Tammie Pease

CS 499

Professional Self-Assessment

Looking into some of the incredibly valuable skills that have been polished through my studies at SNHU, many could be mentioned but I want to highlight these skills the most. One of the first ones is communication, as communication has been key throughout my entire school career and retail career, even in an online presence it holds a lot of use. In a world where the majority of the work done for business has turned to the online space to continue operations. So, keeping communication at the forefront will help keep teams together and progressing. Communication was key in my school career for parts that I was unsure about, such as wanting to ensure that the standards of the requirements for my work have been met or making sure that I understood what the project was without having to do major corrections later on. Effective communication allows for the best understanding of what to do in a given time and having effective communication skills with stakeholders later will ensure that you have your best foot is always forward. This act of effective communication also trickles into communication with team members, with effective collaboration efforts instead of effective communication. Hence, collaboration within a team environment will be upheld to the best of its ability. In the classes where teamwork was implemented, there were cases where some other members of the team would not uphold their parts of what needed to be done, but we continued with the best of our abilities from it. Along with this, showing the proof of effort, such as with discussions of groups with only two participants when you need three to post, we did everything we could to follow what was the bare minimum of the goals implemented. Having evidence of what you have done and showing that it was not time lazing around is also important for trying to show continued growth and improvement in school and life later on. However, for most of the teamwork efforts that I have done, working with others and helping each other develop our skills helped show where we all could grow, which is collaboration for its best. As collaboration is taking the best parts of one another’s abilities for the project whatever it may be but also helping their weaknesses for one another.

With working with data structures and algorithms, I have been working with understanding how the data is manipulated, building up data and how it will be made into the system itself something I have been doing for years now in my academic career. Thus, understanding the structure of data will help ensure I could properly manipulate the data within code or other variations of containment such as within documents. Not to mention, algorithms analyzing them and expanding their abilities to have them become grander over time allows for the best outcomes for code but, this will be covered more later. With data itself, data is always fluctuating and always changing, so understanding the scope of what data is and how to build it will ensure that you can effectively work with it. And with working it in, gain an upper hand for what is possible with your code and knowing on a deeper level of how it all operates. So being able to work with databases and software engineering for designing, developing, maintaining, and testing software or databases will ensure the best standards you feasibly get if you consistently uphold yourself to them. Even when the situation is not as favorable as you would want it to be. And lastly with security, keeping that at the forefront of what I plan on doing seeing as my ideal job is somewhere within Cyber Security, knowing what could go wrong and how to prevent it but also having ways to quickly recover from the loss of security or data will help keep response and reaction time low and keep everything as fault tolerant as possible.

In this capstone and my experience throughout the Computer Science program, I learned many valuable things for my future career in this field. One of the biggest ones is that there is a lot that I know, a lot I do not know, and more than I can learn. For Computer Science itself, the term itself can be quite the handwave of what it means, there are so many branches of Computer Science that the knowledge for such will be always expanding and is never-ending. New technology continues to evolve as each step leads to the next for what computers and software are capable of providing for us. And that pursuit of knowledge and continuing to expand my knowledge base will lead me to my future goals within this industry. This capstone taught me many things in of itself. In that, projects adapt and change over time, taking new forms from the first goalpost and looking at how something that was believed to be in the initial scope was either too quick to be a large change or was too large of a concept that needed to be watered down with the time I was given.

With each project, my main idea was to improve the inner workings of the system or to amplify the security of the code. Doing so with a general knowledge of the systems of C++, MySQL, SQLite, as they are the ones, I worked on the most in a higher level rather than introductory courses. Of with I was able to accomplish; making prepared statements, implementing paths to walk through each program, and also refurbishing them all into something workable. With the capstone, whenever there was something that I was unsure about, I would go and do research online through sources such as the language’s coding manual and Stack Overflow for possible answers and continue trying them until one of them worked. With coding, even with so many ways to get the same right answer, there are so many more wrong answers that can be implemented for a solution. With this another skill obtained is knowing where to weed out the bad answers and implement what will work and truly work within the code is something valuable to have in any situation.

Something that I have struggled with for years now is the idea of being too proud to ask for help and acknowledging the weaknesses in my skill set. But even with these weaknesses, I have taken them and worked on them intending to make them not as apparent. And with that, becoming a jack of all trades for the skills I can provide. I have some aspects that I find myself enjoying more than others, however, that is more along the lines of the strengths I have in analysis and scope studying.

Starting with the artifacts themselves, we have the SQL Injection program. This was a tiny program created for my Secure Coding class in which we were to prevent an SQL injection attack using ‘Or’ injection to bypass a security check and thus cause an attack. With this artifact, I updated the code to allow inserting new data into SQLite through C++, working both languages together with the highlight of having used prepared statements to do so. Along with this, I also updated the way to test for OR injection and also a way to help ‘salt’ the values tested into the system to make sure they are placed within quotes before being passed forward in the program. There are now three ways to help protect the system from SQL injection because of these changes. With these aforementioned changes, I increased the capability of the database and the system by making it so you can add data into the database container, and consequently changed the data structure for it. I was able to take the scope of the project into mind and add systems to it that were not present in the initial project and added functions to it to help it to the state it is now. In this, I had felt the need to keep the original injection function the same after taking in the pros and cons, as it would remove what was used originally and that in a way felt like it changed the code too far from where it was. Through it all, I was able to understand how C++ worked with SQLite and then implemented the additional code through that. The prepared statements however are the main highlight of this update for the fact that when you do prepared statements and do them correctly it ensures that they cannot be changed in a way that would harm the system through SQL injection. As a result, making the security of the system greater than what it was within my secure coding course and with that, the idea of prepared statements or security processes in general, to be trickled through the rest of the system if there was more time given. Prepared statements are one of the best ways to counteract SQL Injection outside of sanitizing statements, so this was key in ensuring that the code was executed well and executed as securely as possible. Taking a high-level concept of understanding how two languages work within one another is critical for environments that will never be stagnant with only one style of language used. Along with this, using a bare set of code and expanding it to include many new areas of coverage is an important aspect to highlight, showing understanding needed from critical data structure analysis and showing what can be coded on short notice. The skills highlighted here the most are the ability to read and understand code quickly, weave together my code that performs what it needs to and is aligned with the system and keep security at the forefront of what I am doing at all times.

My second piece of work for my capstone project was a program that was made for secure coding. This piece of code, it was showing how XOR encryption worked where we would pull a file’s information and then make a file for the encrypted work and also a decrypted version of it. The goal I had in mind for the rework was to work with some sort of encryption system to add or replace XOR, however, I decided to keep it to not change too much of what was in mind. What I did instead was work within the program and l learned how to do Caesar encryption on top of the XOR encryption for a slightly more complex cipher. With this, I learned how to organize data structures and mapped out a pathway set where eight different coding pathways could be taken for the encryption with what I implemented. Being XOR, Caesar, XOR into Caesar, and finally Caesar into XOR. On top of those, you had the option of doing it within the file that was from the original code or doing it within the run application within the program which was added. However, when testing something that I noticed was that XOR into Caesar didn’t work as intended for the symbols of XOR are not what Caesar could read without extra manipulation with the code. This was interesting to note herein that the path was possible but not realistically functional, so I took the best interest of the code for what would work and only that and removed XOR into Caesar. Having any structure that is fundamentally broken and serves no purpose is good to record for future use, but to keep it in the final deliverable is a waste of space and time. The biggest highlight here is the ability to develop and manipulate files outside of the domain of the code and also to understand how the loss of data is seen, tested, and removing such. Not to mention having the ability to understand how encryption works even on a smaller scale and what it does to the files within the machine. Encryption as a whole is a key part of security so having the best understanding of how it works and highlighting its weaknesses is a very important skill to carry with me throughout my career. As with cyber security, it is a never-ending arms race against black hat hackers so by knowing the weaknesses of the systems you are working with, you can help ensure that those weaknesses are not prevalent to the black hat hackers. Which will help ensure the product or the network will maintain the best capabilities of security possible covering your weaknesses and highlighting your strengths.

And for the final artifact, this was the most out-of-the-box concept I had but, in the end, I think it performed the best for its strategy for proper criteria fulfillment. This was working with a database in which the initial conditions for its use were unobtainable for the fact it was a very old class and I no longer had access to the virtual machine the data and program lived on. For adaptability, I began using a 3rd party software to work on the database itself in which my only reference to such as a piece of documentation about what happened with snippets of code for the database. So my time was spent rebuilding the entirety of the code itself, creating the ‘dummy data’ that was to be used within it and anything else that could be useful for the project. Ensuring that the data was correct with what it would need to do was critical within the code itself. As to test the effectiveness of CRUD within MySQL as per the documentation, all that dummy data I constructed had to align with one another and be strung together correctly so that they all would work as if they were from a document like the original had in mind. This alone took time and concise planning to meet with everything that needed to be specified for the system. This idea of the very layered and detail-oriented section was a good highlight of thoroughness for what I want to show for my skills. Not to mention I was able to take the hindrance of the software itself, which was difficult to use at times, and used a trait within it called a trigger to implement a hidden ID system to help keep track of everything on a very detailed level which could be useful for real-world data tracking between systems ensuring that data loss and confusion is slim to none. Highlighting an aspect of trying to turn weaknesses into strengths in ways that are not always visible such as through a hidden ID. The best skills highlighted here for this from a bird’s eye view is the idea of being very detail-oriented for something as detail-heavy as data and coding, taking something that would be a weakness and finding strength in it, and largest of all, taking something with little to no documentation and managing to create a competent deliverable. But now we will delve into the actual artifacts themselves and how they all went outside of the general summaries given here. The order for how I spoke of them is how they appeared within the artifact numbers as well.