Coursework Sample

Descriptions of a few courses taken in pursuit of my bachelor's degree to give an idea of the range and depth of my experience.

Here is a public GitHub repository with some of the assignments described below:
https://github.com/jrunnber/Coursework-Code-Samples

Fundamentals of Compiler Design

This course covered the basics of compiler design including: compiler structure, symbol tables, regular expressions and languages, finite automata, lexical analysis, context free languages, LL(1), LR(1), recursive descent, and LALR(1) parsing. The course also consisted of four incremental programming assignments done individually to create elements of a compiler for a sparse programming language dubbed oc.

Technologies Used: Coding in C/C++, Flex lexical analyser generator, and GDB and Valgrind to debug.

Operating Systems

This course was an in depth study of operating systems which entailed two assignments changing an open source operating system, FreeBSD, and another assignment creating a filesystem using FUSE. The assignments were completed by a partner and myself, primarily through pair programming.

The first assignment was to modify the process scheduling algorithm to use a lottery ticket based algorithm for choosing timeshare priority processes.

The second assignment was to modify the page level memory management algorithm, such that it would page out pages in order of oldest to newest.

The third assignment was to create an all-in-one filesystem using FUSE. We designed the filesystem and using FUSE we overwrote the following functions: Getattr, Create, Unlink, Read, Write to implement it.

Technologies Used: Coding in C and using Unix system calls, FREEBSD open source operating system, FUSE (Filesystem in Userspace), Oracle VM Virtual box to run FREEBSD, and debugged with GBD and Valgrind.

Database Systems II

In this course we studied and implemented database architecture. The course included study of: data storage, tree and hash indexes, storage management, query evaluation and optimization, transaction management, concurrency control, and recovery. This course also included three programming assignments--which built off of one another--completed by myself and a partner, primarily through pair programming.

The first assignment included interfacing with the unix filesystem to create a paged file system used for a record based file manager for a relational database.

The second assignment is a continuation of the record based file manager and the addition of a relation manager.

The third assignment is an indexing component which implements B+ trees.

Technologies Used: Coding in C/C++, Github version control, and GDB and Valgrind to debug.

Introduction to Software Engineering

This course revolved around a single term long, team based project. Throughout the course, working on the project, we studied methods of analysis, design, verification and validation, maintenance, and project management. While working on the project my team and I followed the SCRUM agile methodology.

Technologies Used: Coding in HTML, Javascript, and use of Vue.js and Vuetify, Amazon DynamoDB, and Twitter API.

Geographic Information Systems and Environmental Applications

This course covered an introduction to using and understanding GIS for processing spatial data, including input, storage and retrieval, manipulation and analysis, reporting and interpretation. Throughout the course labs were done using ESRI's Arc Suite: ArcMap, ArcCatalog, ArcGlobe, etc...

Technologies Used: Arc Suite, Python, and SQL