System Administration

Terminals
and the
X Window System
Terminals: Then and Now

• "In the old days": real serial terminals
• Common now: "Virtual Terminal" on monitor
• In both cases, a tty "TeleTYpe"
  − a text terminal
Terminal Types

- vt100
- ansi
- each uses different 'control sequences' to do things like erase characters, move the cursor around, etc
Termcap

- termcap: TERMinal CAPabilities database: an generic interface to different terminal types
- allows programs to say "move cursor here" and translates that into the actual control sequences the end terminal requires
- contains information about screen size, color capability, etc.
How terminals are started

• From inittab: mingetty runs to listen on a virtual terminal, displays login prompt:
  1:2345:respawn:/sbin/mingetty tty1

• Type in username, that is sent to login program

• login prompts for password, verifies that password, finds the user's default shell, and executes that

• User now has shell
How terminals are started

• When user exits shell, login exits and then mingetty exits

• Init respawns mingetty, starting the process over again
X Window System

- X is a framework for a graphical user interfaces, developed initially at MIT.
- A common implementation on Linux systems, is XFree86, an open source implementation of the X Window System
- A newer implementation is the X.org implementation --- this is what Red Hat EL 4 and 5 use
Starting X

- startx
- XDM and variants
Startx

• startx is used for manually starting X11. It is typically run when your machine doesn't default to starting with X11 on.

• It is also useful when configuring X --- you can configure X, run startx to try it, and make changes as necessary
XDM and Variants

- xdm (the X Display Manager) and related programs (kdm, gdm, the KDE and Gnome versions, respectively, of xdm) start X and provide a graphical login screen.

- This is what starts up when you start Red Hat Enterprise Linux in runlevel 5
Which display manager will run?

- `/etc/sysconfig/desktop` contains preferred display manager
  
  \texttt{DISPLAYMANAGER="XDM"}

- If that line does not exist, it simply defaults to a particular display manager (currently, gdm)
Window Managers

- X simply provides a protocol for drawing simple objects: lines, boxes, circles, etc. It has no concept of the menus, title bars, tool bars, etc., that we expect in a graphical user environment.

- Window Managers offer an interface between X and programs, offering those common items and allowing for a common look.
Window Managers

- Some display managers offer more, and are called "Desktop Environments", which provide higher-level things like file managers, inter-program communications, etc.
KDE

• The K Desktop Environment, a project of the KDE e.V., a German non-profit foundation
Gnome

- The desktop environment of the GNOME project, part of the GNU project of the Free Software Foundation
Which Window Manager runs?

- Depends on which display manager you run. gdm and kdm both offer popup menus that allow you to change the which window manager opens
prefdm (RHEL5)

- `/etc/X11/prefdm` is called by `init` when starting a graphical runlevel
- Prefdm takes the information in `/etc/sysconfig/desktop` (if it exists) and runs the appropriate display manager
- If X stops for some reason, `init` will respawn prefdm
Xsession (RHEL4)

• `/etc/X11/xdm/Xsession` is called by all three window managers to start the 'Default' window manager. This file looks in

  $HOME/.xsession

  $HOME/.Xclients

• If those files exist, they are executed.
Xsession

• So you could start gnome-session or startkde, which start the default gnome or kde window managers:

  exec gnome-session

  exec startkde

• or even something more arcane

  exec twm
If neither of those files exist, it looks in
/etc/sysconfig/desktop for a line that looks like

DESKTOP=GNOME

DESKTOP=KDE

which in turn starts gnome-session or startkde
Configuring X

• Configuration for XFree86 is in the /etc/X11/xorg.conf file, which is a wonderfully long and complicated file.

• The X Window System is a very flexible system, allowing for heavy customization of nearly every aspect of the system.

• With that flexibility comes a lot of complexity.
Configuring X

• Fortunately, you typically configure X at installation time

• If you have to reconfigure afterwards, you can run `/usr/bin/system-config-display` which does a decent job of detecting cards and monitors and fixing things

More complicated setups are left as an exercise to the reader