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CS-499 Computer Science Capstone

Professor Brooke Goggin

Milestone Four: Enhancement Three: Databases

04/07/2024

1. Briefly describe the artifact. What is it? When was it created?

The artifact was created for my DAD-220 course in February of 2023 (over a year ago). The course was my introduction to databases but I’ve used databases in a few other courses since then. The artifact is a simple employee table created to hold employee records. There was only a limited number of SQL functions performed (Create, Insert and Select).

1. Justify the inclusion of the artifact in your ePortfolio. Why did you select this item? What specific components of the artifact showcase your skills and abilities in software development? How was the artifact improved?

I chose this artifact because it was too simple of a project to fully showcase my knowledge and understanding of databases. The artifact lacked any complexity and I wanted to make more use of the database. The components of the artifact that showcase my skills in software development are the data storing, data manipulation, and security in input validation to prevent SQL injections. I was able to create and store data appropriately in the database through SQL queries performed in PyCharm. I connected MySQL Workbench to the localhost port and connected PyCharm to the workbench to manipulate the database in MySQL. In PyCharm, I was able to run the program I created and use the CRUD functions (written in Python) on the database. The Python code handled every part of the data manipulation and the database was completely stored separately in MySQL. The artifact has improved significantly by adding a connection to PyCharm, adding read, update, and delete functions, adding a count function, and including proper input validation for security. The input validation ensures only expected input is accepted.

1. Did you meet the course objectives you planned to meet with this enhancement in Module One? Do you have any updates to your outcome-coverage plans?

I met the following course objectives I planned to meet:

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

Best practices are used and communicated through comments in the file. All the functions are fully explained and their purposes are discussed with in-line comments.

* **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.**

Testing was done continuously throughout. Every function was tested as it was written as well as continuous checks to the MySQL Workbench to ensure all the data manipulation performed in PyCharm was in fact being shown in the database. Additionally, the code was constantly reviewed to ensure every aspect of it was fully functional and needed/important for the final product.

* **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.**

Writing secure code was one of the biggest priorities due to the risk of SQL injections. To avoid security risks, I validated every user input required in the program. Any function that requires user input was fully vetted afterward to ensure the least number of design flaws.

1. Reflect on the process of enhancing and modifying the artifact. What did you learn as you were creating it and improving it? What challenges did you face?

When enhancing the artifact I learned how to connect a database to PyCharm. Although it was the first step in the enhancement, I had never done it before. In a previous course, I connected a database to Jupyter and I found the process very similar. I also learned more about how to write SQL queries in Python, most of my previous experiences with SQL have been with MySQL and with Java rather than Python.