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 implemenation 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 prefered display manager

```
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
```

/etc/sysconfig/desktop

- 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