.

Why choice is good...

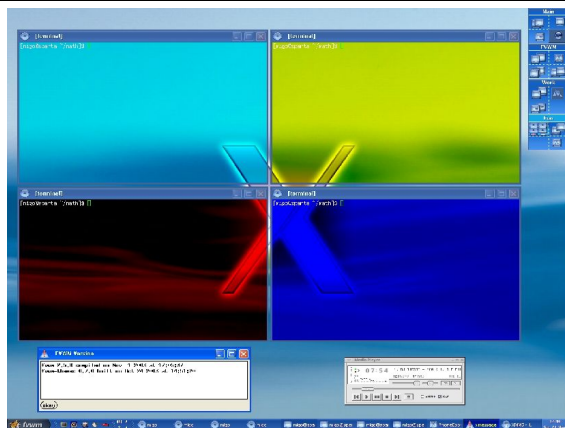
- The window manager can be selected based on the horsepower of the machine
 - Gnome, KDE run well on big, modern hardware
 - Blackbox, FVWM, IceWM, SWM, etc. run better on older machines

One reason for using a non-standard window manager is that modern desktop environments are resource hogs. Putting a smaller, lighter window manager (say, IceWM) can give a whole new lease on life to machines that you were going to send to surplus.

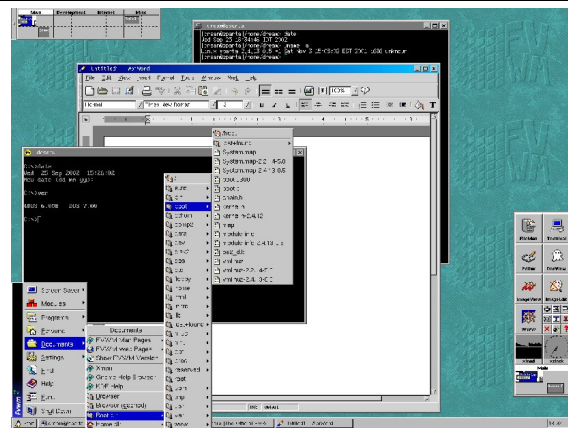
Choice is good II

- International users can customize their WM with non-English languages
- A choice of window manager/theme gives users something harmless to customize their environment with
- Windows users can have a Windows-like DM (FVWM with RedmondXP or Redmond98)

And choices can make you more popular with your users as well. If they can select their native language and favorite window manager, that's a lot more harmless way of customizing the machine than installing insecure software from who knows where. And the right window manager/theme choice can let your (former) Windows users have a familiar look and feel without having to give them Windows.



FVWM with RedmondXP



FVWM with Redmond98

Choosing a Window Manger

- On startup – choose from the “Session” menu in the login screen
- Set a user default – insert `PREFERRED="windowmanagerapp"` into `~/.Xclients`
- Setting system default – put `DESKTOP="KDE"`
`DESKTOP="GNOME"`
`DESKTOP="windowmanagerapp"` into `/etc/sysconfig/desktop`

There are several ways to select a window manager. We've already seen how to choose one from the Session menu, but you can also choose a default by modifying `.Xclients` (for your own default) or `/etc/sysconfig/desktop` (for a global default – you'll have to be root to modify that file).

Why KDE?

- Most popular desktop manager for “large” systems
- One of the two desktop environments installed by Red Hat Enterprise Linux
- Has most complete set of applets and management tools
- Default file manager (Konqueror) works better with AFS volumes than Nautilus (Gnome)

In this class, I'm going to emphasize the K Desktop Environment over some of the others. Why? Because it's probably the best choice for modern hardware. It's most popular, the system tools are better, and Konqueror is more stable than Gnome's Nautilus (especially when working with OpenAFS).

The “Start Menu” in KDE is really called the K Menu, but because Red Hat puts their red hat icon on it instead of KDE's default K, we'll also call it the Start Application menu. Sorry for the confusion.

Switching Between Windows

- Varies; most modern WM accept the Windows `<Alt/Tab>` and clicking on the window
- Some window managers (like Blackbox and TWM) insist that you click on the window titlebar or use arrows on the manager bar

Most modern window managers believe in the Windows `<Alt/Tab>` for switching windows, but not all, so you may have to try clicking on the window (or even the titlebar) if it doesn't work.

Capturing the Screen

- Used to be an application in the menu, left out in new version
- Graphics > GIMP Image Editor
- Choose File > Acquire > Screen Shot
- Click OK
- Save the file as an appropriate graphics type

For creating documentation or just capturing pictures it's useful to capture the graphic screen to a file. There used to be an application in RHEL to do that, but they left it out of the new version. Here's how you do it with GIMP, which does a better job anyway.

[Exercise: save a copy of any window on your screen.

1. Start GIMP from the Graphics menu.
2. Choose File > Acquire > Screen Shot
3. Click OK, then in the window you want to save.
4. Save the picture with File > Save As.]

Setting the Time

- Select System Settings -> Date and Time
- Enter the root password
- Make sure that the time zone is set correctly for your location
- If not Internet connected, turn off "Enable Network Time Protocol" and set time and date; otherwise, just select a time server (time.iastate.edu works fine)

[Exercise:

1. Select System Settings -> Date and Time
2. Enter the root password
3. Verify that the location is somewhere in the Central time zone
4. Turn on Enable Network Time Protocol and select or enter "time.iastate.edu" as the server.
5. Click Apply.]

Moving the KDE Panel

- Choose Preferences -> More Preferences -> Configure Panel
- Click "Arrangement"
- Under Position, click where you'd like the panel to appear.
- Under Size, choose the icon size you'd like to use.
- Click Apply, then OK.

[Exercise:

1. Move the KDE Panel to the right side of the screen.
 2. Make the icons Small or Tiny rather than Normal.]
-

Editing the K Menu

- Right-click on the Start Applications icon
- Select “Menu Editor”
- You can:
 - Add entries
 - Remove entries
 - Rearrange entries

When you install software, you'll probably want to put it in the K Menu (aka Start Applications menu – the theme Red Hat uses puts their Red Hat logo in the Panel instead of the default K). Some installers recognize the K Menu and do it for you, but not all of them. And your users will want to rearrange things anyway...

Adding a Menu Entry

- Highlight the folder you want the item to appear in
- Click “New Item”
- Enter the values for the program:
 - Name
 - Comment
 - Command (with options if necessary)
- Select File > Save

[Exercise:

1. Start the Menu Editor. Right-click the Start menu icon and choose “Menu Editor”.
2. Highlight “Accessories” and click “New Item”.
3. For Item Name, enter “Gimp” and click “OK”.
4. Under Command enter “gimp”.
5. Click the blank icon at the right and pick one you like (there is one for Gimp).
6. Choose File > Save.
7. Verify that the item appears in the Accessories menu, and that it works.
8. Close the Gimp windows.]

Moving a Menu Entry

- Right-click on the item to be moved
- Select “Cut”
- Right-click on the folder you want it to appear in
- Select “Paste”
- Select File > Save

[Exercise:

1. Right-click on the Gimp item we just created and select “Cut”.
 2. Open the Graphics folder by clicking on the plus sign to the left.
 3. Right-click on “Office” and select “Paste”, then choose File > Save.
 4. Verify that Gimp now appears under “Office”.]
-

Starting Apps Automatically

KDE-aware apps left open at logout will automatically reopen at your next login.
For others:

- In Konqueror, open `~/.kde/AutoStart`
- In another Konqueror window, browse to the application you want to run at startup
- Drag the icon of the app to the AutoStart window
- Choose “Link Here”

[Exercise:

1. Open a Konqueror window by choosing Home from the K Menu.
2. If you can't see the `.kde` folder, choose View -> Show Hidden Files.
3. Double-click on `.kde` to open it, then double-click on Autostart.
4. Open another Konqueror window.
5. Use the Up button to browse up to `/`, then down to `/usr/X11R6/bin`.
6. Drag `xclock` from the `/usr/X11R6/bin` window to the `.kde/Autostart` window.
7. Release the mouse button, then click “Link Here”.]

KDE Control Center

- Used to make a wide variety of system settings in KDE
- Select “Control Center” from the Start Applications Menu

Many of the settings in the Control Center apply only to the user running CC. (Those settings will be stored in the `.kde` directory in your home directory.) Bear in mind that if a window has an “Administrator Mode” button in it, you will be changing those settings for all users, not just you, so you'll need the root password to do that.

[Exercise:

Select “Control Center” from the K Menu (aka Start Applications menu).

]

Appearance and Themes

- Background
- Screen Savers
- Styles
- Theme Manager

The Appearance and Themes section of Control Center governs how the Desktop looks. The Theme Manager allows a wide variation in appearance even within KDE itself.

[Exercises:

1. Choose a background wallpaper.
 2. Examine the choices of screen saver (choose one, then click “Test”); pick “Random” when you're finished.
 3. Examine the styles available; switch from the Bluecurve style (the Red Hat default) to KDE Default]
-

Desktop

- Behavior
 - What mouse clicks do
 - What devices appear on the desktop
 - Show previews for files
- Multiple Desktops
- Size & Orientation
 - Screen resolution
 - Rotation where available

[Exercises:

1. Set the left mouse button to open the application menu on desktop click. This is the default in WindowMaker; turn it off again.
2. Set the number of virtual desktops to six, then back to four.
3. Change the screen resolution to something smaller. Allow it to revert to the standard setting.
4. Show the options in the Window Behavior menu. Under Moving, point out that slow machines benefit from turning off “Display content in...”]

Mousing Without a Mouse

- Must turn on in Control Center under Mouse
- Press <Shift/NumLock>
- Move mouse pointer with the numbers around the numeric keypad
- Click mouse button with keypad 5
 - / for left, * for middle, - for right, then 5
- Click-and-hold with keypad 0
- Press <Shift/NumLock> again to turn off

You can use KDE (and many other window managers) without a mouse, but you have to turn it on in the Control Center (choose Mouse > Mouse Navigation > “Move pointer...”).

Just press <Shift/NumLock> and use the numeric keypad keys to move the mouse pointer. The 5 key is the mouse button, modified by the slash, star and minus keys to select which button is clicked when you press it. To click and hold, press keypad 0 to hold, then 0 again to release.

System Administration

- To actually make changes here, you'll need the root password.
- Font Installer
- Login Manager
 - Customize the login screen
 - Sessions – control who can shut down machine from the console or remotely

We'll do more with system administration later in the sequence, often using the command line, but some of those functions are available here in the KDE Command Center.

Unfortunately, to add a font you need a TrueType or PostScript Type 1 font file.

[Exercises:

1. Look at the Font Installer tool.
2. Select the Login Manager and click “Administrator Mode”. Enter the root password. Choose “Sessions” and set Remote shutdown to either “Nobody” or “Only root”.]

Preferences

- About Myself – stores personal information (real name, phone number, etc.)
- Password – sets new password (including the Kerberos password, if Kerberos is used for authentication)

[Exercises:

1. Select Preferences -> About Myself. Change the linuxed full name to “Linux Lab User” and make the office number “89 Durham”.
2. Select Preferences -> Password. Change the password from “linuxed” to “whynot?”. Then change it back to “linuxed”.]

System Settings

- Server Settings -> Services
Used to start, stop and control system services
 - See info about a service: highlight the service name
 - Start/stop a service: highlight the name, click the start or stop buttons
 - Schedule a service to start at machine startup: turn on the check box to the left of the service name
 - Actually runs system-config-services

Services are background programs that are owned by the system, not by the user. They provide things like printing, Internet services, firewall, etc.

System Settings -> Add/Remove Programs

- Used to install and remove programs from the Red Hat CDs
- To install a package, click details, the check box next to the package name, click Close, then click Update.
- To remove a package, click Details, clear the check box next to the package name, click Close, then click Update.

The Add/Remove Programs tool installs and uninstalls programs specifically from the Red Hat CDs. It's the same system that was used to install packages during the system installation.

If the machine is connected to the Internet through a fast network and is registered with the Red Hat Network, you're better off using the tools on the Web at <http://rhn.redhat.com> to add and remove packages:

- Packages you install with RHN are registered for automatic notification/installation of updates;
 - A wider variety of packages is available through the non-RedHat (ISU) channels.
-

Gnome Desktop Prefs

- Many Linux systems have both KDE and Gnome installed, and KDE utilities can be run from the Gnome Desktop (they usually show up under “More Preferences”)
- Most Gnome preferences are user-oriented and don't require root access

[Exercise: log out and log back in using the Gnome Desktop instead of KDE. Now choose the Preferences menu to explore the settings changes possible for the Gnome Desktop.]

Assistive Technology

- Gnome comes with assistive technology built in
- Preferences > Accessibility > Accessibility – enables special keyboard features (slow/sticky/mouse keys)
- Preferences > Accessibility > Assistive Technology Support – activate screen magnifier, on-screen keyboard and audio screenreader (Gnopernicus)

One of the good things about Gnome Desktop is for those with various disabilities is that lots of assistive technology is built in. Not only does Gnome support special keyboard features for those with motor control problems (like slow and sticky keys), but for the visually impaired there are screen magnifiers and even a full-blown audio screenreader (which usually costs several hundred dollars in that other operating system). All of these features can be activated under Preferences > Accessibility.

Screenshots with Gnome

- Easy to take shot of whole screen, but can't select a window like GIMP can
- Choose Actions > Take Screenshot
- Enter and/or browse a filename
- Click Save

You can take screenshots with GIMP the way we did in KDE, but Gnome also has its own little screenshot utility. Unfortunately, it only dumps the entire screen; you can't select part of the display or an open window.

[Exercise: Save the screen to a file.

1. Choose Actions > Take Screenshot.
 2. Enter a filename.
 3. Click Save.]
-

WindowMaker

- Window manager (not a desktop environment)
 - Lower overhead, good choice for smaller machines
 - No applets to clutter screen, take up CPU time
- Part of GNUStep project, derived from OpenStep, derived from NeXTStep (which also was the origin of Mac OS X)

WindowMaker is an alternative to KDE and Gnome. It's especially good on older machines, as the overhead is much smaller. If you don't have WindowMaker on your RHEL machine and you've set up for the Dag Wieers repository (which is done automatically with the Iowa State install) you can install it with the command

```
up2date -i windowmaker
```

Where's the Start Menu?

- Everywhere! Just right-click on the Desktop.
- Move the menu to make it stick
- Sub-menus can be dragged off the menu to stick independently



Many features of WindowMaker are triggered by right-clicking. Right-clicking the desktop activates the application menu, which will stay open until you select something. If you move the menu by dragging its title bar, it will stay open (and on top of the other windows) until you click its close box. You can do the same thing with submenus as well, and the parent menu can be closed without closing the submenu.

The Dock

- Double-click on icon to launch app (if 3 dots appear)
- To add icons, open an app and drag its icon to the Dock, then enter the command to start it
- Drag icon out of Dock to remove
- “Screwdriver” icon starts the WindowMaker Preferences tool
- Many dockapps are available



The Dock, in the upper right-hand corner, has icons to launch commonly used applications. If three dots appear on the button, the application can be launched. If not, the application is already running.

There are also “dockapps”, applications designed specifically to run *in* the dock for chores like displaying weather, mounting CDs, etc.

Handling Windows

- Left title-bar button minimizes (double-click icon below to restore)
- Right title-bar button closes
- Double-click title bar to windowshade
- Right-click-and-hold title bar to get window menu



The WindowMaker title bar is simpler than the others; you minimize on the left and close on the right. Double-clicking on the titlebar reduces the window to the titlebar (windowshading). For anything fancier than that, right-click on the titlebar for the window menu.

Moving a window is done by dragging the titlebar, and resizing the window is done by click-hold-and-drag on the lower corners of the window (betraying WM's Mac OS heritage).

Workspaces in WindowMaker

- Only two workspaces at startup, create new workspaces as necessary
- From Application menu, choose Workspaces -> New
- Use the Application menu or arrows on the Clip to switch workspaces
- To remove a workspace, empty it, leave it and choose Workspaces > Destroy Last



WindowMaker has a unique trick; it can create new virtual workspaces on the fly. Just choose "Workspaces > New" from the Application menu. To move windows, right-click on the titlebar and choose "Move to". To switch workspaces, click on the arrows on the Clip or choose a workspace from the Application menu. Notice that workspaces can be named; right-click on the Clip to rename the workspace.

The Failsafe WM

- Failsafe is an extremely primitive window manager
- You may find yourself in Failsafe when KDE and/or Gnome get corrupted somehow
- To exit Failsafe, press <Ctrl/D> in the terminal window.

[Exercise:

1. Log out of WindowMaker and log back in using Failsafe.
2. Type ooffice at the command prompt to prove you're really running a window manager (just not a very good one).
3. Exit OpenOffice.org, then press <Ctrl/D> to return to the login screen.]