



11/21/2007





Opening Discussion

- Let's look at solutions to the interclass problem.
- Vote was 7 for ASCII, 10 for X11.
- Do you have any questions about the assignment?



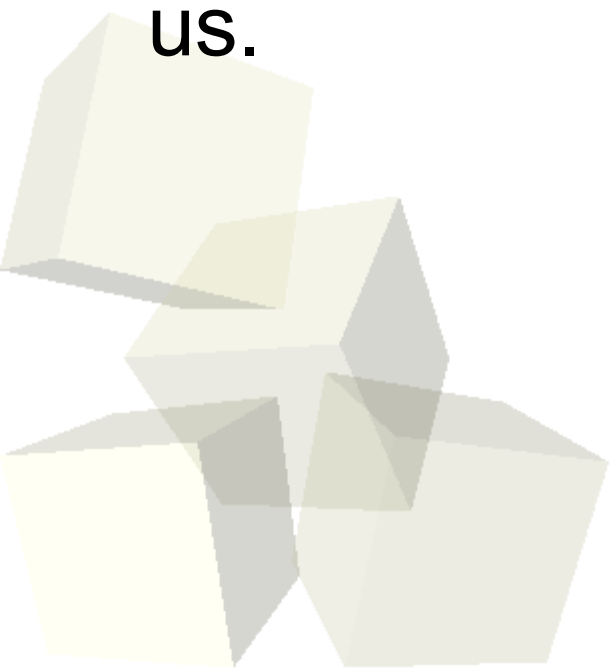


Full Terminal Control

- The ncurses library provides you with functions that allow you to write any ASCII character that you want to any point on the screen.
- This can allow you to do ASCII animations.
- It also includes functions for doing non-blocking input and input of non-character keys.
- Normal scanf and getchar functions only read from a terminal once enter has been pressed.
- Note that this isn't portable code. It won't work on a Windows box unless perhaps you have something like Cygwin.



- In order to set up a window so that you can use curses function with it you need to initialize it.
- You do this with the WINDOW *initscr() function. Let's look at the man page for this function.
- The WINDOW* that is returned needs to be remembered because it has to be passed to most of the functions that will draw out characters for us.





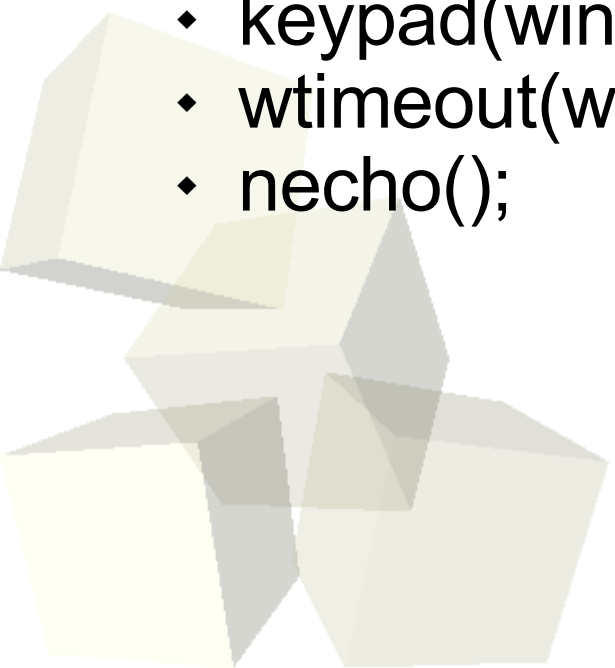
“Drawing” Functions

- There are number of different functions that can output to the screen. I'm not going to type them all up here, but I'll give a little list. We can look at a web page for a more complete list.
 - ◆ `mvaddch(win,y,x,ch)`
 - ◆ `mvwaddstr(win,y,x,str)`
 - ◆ `mvwaddchstr(win,y,x,chstr)`
- After calling one of these call `refresh(win)` to see the change.
- You can use the See Also section of the man pages to find more related functions.



Input Functions

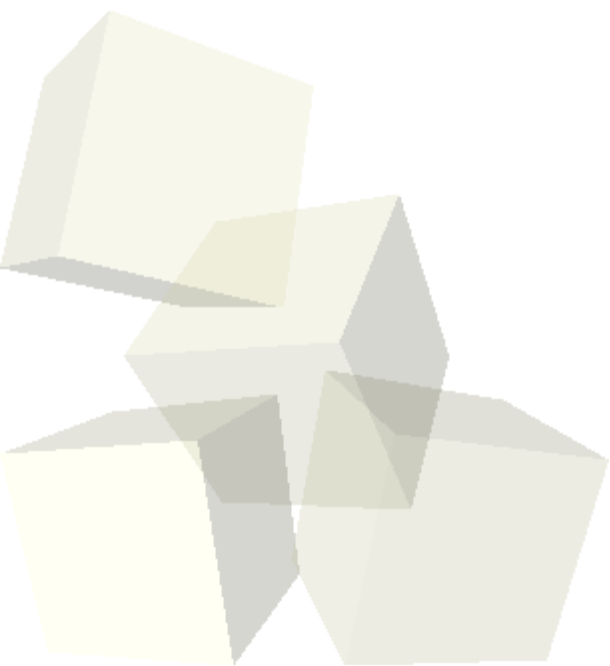
- There are a number of functions for getting input in curses. The simplest is `wgetch(win)`.
- Unless you set other options this will work just like `getchar()` blocking the program and printing to screen.
- The following lines will allow non-blocking, non-printed input that doesn't print.
 - ◆ `keypad(win,1);`
 - ◆ `wtimeout(win,0);`
 - ◆ `necho();`





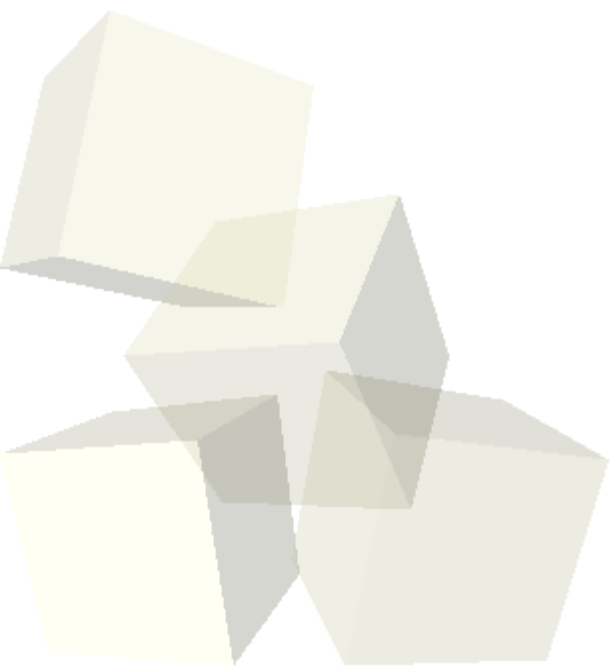
X-Windows and X11

- Linux and Unix boxes use a windowing system called X-windows. This is a very general graphical system that allows a lot of flexibility.
- One of the most significant features of X-windows is the ability to display windows remotely.
- Cygwin can give you X-windows under Windows, but by default you can't use it there.





- There are several steps in getting an X window.
 - ◆ Get a display. (`XOpenDisplay`)
 - ◆ Get a screen number on the display. (`XDefaultScreen`)
 - ◆ Create the window. (`XCreateSimpleWindow`)
- Here again, the man pages can help us get more information.





- Most GUI environments use events for user input. That's because you can't block the thread and there are many different event types (key presses, mouse actions, exposures, etc.)
- There is a big union called `XEvent` that has the different events. Every structure in it shares certain elements at the beginning.
- The `XNextEvent` function will return the next event to you. You switch on the type of the event to determine what you should do about it.
- For X-programs the event handling likely belongs in a loop.



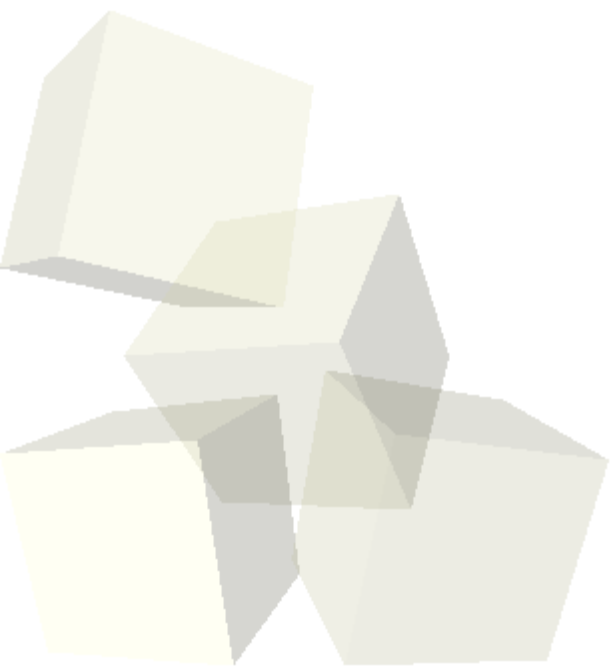
- One type of event that is particular to the X system is exposures.
- They tell you that some part of the window has been exposed and that you need to redraw it.
- By default, X-windows don't remember what is drawn in them so the refresh has to be done manually.





Graphics Context

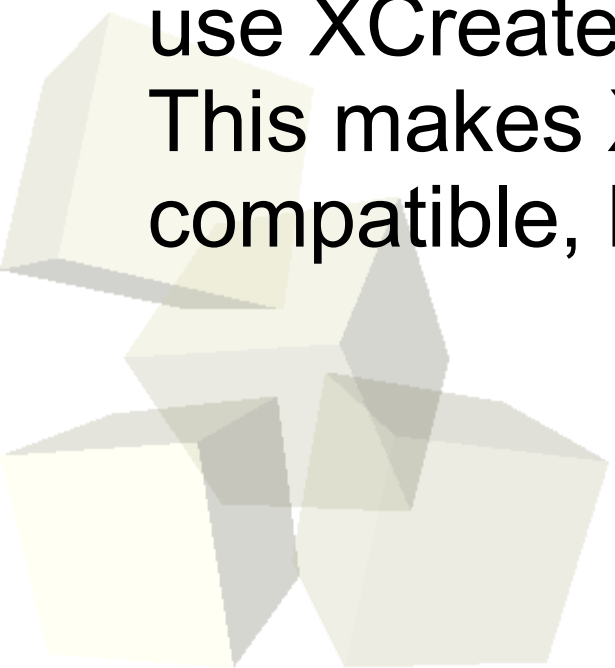
- The graphics context in X is a struct that tells X how to draw things.
- You can create multiple instances of this structure and set them up to draw in different ways. You can think of each one as being like a pencil or brush with a different color, width, etc.
- The struct is called `XGCValues`.





Drawing and Colors

- There are a bunch of drawing functions in X11 that begin with XDraw and XFill. They are fairly simply to master and running a command like “man -k XDraw” will list them.
- Colors are more challenging. The XAllocNamedColor will give you a color from a set of “named” colors. For more variety you need to use XCreateColormap to make a full color map. This makes X applications more cross-platform compatible, but harder to work with.





- What are you doing for Thanksgiving?
- Interclass Problem – Write a little program to use one of these two libraries.

