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7-1 Final Project Narrative

For this assignment I have two artifacts that I will be presenting, IT145: Java dashboard and DAD220: Structured Query Language (SQL) database. The first artifact was created back in 19EW6 for IT-145 X6274 Found in App Development. It works as a front end dashboard that validates a user’s credentials to a .txt file. It takes a password and creates a hash through MD4 then checks the .txt file to see if that exact hash exists.

The second artifact DAD220: was created for DAD-220 R5642 Introduction to SQL dated 19EW5, just before IT145 was created. This was originally a script for a SQL database that created multiple tables and linked them with a primary key to store user information.

I selected these artifacts because they are simple, but can cover all of the required course outcomes. To break it down further, looking at each of the categories and explaining how the artifacts satisfy the outcomes see the table below.

* [CS-499-01] Employ strategies for building collaborative environments that enable diverse audiences to support organizational decision making in the field of computer science

The best way to keep code open for collaboration is to follow general best coding practices. Keep the code well commented, use self-defining variable names, keep things simple/do not add any unnecessary code, and utilize coding structures. The best artifact I have to demonstrate this is IT145. The code itself has strong commenting throughout and keeps things simple with self-defining variable. It also has an easy to read flow, and uses simple data structures. I also have all of the code uploaded into GitHub which allows for multiple branches to be created, and tested prior to being committed to the main branch, allowing for multiple developers to work on this code all at the same time.

* [CS-499-02] Design, develop, and deliver professional-quality oral, written, and visual communications that are coherent, technically sound, and appropriately adapted to specific audiences and contexts

For this course outcome please refer to the code review video that is attached to the ePortfolio.

* [CS-499-03] Design and evaluate computing solutions that solve a given problem using algorithmic principles and computer science practices and standards appropriate to its solution, while managing the trade-offs involved in design choices (data structures and algorithms)

For this course I had to overcome a quite a few obstacles, some major and some minor, but all of them helped me better learn the software I was creating. The two biggest problems I faced working with the artifacts selected are that IT145 didn’t function as intended and DAD220 was in a static database. It took a lot of time to fix IT145 and incorporate an invalid login attempt counter, and to create an object to use for the .txt file. Once these two tasks were complete I decided to implement the functions of the Md5 digest class into the validate credentials class directly and remove the Md5 digest class all together. This required a complete change in data structure and use of new algorithms to change the Md5 class into a function of validate credentials.

The second major challenge was taking my static SQL file that was saved as a .txt script and load it into a SQL database server. This is not the direction I originally intended on going, but to allow my table to be utilized in real time and expand on future functionality using a server is the way to go. Eventually I’d like to add the ability for a user to create login information and have their credentials added to the database in real time.

* [CS-499-04] Demonstrate an ability to use well-founded and innovative techniques, skills, and tools in computing practices for the purpose of implementing computer solutions that deliver value and accomplish industry-specific goals (software engineering/design/database)

This outcome is pretty similar to the previous outcome but in my opinion focuses more on the actual techniques and skills implemented to meet industry standards. The first and most important two techniques and skills that I value are simplicity and commenting. If you master these two things alone your code should be extremely easy for other developers to review, enhance, and implement into other programs. All of that being said, I feel like I took these two concepts to heart in IT145. I also implemented modern database practices by using a server for real time accessibility through the Java program. I used NetBeans unit testing tools to ensure the code could handle varying levels of stress, and GitHub to create multiple levels of accessibility. The original goal was to create a full stack program that allows a user to give credentials, through the IT145 dashboard, hash it and check it to a dynamic database. This original goal has been accomplished due to software design and database changes that enhanced the original program.

* [CS-499-05] Develop a security mindset that anticipates adversarial exploits in software architecture and designs to expose potential vulnerabilities, mitigate design flaws, and ensure privacy and enhanced security of data and resources

For cyber security I want to focus on two major functions of this full stack application, specifically in IT145. First was in the original design, using the Md5 digest hashing function. This protects information in transit between the SQL server and the front end dashboard, ensuring that if packets are stolen, passwords won’t be comprised. The second part of security that was added to IT145 is the invalid login attempts counter. After three failed attempts the program closes down, this stops programs from brute forcing their way into our system. Further security implementations are time lockouts after failed attempts, and input validation for complex passwords and only allowing certain characters/strings. The DAD220 SQL server doesn’t have any added security to it, but it does come with a host of standard security systems in place.

Finally I want to reflect on the journey that was this class and these artifacts. It took a lot of trial and error, changes in mindset, and research to make these enchantments possible, but the final product is much better than the original in design, and in practice. The hardest decision I had to make over the entire project was removing the Md5 digest as a class, but ultimately the code is much easier to read, and follow as a result. I learned that sometimes the harder route is the better route, providing much more powerful code and stronger results in the end. I also had to research servers and compare them to static database to better accomplish the goals created for this artifact. Both of the artifacts that I worked on (IT145 & DAD220) are very different that when I originally started this course, but in every way they are better. The first noticeable difference is that the IT145 program actually functions! The second noticeable difference is that DAD220 is being incorporated into a server. Beyond the few obvious differences, there are a lot of smaller differences and adjustments to the code that make it smoother and easier to follow. Changes to the loop for the invalidation code, and different values relevant to this assignment added to the tables in SQL to name a few. As a whole the artifacts were improved with changes to the data structures being used, and adjustments to methods inside each data structure.

Link to GitHub

<https://github.com/Lordsogi/CS-499-T5648-Computer-Science-Capstone>