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CS-499

Milestone Three 4-2

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

   The artifact I selected for the Algorithms and Data Structures category was developed

   during the CS-320: Software Testing with JUnit course. This application manages

   customer information using a full CRUD (Create, Read, Update, Delete) system, focusing

   on automated testing. The original application includes four classes: Customer,

   CustomerService, CustomerServiceTest, and CustomerTest, which are used for JUnit test

   automation. Recently, I integrated a new class, Main, to allow manual testing and

   interaction.

2. **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
   algorithms and data structure? How was the artifact improved?

   I selected this artifact because it aligns well with the principles of data structures and

   algorithms. As part of the enhancement process, I made several improvements to the

   artifact, including refining the CRUD logic, refactoring the code, and organizing the

   structure of classes and methods. One of the most significant improvements was

   replacing the original data structure with a HashMap, which increased the efficiency of

   CRUD operations from linear time to constant time, $O(1)$.

Additionally, in the Main class, I improved the logic for generating customer IDs, making them automatically assigned by the system rather than entered manually. I believe this is a best practice to ensure data integrity and consistency. In the future, I plan to replace the ID with a random ID number of ten digits. This will align with the original structure of the application.

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

By selecting this artifact, I have aligned my work with the course objectives and the goals I set in Module One. Demonstrating improvement in data structure and algorithm efficiency, while following industry standards, reflects strong practices in evaluating and developing computational solutions. So far, I have remained on track with my original goals. Staying consistent with my initial plans has helped me improve my technical evaluation skills while building a professional and high-quality ePortfolio that reflects my growth and professionalism as a computer scientist.

4. **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?**

At the beginning of the enhancement process, I felt somewhat frustrated, especially after reviewing my CS-340 Client/Server code, because I started to see my previous coding mistakes more clearly. Even though the application seemed to work correctly, I realized that many algorithms and structural components could be significantly improved. It was a humbling experience to recognize so many flaws in something I thought was solid.

However, this is all part of the learning process. Working through each artifact allowed me to understand that there is always room for improvement in logic, structure, design, and performance. Although my progress has been gradual, I am proud to see that I have improved each artifact meaningfully. This experience has strengthened my technical skills and my mindset as a developer.