DASL 130 – C Programming Course

Lecture 7

Problem Solving

- Identify what data you need, and how to get it from the user, and how to convey the end result
- Break the processing down into simple steps
- Write code bit by bit, test as you go with printf diagnostic statements
- If something needs to be done many times, convert it into a function, or do it all at once in a loop

File IO

```
#include <fstream>
#include <iostream>
#include <stdlib.h>
#include <stdio.h>

// Read
FILE *bmpInput  =  fopen(fileName, "rb");
// Write
FILE *bmpOutput  = fopen(fileName, "wb");
```

File IO

- fopen flags

r - open for reading.

w - open for writing.

a - open for appending.

r+ - open for both reading and writing. The stream will be positioned at the beginning of the file.

w+ - open for both reading and writing. The stream will be created if it does not exist, and will be truncated if it does exist.

a+ - open for both reading and writing. The stream will be positioned at the end of the existing file content.

rb - open for reading. The 'b' indicates binary data (as opposed to text); by default, this will be a sequential file in Media 4 format.

wb - open for writing. The 'b' indicates binary data.

ab - open for appending. The 'b' indicates binary data.

File IO

- Seeking within a file:
  - fseek(bmpInput, 54, SEEK_SET);
- Reading 1 byte from a file, value is in *pChar
  - unsigned char *pChar;
  - fread(pChar, sizeof(char), 1, bmpInput);
- Writing to a file
  - fwrite(pChar, sizeof(char), 1, bmpOutput);

Bitmaps

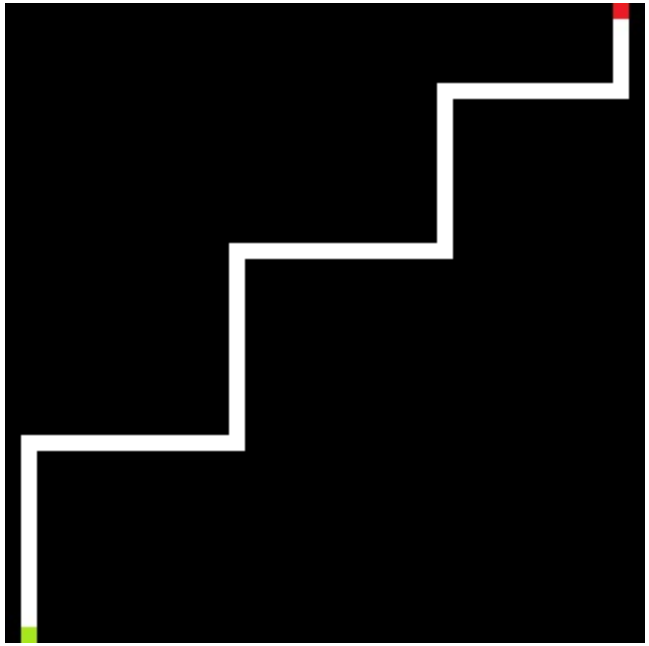
- 54 Byte Header – resolution and color depth information
- 24 bit uses 3 bytes, one each for Red Green Blue
- If we are using grayscale we can just use one of those bytes for our processing.

Navigating

- For this project – can only move up, down, right, or left into another white space.

- Start at green,
  end at red

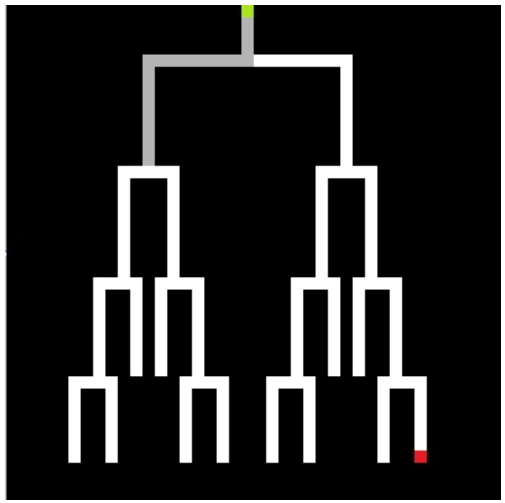
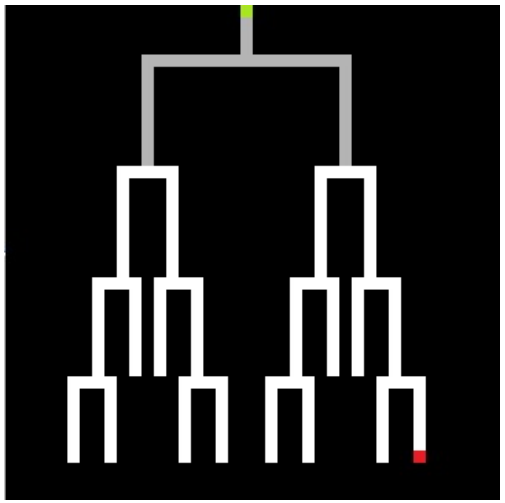
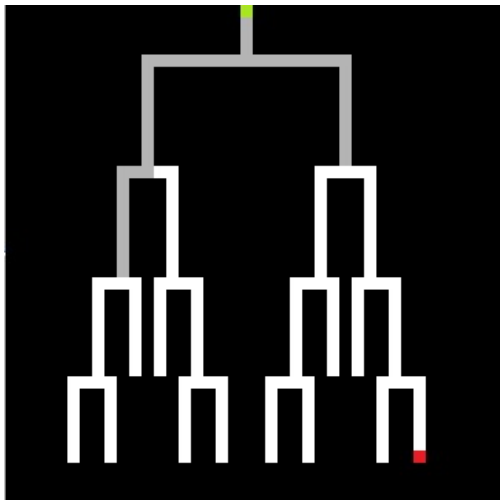
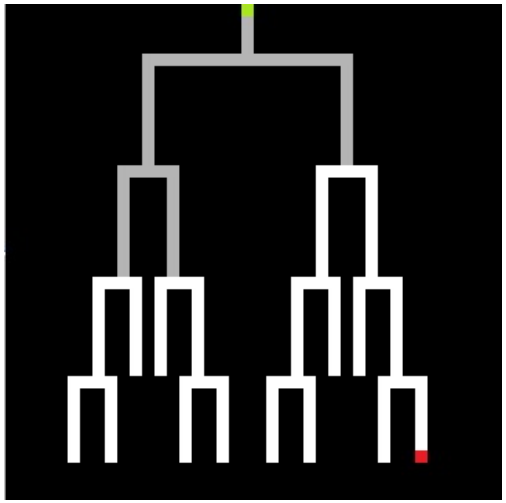
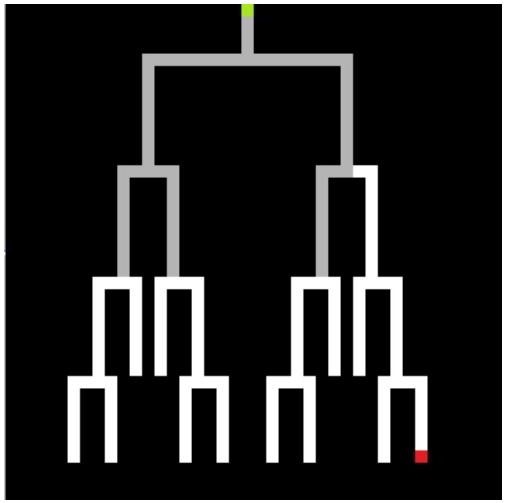
- Mark your path with
  grey, 128



Navigation Techniques

- Turn right, turn left
- Breadth first search
  - Take each turn, and go until the next turn, then go back. When all options at this "level" have been exhaust, take one of the next turns and continue.
- Depth first search
  - Keep going till you hit a dead end, then retrace back to the last turn, choose another way and try that till the end

Breadth First Search

- etc

Depth First Search