Milestone 3: Dashboard & Reporting

1. Introduction

In modern digital financial systems, data extraction alone does not provide sufficient value unless the extracted information can be effectively reviewed, analyzed, and utilized by end users. Earlier milestones of the Receipt Vault System focused on image-based receipt ingestion, optical character recognition, structured data extraction, validation, and secure storage. While these components form the foundation of the system, they do not directly address the user's need for visibility, reporting, and financial insight.

Milestone 3 addresses this gap by introducing a comprehensive dashboard and reporting layer. This milestone is centered around presenting stored receipt data through an interactive Streamlit-based interface that enables users to upload and review receipts, export financial records, and analyze monthly spending patterns. The dashboard acts as the primary interaction point between the user and the system, transforming backend data into a user- friendly and actionable format.

The significance of this milestone lies in its role as a bridge between automated data processing and real-world usability. By enabling visualization, reporting, and data export, the system evolves from a technical prototype into a practical expense management solution suitable for personal finance tracking, small business accounting, and audit preparation.

2. Objectives of Milestone 3

The primary objectives of Milestone 3 are defined as follows:

1. To build an interactive Streamlit dashboard that enables users to upload receipts and review extracted data in a structured and user-friendly manner.

2. To implement CSV and Excel export functionality that allows users to download receipt and transaction data for external use and functionalities like monthly budget setting,AI suggestions etc.

3. To provide simple analytical capabilities in the form of monthly spending summaries to support basic financial analysis.

These objectives collectively aim to improve usability, accessibility, and interpretability of the stored receipt data.

3. Scope of Milestone 3

The scope of Milestone 3 is limited to dashboard development and reporting features built on top of previously implemented extraction and storage mechanisms. This milestone focuses on data presentation, user interaction, and reporting, rather than improving extraction accuracy or introducing advanced predictive analytics.

Within the scope of this milestone, the system supports receipt upload and review through a graphical interface, structured viewing of historical invoices, export of financial data in common formats, and computation of monthly expenditure totals. Advanced financial forecasting, anomaly detection, and long-term trend prediction are intentionally kept out of scope and are reserved for future milestones.
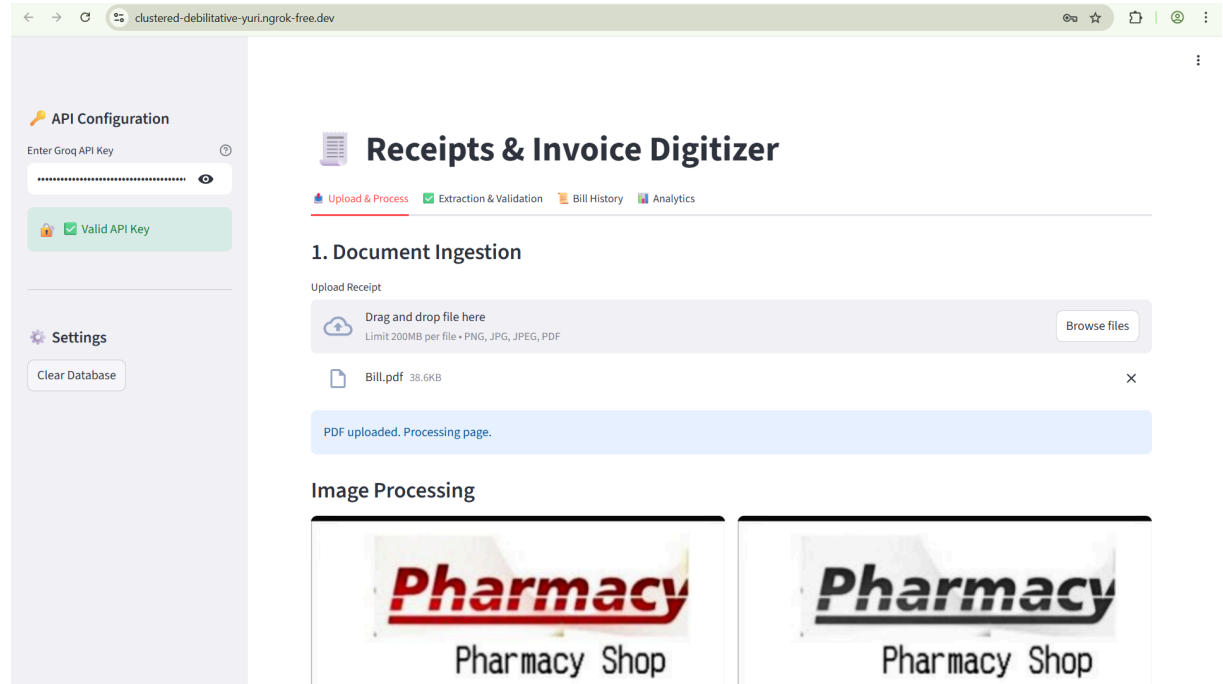
The scope also includes ensuring compatibility with existing database structures, maintaining backward compatibility with previously stored data, and providing a clean and intuitive user experience suitable for non-technical users.

4. Overview of Dashboard Architecture

The dashboard for Milestone 3 is developed using Streamlit, a Python-based framework designed for rapid development of interactive data applications. The dashboard is structured into logical sections that separate data ingestion, review, history management, and analytics. This modular design allows each component to operate independently while sharing a common backend database.

SQLite is used as the underlying database to store receipts, line items, and associated metadata. Pandas is used extensively to retrieve, process, aggregate, and format data for display and export. The integration of these technologies ensures smooth data flow from storage to visualization, enabling real-time interaction without complex deployment requirements.

5. Objective 1: Dashboard for Upload and Review

5.1 Purpose of the Upload and Review Interface

The upload and review interface is designed to serve as the primary entry point for users interacting with the system. Its purpose is to allow users to submit receipt images and immediately review the extracted information. This interface ensures transparency in the
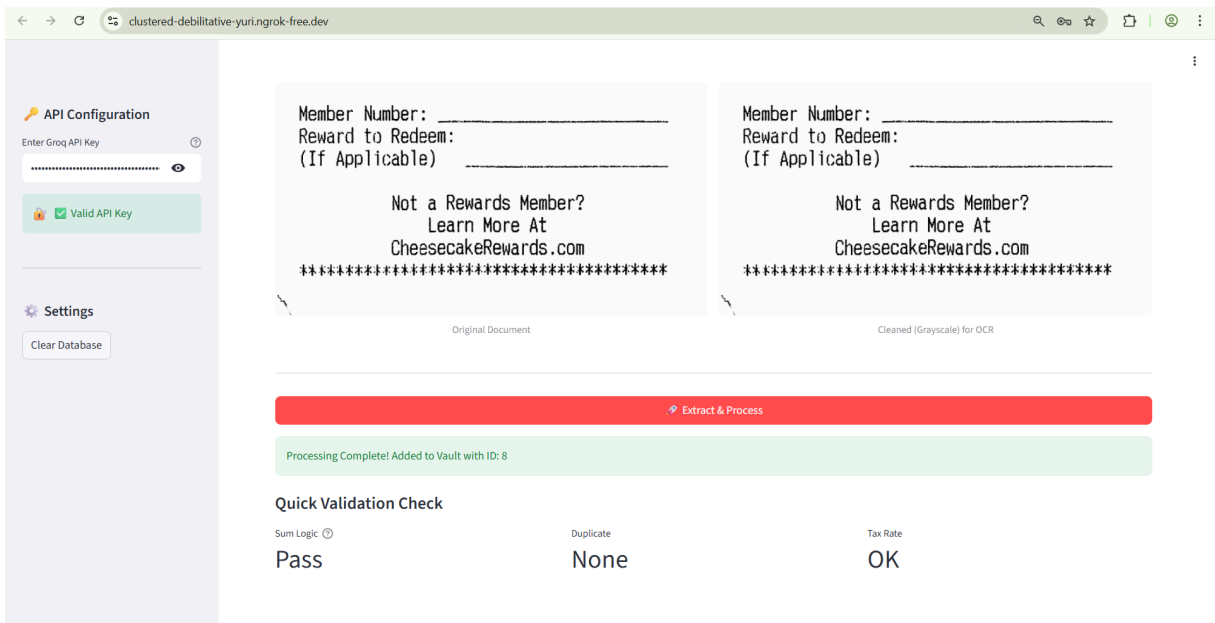
extraction process and allows users to confirm the correctness of automatically extracted data.

By presenting extracted fields such as merchant name, transaction date, invoice number, subtotal, tax, total amount, and category, the system reduces ambiguity and builds user confidence in automated processing.

5.2 Receipt Upload Workflow

The receipt upload workflow enables users to upload image files in common formats such as JPEG ,PDF and PNG. Once uploaded, the image is processed internally and linked to the receipt extraction pipeline developed in earlier milestones. The dashboard displays both the original and processed versions of the receipt image, allowing users to visually inspect input quality.

This workflow ensures that users remain informed about the source of extracted data and can easily identify potential issues such as poor image quality or missing information.

5.3 Review of Extracted Data

After extraction, the dashboard displays the extracted receipt information in a structured and readable format. Each field is clearly labeled, and numerical values are formatted for consistency. Line-item details, including product name, quantity, and price, are displayed in tabular form.

This review step plays a critical role in ensuring data accuracy and accountability. By allowing users to review extracted information before relying on it for reporting or analysis, the system minimizes the risk of propagating incorrect data.

6. Objective 2: History Page with CSV/Excel Export and Financial Management Features

6.1 Purpose of the History Page

The History page is designed to function as the central repository for all receipts processed and stored within the system. While the upload and review interface focuses on individual receipt ingestion, the History page addresses long-term data access, reporting, and management requirements. Its primary purpose is to allow users to view, organize, and utilize historical receipt data in a structured and efficient manner.

This page plays a crucial role in transforming stored receipt data into a usable financial record by providing tools for searching, filtering, exporting, and analyzing past transactions.

6.2 CSV and Excel Export Functionality

A major enhancement introduced in Milestone 3 is the ability to export stored receipt data in CSV and Excel formats. The History page enables users to download their financial data in two structured forms: receipt-level summaries and detailed line-item records.

Receipt-level exports present one row per receipt and include information such as merchant name, transaction date, invoice number, category, subtotal, tax, total amount, and upload timestamp. Line-item exports provide a more granular view, where each row represents an individual purchased item along with its quantity, price, and associated receipt details.

These export options ensure compatibility with external tools such as spreadsheet applications, accounting software, and auditing systems. By supporting common data formats, the system allows users to perform offline analysis, maintain backups, and meet reporting or compliance requirements.

📜 **Comprehensive Invoice Management & Analysis**

📊 Total Invoices in Vault: **5**

⌄ 📁 Export Data (CSV / Excel)

Download your vault data for accounting or external analysis.

📑 **Receipts Summary**   🛒 **Itemized Details**

One row per receipt (Totals, Dates, Merchants).   One row per line item (Product Name, Qty, Price + Receipt Info).

⬇ Download CSV   ⬇ Download CSV

⬇ Download Excel   ⬇ Download Excel

6.3 Search and Filtering Capabilities

As the number of stored receipts increases, efficient data retrieval becomes essential. To address this need, the History page incorporates multiple search and filtering mechanisms. Users can perform keyword-based searches across vendor names, invoice numbers, categories, and item names, enabling flexible and intuitive access to records.

In addition, direct search by receipt ID allows instant retrieval of specific invoices. Date-based filtering and month-wise filtering further enhance usability by allowing users to isolate transactions from particular time periods. These filters can be applied individually or in combination, ensuring precise and efficient navigation through historical data.

🔍 **Search & Filter** 🔗

Search by Vendor, Invoice ID, Category, or Item Name   Or Search by Receipt ID

e.g., Walmart, INV-123, Groceries   0   −   +

☐ Filter by Date

📅 Filter by Month

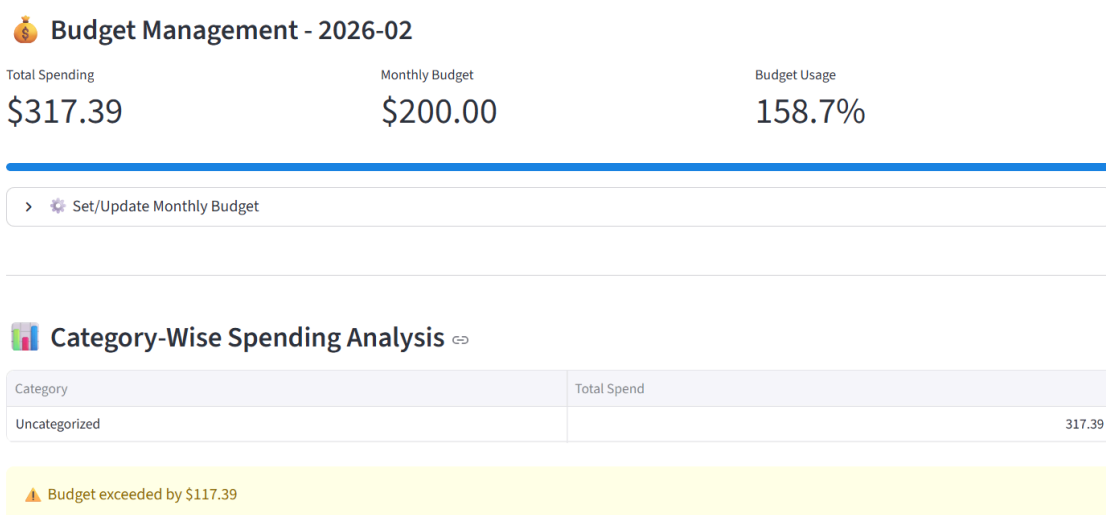All Months   ⌄

6.4 Monthly Budget Setting and Tracking

To extend functionality beyond static reporting, the History page introduces monthly budget management features. When a specific month is selected, the system aggregates all receipt totals for that month to compute overall expenditure. Users can then define or update a monthly budget amount, which is stored persistently in the database.

The dashboard dynamically displays total spending, configured budget, and budget utilization percentage. A visual progress indicator further highlights budget consumption. This functionality enables users to monitor their financial behavior in real time and promotes disciplined spending through continuous feedback.

💰 **Budget Management - 2026-02**

Total Spending	Monthly Budget	Budget Usage
$317.39	$200.00	158.7%

> ⚙ Set/Update Monthly Budget

📊 **Category-Wise Spending Analysis** 🔗

Category	Total Spend
Uncategorized	317.39

⚠ Budget exceeded by $117.39
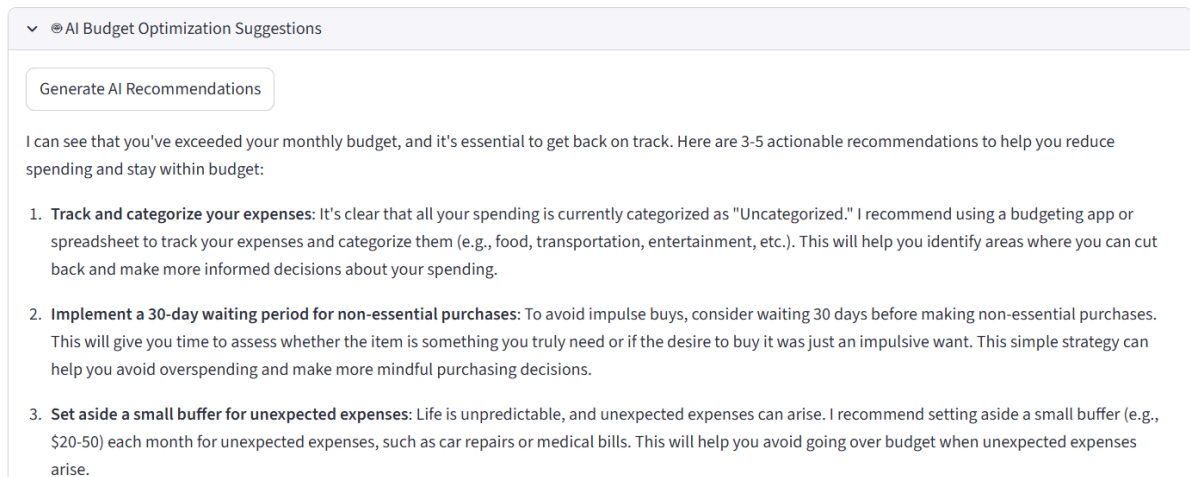
6.5 Category-Wise Spending Analysis

In order to provide deeper insight into expenditure patterns, the History page supports category-wise spending analysis. Receipts are grouped based on assigned categories such as groceries, dining, shopping, transportation, utilities, healthcare, and entertainment.

For the selected time period, the system computes total spending per category and displays the results in a structured and sorted format. This analysis allows users to quickly identify high-spending categories and evaluate whether their expenses align with personal or organizational priorities.

6.7 AI-Based Budget Optimization Suggestions

When a user exceeds the defined monthly budget, the system provides optional AI-based spending recommendations. Using the aggregated monthly spending data and category-wise breakdown, the system generates practical suggestions aimed at reducing overspending and improving budget adherence.

These recommendations are designed to be supportive and actionable rather than prescriptive. By integrating AI assistance at this stage, the system enhances decision-making without introducing complex predictive analytics, keeping the feature aligned with the scope of Milestone 3.

6.8 Interactive Invoice Review and Management

The History page also supports interactive invoice management. Users can view a structured list of all invoices and select a specific invoice to examine detailed information such as vendor name, transaction date, category, invoice number, and upload timestamp.

Associated line items are displayed in tabular form with calculated totals, providing full transparency into individual transactions. Users can also export line-item details for a single invoice, enabling focused reporting when required.

6.9 Secure Invoice Deletion

To maintain data control and integrity, the system allows users to permanently delete invoices when necessary. This operation requires explicit confirmation to prevent accidental data loss. When an invoice is deleted, all associated line-item records are also removed, ensuring database consistency.

This feature provides flexibility in managing stored data while maintaining appropriate safeguards.

7.Objective 3: Simple Analytical Reporting for Financial Insights

7.1 Purpose of the Analytics Page

The Analytics page is introduced to provide users with a high-level overview of their financial activity through descriptive statistics and visualizations. Rather than focusing on raw transaction data, this page emphasizes summarization and pattern recognition to support informed decision-making.

The analytics provided in Milestone 3 are intentionally simple, focusing on clarity and interpretability for non-technical users.

7.2 Monthly Spending Summaries

The system computes monthly spending totals by aggregating receipt amounts based on

transaction dates. These summaries allow users to compare spending across months and identify trends in financial behavior.
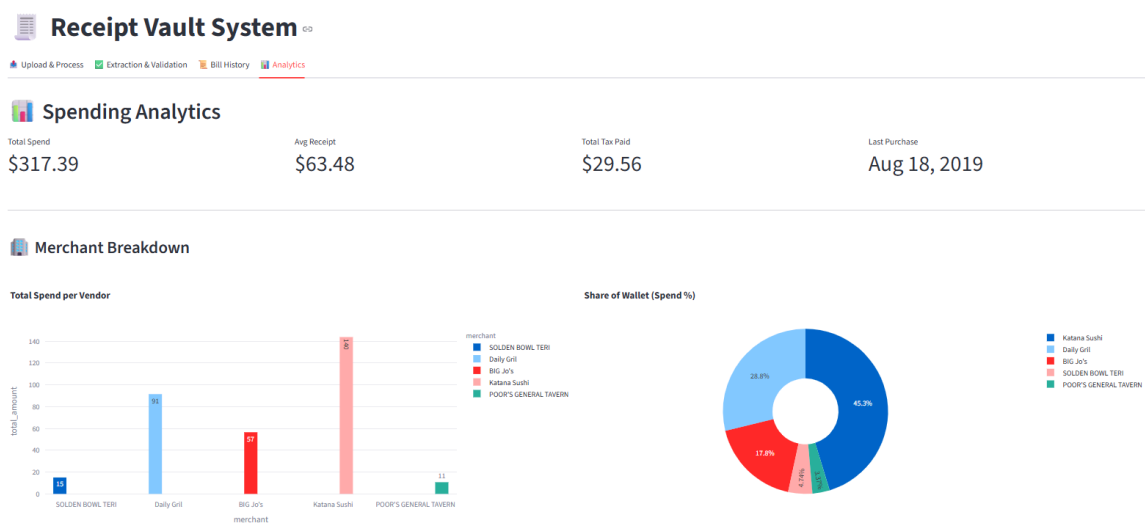
Monthly summaries serve as the foundation for budget tracking and long-term financial awareness.

7.3 Key Financial Indicators

The Analytics page displays essential metrics such as total spending, average receipt value, total tax paid, and the most recent transaction date. These indicators provide an at-a-glance summary of overall financial activity.

7.4 Visual Spending Analysis

To enhance interpretability, the system uses interactive visualizations to represent spending patterns. These include vendor-wise spending distribution, monthly trends, cumulative spending over time, and category-level insights. Visual analytics make complex financial data easier to understand and more engaging for users.

Total Spend per Vendor (Bar Chart)

This bar chart displays the total amount spent with each merchant. Receipt data is grouped by vendor and summed to show which merchants contribute most to overall expenditure. It helps users identify major spending sources.

Share of Wallet by Vendor (Pie Chart)

The pie chart represents the percentage distribution of total spending across different vendors. Each slice indicates a vendor's contribution, providing a quick overview of spending concentration.

Monthly Spending Trend (Line Chart)

This graph shows how spending varies month by month. Monthly totals are calculated from receipt dates and plotted as a line chart, allowing users to observe increases, decreases, or

recurring patterns in expenditure.

Cumulative Spending Over Time (Area Chart)

The cumulative spending chart visualizes the running total of expenses over time. It highlights long-term spending growth and overall financial progression.

Spending by Day of the Week (Bar Chart)

This chart groups expenses by weekday, showing how spending behavior differs across days. It helps identify habitual high-spending days, such as weekends.
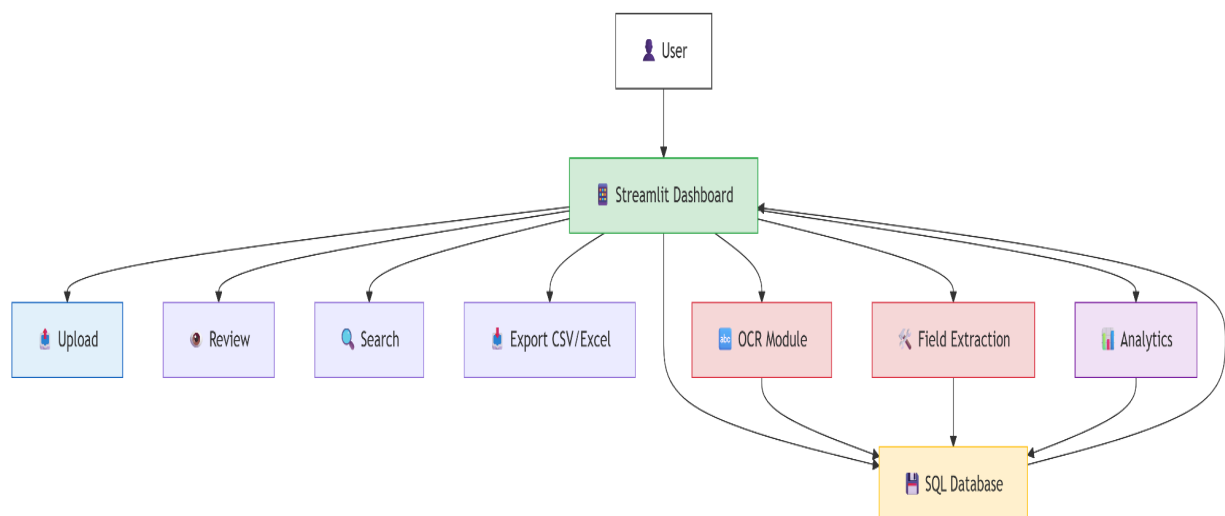
Distribution of Receipt Amounts (Histogram)

The histogram displays how receipt values are distributed across different ranges. It helps users understand typical purchase sizes and identify unusually high or low transactions.

Top Purchased Items (Horizontal Bar Chart)

This chart shows the most frequently purchased items across all receipts. It provides insight into common consumption patterns and recurring expenses.

8.System Architecture Diagram

Timeline for Milestone 3 :

Phase 1: Initiation & Planning

- **February 4th: Project Kickoff & Setup**
  - **Core Activity:** Team formation, GitHub repo creation, and sharing.
  - **Details:** The project officially commenced with the finalization of the team structure. The technical foundation was laid by initializing the GitHub repository, setting up the directory structure (main/dev branches), and granting access rights to all collaborators to ensure a smooth workflow.
- **February 5th: Resource Allocation**
  - **Core Activity:** Roles and Responsibilities distribution.
  - **Details:** To ensure efficiency, the team divided the workload based on individual strengths. Specific modules (e.g., The Analytics Tab, History Tab, Data Export, and AI integration) were assigned to specific members (like Divya and the developers) to avoid merge conflicts and overlapping work.
- **February 6th: Strategic Planning**
  - **Core Activity:** Timeline decision and areas of improvement discussion.
  - **Details:** The team gathered to lock in the deadline milestones. A critical discussion was held regarding "Areas of Improvement," likely identifying gaps in the previous prototype (Milestone 2) and deciding which new features (like the Receipt Search or Spending Analytics) were feasible for this sprint.

Phase 2: Execution & Review

- **February 7th: Integration & Initial Review**
  - **Core Activity:** Progress sharing and code review.
  - **Details:** This marked the first major integration point where individual branches were merged. The team shared their progress on their respective features. An initial code review was conducted to check for logic errors, syntax issues, and to ensure the new "Analytics" graphs rendered correctly.
- **February 8th: Quality Assurance & Optimization**
  - **Core Activity:** Peer code review and other project enhancements.
  - **Details:** A deeper "Peer Review" was conducted where team members tested each other's code. Focus shifted to "Enhancements"—polishing the UI, improving the responsiveness of the Streamlit dashboard, and fixing any bugs discovered during the previous day's integration.

Phase 3: Documentation & Delivery

- **February 9th: Documentation & Final Polish**
  - **Core Activity:** Finalizing and updating Milestone 3 PPT and document.
  - **Details:** With the coding largely complete, the focus turned to deliverables. The team compiled the project report, took screenshots of the final UI for the presentation, and updated the slide deck (PPT) to reflect the newly added features and improved architecture.

9.Conclusion

This Milestone 3 implementation successfully delivers all required features and objectives:

✅ Build a Streamlit dashboard for upload/review.
✅ Add CSV/Excel export.
✅ Display simple analytics (monthly totals).