The Course Planner is an artifact initially developed in C++ and later enhanced through multiple iterations to improve functionality, efficiency, and scalability. The first enhancement involved converting the project from C++ to Python, allowing for better readability, easier maintenance, and leveraging Python’s built-in libraries for file handling and data structures. The second enhancement introduced sorting algorithms and an interactive search feature, enabling users to organize courses by the number of prerequisites and dynamically search for courses based on keywords. The most recent enhancement integrated MongoDB, providing an alternative data storage method to complement the existing CSV-based structure. These enhancements showcase a structured approach to software development, improving usability and data management.

The artifact was selected for my ePortfolio because it demonstrates my skills in software development, data structures, and algorithm implementation. The enhancements highlight my ability to convert code between programming languages, optimize data organization, and implement a database for scalability. The project’s transition from a simple BST-based CSV reader to a dual storage system (CSV and MongoDB) reflects growth in problem-solving, database integration, and user experience design. The introduction of sorting and searching mechanisms, alongside the interactive search functionality, significantly improved the efficiency of accessing course information.

The enhancements align with the course outcomes by demonstrating the ability to design and evaluate computing solutions using structured data and algorithms. Implementing the BST and database storage options showcases an understanding of the trade-offs between in-memory structures and persistent databases. Additionally, by improving interactive user engagement and data security in MongoDB, the project aligns with industry standards in software engineering, data management, and usability design. These improvements reinforce the importance of applying sound engineering principles when handling structured data.

Throughout the enhancement process, several challenges emerged. The first involved converting C++ memory management logic into Python’s garbage collection system while maintaining BST functionality. The second challenge was implementing sorting and search algorithms that efficiently worked with BST nodes. Lastly, the MongoDB integration required refreshing my knowledge of NoSQL database principles, setting up a local database instance, and ensuring seamless interaction between MongoDB and the Python application while preserving CSV functionality. These challenges provided valuable hands-on experience in handling real-world software development obstacles, refining my ability to design, debug, and enhance computing solutions.

**Enhancement TwoA screenshot of a computer program

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**Enhancement Three**

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**CSV to MongoDB upload checks**

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**Status Checkpoints for All Categories**

|  |  |  |  |
| --- | --- | --- | --- |
| **Checkpoint** | **Software Design and Engineering** | **Algorithms and Data Structures** | **Databases** |
| **Name of Artifact Used** | Source.cpp | Source.cpp | Courses.csv |
| **Status of Initial Enhancement** | Completed (Converted from C++ to Python) | Completed (Updated algorithms for new sorting and display) | Completed (CSV uploaded into MongoDB, ability to search via CSV or DB) |
| **Submission Status** | Submitted | Submitted | Submitted |
| **Status of Final Enhancement** | Completed | Completed | Pending |
| **Uploaded to ePortfolio** | Yes | No | No |
| **Status of Finalized ePortfolio** | Pending | Pending | Pending |