Portfolio

Projects for Software Engineering & Data Engineering

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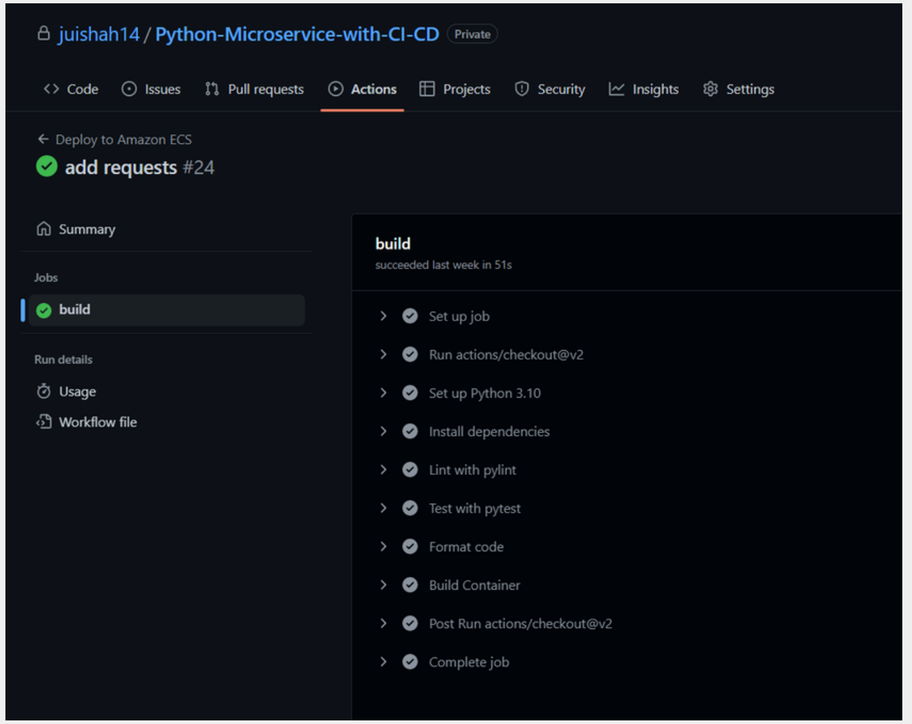
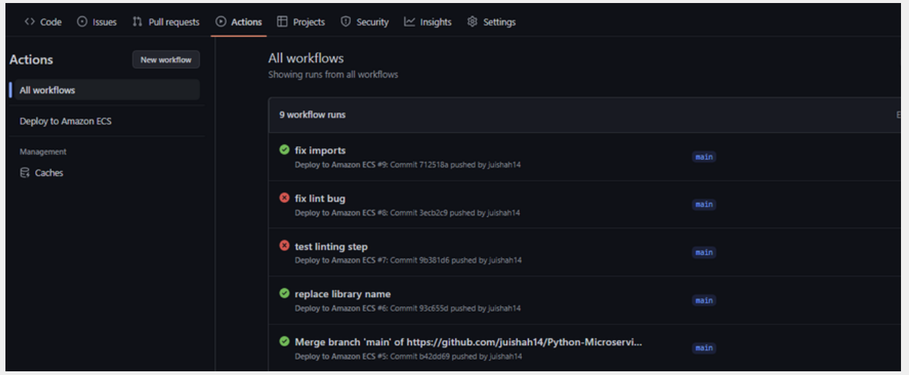
Python Microservice with CI-CD

Tools: Docker, AWS, Fast API

With this microservice, users can retrieve information on NASA and its various missions and scientific discoveries, as well as perform a search of the NASA Image and Video library.

This containerized Paas microservice has been designed such that it can be scaled to create a production-level Dev-Ops workflow and infrastructure, equipped with unit and end-to-end tests, formatting and lint checks, and continuous deployment of its container to AWS.



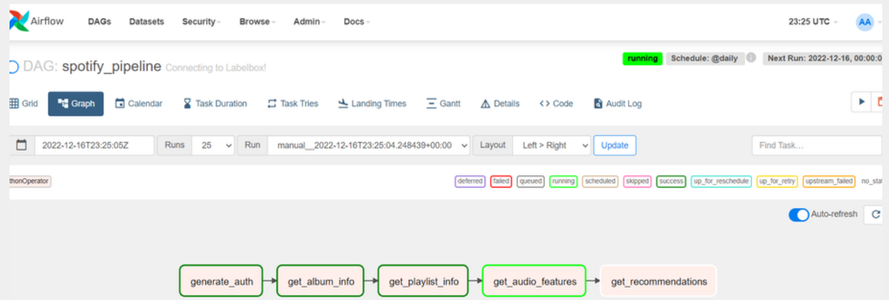


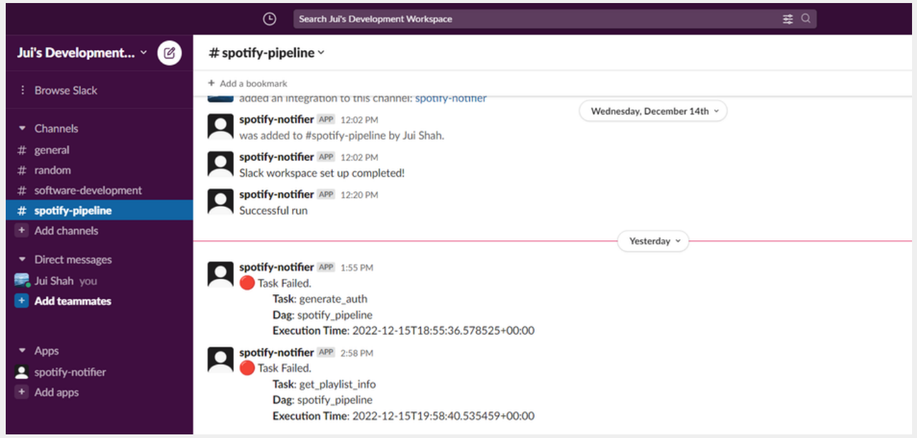
Spotify ETL Pipeline

Tools: Airflow, Docker, Slack, Spotify API

This pipeline was designed using Apache Airflow and Docker to programatically generate song recommendations using the Spotify API, as well as inform the user of any failures via Slack.

It extracts data on your favourite playlists, albums, and tracks on Spotify, and processes its key features (artist, tempo, energy, etc.) to generate song recommendations, with a bias towards songs with higher valence and 'danceability' scores. I was pleasantly suprised with the outcome and have loved many of songs recommended!





Real-Time Executive (RTX)

Tools: C, Keil Board, NXP Microcontroller

As part of the lab for SE350 (Operating Systems), our group designed a small real-time executive (RTX) and implemented it on a Keil MCB1700 board populated with an NXP LPC1768 microcontroller.

The executive provided a basic multiprogramming environment, with five priority levels, preemption, simple memory management, message-based inter-process communication, a basic timing service, and system console I/O and debugging support. The RTX is also suitable for embedded computers which operate in real time.

k_process.c 2, M

manual_code > Context_Switching > src > k_process.c > scheduler(void)

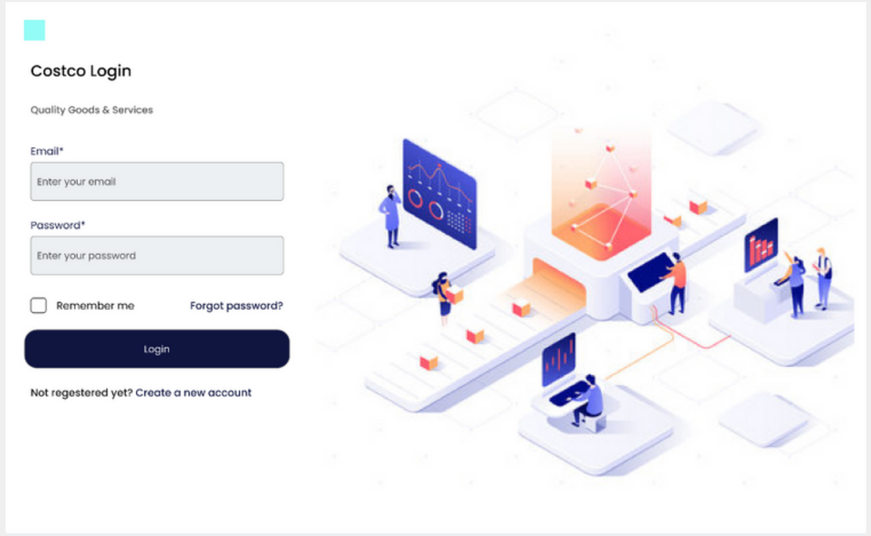
```
170
171 int process_switch(PCB *p_pcb_old)
172 {
173     PROC_STATE_E state;
174
175     state = gp_current_process->m_state;
176
177     if (state == NEW)
178     {
179         if (gp_current_process != p_pcb_old && p_pcb_old->m_state != NEW)
180         {
181             p_pcb_old->m_state = RDY;
182             p_pcb_old->mp_sp = (U32 *)__get_MSP();
183         }
184         gp_current_process->m_state = RUN;
185
186         U32 ctrl = __get_CONTROL();
187         ctrl &= ~BIT(0); // clear bit 0, want to be at priv. level when exit from the kernel
188         __set_CONTROL(ctrl);
189         __set_MSP((U32)gp_current_process->mp_sp);
190         __rte(); // pop exception stack frame from the stack for a new processes
191     }
192
193     /* The following will only execute if the if block above is FALSE */
194
195     if (gp_current_process != p_pcb_old)
196     {
197         if (state == RDY)
198         {
```

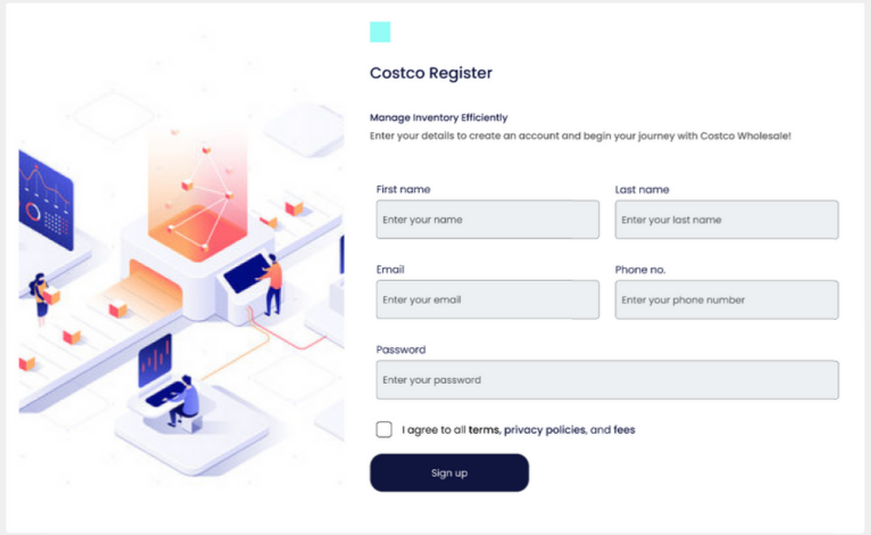
Costco Management Platform

Tools: Golang, MongoDB

This backend for a Costco Management Platform was designed using Golang and Mongo DB. It features user authentication using JWT, database access using Mongo DB, and handles HTTP requests, route management, and JSON validation using Gin Gonic.

This CRUD API keeps track of product inventory, orders, invoices, account holders, and their memberships (Business, Executive, or Gold Star).





Mental Health App

Tools: React Native, MongoDB, Node.js & Express.js

"Happy Sapling" is an app that encourages mindfulness and daily self-reflection. When the user first enters the app, they're greeted with a sapling, which slowly grows over time as the user continues to use the app. The user has the opportunity to reflect on their day via daily questions, journal entries, and a timed meditation bubble, as well as celebrate their successes via an 'Accomplishments' tab.

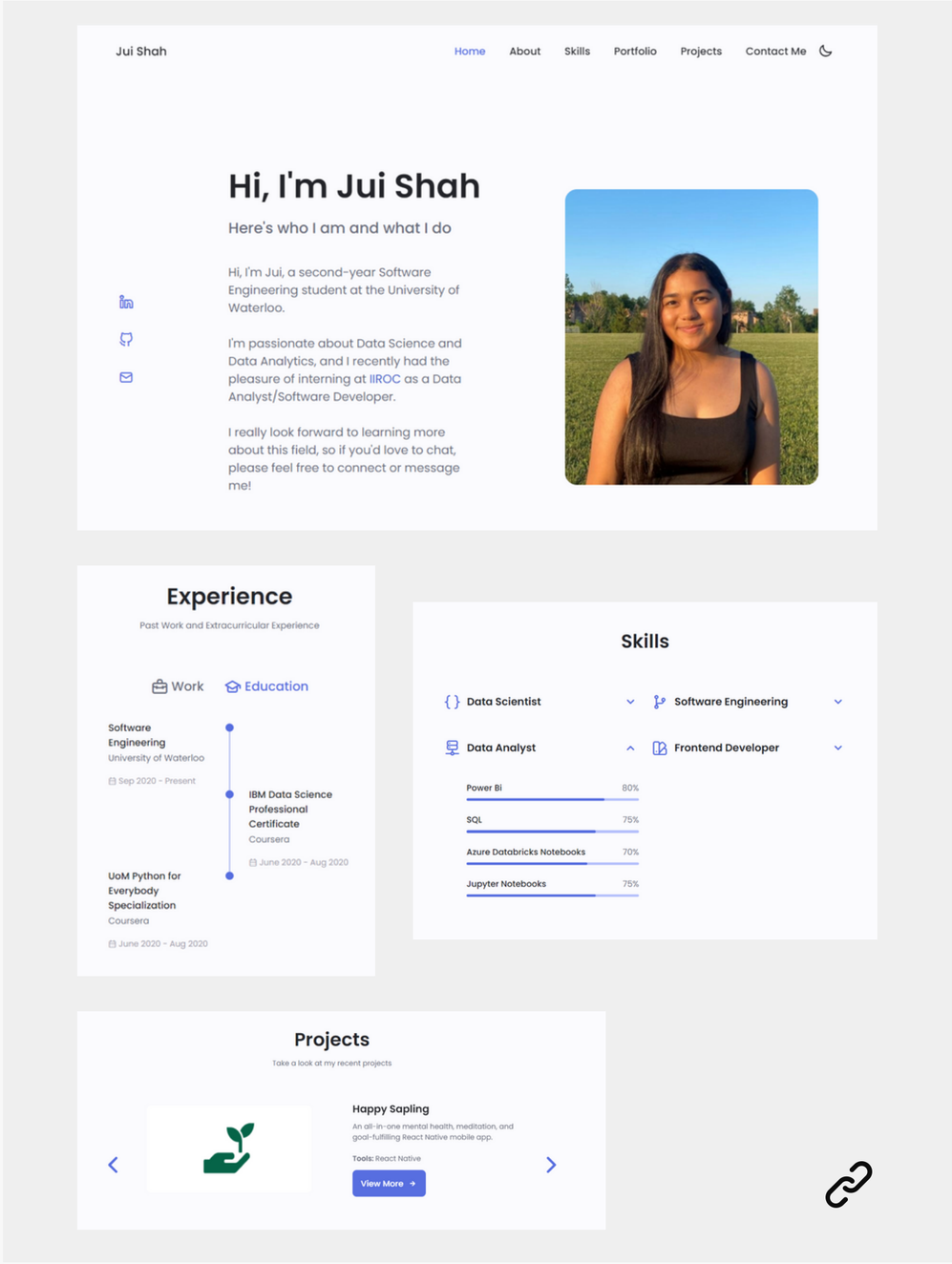
Through the Mood Calendar, the user can also have a birds' eye view of how they were feeling that month, through the mood colour they logged when answering the mindfulness questions.

Personal Website

Tools: Javascript, HTML, CSS

To showcase my projects and past experience, I designed a personal website using Javascript, HTML, and CSS. With this project I was able to learn how to implement a frontend and iterate on the designs I implemented.

I added various features, such as a Light & Dark mode, a carousel demonstrating my recent projects, and a timeline to demonstrate my past experiences & extracurriculars. I aimed to implement a clean design, and hope to add to this website in the future.

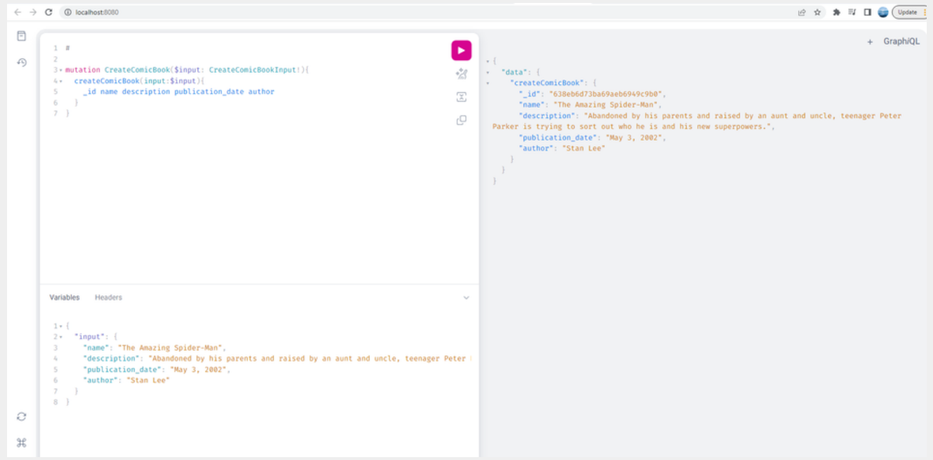


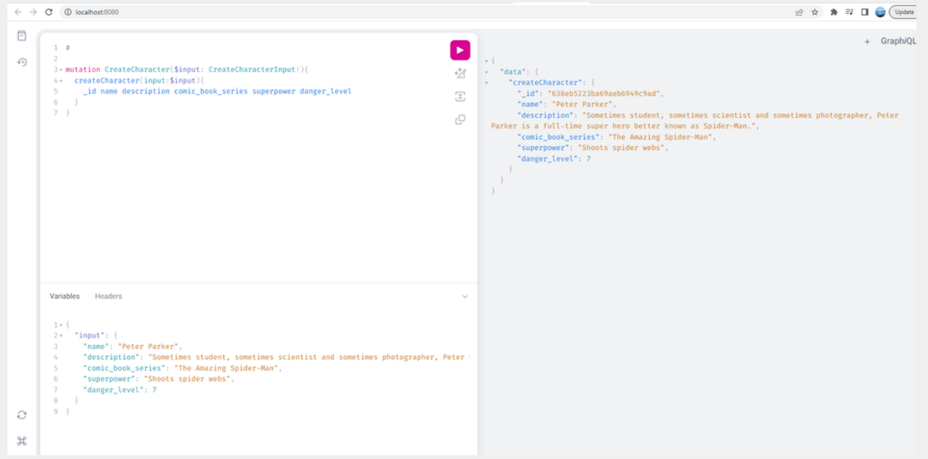
Comic Book API

Tools: Golang, GraphQL, MongoDB

Inspired by comic books and Marvel, I used Golang, GraphQL, and MongoDB to create a CRUD API to keep track of comic books, its characters and authors, as well as the location and details of comic book stores all around the world.

This project gave me a chance to learn and familiarize myself with GraphQL and use it with a backend to store information in a MongoDB database.



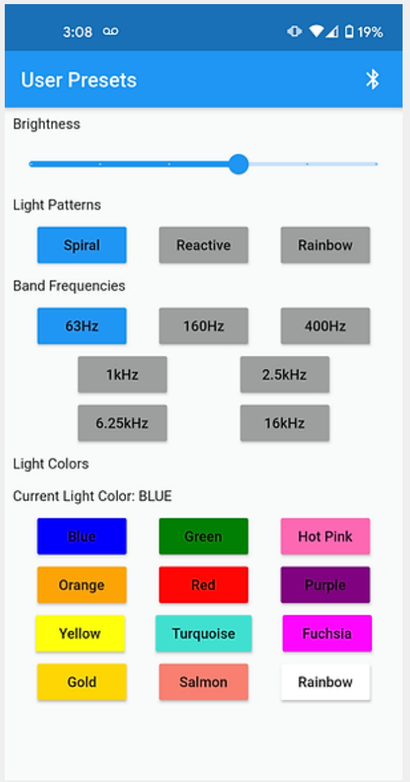


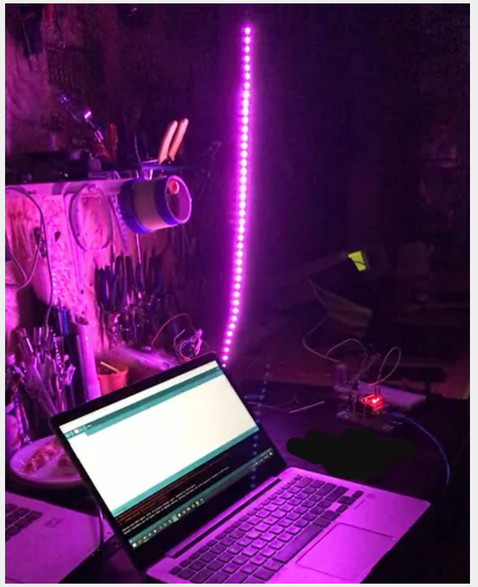
LED Music Visualizer

Tools: Arduino, Flutter

This LED Music Visualizer allows an LED light strip to instantaneously react to music played by the user. Its hardware consists of an Arduino microprocessor, a Bluetooth module, and a Spectrum Shield.

The Bluetooth-connected app, created using Flutter, provides an interface for the user to select from 3 presets and 12 colours for the LED strip to display, as well as set the brightness level of the LEDs. The 'Reactive' preset allows for the user to select from 7 audio frequency bands (eg. Bass) for the LED strip to react to.





Data Science & ML

Tools: Python, Jupyter Notebooks

In order to learn the basics of data science, data analysis, and machine learning, I completed various courses offered by IBM on Coursera. These courses gave me the opportunity to use Python (Pandas, Numpy, Seaborn, Matplotlib) to clean and visualize data, as well as build ML regression models.

I later used my learnings from these courses to build various classifiers, such as a Titanic Passenger Survival classifier and a Car Price classifier. All the labs from the IBM courses, as well as the above classifiers, can be found on my Github.