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CS 3160 Concepts of Programming Languages
Final Project Write-Up
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The Game of Life is a cellular automaton that was developed in the 1970s by a mathematician named John Conway.   The game was conceived when Conway was attempting to simplify the problem of finding a machine that could build copies of itself. The game has garnered a lot of attention since its inception because of the interesting patterns and sequences it produces. But perhaps the most interesting thing is that it is said to represent a language that is turing-complete.

As my final project, I chose to create a small sandbox version of the game of life. Every time I see simulations of this game it amazes me, but I have never found a tool that let me experiment with creating my own patterns with ease. So that was the aim of this project.

My solution initiates the game with an interesting pattern to demonstrate how both the game and the user interface work. The user can start and stop the simulation at will. They can also alter the simulation or create an entirely new one by clicking on cells to reverse their states. These features provide a simple but effective way to experiment and observe the behavior of the game.

Running this project is simple. Open the file title "The Game of Life.html" with a browser and rest is self-explanatory. I tested this project on 4 different browsers. They are Mozilla Firefox, Google Chrome, Microsoft Edge, and Microsoft Internet Explorer. The project does not work on Internet Explorer. I was not surprised by this. Inside the browsers, I tested the program further by initiating the game with well known configurations, many of which I included in the initial configuration of the game, and observed their behavior.

As this is a web project, was written using HTML, CSS, and Javascript. Every visible element in the project is an HTML element styled with CSS. Javascript provides the game's logic and also handles updating the user interface according to the game's logic and the user's commands. Getting Javascript to handle both of these tasks simultaneously required getting somewhat creative, as Javascript is strictly single threaded. A fact I was painfully unaware of until I I was a majority of the way through this project.

This project is modular because the code for each language I used is stored in separate files. It would be fairly easy to use each piece to perform its function on an entirely different project, assuming proper attention is given to its implementation style. That being said, this project should be considered a rough-draft. I have run short on time that I would ideally spend on reiterating much of the code here and improving it. So it is modular, sort of. After cleaning up and tweaking it could be a pretty solid modular design.

The javascript, in particular, could use some polishing. The first thing I would do is separate more of my functionality out into individual functions. Defining functions that alter properties of the elements on the page with parameters that allow the user to specify which properties are altered would truly make this game implementation flexible. This alone would make it a truly object-oriented design.

This project could be extended to facilitate much larger simulations of the game. Currently it is hard coded to work on a 40x40 grid. But it could, and probably should, be extended to allow the user to define the size of the simulation at runtime. Javascript could be used to implement browser sniffing capabilities which, in turn, would be utilized to call CSS layouts that are tailored for specific environments and completely responsive to window size. This would allow my project to fun on a whole array of devices including smartphones, tablets, and traditional computers. Responsiveness to window size could be done without modification of existing code. Adding new CSS classes that are applied dynamically as a function of the window size would achieve this.

In terms of reusability, the HTML and CSS could be used to generate a simple webpage that features any web application. This could be achieved by swapping out the javascript files and renaming the resource files for the background image and title. It is essentially a basic template for a web page that showcases some web app. The game itself however, is dependant upon specifically my CSS file. So, in its current state it is not useful anywhere except in my project.

I am very grateful that I had the opportunity to code a Game of Life sandbox. It had been on my personal to-do list for a long time, but I am not sure I would have ever done it if weren't for an open ended project such as this one. I hope you will give the game a try. I think you will find it is an easy to use and accurate implementation of the Game of Life.