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**Enhancement Three Narrative**

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

The artifact that I selected for the Databases enhancement is a Python-based MongoDB dashboard that I created for my final project in the CS-340: Client/Server Development course. It was originally developed in a virtual Apporto environment and utilizes the Dash framework to give CRUD functionality and data visualization of data for a local animal shelter in Austin, Texas. It has a dashboard, geolocation maps, interactive charts, and radio button filters enabling the user to sort and view data based on desired criteria like breed, purpose, age, etc.. The original product had very basic CRUD functions but lacked efficiency.

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 algorithms and data structures? How was the artifact improved?**

I chose this artifact because I thought it fit perfectly within the Databases category, considering that MongoDB and CRUD operations are the entire focus of the artifact. It offered a good opportunity to demonstrate some practice database concepts. I think the enhancements I made really showed my ability to apply database solutions. The artifact was improved in several ways. First, I implemented indexing on key fields like animal type, breed, and age in order to reduce query execution times. Before applying indexing, queries would take a little longer to run, but with indexes applied, the same query (over 2,600 results) returned in 22 milliseconds. I also implemented an aggregation pipeline. I incorporated this into the overall dashboard product as well. I used MongoDB’s aggregation framework to group and count dog adoptions that were under two years of age by breed. I used this specific criterion, but this same concept can be applied to any desired combination of fields. Finally, I added a function for bulk insertions. I added an insert\_many() method to allow the system to more efficiently insert large datasets, specifically from CSV files. I also created a mock bulk animals CSV file to demonstrate that data could be successfully inserted in bulk. All of these make the product more scalable, efficient, and practical.

1. **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?**

I think these enhancements align well with Course Outcome #3 and Course Outcome #4. The indexing and aggregation features directly address product optimization, while the bulk insertion enhancement is vital for the scalability of the product and shows that I could implement an innovative technique to deliver value. As of right now, I have no changes to my coverage plan.

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?**

This artifact was by far the most difficult to enhance. However, I did learn a lot more about MongoDB’s tools and how it works. One of the challenges I faced was trying to verify that I could delete the records that were inserted in bulk. To do this, I ended up checking both Boolean and String “True” values and making sure I got a response that the number of records deleted matched the number of records that were originally added. The other huge challenge I faced was with the aggregation enhancement. I wanted to not only test it in its own cell (which I did), but I wanted to figure out a way to incorporate it into the overall dashboard product. I ended up creating its own radio button and working through the little kinks that came along. Overall, these enhancements made me a better developer and have increased my overall confidence in developing and optimizing products.