**Enhancement Three: Databases**

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**Artifact Description**

For the third enhancement category, databases, the artifact I used was the final project for IT145, which was created using Java in February of 2023. This artifact is a program created for an animal search and rescue company, allowing them to intake new animals, reserve rescue animals, and print lists of animals based on animal type and reserved status. Once an animal is reserved, it can be sent out on rescue missions to save humans from dangerous, and potentially life-threatening situations.

**Why This Artifact Was Selected**

The original artifact stored animals in array lists, which would clear their data once the program ended. This would be very inefficient for a company that would need to continually use this data. I chose this artifact so I could implement a database, which would continually store the animals, making the program significantly more useful. The program also initially only had create and read functionality, so I added update and delete functionality to increase the programs usefulness: once training status changes, the animal will need to be updated, and once the animal can no longer be used for rescue missions, it will need to be deleted from the system. I also implemented role based access control to limit CRUD functionality to users with specific credentials. This increases the security of the program, and ensures that users without access to the database cannot alter it. Lastly, when the data was output to the user, it was output as a list which is hard to navigate. To mitigate this, I wanted to implement a dashboard.

**Course Outcomes Met**

By completing this enhancement, I have met the following course outcomes:

* 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.
  + Using MongoDB instead of storing animals in an array list, and completing the implementation of CRUD functionality increases the value in my application. Animal data is now persistent once the program ends, and can now be updated or deleted as needed.
  + Utilizing a dashboard for data visualization allows the user to interact in the data in a more practical way.
* 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.
  + Security of the program has been enhanced by implementing role based access control. This ensures users can only access the CRUD functionality that they have access to, inhibiting certain users from altering the data within the database.

**Reflecting on the Enhancement Process**

I began this enhancement process by implementing MongoDB and completing the rest of the CRUD functionality. Doing so was relatively straight forward due to implementing similar functionality in CS340. Although, I ran into an issue where the data within the JSON file was imported into MongoDB every time I ran the program, resulting in duplicate data. I mitigated this by ensuring that the program checks for duplicates prior to importing data. I then moved on to implementing the dashboard, which I also based off of work completed in CS340. Lastly, I implemented role based access control, which I was also able to reference previous work to help me complete this step.