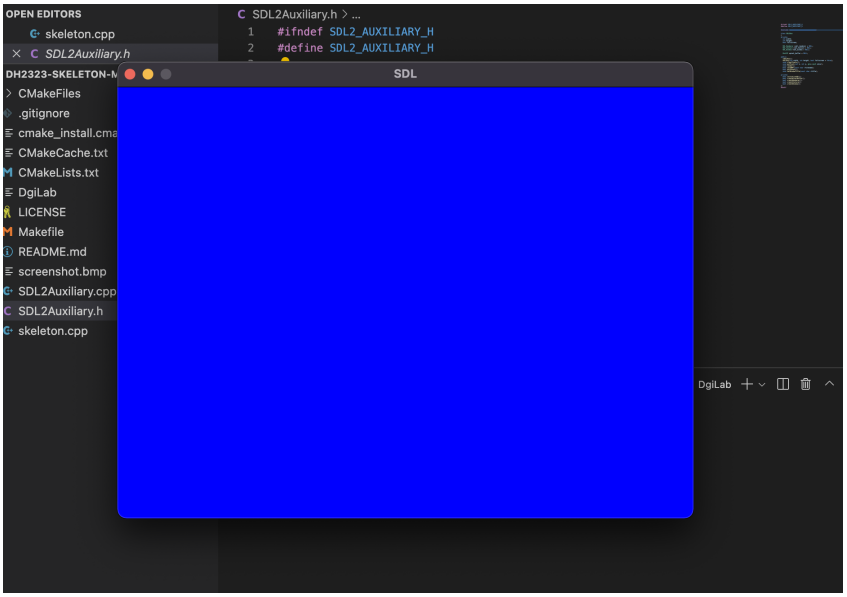
1. Set up

I cloned the github skeleton code from user Lemonad (https://github.com/lemonad/DH2323-Skeleton).



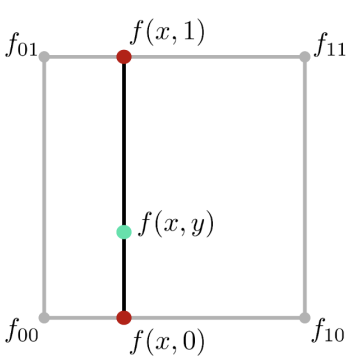
2. Intro to 2D graphics

2.2 Linear interpolation
Linear interpolation is pretty much averaging the two values that surround the new value. It can be done in different directions, e.g linear in x or linear in y. Formula is f(t) = (1-t)a + tb

2.3 Bilinear interpolation
This is pretty much the same as before only that you first have to interpolate twice in either y direction or x direction, and then interpolate once in the other direction. In my case, I will first interpolate the sides that have constant x values and varying y values, and then use these sides to interpolate the “middle line” where x will vary.

I will insert a drawing/graph that describes my thinking for this algorithm:

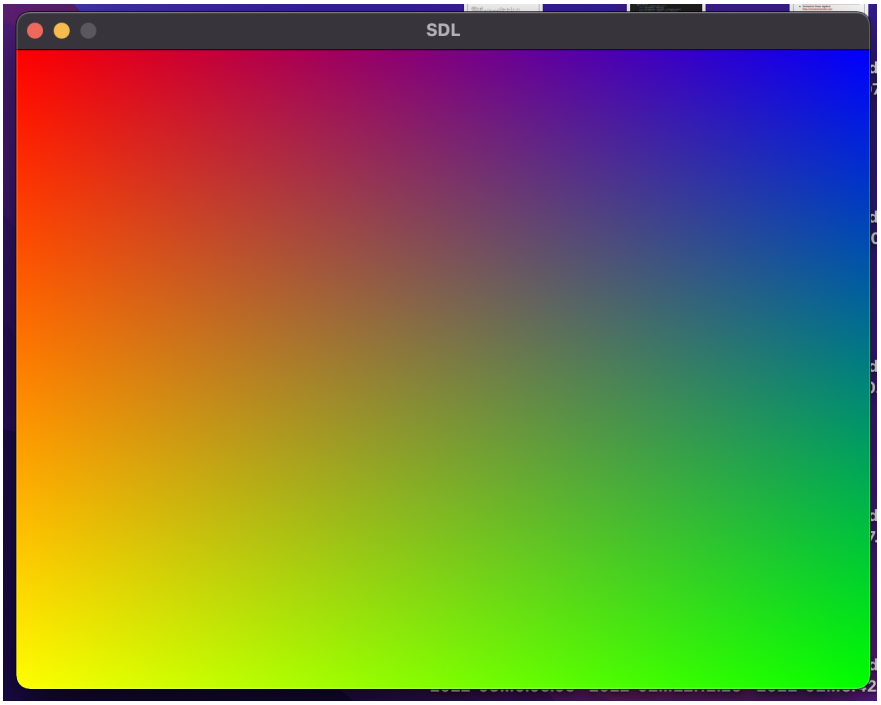
2D, “bi-linear”



$$f(x,y) = (1-x)(1-y)f_{00} + x(1-y)f_{10} + (1-x)y f_{01} + x y f_{11}$$
$$= (1-y)((1-x)f_{00} + x f_{10}) + y((1-x)f_{01} + x f_{11})$$

“interpolate twice in x direction and then once in y direction”

This is from the lecture slides of DH2320/DD2258 VT22-1 Introduction to Visualization and Computer Graphics



Results from 31/3-2022

3. Starfield

Random float number with range, how to:
https://stackoverflow.com/questions/4310277/producing-random-float-from-negative-to-positive-range

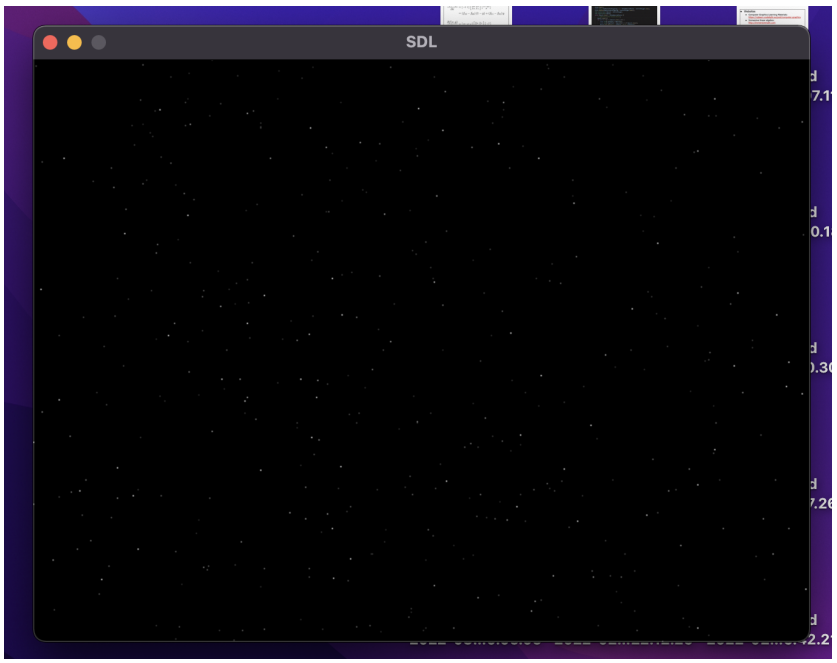
I found some introduction to perspective projection and 3D starfield on this page:
https://www.j0e.io/tutorials/starfield/

“A good value for it is f=H/2. Then the vertical field of view for the camera will be 90 degrees. What is the resulting horizontal field of view? Try to calculate this.”
https://www.reddit.com/r/Planetside/comments/1xl1z5/brief_table_for_calculating_fieldofview_vertical/
https://www.pcgamingwiki.com/wiki/Glossary:Field_of_view_(FOV)

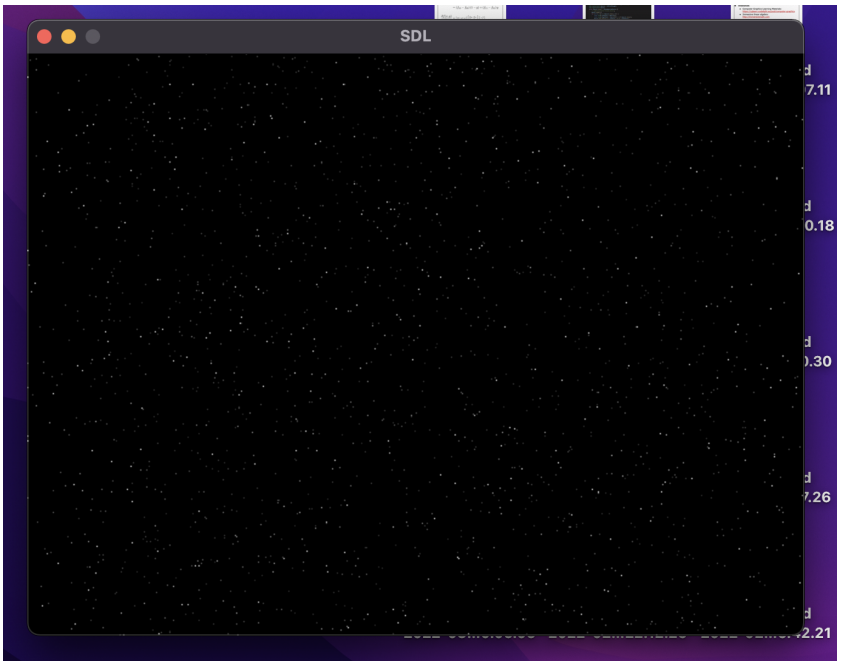
Aspect ratio = y / x = tan(vertical FOV/2) / tan(horizontal FOV/2)

640/480 = 4/3

f=H/2 gives vertical FOV of 90 degrees. Horizontal FOV is then 106 degrees (according to some web calculator). I cannot get my own calculations correct but according to pre-made tables of FOV it should be 106 degrees.



A thousand stars, from 31/3-2022



Five thousand stars, it looks nicer with more of them. From 31/3-2022

Velocity: 0.0001f looks smooth and nice, 0.001f looks very fast, 0.01f cannot really see motion.

Implemented the three equations in the lab instructions, which worked to get the stars moving. A movie of it is included in the lab1 folder.