Intro to Programming II
Curses

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Curses is a C library for displaying ASCII characters at arbitrary points within a text window.

Nice for making better-looking text-based UIs.

C also has a number of third-party GUI libraries

△ Nothing standard like Java has
#include <curses.h>

int main(void) {
    int c;
    initscr();
    move(10, 25);
    printf("Hello world!");
    refresh();
    c = getch();
    endwin();
    return (0);
}
25-2: The pieces

6. `#include <curses.h>`
6. `initscr()` - this sets up the curses window. It should be the first line in your program.
6. `refresh()` - redraws the screen.
6. `endwin()` - this cleans up curses. It should be the last thing in your program.
25-3: Placing the cursor

- Curses uses (row, col) as its indexing method.
- (0,0) is the upper-left corner.
  - In other words, (y,x) is the representation.
- To place the cursor at a particular location, do move(y,x).
printw() - a printf-style function that places a string at the current cursor location.

putch() - write one character at the current location.

And, if you’re feeling lazy, you can do:

- `mvaddch(row, col, char)`
- `mvprintw(row, col, string, arg1, arg2, ...)`
- to combine moving and writing.
25-5: Example - adding a marquee

Let’s add a border to our “Hello World” app.
25-6: Example - adding a marquee

6 Let’s add a border to our “Hello World” app.
6 Actually, we could also use the box() function.
6 Notice that box takes three arguments: window name, horizontal char, vertical char.
6 We can actually have multiple ’windows’.
6 We can read input with:
   - `getch()` = works just like `getc()`
   - `scanw()` - works just like `scanf`.

6 In this case, we use `getch()` to leave the input on the screen.

6 We can also use `usleep()` to specify a number of microseconds the program should sleep.
To change the appearance on the screen, we just draw over the old content and draw our new content.

In curses, that means writing spaces over areas we want to be blank.

How can we make the print statement crawl across the screen?

Let’s modify it to print a command line argument.
We can also set the attributes of the text that’s printed, using `attron()` and `attroff()`

- Interesting attributes are:
  - A_NORMAL
  - A_STANDOUT
  - A_UNDERLINE
  - A_REVERSE
  - A_BLINK
  - A_INVIS
Exercise 6: Make the ’hello’ string crawl left to right, with reverse video text.
As we mentioned before, you can use scanw() and getch() to read in input.

Let’s use this to create a simple quiz program.
25-12: Clearing the screen

6 We can use clear() to clear the whole screen.

6 Let’s add this to our quiz program. Remove the question before printing ’correct’ or ’incorrect’.
25-13: Using Curses in Project 5

- Where do you need to use this in project 5?
- `drawBoard` should draw each component of the `boardArray`.
- Draw a ’1’ if the square is alive.
- Draw a ’ ’ if the square is dead.
- Refresh once all cells are drawn,
To set the screen to draw in other colors, we do the following:

- Add `start_color()` to the beginning of your program.
- Create a set of color pairs - these indicate the foreground and background colors.
- `init_pair(1, COLOR_RED, COLOR_BLACK);`
- To start using a particular pair, set it as an attribute:
  - `attron(COLOR_PAIR(1));`
Curses has 8 builtin colors:

COLOR_BLACK, COLOR_RED, COLOR_GREEN, COLOR_YELLOW, COLOR_BLUE, COLOR_MAGENTA, COLOR_CYAN, COLOR_WHITE

You can also change the builtin colors by setting their RGB values:

init_color(COLOR_RED, 700, 700, 0);

Modify the marquee program to use at least three different color pairs.
If you’re making a game, you typically want the user to provide input via the arrow keys.

The numerical values returned by the arrow keys are: 65,66,67,68.

You can do:

```c
int ch;
ch = getc();
if (ch == KEY_LEFT) {
    etc
}
```
Let’s use this to make a program that moves a character around the screen.

When the user pushes ‘up’, move the character up one row. Etc.

Issues:

- Don’t forget to undraw the old character.
- Use noecho() to keep user input from showing up.
- Move the cursor ‘one step back’ to place it on top of the character,
Other things we haven’t touched on:

- Curses also lets you create multiple windows. This is useful when you’re making lots of changes, or you need to be able to revert back to a previous screen.
- You can also use this to break the screen into multiple subscreens. This is useful if, for example, you want to have a menu at the top.