The third artifact of the enhancement plan is based around databases. I chose to use my artifact from CS 340 which used MongoDB as a database for the animals in the animal shelter. For my enhancement I uses SQLite 3 and had it store our character info inside of it. In this enhancement moving from a csv file, I was allowed persistent data storage, so the character data could be loaded, queried, and managed across sessions. The program automatically reads from characters.db and populates our BST, we are then able to interact with it with our previous CRUD interface to adjust it. Finally at the end I added a way to create a html report with all the information after the change, and create a chart based on the gun damage on the bottom.

I selected the enhancement this way to demonstrate the ability to bridge algorithmic data structurees with real world data management systems. This database integration required me to understand the SQL schema and C++ database connectivity using SQLite3 to integrate a new data source different from the previous version. Some key components that highlight those skills are, the loadFromDB() function which uses prepared sql statements to query our data safely and efficiently with support from runtime exception handling. It also showcases the ability to integrate it into the system by taking the sql database and have it feed into our BST so I can integrate structured database output with a recursive in-memory data structure. This allowed me to convert this system from a local, static system to a scalable, persistent storage system. The enhancement meets the following course outcomes, first Data Management and Persistence via the SQLite integration for our storage, retrieval, and manipulation of persistent data. Next it handles Software development practices and error handling, with the modular integration of our database code being separated and then added in can allow for adjustments in the future, and the error handling and detection to ensure data import and handling is done safely.

Reflecting on this enhancement, took some work getting the SQLite to work correctly and create the correct tables since the reading from the database is very strict with spelling and spaces. This helped me learn a new database structure compared to mongoDB to be able to compare and contrast their similarities in how you access them. During this time I also had to handle duplicates between the database and the BST and having to create a new function to handle duplicates. Overall this enhancment was a fun challenge to solidify my understanding of a more complex and real world system, connecting a backend to a front end and creating functions that can interact and share data between those systems.