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Professional Self-Assessment

I am like many adult students who returned to college to finish a degree started earlier in their lives. I started out as an Electrical Engineering student who finished a little over two years' worth of coursework. I started an internship that turned into a fulltime position with a company. I learned a tremendous amount in my time with my first company. I transitioned into controls engineering position with the second company I worked for. At my current employer I work in engineering developing desktop applications for production equipment. My professional life took a fantastic turn when I decided to go back to school and take the coursework under my belt and earn a Computer Science degree at Southern New Hampshire University.

My first position started out life as an internship and turned into a full-time position with benefits. I learned many things at this first company. This includes designing, building, and testing small circuits. I was introduced to EMC testing and even performed some testing on products we were producing and learned how to generate reports from this testing. EMC testing is compliance testing to certify products to be used across the globe and verifies its use will not interfere with other electrical equipment or be a hazard to the end-user. The ladder years of this company I was a part of software development team designing C++ and Java software for a new product. I had brief training in UML and developed small pieces of C++ code that were used by software engineers with more experience.

My second position was with a small machine builder who specializes in making equipment and tooling for the medical industry. I filled a Controls Engineering role for this

company. I was given a specification from a customer. I specified components, created wiring diagrams, and then wired the controls cabinets based off the wiring diagrams I created. Most of this equipment is PLC (Programmable Logic Controller) based and programmed in ladder logic. I received formal training in PLCs from Allen-Bradley. I learned how to complete work based on a fixed budget and schedule. I learned how to address customer needs and the importance of producing reliable product that will be deployed in the field and in constant use. Another facet of this job that I fulfilled is designing quality inspection equipment. A lot of this equipment is PC based and used off-the-shelf machine vision cameras and laser triangulation gauges. I created small Visual Basic.NET desktop applications that created a user interface and controls for the various machine vision cameras, laser triangulation gauges, and barcode readers. The desktop application along with the machine tooling created a piece of quality inspection equipment that verified the quality of the product the customer was producing. The piece of software I developed would take lot and serial information from the label through the barcode reader, perform inspections with machine vision and/or laser gauges and then output the results into a Microsoft Excel spreadsheet. To finish out the equipment, I was responsible for creating a user manual.

My current position picked up where I left off at my previous company. I was hired for a salary position as a Software Engineer. My position focused specifically on developing Visual Basic.NET desktop applications using Cognex machine vision. My first task was to develop a vision inspection application for our end-of-line tester. This end-of-line tester checks the quality of vehicle instrument clusters and calibrates the speed, tachometer, fuel, and temperature indicators. The application uses XML files to configure the tests, the tests are highly configurable through the XML files. This application has been in production in various forms

since 2006. The applications have evolved over the years now in C# and now responsible for transferring data to a SQL server. That is where the bulk of my work is today. I develop applications for production equipment that takes hardware components, creates a test with a user interface, and then outputs those results to the user and a SQL server. I also develop SQL stored procedures, do light database administration, and create SQL reports for retrieving data from the SQL server.

To fulfill my career goals and to fill the gaps in my knowledge I decided to go back to college. Southern New Hampshire University was a good fit to continue my education. I have a learned a tremendous amount in the earning of my bachelor's degree.

One of the many valuable things I have learned is the software development life cycle. The SDLC model that appeals to me the most is the iterative approach or the Agile approach. Working in a team performing one- or two-week sprints with a functioning piece of software at the end of the sprint appeals to me. On top of learning the model I have learned the types of artifacts needed to be a professional software engineer. If it is an object-oriented approach that means developing several functional, structural, and behavioral diagrams. These are developed incrementally and iteratively throughout the whole process. As far as artifacts for the coding activities themselves, it is important to start out with pseudocode or a flowchart. There needs to be useful and succinct comments throughout the code.

Another hole I had in my knowledge was algorithms and data structures. My coursework here introduced me to the various types of data structures like tree structures and hash tables. The value of something like a hash table is the speed at which data can retrieved from memory and how to efficiently use memory.

I furthered my knowledge of databases and was introduced to the NoSQL database, Mongo. I have learned how to use MongoDB and where it makes sense to use. I have also learned MySQL and that this database does not have to live on an expensive server managed by an IT department. MySQL can live and serve data on Android smart phones and small pieces of hardware like a Raspberry Pi. A part of this learning is creating a data structure and querying data out of that structure. With what I have learned through my job and cemented at Southern New Hampshire University; I have become quite effective at creating code that utilizes database technologies.

This capstone course and the activities we have performed have been a journey back through the last two years. I have employed all the knowledge gained into refining software fit to be a part of a professional portfolio. The project I chose to enhance is the Weather Station application. This project has it all, it utilizes and embedded Linux system, hardware sensors, Python, a database, and even touches web applications with a dashboard application.

Comparing the original Python code to the code I have today, there has been a heavy amount of refactoring. I had the freedom to select any project I deemed fit. I have demonstrated the ability to take an application and enhance to introduce new functionality to fill another need.

The first enhancement shows my ability to use what I have learned about software design and engineering. This enhancement includes eliminating all the hardcoded values in the code and breaking those out into a JSON configuration file. I also identified parts of the code that needed to be broken out into separate functions for reuse and readability.

The second enhancement demonstrates my knowledge of data structure and algorithms. I created data lists for temperature and humidity. I created functions for determining the minimum,

maximum, and average of both humidity and temperature. There is a new function for converting Celsius to Fahrenheit as well.

The last and maybe the largest change is the implementation of the MariaDB on the Raspberry Pi Weather Station. With MariaDB I created the database and the table holding the temperature and humidity data. In Python I utilized the MySQL tools for Python to add data to the server.

This capstone has shown me many things including how to refine an existing application. This demonstrates the iterative approach of software development. I am on the fourth iteration of the Weather Station. Future iterations can include developments on the web application side utilizing the data from the MariaDB database I created.

My experience with fellow students and professors has been invaluable to my learning experience. I have been shown how important communication is and how much can be gained from working with other people across the country and even the world. I look to take what I have learned here and continue to build upon it. Computer Science is an everchanging field and the learning does not stop. I will constantly be looking back at all the knowledge I have acquired and looking at combining it with new knowledge to make myself a better software engineer.