Introduction to Graphics

Billy Moses
How to make pretty things appear on screen
Libraries that will be covered

- OpenGL
- glut
- SDL2
- SDL2_mixer
- SDL2_image
OpenGL

➢ Traditional (old) cross-platform library for graphics

➢ Widely used / extended upon

➢ Wrappers available for most languages

➢ Additional libraries such as glut extend and provide added functionality
SDL (2)

➢ Newer cross-platform library for graphics / images / music

➢ Less commonly used

➢ Wrappers available for many languages

➢ Provides almost all functionality you want

➢ Personally, easier to use / looks nicer
Makefile
Makefile Basics

all: pong test mandel sdl2

pong: pong.c
    gcc pong.c -std=c99 -lGL -lGLU -lglut -lSOIL -o pong

test: test.c
    gcc test.c -std=c99 -lGL -lGLU -lglut -lSOIL -o test

sdl2: sdl2.c
    gcc sdl2.c -std=c99 -lSDL2_mixer -lSDL2_image -lSDL2 -o sdl2

mandel: mandel.c
    gcc mandel.c -std=c99 -lGL -lGLU -lglut -lSOIL -o mandel
Advanced Makefile

CC = gcc

UNAME := $(shell uname)

OPENGL = -DUSE_OPENGL

SDL = -DUSE(SDL) -lSDL2_mixer -lSDL2_image `sdl2-config --cflags --libs`

ifeq (, $(findstring NT, $(UNAME)))
    SDL += -lWinmm
    OPENGL += -lglut -lglu32 -lopenGL32
else ifeq ($(UNAME), Darwin)
    OPENGL += -I/opt/X11/include -framework OpenGL -framework GLUT -framework Cocoa
else
    OPENGL += -lGL -lGLU -lglut
endif

all:
    @echo "Building project"
    $(CC) Main.c -std=c99 $(OPENGL) $(SDL)
General Suggestions
(Double) Buffering

➢ Instead of drawing everything manually to screen (slow to draw), draw to buffer then draw that all at once

➢ Much faster, and can resolve random flashes of something drawing if that is an issue
Events

➢ All changes from the user are relayed as events

➢ Keyboard / Mouse Click / Mouse move / Window Resize / etc

➢ To use, add something to listen for these events (likely asynchronously)
Keyboard Input

➢ Two types of input, keyup and keydown

➢ When you hold down a key, it sends a single keydown, pauses, then a series of keydown events

➢ For fluidity (e.g. movement keys) its much better to have a variable which keeps track of whether the key is down rather than checking for events
Drawing
Drawing to screen

➢ Set Color / Texture, then draw shape

➢ Example shapes: triangle, quadrilateral, rectangle, circle, ellipse, point, etc (3D even if you set it up)
Lots of Example Code