Assignment 2

Using computers to render 3D graphics from vectors to create a 2D image on your screen is a very complicated process, the way we do this is with a method called the graphics pipeline. To first talk about the software side, we need to go over what hardware there is to use the software. The main parts that we care about for these processes include the CPU and GPU, central processing units and graphics processing units respectively. The CPU rans the OS that control the overall functioning of the device along with the use of RAM, random access memory. The GPU of a computer is designed specifically to render 3D graphics, however more uses have come as of recently, such as using them for neural networks and recognition training. RAM is memory that stores and sends program data and instructions to the CPU, while graphics memory stores vector data, raster images, and a screens pixel. The step by step process used to create these graphics is called the graphics pipeline. Data is feed into the pipeline and a raster image comes out. The first step in the pipeline includes the data setup, where a webGL program creates the link between the variables in a vertex shader program and the GPU buffers, which hold that data and variables. Step 2 is the actual use of the vertex shader program on every vertex defined in world coordinates. The next step is to simply get rid of the data that is outside the FOV, field of view, the step afterwards then maps the data to a viewport which is defined in pixels. Then it goes on to the next step which includes rasterizing the geometric primitive by figuring out which pixels are inside the boundaries. The next step in this pipeline executes a fragment shader on every pixel defined in the previous steps. Then it goes on to the final step which includes combining the color of the pixel from the fragment shader with the color already assigned to the output draw buffer. Step 1 is performed by the CPU in conjunction with the RAM. where all the GPU performs every step afterwards.

Sources:

<https://runestone.academy/runestone/books/published/learnwebgl2/01_the_big_picture/3_3d_graphics_pipeline.html>

<https://www.tutorialspoint.com/webgl/webgl_graphics_pipeline.htm>