ePortfolio and Refinement Plan

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CS 499 Computer Science Capstone

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## Category One: CS 360

## Artifact Name: Mobile Application Development/Weight Tracking App, I design an app that monitors user’s weight and controls his or her diet. This app will hold multiple records as it can that a squad leader or team leader needs to keep track of their subordinates.

## Origin: Software Engineering/Design.

## Enhancement Plan:

* Enhanced BI Dashboard with Streamlined Navigation:

My selected enhancement focuses on elevating the project's complexity by implementing a more advanced Business Intelligence (BI) Dashboard and enhancing the overall navigation within the weight tracking app. The enhanced BI Dashboard will provide users with a sophisticated and intuitive interface to interact with the app's data, offering them a deeper and more comprehensive understanding of their weight management progress. In terms of navigation, my work will include refining the app's user journey, making it more straightforward, accessible, and user-friendly. Through this enhancement, I aim to provide users with a highly interactive and visually engaging dashboard, ensuring they can effortlessly navigate the app, access vital information, and make more informed decisions regarding their weight management journey. The expansion of project complexity through this enhanced BI Dashboard and navigation experience will significantly contribute to creating a more valuable and user-centered application.

## Skills illustrated and course outcome alignment:

* Course Outcome 1: Collecting user feedback through surveys and usability studies involves collaboration with diverse audiences to gather input and insights. This information can be used to make informed decisions related to software design and user experience.
* Course Outcome 2: Proficiency in UI/UX design ensures that my visual communication is coherent and user-friendly. Conducting usability testing and incorporating innovative design elements further demonstrates my ability to adapt communication to specific audiences and contexts.
* Course Outcome 3: Incorporating innovative mobile programming languages and frameworks and extending app functionality requires problem-solving and design evaluation skills to make informed choices and manage trade-offs effectively.
* Course Outcome 4: Extending the app's functionality with innovative technologies demonstrates my ability to use innovative techniques and tools to implement computer solutions that deliver enhanced performance and value.
* Course Outcome 5: While my skills primarily focus on user experience and performance, incorporating security considerations in my app design (e.g., secure user data handling) is crucial for aligning with the security mindset course outcome.

## Pseudocode of the design

Start

# Step 1: User-Centric Design Improvements

Collect User Feedback and Surveys ()

Analyze User Feedback ()

Redesign User Interface and User Experience ()

Optimize Layout and Navigation ()

# Step 2: New Features Integration

Add Personalized Health Tips ()

Integrate with Fitness Wearables ()

Implement Goal Setting Tools ()

# Step 3: Security and Privacy

Conduct Security Assessment ()

Identify Vulnerabilities ()

Implement Data Encryption ()

Enhance Authentication Methods ()

# Step 4: Cross-Platform Compatibility

Adapt Code for iOS and Android ()

Optimize User Interface for different Screens ()

Test on iOS and Android Devices ()

# Step 5: Performance Optimization

Review and Optimize Code ()

Optimize Database Queries ()

Improve App Load Times ()

End

## Category Two: CS 260

## 2.1 Artifact Name: The vectorSorting.cpp is a collection of bids using two different sorting algorithms: selection sort and quicksort. It also includes functionality for loading bid data from a CSV file, displaying the bids, and timing the sorting operations.

## Origin: Algorithms and Data Structures.

## 2.3 Enhancement Plan:

* Enhanced Data Structures and Algorithmic Complexity:

The enhancement plan for the "VectorSorting.cpp" artifact focuses on completing and improving the quicksort implementation and enhancing the overall user experience by implementing a more advanced Business Intelligence (BI) Dashboard. This plan aims to make the sorting functionality more robust and user-friendly.

## Skills illustrated and course outcome (Aligned with Algorithms and Data Structures):

* Course Outcome 1: Proficiency in Sorting Algorithms. The implementation of quicksort in the artifact demonstrates proficiency in sorting algorithms, particularly quicksort. The ability to understand, implement, and optimize sorting algorithms aligns with this course outcome. Algorithm optimization and data structure efficiency can support diverse audiences in making informed decisions by enhancing the performance of computer systems and applications.
* Course Outcome 2: User Interface and User Experience Enhancement. The plan to implement a Business Intelligence (BI) Dashboard for enhanced user experience showcases the skill of improving user interfaces. Enhancing the user interface to provide a visually engaging dashboard aligns with this course outcome, emphasizing UI/UX design.
* Course Outcome 3: Code Optimization and Documentation. The plan includes optimizing the code and adding meaningful documentation to enhance code quality and maintainability. Code optimization and documentation align with this course outcome, focusing on the clarity and efficiency of code.
* Course Outcome 4: Error Handling and Debugging. The plan aims to identify and fix any bugs or issues in the existing code while improving error handling. Demonstrating the ability to handle errors and debug code aligns with this course outcome, emphasizing the importance of debugging skills.
* Course Outcome 5: Problem Solving and Algorithmic Thinking. The implementation of sorting algorithms (quicksort and selection sort) requires problem-solving and algorithmic thinking skills. Problem-solving and algorithmic thinking align with this course outcome, which focuses on applying problem-solving techniques to computing challenges.

## 2.5 Pseudocode of the design

“Pseudocode for Enhancement Design

# Step 1: Design the Enhanced BI Dashboard

Initialize BI\_Dashboard

Display "Creating Enhanced BI Dashboard..."

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# Step 2: Define Dashboard Components

Define BI\_Charts

Define BI\_Tables

Define BI\_Interactive\_Elements

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# Step 3: Load Data into the BI Dashboard

Load Data from bids into BI\_Dashboard

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# Step 4: Create Interactive Elements

Create Interactive Filters

Create Dynamic Charts

Create User-Friendly Navigation Links

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# Step 5: Implement Navigation Enhancement

Initialize Navigation\_Enhancements

Display "Implementing Navigation Enhancements..."

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# Step 6: Redesign User Interface for Enhanced Navigation

Redesign UI with Improved Navigation

Implement Responsive Design for Various Devices

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# Step 7: Optimize Page Load Times

Optimize Image Sizes

Utilize Asynchronous Loading Techniques

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# Step 8: Ensure Data Privacy and Security

Implement Data Encryption

Secure User Data Storage

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# Step 9: Display Enhanced BI Dashboard

Display BI\_Dashboard

Wait for User Interactions

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# Step 10: Respond to User Interactions

If User Selects Filter:

Apply Filter to BI\_Charts and BI\_Tables

Update Charts and Tables with Filtered Data

Else If User Selects Navigation Link:

Navigate to the Selected Section

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# Step 11: Continuously Collect User Feedback

Initialize User\_Feedback

Display "Collecting User Feedback..."

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# Step 12: Collect User Feedback through Surveys and Usage

Prompt Users for Feedback

Collect and Record User Suggestions

Store Feedback Data for Analysis

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# Step 13: Analyze and Incorporate User Feedback

Analyze Feedback Data

Identify Areas for Improvement

Incorporate User Suggestions into Dashboard

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# Step 14: Monitor Dashboard Performance

Monitor BI\_Dashboard Usage

Check Loading Times and Responsiveness

Address Performance Issues

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# Step 15: Repeat Steps 10 to 14 for Iterative Enhancements

While Dashboard in Use:

Listen for User Interactions

Gather Feedback and Data

Make Iterative Improvements

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# Step 16: Completion

Display "Enhanced BI Dashboard and Navigation Implemented Successfully!"

## Category Three: CS 340

## 3.1 Artifact Name: Training and Motivation Project. I created a software application that selects certain profiles in dogs to train. This project uses Python, MongoDB Compass, and ‘Jupyter Notebook’ to accomplish.

## 3.2 Origin: Databases

## 3.3 Enhancement Plan:

* Full-Stack Diversification with Node.js:

The core of this enhancement centers on expanding the versatility and adaptability of the International Animal Shelter project by building a full stack with a different programming language. Specifically, I will leverage Node.js, a powerful and widely used runtime that excels in building scalable and efficient server-side applications. This addition will complement the existing Python-based stack and introduce diverse audiences to a comprehensive solution developed using two distinct programming languages. The integration of Node.js will facilitate enhanced data handling and faster server-side processing, further contributing to the project's performance and user experience. Furthermore, the introduction of Node.js demonstrates my proficiency in working with multiple programming languages and showcases my ability to make informed design choices while maintaining professional standards.

## Skills illustrated and course outcome alignment:

* Course Outcome 1: Proficiency in working with multiple database systems and integrating SQL (MySQL) with NoSQL (MongoDB) can help diverse audiences make data-driven decisions.
* Course Outcome 2: Front-end web development and UI/UX design emphasize the importance of delivering professional-quality visual and interactive communications.
* Course Outcome 3: Building a full-stack application using different programming languages to complement an existing stack demonstrates my ability to make design choices based on standards and trade-offs.
* Course Outcome 4: Proficiency in database management, front-end web development, and adaptability in using different programming languages highlights my ability to use innovative techniques and skills to implement valuable computer solutions.
* Course Outcome 5: Proficiency in database management can include security measures in data handling, while full-stack adaptability demonstrates the flexibility to mitigate vulnerabilities and enhance the security of software systems.

## 3.5 Pseudocode of the design for the enhancement plan:

Start

# Diversify Programming Languages for Full Stack

Function Select New Language ():

New Language = "Node.js" # Can replace with the chosen language

Return New Language

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Function Backend Development with New Language ():

New Language = Select New Language ()

Initialize Server With (New Language)

Define Routes With (new Language)

Manage Database With (New Language)

Ensure Data Security with (New Language)

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Function Frontend Development with New Language ():

new Language = Select new Language ()

Initialize Frontend with (New Language)

Create Interactive Webpages with (New Language)

Integrate With Backend for Real Time Updates (New Language)

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Function Data Migration ():

Migrate Data from MongoDB to New Database ()

ensure Data Consistency ()

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Function Testing and Quality Assurance ():

Test Backend and Frontend ()

Address Issues If Found ()

ensure Smooth User Experience ()

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Function Deployment ():

Deploy Application to Server or Cloud ()

Configure Server Environment ()

Set Up Performance Monitoring ()

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Function User Training and Documentation ():

Prepare User Documentation ()

Conduct User Training If Needed ()

# Call the functions to initiate the diversification of the programming language for full-stack development

Backend Development with New Language ()

Frontend Development with New Language ()

Data Migration ()

Testing and Quality Assurance ()

Deployment ()

User Training and Documentation ()

End

## 4. ePortfolio Overall

- Fulfill enhancement plans, the specific skills my work will demonstrate:

* User-Centered Design and UI/UX Enhancement: My work will demonstrate proficiency in collecting user feedback through surveys and usability studies, aligning with Course Outcome 1. I will show the ability to adapt communication to specific audiences and contexts, addressing Course Outcome 2.
* Incorporate AI and VR for Enhanced Functionality: This enhancement plan shows my ability to incorporate innovative technologies, fulfilling Course Outcome 3. It also demonstrates my problem-solving skills in managing trade-offs and design choices.
* Security Assessment and Vulnerability Mitigation: Addressing security measures and conducting a security audit emphasizes my awareness of security considerations, aligning with Course Outcome 5.
* Cross-Platform Compatibility Checks: By evaluating compatibility across various mobile platforms and devices, my work aligns with Course Outcome 4.
* Optimize Database Performance: This plan demonstrates my ability to optimize algorithms and data structures, aligning with Course Outcomes 1 and 2. It also highlights my proficiency in time complexity analysis, addressing Course Outcome 3.
* Streamline User Interface: This enhancement emphasizes the importance of delivering professional-quality visual and interactive communications, aligning with Course Outcome 2. It also focuses on optimizing the user experience, addressing Course Outcome 4.

- Regarding potential gaps, limitations, or weaknesses:

While my enhancement plans address a wide range of skills, ensure that the emphasis on security aligns well with Course Outcome 5, as it is mentioned in various categories. My plans demonstrate adaptability and proficiency in diverse areas. However, it's essential to ensure that the diversity of skills does not lead to a lack of depth in any one area. Consider reinforcing my expertise in specific areas. By addressing these considerations, my ePortfolio will effectively demonstrate alignment with course outcomes and present a comprehensive showcase of my skills and knowledge.