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

The artifact I selected is the Animal Shelter Dashboard application originally developed in Python using Dash for CS-340: Client/Server Development in March 2025. The dashboard was designed to connect to a MongoDB database and visualize adoption data through an interactive map, filters, and charts. For this enhancement, I refactored the database layer to integrate Firebase as the backend, replacing local MongoDB access with a secure, cloud-based authentication and data storage solution.

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 selected this artifact because it represents my ability to enhance a full-stack, data-driven application using modern cloud-based technologies. The Firebase integration allowed me to replace the original MongoDB connection with a secure, scalable backend while improving authentication and data management. This process demonstrated my skills in refactoring legacy code, implementing secure login systems, and maintaining compatibility between backend services and frontend visualization tools.

In developing this enhancement, I transitioned the dashboard's local database operations to Firebase's Firestore, which provides real-time data access and better long-term scalability. I also implemented Firebase Authentication, allowing users to log in securely using email and password credentials, and added robust error handling that gracefully manages credential issues.

Throughout this process, I focused on maintaining clean, modular code by reorganizing the AnimalShelter class to separate authentication logic from database operations.

These improvements not only modernized the project's infrastructure but also reflected my ability to integrate cloud services, apply secure design principles, and structure software for maintainability and reliability. Overall, the enhancement reflects practical skills in backend integration and secure application development that align with real-world software engineering practices.

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?

Yes, this enhancement met all the course outcomes I planned in Module One. Specifically:

- Outcome 1: The refactored Firebase integration demonstrates collaboration and communication through structured, reusable functions and well-documented configuration handling.
- Outcome 2: Clear console output and structured logging communicate backend processes transparently, supporting both users and developers.
- Outcome 3: Replacing MongoDB with Firebase shows my ability to design, implement, and evaluate secure data management solutions using current technologies.
- Outcome 4: The use of authentication, error handling, and secure cloud storage reflects advanced software engineering principles for system reliability and maintainability.

- Outcome 5**:** Incorporating secure credential management and fallback authentication improved the application's reliability, privacy, and professional quality.

No updates to the original outcome plan were necessary, but this enhancement expanded my focus to include secure authentication and scalable data solutions, key skills for professional software development.

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 enhancement reinforced my understanding of backend connectivity and secure cloud integration in a full-stack context. Implementing Firebase required learning its SDK, authentication structure, and database models while ensuring compatibility with the existing Dash dashboard.

One of the main challenges was debugging credential handling and ensuring the Firebase Admin SDK and Firestore client initialized correctly in different environments. Another challenge involved refactoring database operations to work seamlessly with Firestore's data model without breaking the dashboard's data display or charts.

Through this process, I strengthened my skills in cloud authentication, error handling, and modular design. I also learned the importance of maintaining clear configuration structures and robust fallbacks for authentication systems. This enhancement reflects real-world development

practices where cloud services, data security, and maintainability must align to deliver reliable, user-centered software.