



SECD2613: SYSTEM ANALYSIS AND DESIGN

Project: Phase Phase 3 – Analysis and Design

BUDGET TRACKER APPLICATION

PROJECT TITLE: BUDGET BUDDY

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**MALAYSIA-JAPAN INTERNATIONAL INSTITUTE OF
TECHNOLOGY (MJIIT)**

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1.0 OVERVIEW OF THE PROJECT

The Budget Buddy project aims to develop a simple yet comprehensive budget-tracking application to help users manage their finances effectively. This mobile application is designed for individuals, families, and students, providing a user-friendly platform to track expenses, categorize spending, and visualize financial patterns using pie charts. The app will support the management of multiple accounts, including cash, bank cards, and other financial instruments, offering users a holistic view of their financial status. Key features include predefined and customizable expense categories, such as Food, Social Life, Transportation, and Health & Beauty, enabling users to tailor the app to their specific needs. Additionally, the application will feature an account management section where users can access transaction history, manage accounts, and set budget limits, fostering enhanced financial control and accountability. This project underscores our organization's dedication to promoting financial literacy and empowering individuals to make informed financial decisions, ultimately simplifying the complexities of financial management in a fast-paced world.

2.0 PROBLEM STATEMENT

As Malaysia transitions toward a cashless society, managing daily expenditures has become increasingly complex. Research indicates that people tend to spend more when using digital forms of payment as opposed to physical cash, leading to potential financial mismanagement. This situation poses a significant challenge, especially for individuals, families, and students who need to maintain a tight grip on their budgets within a multitude of digital transactions. The lack of tangible cash makes it difficult for many to visualize their spending patterns, leading to overspending and financial instability. Thus, there is a pressing need for a comprehensive solution that enables effective financial management in a digital age. A thorough analysis of the current environment reveals the complex interplay between various stakeholders including consumers, financial institutions, and regulatory bodies :

2.1 Consumers

Consumers are increasingly prioritizing financial management tools that align with their personal financial goals. They also bring along certain difficulties that need to be addressed.

- Consumers are the primary stakeholders.
- Need tools for clear visibility into spending habits.
- Require features for budgeting and expense tracking.
- Desire a user-friendly interface for ease of use.

2.2 Financial Institutions

- Interested in promoting financial literacy among clients.
- Support tools that integrate with existing financial services.
- Aim to encourage responsible spending.

2.3 Regulatory Bodies

- Ensure compliance with local data protection laws.
- Promote the overall financial health of the populace.
- Oversee the security and integrity of digital financial tools.

2.4 Individuals

With the eve of being a cashless society looms over Malaysia it has been increasingly important to manage daily expenditures. A study has shown that especially for individuals, families, and students are more likely to spend when the cash is not in a physical tangible form like cash.

- Increased tendency to overspend with digital payments.
- Difficulty in tracking expenses due to the intangible nature of electronic transactions.
- Diverse spending patterns and economic behaviors in Malaysia.
- Need for comprehensive tools that cater to various demographics and financial literacy levels.

3.0 PROPOSED SOLUTIONS

To address the challenges posed by a cashless society, the proposed solution is the development of a mobile application, "Budget Buddy", designed to help users manage their finances comprehensively. This application will offer a suite of features aimed at providing users with greater control and insight into their spending patterns.

3.1 User-Friendly Interface

Budget Buddy will prioritize an intuitive and engaging user interface to ensure ease of use across various demographics. This includes clear visualizations of spending patterns through pie charts and other graphical elements.

- Intuitive and engaging design for ease of use.
- Visualizations such as pie charts to depict spending patterns.

3.2 Expense Tracking and Categorization

Users will be able to log their expenses manually or automatically through linked bank accounts and categorize them into predefined and customizable categories such as Food, Transportation, and Health & Beauty. This granular tracking will help users identify areas where they can reduce spending.

- Ability to log and categorize expenses automatically or manually.
- Customizable categories to reflect diverse spending habits.

3.3 Multiple Account Management

The app will support the management of multiple financial accounts, including bank cards and e-wallets, providing users with a consolidated view of their financial status.

- Support for managing multiple financial accounts (e.g., bank cards, e-wallets).
- Provide a consolidated view of financial status.

3.4 Budget Setting and Monitoring

Users can set monthly budgets for different categories and receive alerts when they are close to exceeding these limits. This proactive feature aims to promote disciplined spending habits.

- Set and monitor budget limits for different categories.
- Receive alerts when approaching or exceeding budgets.

3.5 Data Security and Compliance

Robust security measures will be implemented to protect user data, ensuring compliance with Malaysian data protection regulations. This includes encryption, secure authentication methods, and regular security audits.

- Robust security measures to protect user data.
- Compliance with Malaysian data protection regulations.

3.6 Stakeholder Engagement and Feedback Loop

Continuous engagement with stakeholders, including users and financial institutions, will be crucial. Regular updates and enhancements based on user feedback will be prioritized to keep the app relevant and effective.

- Continuous feedback loop with users and financial institutions.
- Regular updates and enhancements based on feedback.

3.7 Support and Resources

To foster user adoption, Budget Buddy will include extensive support resources such as FAQs, tutorials, and customer service channels. This ensures users can effectively leverage all features of the app.

- Comprehensive support resources, including FAQs, tutorials, and customer service channels.
- Educational materials to enhance financial literacy.

4.0 CURRENT BUSINESS PROCESS/WORKFLOW

Current business process (scenarios, workflow)

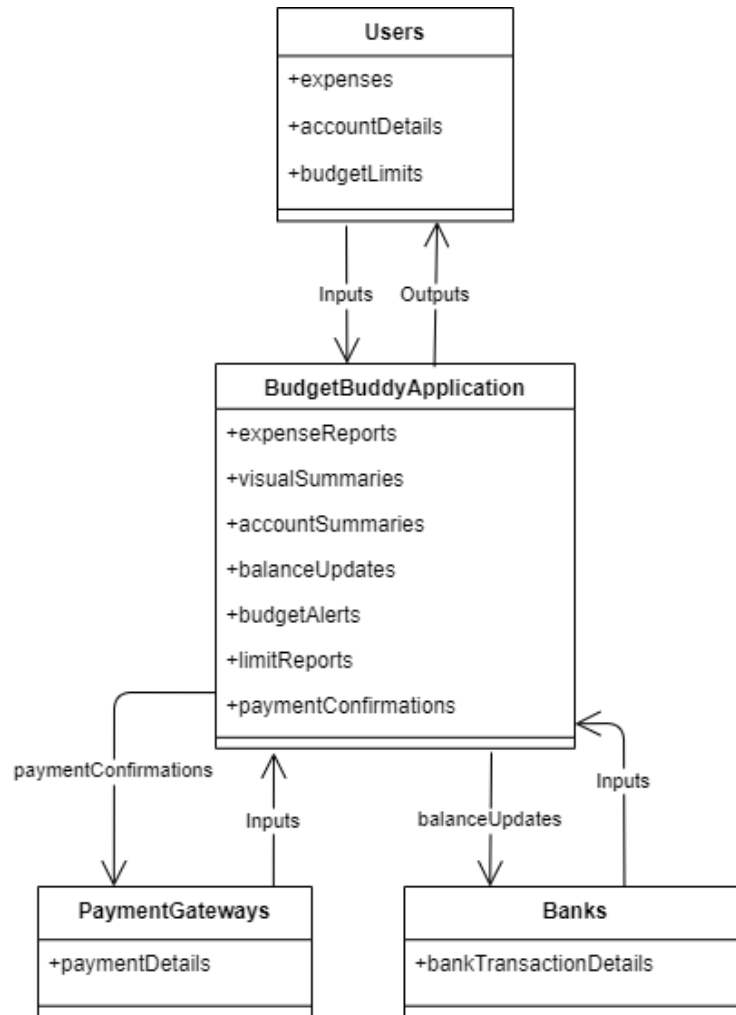
The current process involves manual tracking of expenses using spreadsheets or basic financial apps that lack comprehensive features. Users face challenges in maintaining consistency and gaining insights into their spending patterns.

Scenario	AS-IS Process	Workflow
Expense Tracking	Users manually record expenses in notebooks or spreadsheets. Some use basic financial apps, but these often lack customization and visual tools.	The user identifies an expense. User manually enters expense details (date, amount, category) into their chosen tracking method. The user reviews and categorizes expenses periodically (weekly/monthly).
Expense Categorization	Users create their categories in spreadsheets or use pre-defined categories in basic apps. Customization is limited and often requires manual adjustments.	The user creates categories based on common expenses. The user assigns each recorded expense to a category. User updates categories manually if new types of expenses arise.
Financial Summaries and Visualizations	Users compile data from spreadsheets or basic apps to create summaries. Visualizations, if created, are typically basic charts in spreadsheet software.	The user compiles monthly expense data. The user creates charts (e.g., pie charts) manually to visualize spending patterns. The user interprets the visual data to make financial decisions.

5.0 Logical DFD AS-IS (Context Diagram, Diagram 0, Child)

Context Diagram

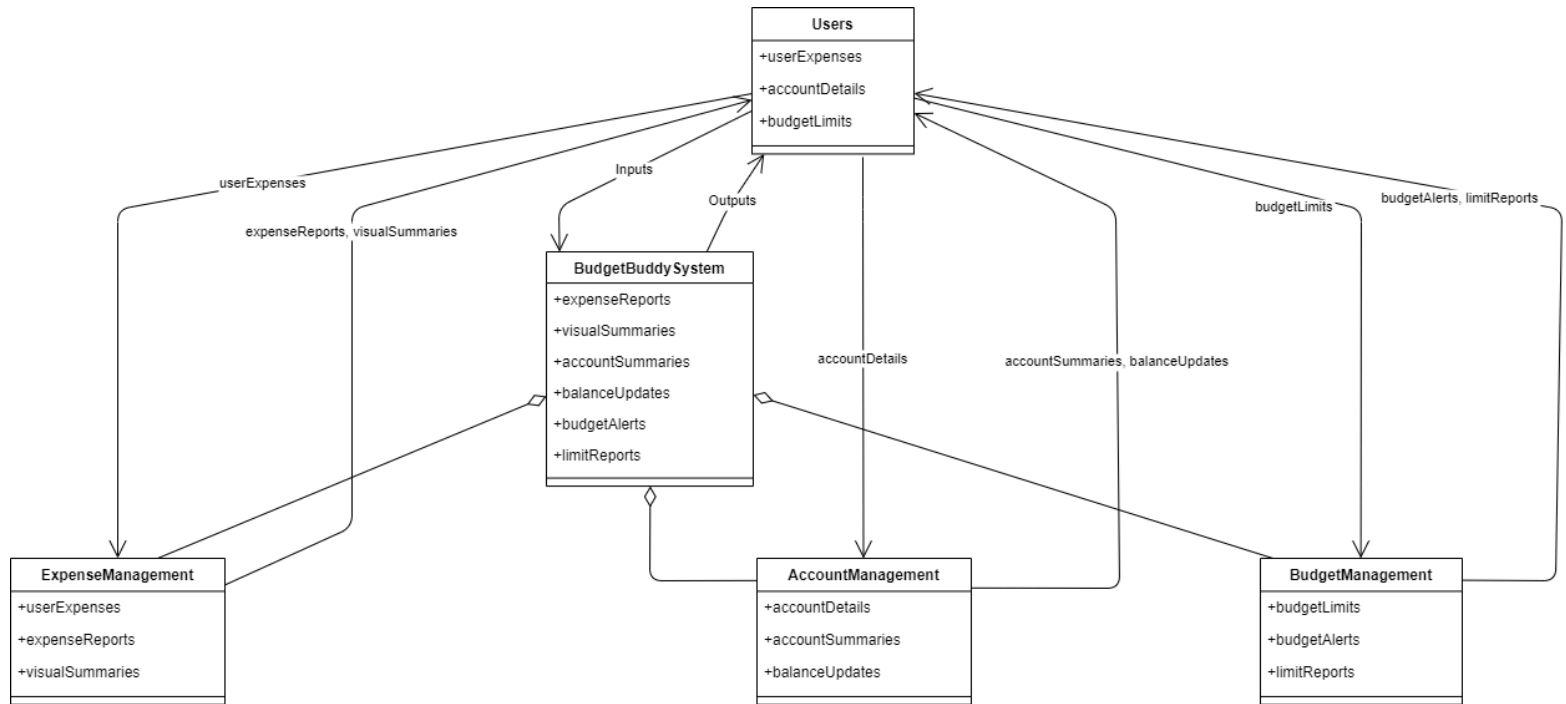
The Context Diagram shows the interaction between external entities (Users, Payment Gateways, Banks) and the Budget Buddy system. It represents the high-level view of how data flows between the system and external entities.



- **Users**: Provide expenses, account details, and budget limits to the Budget Buddy Application and receive expense reports, visual summaries, account summaries, balance updates, budget alerts, and limit reports.
- **Payment Gateways**: Provide payment details to the Budget Buddy Application and receive payment confirmations.
- **Banks**: Provide bank transaction details to the Budget Buddy Application and receive balance updates.
- **Budget Buddy Application**: The central system that processes inputs from users, payment gateways, and banks, and provides various reports and updates.

Diagram 0

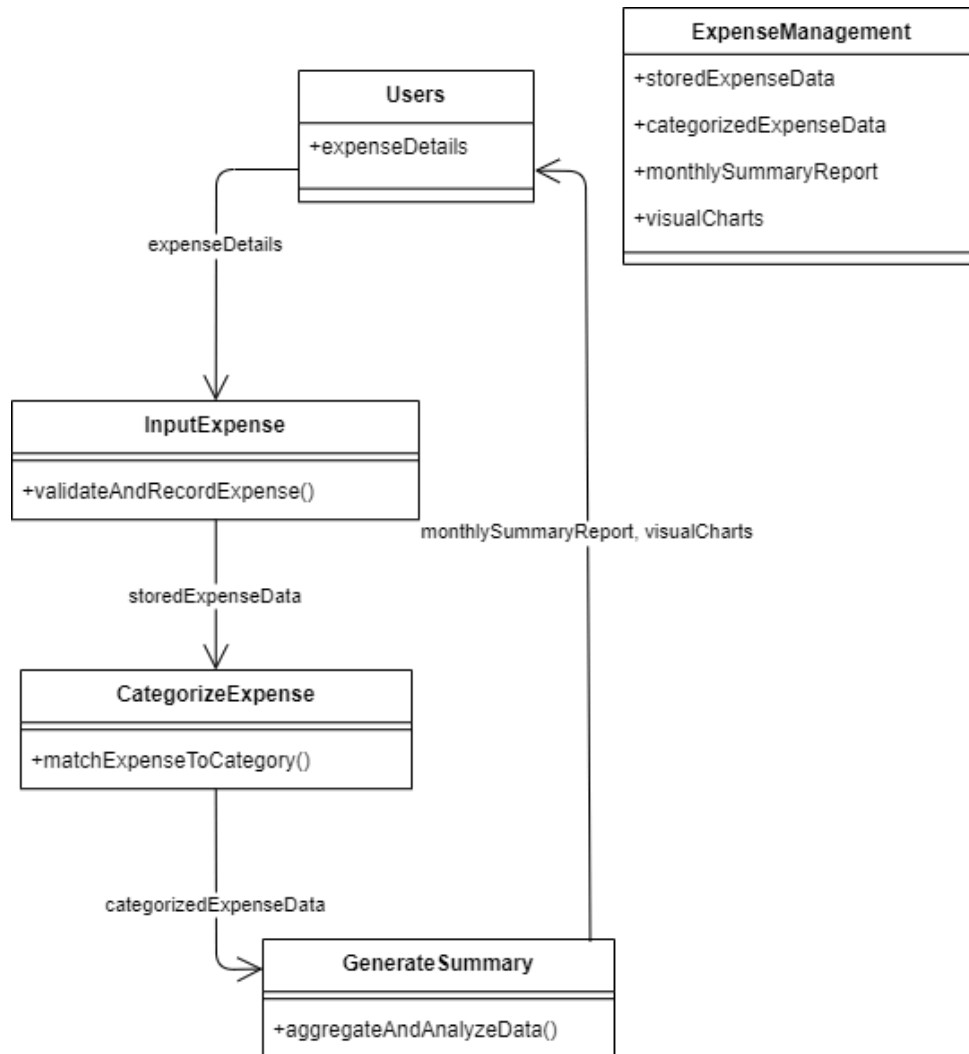
Diagram 0 provides a high-level overview of the major processes within the Budget Buddy system. It breaks down the system into its primary components and illustrates how data flows between them.



- **Users:** Interact with the Expense Management, Account Management, and Budget Management processes.
- **Expense Management:** Handles user expenses and generates expense reports and visual summaries.
- **Account Management:** Manages account details, provides account summaries, and updates balances.
- **Budget Management:** Manages budget limits, monitors spending, and provides budget alerts and limit reports.
- **Budget Buddy System:** Integrates the processes and facilitates the interaction between users and the system components.

Child Diagram (Expense Management)

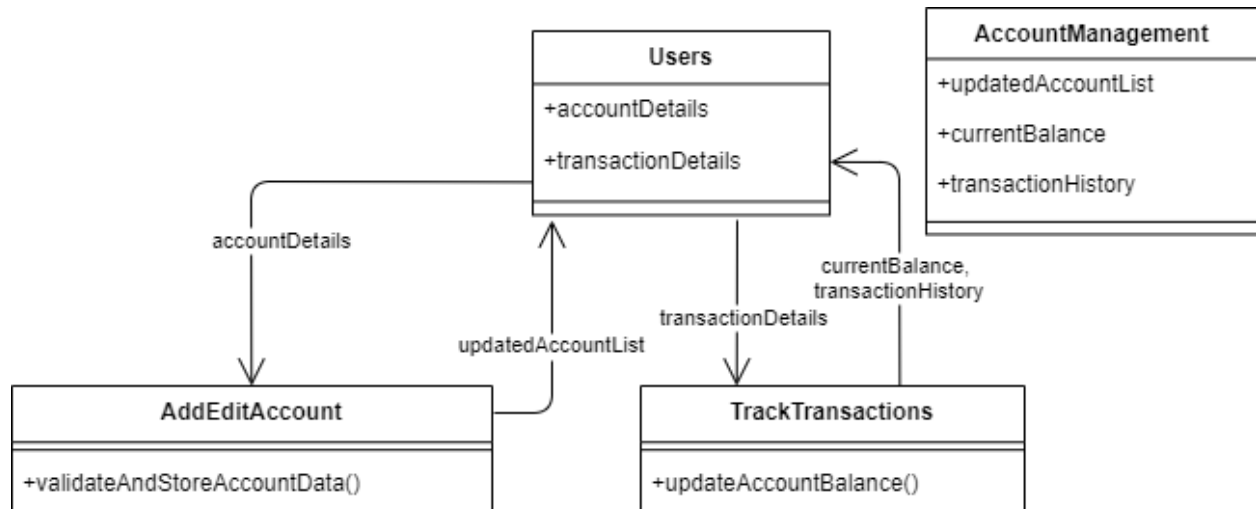
The Expense Management Child Diagram breaks down the Expense Management process into smaller sub-processes: Input Expense, Categorize Expense, and Generate Summary.



- **Users**: Provide expense details to the system.
- **Input Expense**: Validates and records the user-provided expense details.
- **Categorize Expense**: Matches recorded expenses to the appropriate categories.
- **Generate Summary**: Aggregates and analyzes categorized expense data to produce monthly summary reports and visual charts.
- **Expense Management**: Integrates these sub-processes to manage expenses effectively

Child Diagram (Account Management)

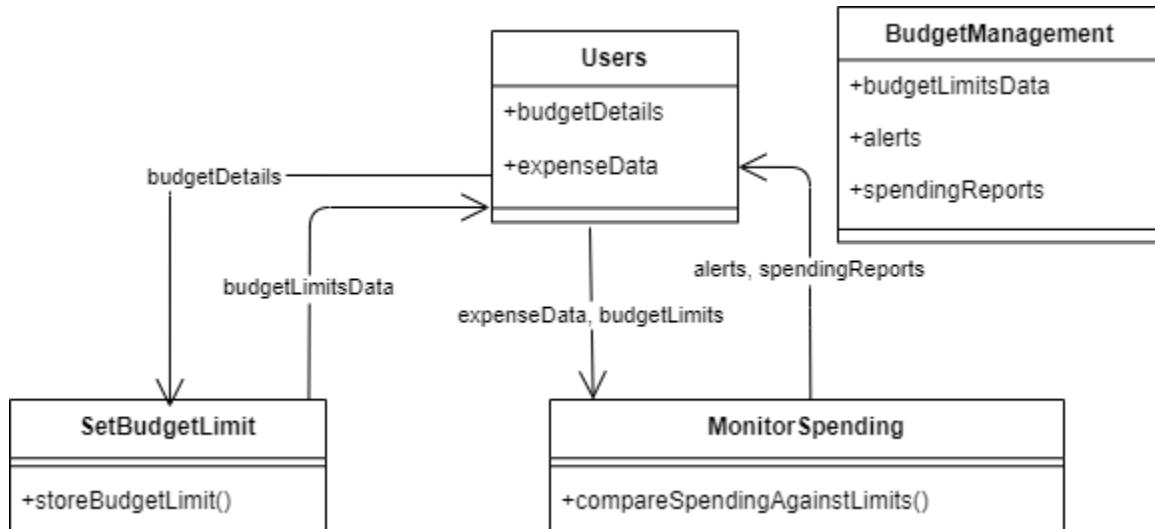
The Account Management Child Diagram breaks down the Account Management process into smaller sub-processes: Add/Edit Account and Track Transactions.



- **Users:** Provide account details and transaction details to the system.
- **Add/Edit Account:** Validates and stores the user-provided account details, updating the account list.
- **Track Transactions:** Updates account balances based on transaction details and maintains the transaction history.
- **Account Management:** Integrates these sub-processes to manage user accounts effectively.

Child Diagram (Budget Management)

The Budget Management Child Diagram breaks down the Budget Management process into smaller sub-processes: Set Budget Limit and Monitor Spending.



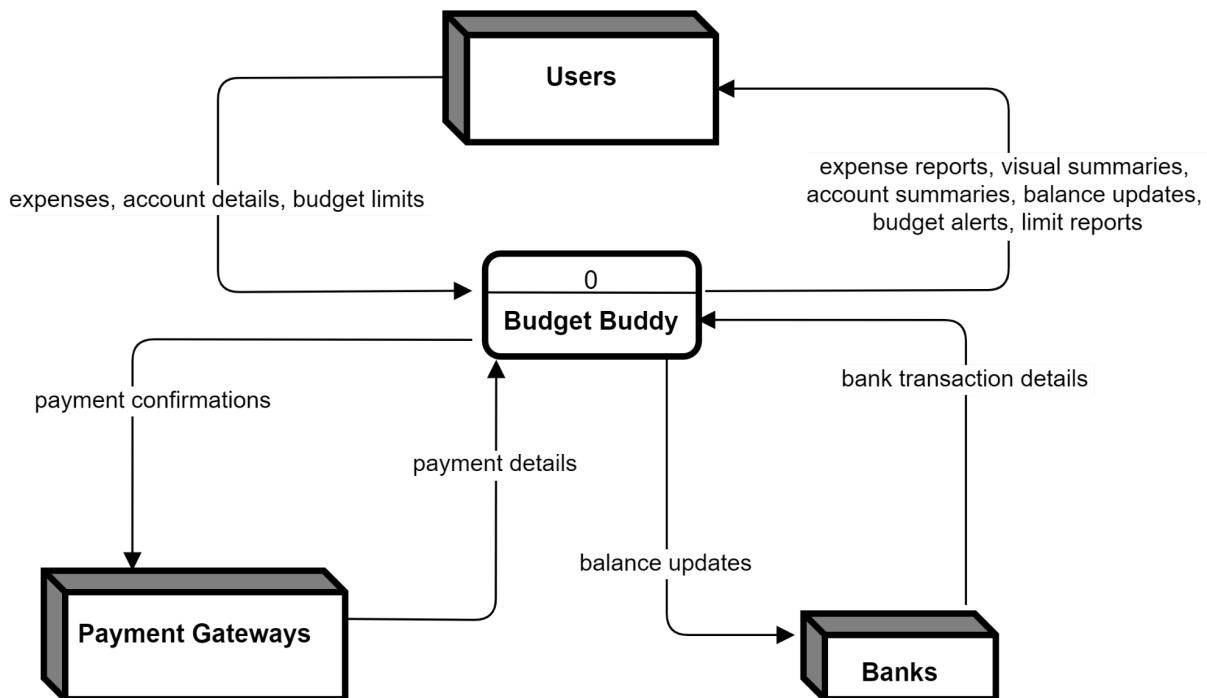
- **Users**: Provide budget details and expense data to the system.
- **Set Budget Limit**: Stores the user-provided budget limits.
- **Monitor Spending**: Compares user spending against the stored budget limits and generates alerts and spending reports.
- **Budget Management**: Integrates these sub-processes to manage user budgets effectively.

6.0 SYSTEM ANALYSIS AND SPECIFICATION

6.1 Logical DFD TO-BE System

Context Diagram

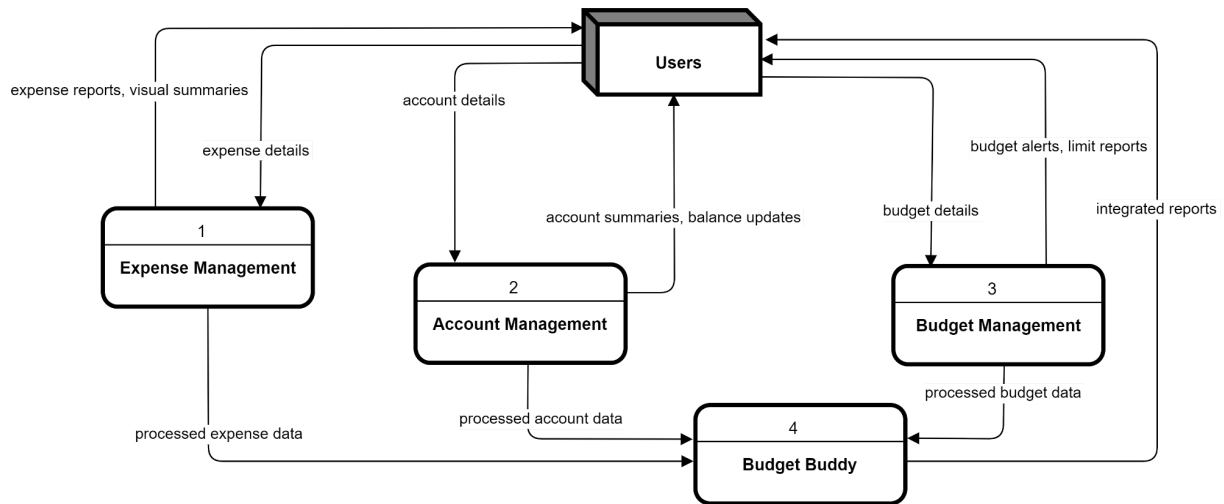
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- Budget Buddy Application: The central system that processes inputs from users, payment gateways, and banks, and provides various reports and updates.

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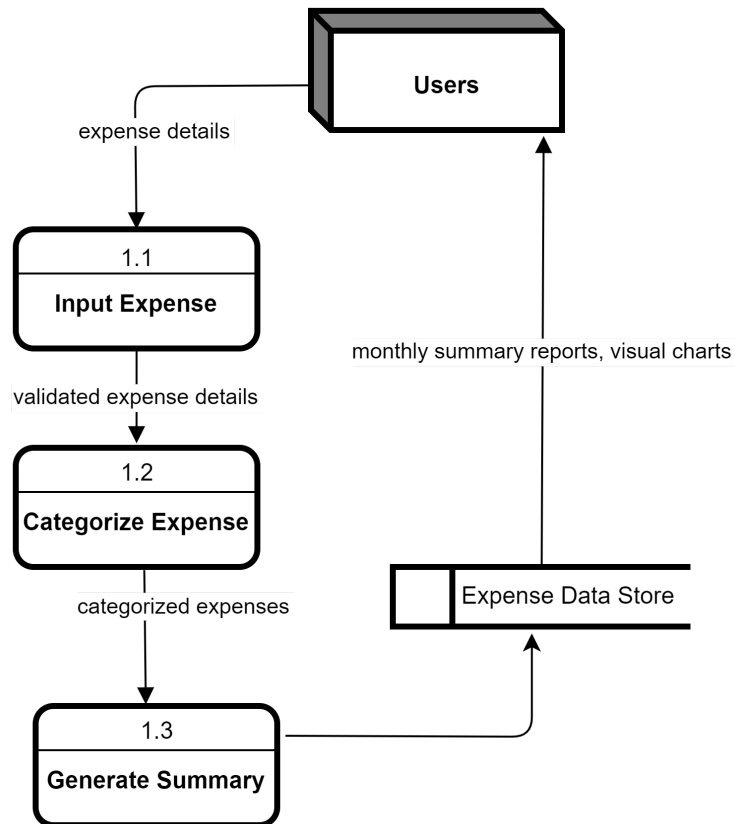
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Child Diagram (Expense Management)

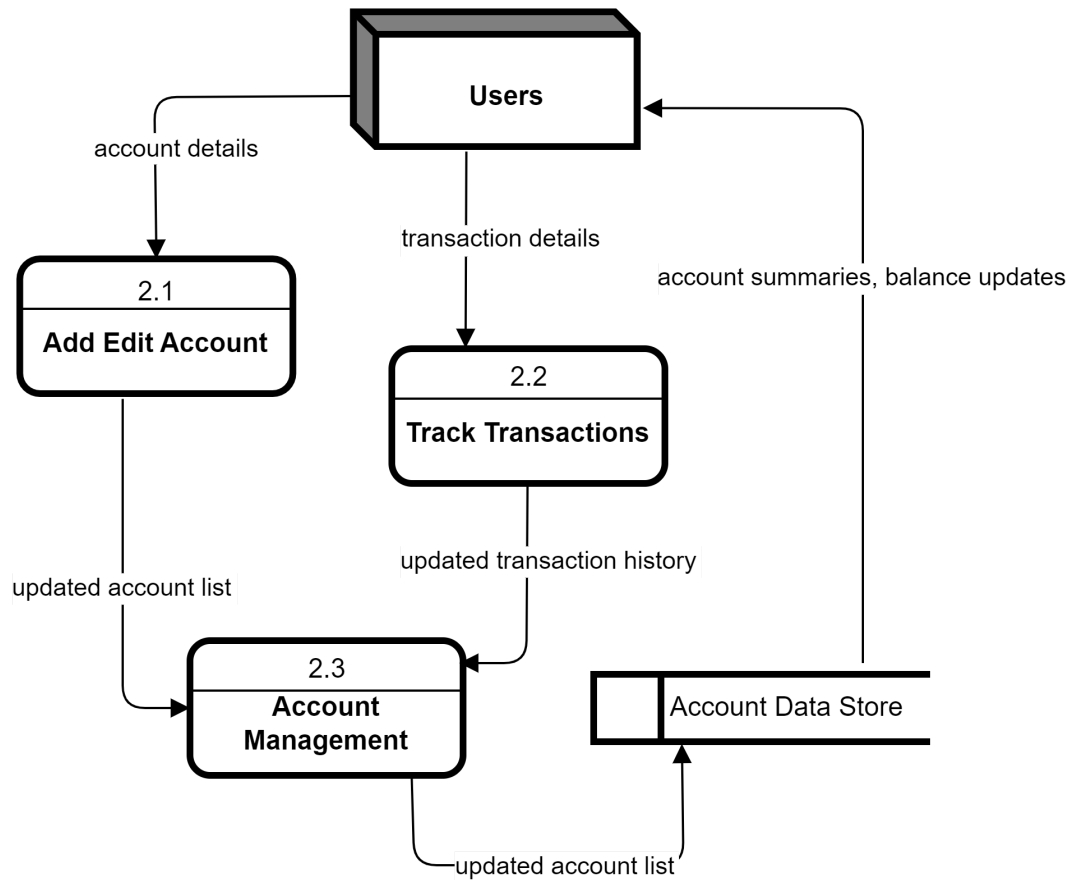
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Child Diagram (Account Management)

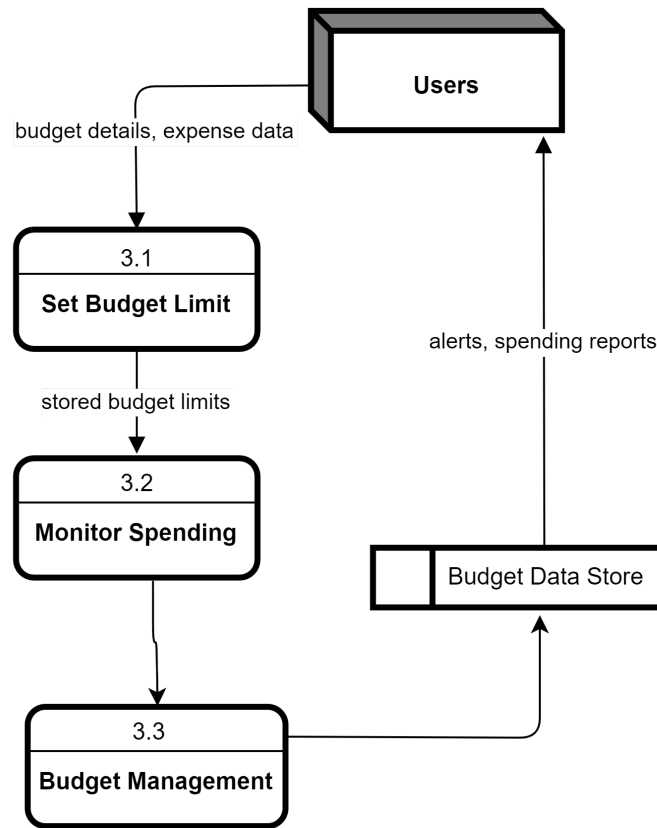
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- Account Management: Integrates these sub-processes to manage user accounts effectively.

Child Diagram (Budget Management)

The Budget Management Child Diagram breaks down the Budget Management process into smaller sub-processes: Set Budget Limit and Monitor Spending.



- Users: Provide budget details and expense data to the system.
- Set Budget Limit: Stores the user-provided budget limits.
- Monitor Spending: Compares user spending against the stored budget limits and generates alerts and spending reports.
- Budget Management: Integrates these sub-processes to manage user budgets effectively.

6.2 Process Specification

Process: Input Expense

- **Description:** This process validates and records the expense details provided by the user.
- **Inputs:** Expense details (date, amount, category)
- **Outputs:** Validated expense records
- **Steps:**
 1. User enters expense details.

2. System validates the details.
3. Validated details are recorded in the system.

Process: Categorize Expense

- **Description:** This process matches the recorded expenses to the appropriate categories.
- **Inputs:** Validated expense records
- **Outputs:** Categorized expenses
- **Steps:**
 1. System receives validated expense records.
 2. System matches each expense to a predefined category.
 3. Categorized expenses are stored for further processing.

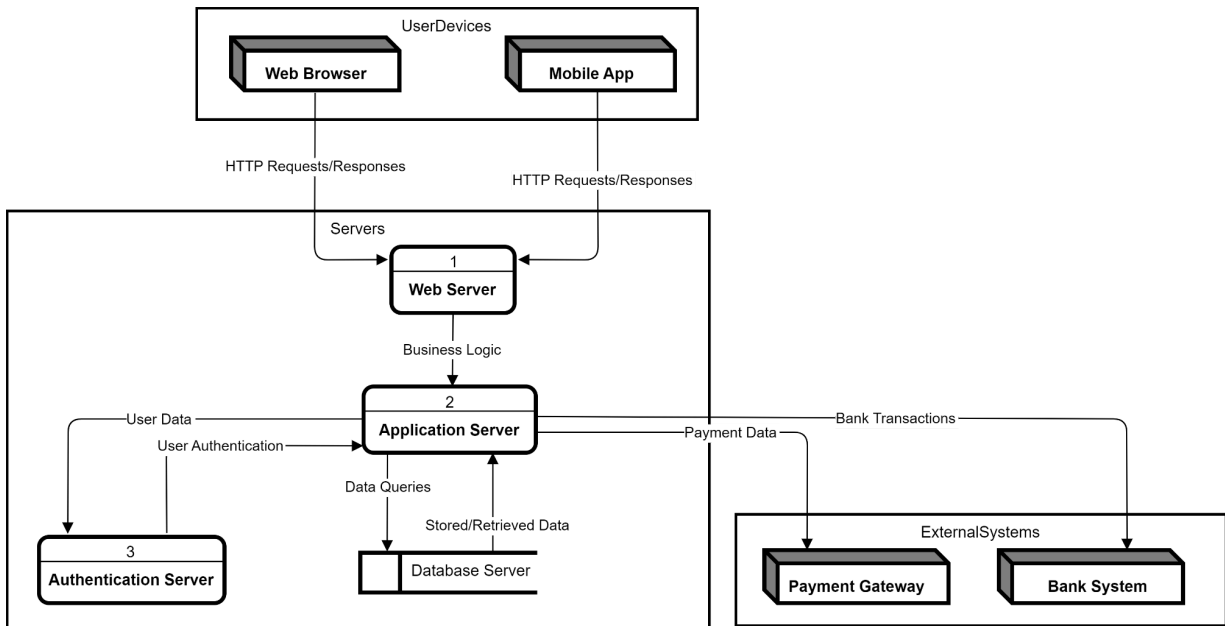
Process: Generate Summary

- **Description:** This process aggregates and analyzes categorized expense data to produce monthly summary reports and visual charts.
- **Inputs:** Categorized expenses
- **Outputs:** Monthly summary reports, visual charts
- **Steps:**
 1. System aggregates categorized expenses.
 2. System analyzes the aggregated data.
 3. System generates summary reports and visual charts.

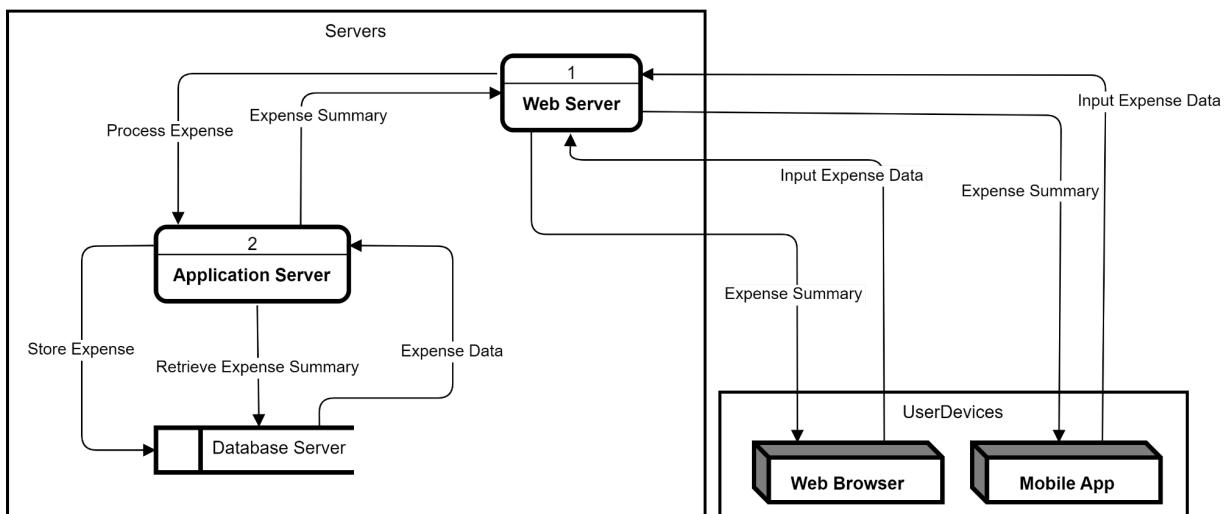
7.0 PHYSICAL SYSTEM DESIGN

7.1 Physical DFD TO-BE system

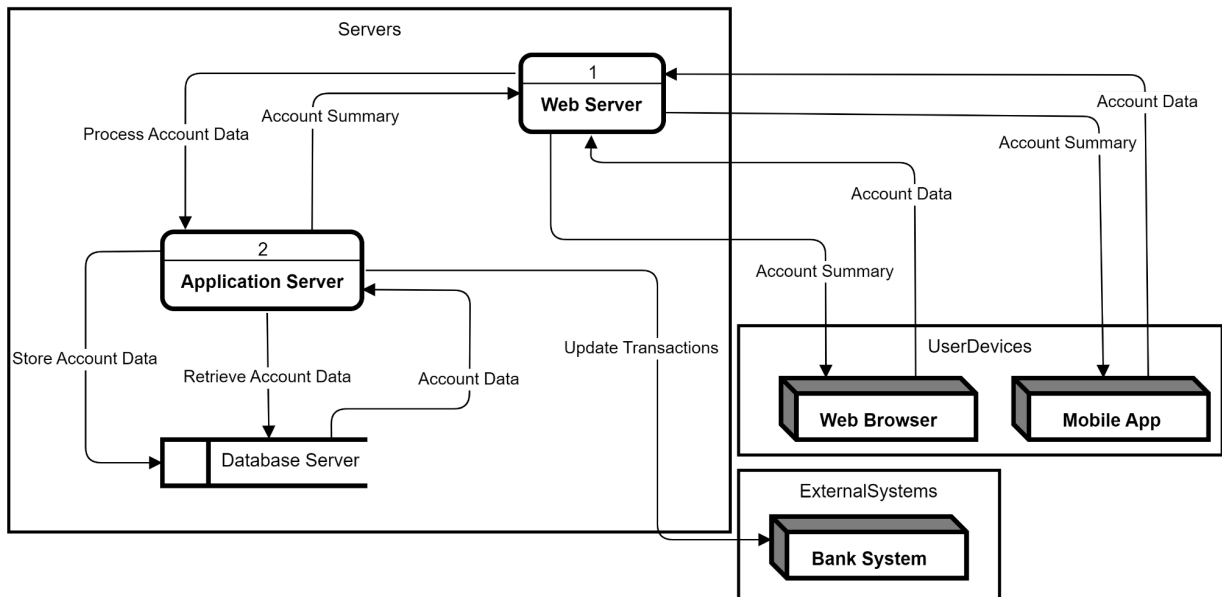
Diagram 0



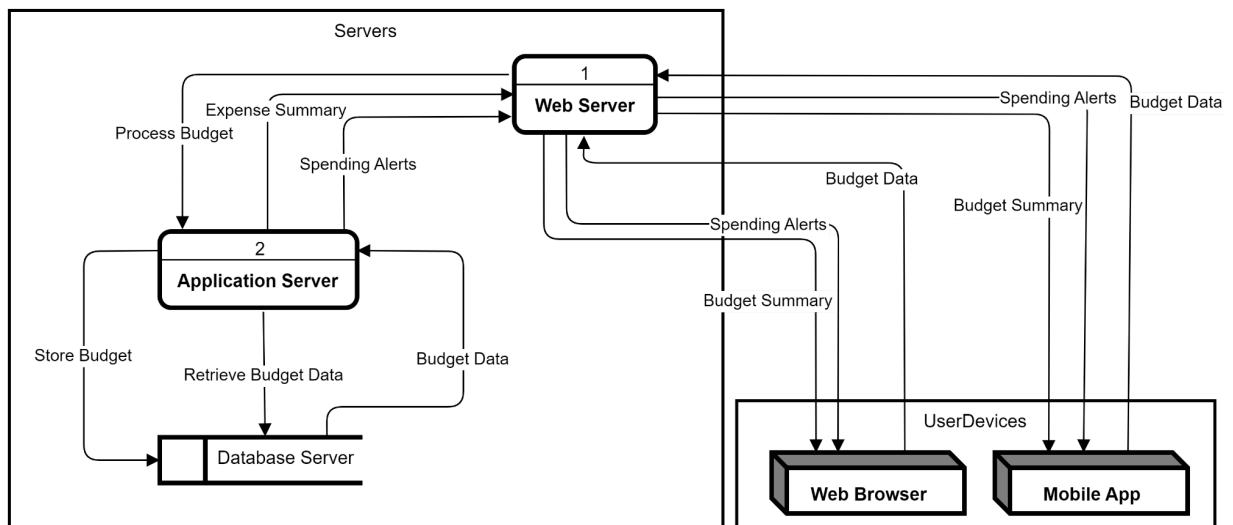
Child Diagram (Expense Management)



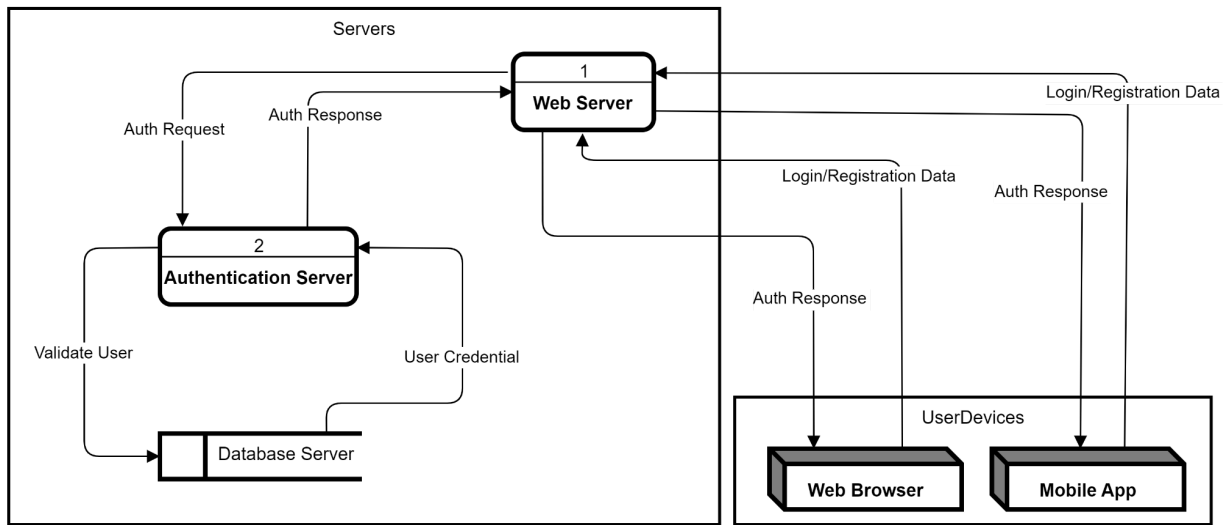
Child Diagram (Account Management)



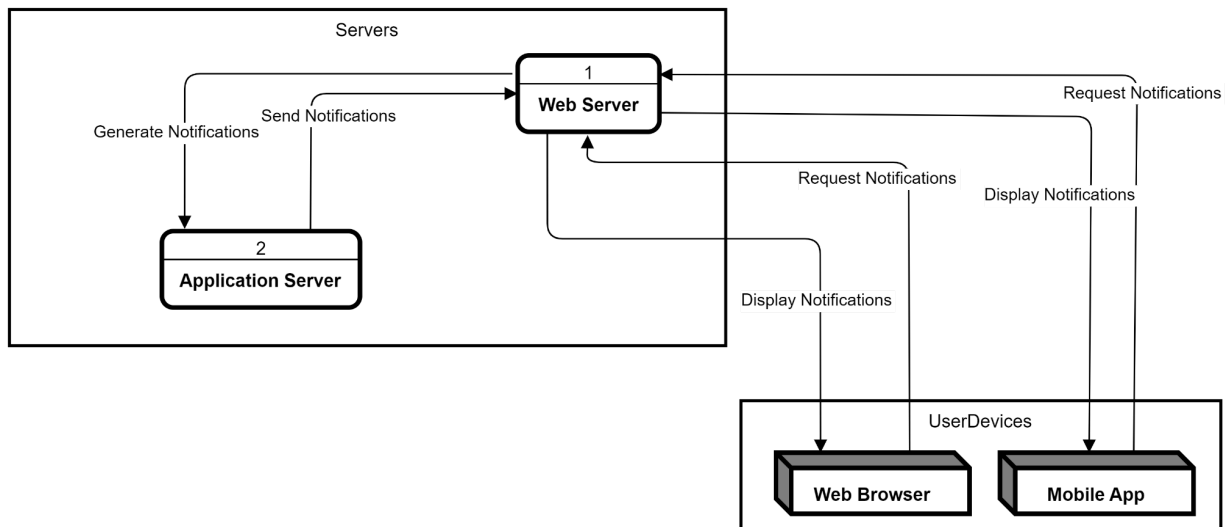
Child Diagram (Budget Management)



Child Diagram (User Authentication)



Child Diagram (Notification Management)

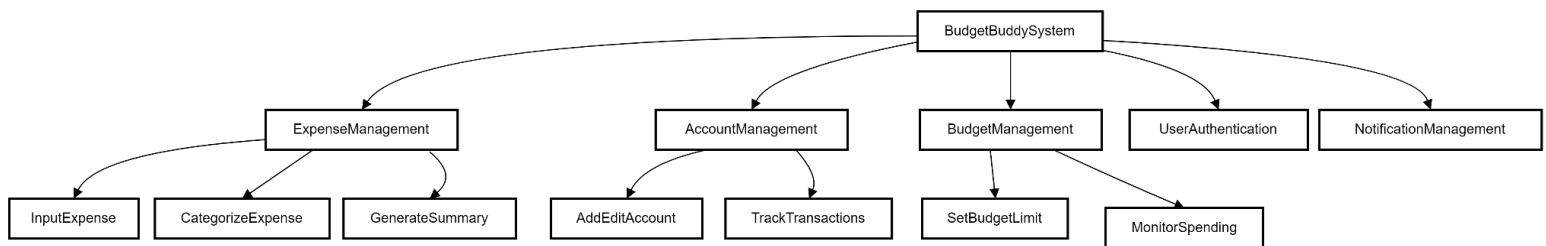


Partitioning

Partitioning in system design involves breaking down the system into distinct, manageable modules or partitions. Each partition encapsulates a specific subset of the system's functionality, allowing for better modularity, scalability, and maintainability. For the Budget Buddy system, partitioning ensures that different aspects of the financial management process are handled independently yet cohesively.

Logical Partitioning

Logical partitioning divides the system based on functionality. Each module handles a specific aspect of the system.



1. Expense Management

- **Input Expense:** Captures and validates user expenses.
- **Categorize Expense:** Classifies expenses into categories.
- **Generate Summary:** Creates expense reports and summaries.

2. Account Management

- **Add/Edit Account:** Manages user account details.
- **Track Transactions:** Monitors and updates transaction history.

3. Budget Management

- **Set Budget Limit:** Sets budget limits for users.
- **Monitor Spending:** Tracks spending and generates alerts.

4. User Authentication

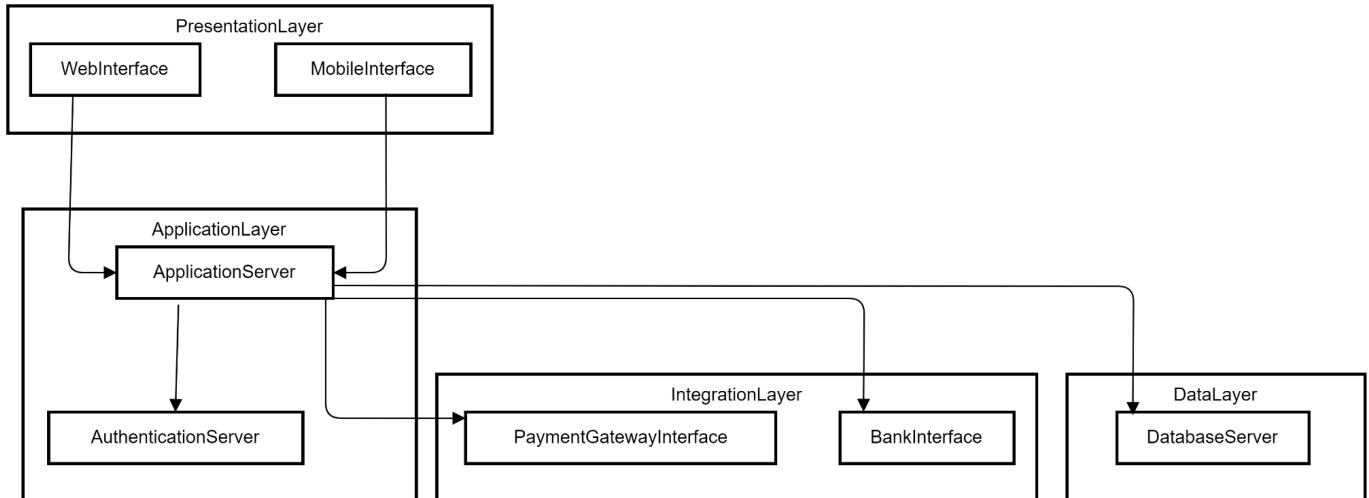
- Manages user login and authentication.

5. Notification Management

- Sends alerts and notifications to users.

Physical Partitioning

Physical partitioning separates the system based on deployment infrastructure.



1. Presentation Layer

- **Web Interface:** For web browsers.
- **Mobile Interface:** For mobile devices.

2. Application Layer

- **Application Server:** Processes business logic.
- **Authentication Server:** Handles user authentication.

3. Data Layer

- **Database Server:** Stores all system data.

4. Integration Layer

- **Payment Gateway Interface:** Communicates with payment gateways.
- **Bank Interface:** Interacts with banks for transaction details.

CRUD Matrix

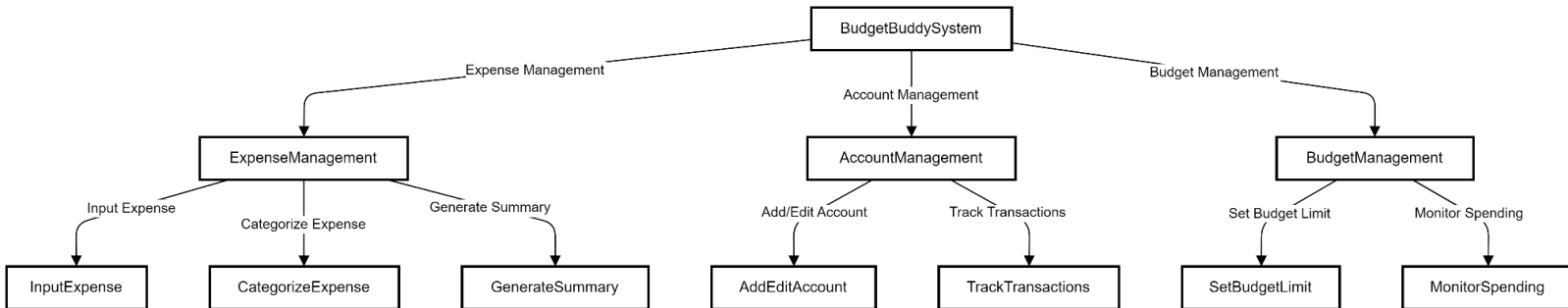
Process	Data Entity	Create	Read	Update	Delete
Expense Management	Expense Records	X	X	X	X
Account Management	Account Details	X	X	X	
Budget Management	Budget Limits	X	X	X	

Event Response Table

Event	Trigger	System Response
New Expense Added	User Enters Expense	Validate And Save Expense, Update Summaries
Account Updated	User Updates Account	Validate And Update Account Details
Budget Limit Set	User Set Budget Limit	Store Limit And Start Monitoring Expenses

Structure Chart

The structure chart illustrates the breakdown of the Budget Buddy system into its primary modules and sub-modules, showcasing their hierarchical relationships. It demonstrates how the high-level functions are decomposed into more specific functions, ensuring clarity in system design and facilitating maintenance and scalability.



Components and The Roles

1. BudgetBuddySystem

The main system encompassing all functional modules. It is the top-level component responsible for managing all high-level functionalities and integrating various modules to provide a cohesive financial management solution.

2. Expense Management

Manages user expenses, ensuring they are correctly input, categorized, and summarized.

- **Input Expense:** Validates and records the user-provided expense details.
- **Categorize Expense:** Classifies the recorded expenses into appropriate categories for better management and reporting.
- **Generate Summary:** Aggregates and analyzes categorized expense data to produce summary reports and visual charts.

3. Account Management

Manages user accounts, tracking transactions and providing account summaries.

- **Add/Edit Account:** Validates and stores user-provided account details, updating the account list as necessary.
- **Track Transactions:** Monitors and updates account balances based on transaction details and maintains transaction history.

4. **Budget Management**

Manages user budgets, setting limits, monitoring spending, and providing alerts.

- **Set Budget Limit:** Stores user-provided budget limits for various categories.
- **Monitor Spending:** Compares actual spending against budget limits, generating alerts and spending reports to help users stay within their budgets.

Data Flow and Interactions

- **Data Input:** Users interact with the system through the Presentation Layer (Web or Mobile Interface), providing data related to expenses, accounts, and budgets.
- **Processing:** The data flows into the respective management modules (Expense Management, Account Management, Budget Management), where it is processed and validated.
- **Storage:** Validated and processed data is stored in the Data Layer (Database Server) for future retrieval and analysis.
- **Output:** Processed data is used to generate reports, summaries, and alerts, which are communicated back to the users through the Presentation Layer.

Benefits of the Structure Chart

- **Modularity:** Each module handles specific functionalities, making the system easier to understand, develop, and maintain.
- **Scalability:** The modular design allows for easy scaling of the system by adding or modifying modules without affecting the entire system.
- **Reusability:** Functions within each module can be reused across different parts of the system, reducing redundancy and enhancing efficiency.
- **Maintainability:** The clear hierarchical structure helps in isolating issues within specific modules, simplifying debugging and maintenance tasks.

System Architecture

The system architecture for the Budget Buddy application is divided into several layers:

Components and Interactions

1. Presentation Layer:

Web Interface and **Mobile Interface**: These are the primary user interfaces through which users interact with the Budget Buddy system. They allow users to manage expenses, accounts, and budgets.

2. Application Layer:

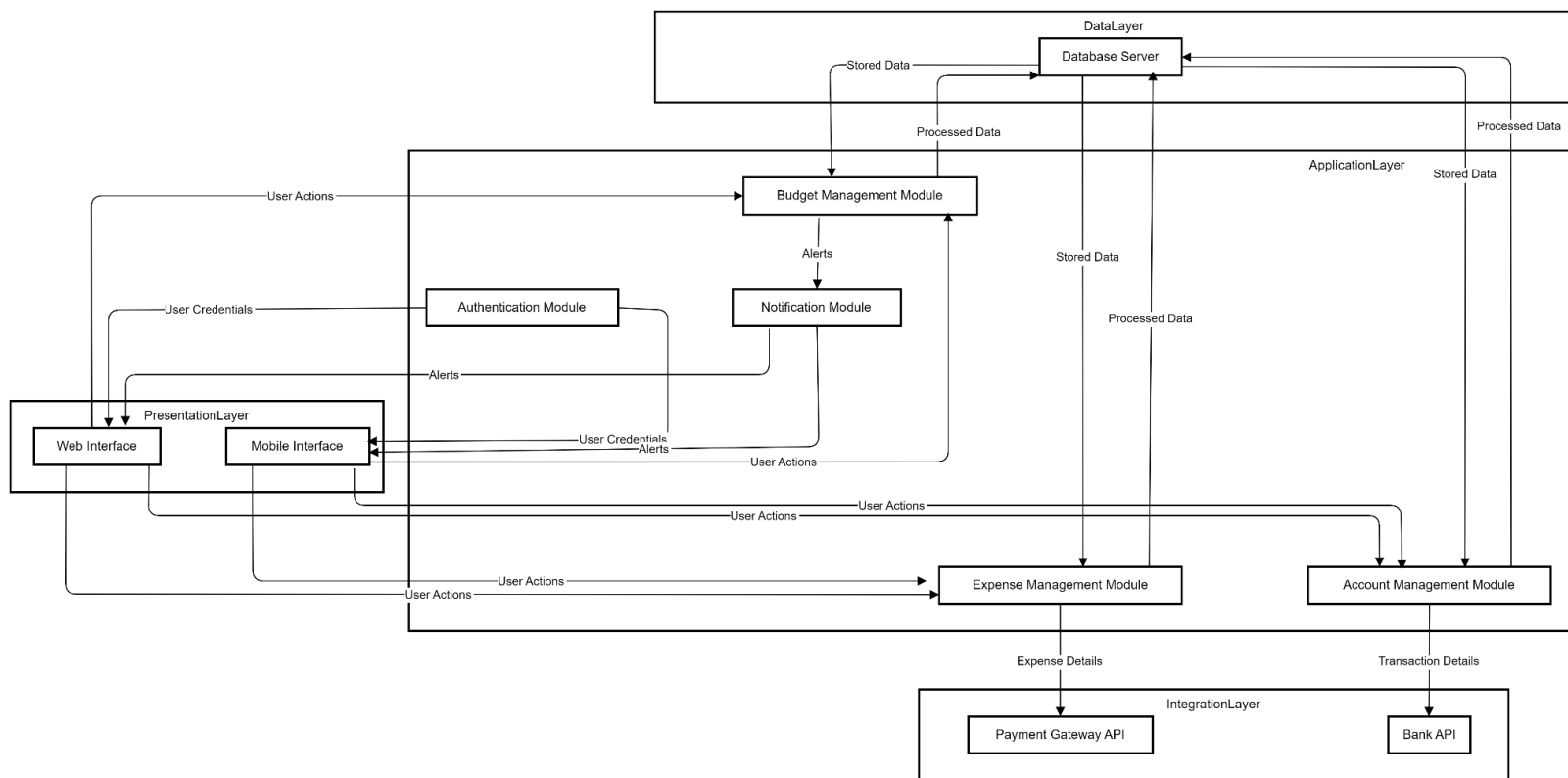
- **Expense Management Module**: This module processes user-provided expense details, categorizes them, and generates summaries and reports.
- **Account Management Module**: Manages user accounts, tracks transactions, and provides account summaries.
- **Budget Management Module**: Handles setting and monitoring budget limits, generating alerts when limits are reached.
- **Authentication Module**: Ensures secure user authentication and authorization.
- **Notification Module**: Sends alerts and notifications to users about budget limits, expense reports, and account updates.

3. Data Layer:

Database Server: Stores all the data related to expenses, accounts, budgets, and user details. It uses an RDBMS to manage and query the data efficiently.

4. Integration Layer:

- **Payment Gateway API**: Interfaces with external payment gateways to process payment details.
- **Bank API**: Interfaces with banks to retrieve transaction details and update account balances.



Data Flow Explanation

- **User Actions:** Users interact with the system via the web or mobile interface, providing expense details, account information, and budget limits.
- **Expense, Account, and Budget Management Modules:** These modules process user inputs, interact with the database to store/retrieve data, and generate necessary reports and alerts.
- **Database Server:** Acts as the central repository for all data, ensuring data integrity and availability.
- **External APIs:** The system communicates with external payment gateways and banks to fetch necessary transaction details and process payments.

8.0 SYSTEM WIREFRAME

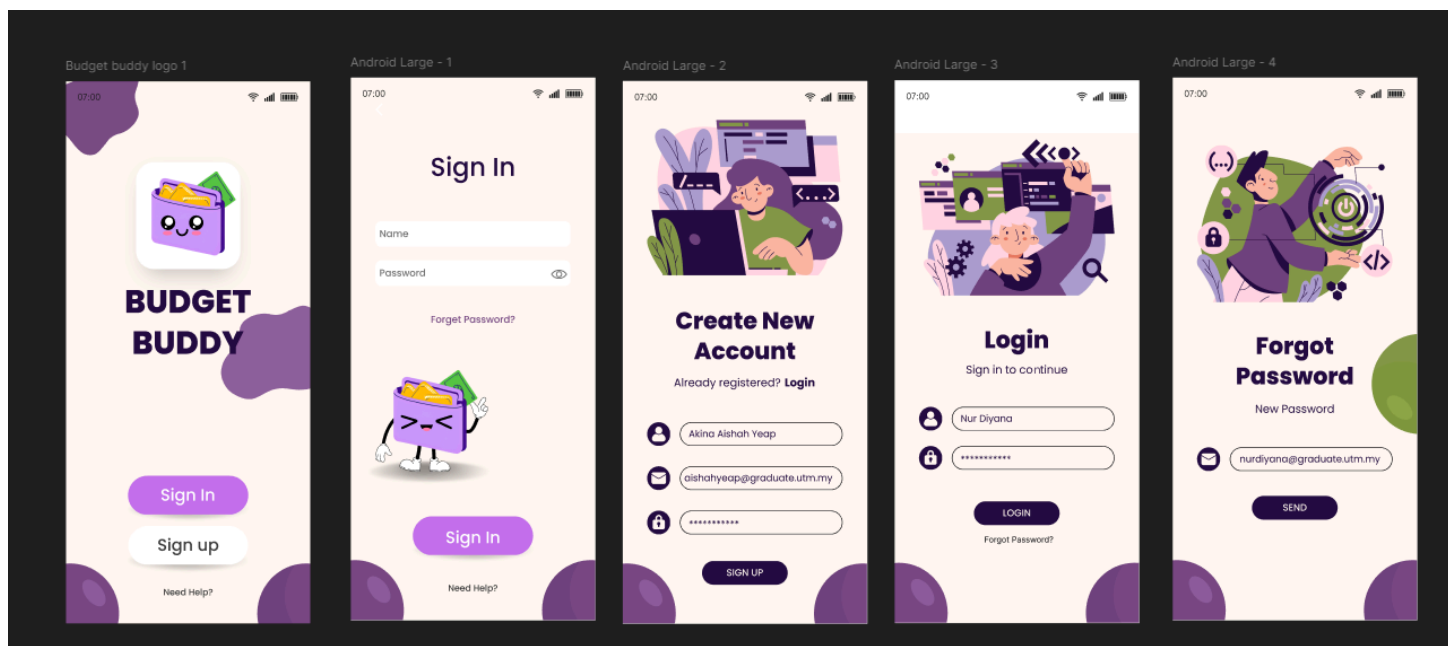
The design ensures that users can efficiently and accurately enter data into the system and focuses on how the system will display information to users.

a. User Interface for Data Entry

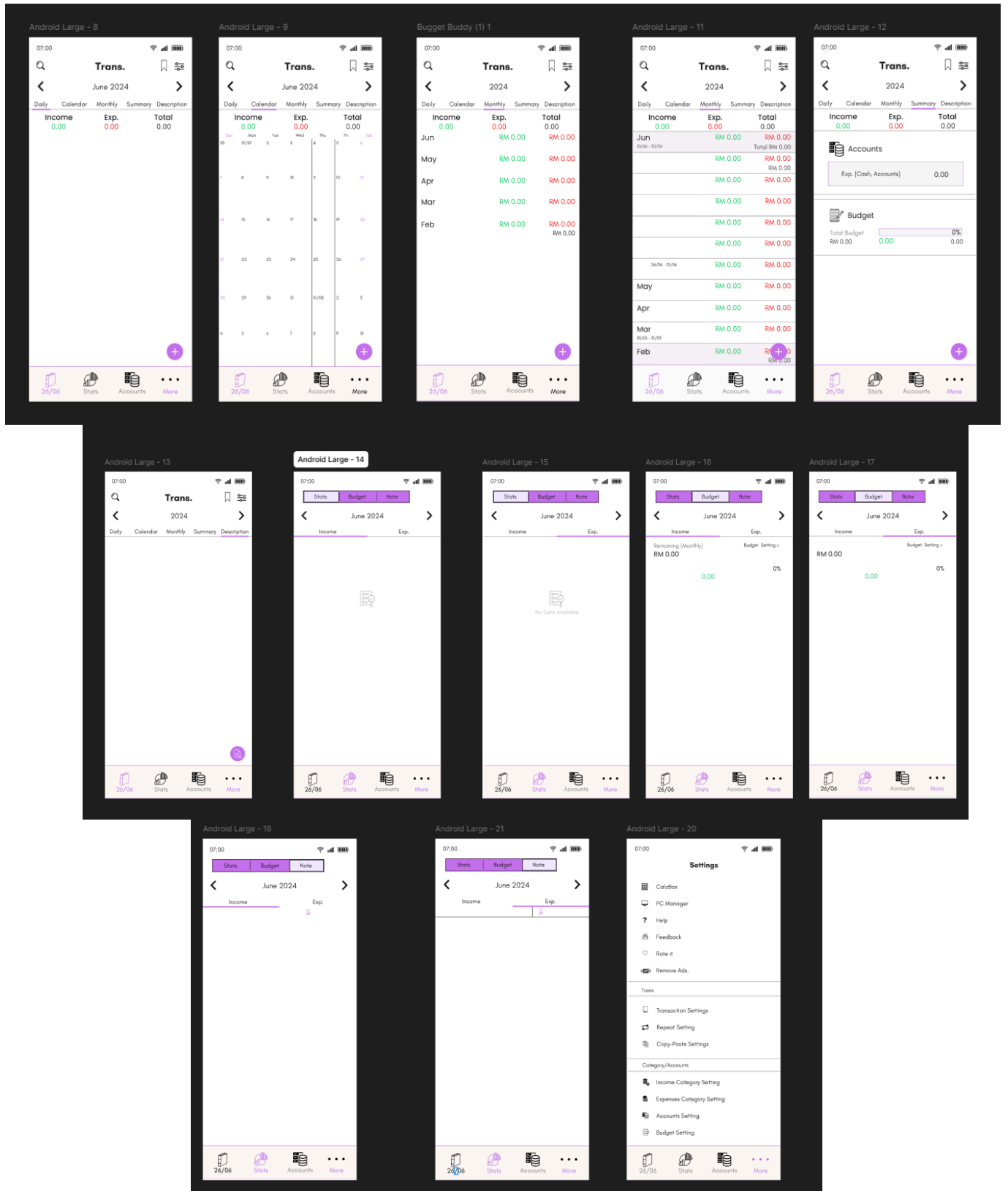
- **Expense Management:** Design input forms for entering expense details such as date, amount, category, and description.
- **Account Management:** Create forms for adding and editing account details, including account name, type, balance, and transaction history.
- **Budget Management:** Develop interfaces for setting budget limits for different categories and inputting expense data.

b. Validation Mechanisms

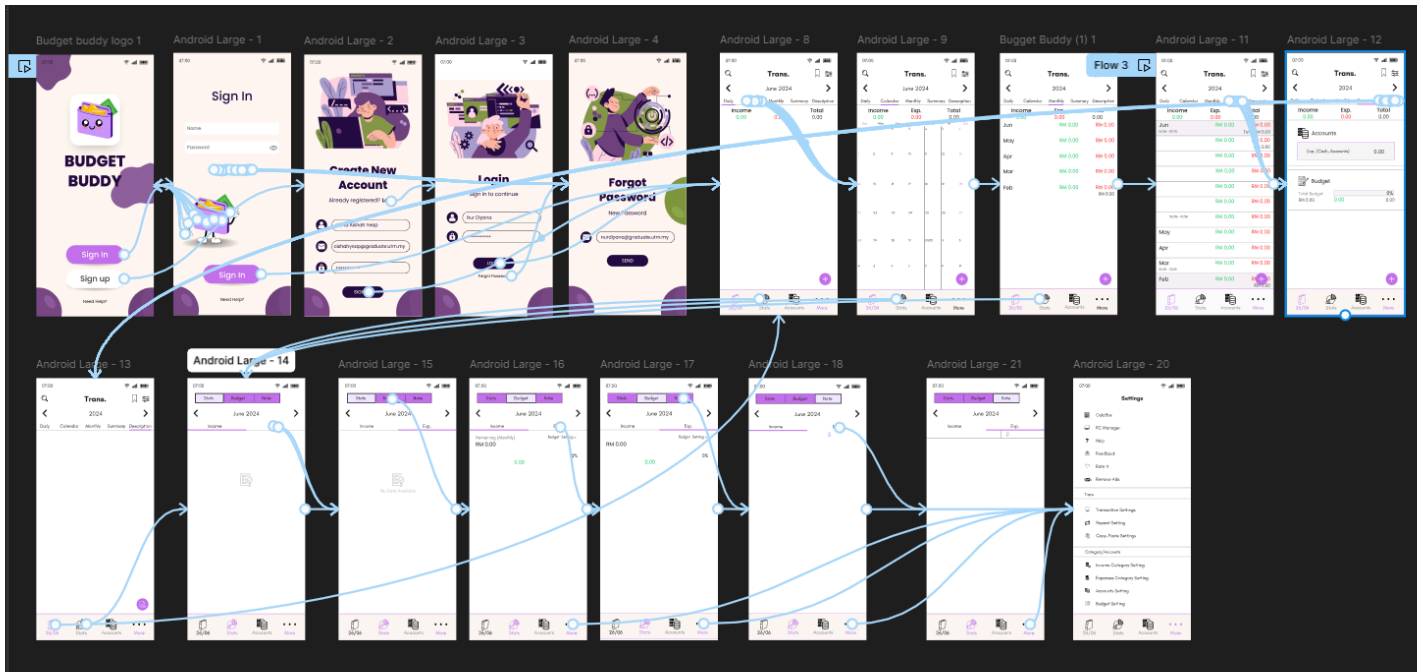
- **Expense Details:** Implement validation checks for required fields, data formats (e.g., date, amount), and logical consistency (e.g., expense date should not be in the future).
- **Account Information:** Ensure that account numbers and balances are validated against predefined rules.
- **Budget Limits:** Validate that budget limits are positive numbers and within reasonable ranges.



Output Design Prototype



Output Design Prototype



Interaction Prototype

Users	
PK	<u>UserID INT AUTO INCREMENT</u>
	UserName VARCHAR(50) NOT NULL
	UserEmail VARCHAR(100) NOT NULL UNIQUE
	PasswordHash VARCHAR(255) NOT NULL
	CreatedAt TIMESTAMP DEFAULT CURRENT_TIMESTAMP

Accounts	
PK	<u>AccountID INT AUTO INCREMENT</u>
	UserID INT NOT NULL
	AccountName VARCHAR(50) NOT NULL
	AccountType VARCHAR(20) NOT NULL
	Balance DECIMAL(10, 2) DEFAULT 0
	CreatedAt TIMESTAMP DEFAULT CURRENT_TIMESTAMP
	FOREIGN KEY (UserID) REFERENCES Users(UserID)

Expenses	
PK	<u>ExpenseID INT AUTO INCREMENT</u>
	UserID INT NOT NULL
	AccountID INT NOT NULL
	ExpenseDate DATE NOT NULL
	Amount DECIMAL(10, 2) NOT NULL
	Category VARCHAR(50) NOT NULL
	Description VARCHAR(255)
	CreatedAt TIMESTAMP DEFAULT CURRENT_TIMESTAMP
	FOREIGN KEY (UserID) REFERENCES Users(UserID)
	FOREIGN KEY (AccountID) REFERENCES Accounts(AccountID)

Budgets	
PK	<u>BudgetID INT AUTO INCREMENT</u>
	UserID INT NOT NULL
	Category VARCHAR(50) NOT NULL
	BudgetLimit DECIMAL(10, 2) NOT NULL
	CreatedAt TIMESTAMP DEFAULT CURRENT_TIMESTAMP
	FOREIGN KEY (UserID) REFERENCES Users(UserID)

Input Prototype

9.0 SUMMARY OF THE PROPOSED SYSTEM

The proposed system, Budget Buddy, is a comprehensive mobile application designed to help users manage their finances effectively in a cashless society. It offers a suite of features aimed at providing users with greater control and insight into their spending patterns. The key components of the system include:

1. **User-Friendly Interface:** An intuitive and engaging design that includes visualizations like pie charts to depict spending patterns, making the application accessible to various demographics.
2. **Expense Tracking and Categorization:** The ability to log expenses manually or automatically through linked bank accounts, with customizable categories to reflect diverse spending habits.
3. **Multiple Account Management:** Support for managing multiple financial accounts, including bank cards and e-wallets, providing a consolidated view of the user's financial status.
4. **Budget Setting and Monitoring:** The ability to set monthly budgets for different categories and receive alerts when close to exceeding these limits, promoting disciplined spending habits.
5. **Data Security and Compliance:** Robust security measures to protect user data and ensure compliance with Malaysian data protection regulations, including encryption and secure authentication methods.
6. **Stakeholder Engagement and Feedback Loop:** Continuous engagement with users and financial institutions, with regular updates and enhancements based on feedback to keep the app relevant and effective.
7. **Support and Resources:** Comprehensive support resources, including FAQs, tutorials, and customer service channels, along with educational materials to enhance financial literacy.

The Budget Buddy app helps people manage their finances in a cashless society. It promotes financial literacy and empowers users to make informed financial decisions, making financial management easier in a fast-paced world.

