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ENSE 375 – Software Testing and Validation

Project Title

Budget management System

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- Proof read the text for typing and grammar mistakes.
- Follow the IEEE Bibliography style for the references by selecting "References/ Citations & Bibliography/ Style".

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1 Introduction

Personal financial management has become increasingly important as individuals seek better control over their income, expenses, and savings. Many people struggle to track where their money goes, leading to overspending and difficulty achieving financial goals. A budget management system addresses this need by providing users with tools to record transactions, organize them into categories, and view summaries that reveal spending patterns.

The Budget Management System developed in this project allows users to input income and expenses, assign transactions to predefined categories, and generate reports summarizing their financial activity. The system is built using a modular architecture that separates data handling, business logic, and user interface components, making it well-suited for applying structured software testing methodologies.

Software testing is critical for financial applications because calculation errors or data handling bugs could cause users to misunderstand their financial situation. A budget tool that displays incorrect totals or loses transaction data would fail its fundamental purpose. This project applies software testing and validation principles including test planning, test case design, validation techniques, and defect tracking to ensure the system performs correctly and reliably.

The following sections describe the problem definition and design requirements in Section 2, present alternative solutions and the final chosen approach in Section 3, document team collaboration and meetings in Section 4, outline the project schedule in Section 5, and conclude with a summary of achievements and recommendations for future work in Section 6.

2 Design Problem

This section has the following two subsections:

2.1 Problem Definition

Write a problem statement of the project

Individuals often lack visibility into their spending habits, making it difficult to manage finances effectively and achieve savings goals. Without a structured system to record and categorize transactions, users may lose track of expenses, overspend in certain categories, or fail to identify areas where they could reduce costs. Manual tracking methods such as spreadsheets are error-prone and time-consuming, while many existing budgeting applications are either too complex or lack the reliability users need to trust their financial data.

The goal of this project is to develop a Budget Management System that enables users to track income and expenses, categorize transactions, and generate accurate budget summaries and reports. The system must be thoroughly tested and validated to ensure that all financial calculations are correct, data is stored and retrieved reliably, input validation prevents invalid entries, and reports accurately reflect the user's financial activity.

From a software testing perspective, the problem is to design and execute a comprehensive test strategy that verifies the system's functionality, accuracy, and robustness. This includes creating test cases that cover normal operations, boundary conditions, and error scenarios, as well as tracking and resolving any defects discovered during testing. The testing effort must demonstrate that the Budget Management System meets its requirements and can be trusted to provide users with accurate financial information.

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2.2 Design Requirements

This section has the following three subsections:

2.2.1 Functions

- Provide functions of the design project. Remember that the functions contain verbs.

2.2.2 Objectives

- Provide objectives of the design project. Remember that the objectives are specified as adjectives.

2.2.3 Constraints

- Provide constraints here. Remember that the constraints are binary (either satisfied or not).

3 Solution

In this section, you will provide an account of some solutions your team brainstormed to implement and test the project. Some solutions might not have all the desired features, some might not satisfy the constraints, or both. These solutions come up in your mind while you brainstorm ways of implementing all the features while meeting the constraints. Towards, the end you select a solution that you think has all the features, testable and satisfies all the constraints. Remember that an engineering design is iterative in nature!

3.1 Solution 1

Write a brief description of your first solution and provide the reasons in terms of testing for not selecting this one.

3.2 Solution 2

This is an improved solution but might not be the final solution that you select. Give a brief description of this solution here. Again focus on its testing attributes.

3.3 Final Solution

This is the final solution. Explain why it is better than other solutions (focus more on testing). You may use a table for comparison purposes. After providing the reason for selecting this solution, detail it below.

3.3.1 Components

What components you used in the solution? What is the main purpose of using individual component? What testing method did you employ for each component? Provide a block diagram (with a numbered caption, such as Fig. 1) representing the connectivity and interaction between all the components.

3.3.2 Environmental, Societal, Safety, and Economic Considerations

Explain how your engineering design took into account environmental, societal, economic and other constraints into consideration. It may include how your design has positive contributions to the environment and society? What type of economic decisions you made? How did you make sure that the design is reliable and safe to use?

3.3.3 Test Cases and results

What test suits did you design to test your prototype? How did you execute the test cases to test the prototype?

3.3.4 Limitations

Every product has some limitations, and so is the case with your design product. Highlight some of the limitations of your solution here.

4 Team Work

Since this is a group project, you must have a fair distribution of tasks among yourselves. To this end, you must hold meetings to discuss the distribution of tasks and to keep a track of the project progress.

4.1 Meeting 1

Time: Month Date, Year, hour: minutes am/pm to hour: minutes am/pm
Agenda: Distribution of Project Tasks

Team Member	Previous Task	Completion State	Next Task
Team member 1	N/A	N/A	Task 1
Team member 2	N/A	N/A	Task 2
Team member 3	N/A	N/A	Task 3

4.2 Meeting 2

Time: Month Date, Year, hour: minutes am/pm to hour: minutes am/pm
Agenda: Review of Individual Progress

Team Member	Previous Task	Completion State	Next Task
Team member 1	Task 1	80%	Task 1, Task 5
Team member 2	Task 2	50%	Task 2
Team member 3	Task 3	100%	Task 6

4.3 Meeting 3

Provide a similar description here.

4.4 Meeting 4

Provide a similar description here.

5 Project Management

Provide a Gantt chart showing the progress of your work here. Mention all the tasks along with their predecessors. Provide the slack time of each task and identify the critical path.

6 Conclusion and Future Work

- A summary of what you achieved. Mention all the design functions and objectives that you achieved while satisfying testing requirements?
- While keeping the limitations of your solution, provide recommendations for future design improvements.

7 References

- Use the IEEE reference style.
- Do not put any reference if it is not cited in the text.

8 Appendix

If you want to provide an additional information, use this appendix.