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CS499

5-2 Milestone: Databases Artifact Narrative

The Databases artifact I am demonstrating is a Model-View-Controller (MVC) framework implementation using MongoDB, a Jupyter Notebook controller with a Python-based middleware module for database CRUD operations, and a Dash dashboard for users to interact with and visualize the dataset. The application allows users to filter a large dataset based on several client-provided criteria. I originally created this artifact for CS340: Advanced Programming Concepts in June 2024. An example of the unmodified artifact demonstrates its basic functionality:

A screenshot of a computer

Description automatically generated

This artifact is a good example of my ability to create an interface with for database, perform advanced queries, and serve specific database records to users in a useful and value-added format. This implementation includes two data visualizations, a pie graph and a map, to contextualize user-selected data.

However, the original artifact has all of the filter criteria hard-coded into the application. While these criteria are based on client specifications, and thus likely very useful to their needs, they are inflexible, especially if a sustainment plan has not been implemented for the application. To address this limitation, I chose to enhance the artifact by adding the ability to perform custom database queries.

A screenshot of a computer

Description automatically generated

Selecting the option to perform a custom query will now present the user with several additional fields that they can use to narrow their search results to something specific or unique. This additional functionality required additional error checking, however, as it is now possible for users to perform queries that do not yield any results. Warnings will now inform users if their search has yielded no results:

A screenshot of a computer

Description automatically generated

This enhancement also creates the possibility that a very broad filter will create an extreme number of results, which can create unexpected behavior in some of the data visualizations. To alleviate this, the pie graph will now only show the ten most frequent animal breeds returned by the query. Other breeds will be grouped together into an “other” category, maintaining a clean and readable appearance.

A pie chart with numbers and a number of people

Description automatically generated

The code for this artifact also required a significant overall in order to align with industry standard best practices. Comments and whitespace were both fully updated and brought in line with a consistent style, improving readability and maintainability, as well as demonstrating professionalism.

A screenshot of a computer program

Description automatically generated

With these enhancements, I have achieved the course outcomes I intended to target with this artifact, specifically:

Employ strategies for building collaborative environments that enable diverse audiences to support organizational decision making in the field of computer science

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

My outcome coverage plan does not require modification at this time.

Overall, I found enhancing this artifact to require a more comprehensive approach than previous artifacts. The code badly needed overhauled to enhance its readability and bring it in line with best practices. Additionally, as I modified the code, I found several possible errors that were not sufficiently handled by the original implementation and made some modifications to the overall architecture to be more robust. The biggest challenge, however, was that this artifact was originally developed in the SNHU virtual lab, and in order to even begin modifying it I had to recreate that environment on my local machine. This involved installing and configuring MongoDB, creating appropriate user credentials for the database, ingesting the dataset, and a fair amount of Python package management. This, in turn, identified some elements of the implementation that were deprecated and needed to be updated. Enhancing this artifact was quite the journey.