

EXPENSE TRACKER REPORT

PYTHON PROJECT

VITyarthi PROJECT

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1. Introduction

Managing day-to-day expenses is an essential task for individuals and businesses alike. Most people struggle to track their spending habits due to manual methods such as notebooks or basic spreadsheets. To overcome these challenges, a computer-based solution offers a more efficient, organized, and error-free approach.

This project presents a Python-based Expense Tracker Application built using Tkinter for the graphical user interface, SQLite as the database for storing expense records, and tkcalendar to facilitate date selection. The application enables users to add, update, view, and delete expenses in a user-friendly manner while maintaining a persistent database.

2. Problem Statement

Many individuals lack a systematic way to track their daily expenditures. Manual tracking methods are time-consuming, prone to errors, and often lack proper organization and retrieval features. Without proper tracking, users cannot analyze their spending patterns or maintain financial discipline.

The main problem addressed by this project is the absence of an easy-to-use, computerized system that allows users to record, edit, and manage expenses efficiently, ensuring accuracy and quick access to financial records.

3. Functional Requirements

Functional requirements describe what the system should do.

3.1 Add Expense

The user must be able to enter details such as date, payee, description, amount, and mode of payment.

The application should store this data in an SQLite database.

3.2 View Expense

The system must display all stored expenses in a tabular Tree View.

The user must be able to select an expense to view its detailed information.

3.3 Edit Expense

The user must be able to update previously stored expense information.

Updated records must be saved in the database.

3.4 Delete Expense

The user must be able to delete a selected expense.

The system must also offer an option to delete all expenses at once.

3.5 Clear Fields

The input form should reset to default values when the "Clear Fields" action is triggered.

3.6 Convert Expense to Words

The system allows users to convert a selected expense into a readable sentence.

This helps users understand the record linguistically.

3.7 Date Selection

The calendar widget must allow easy date picking to avoid format errors.

4. Non-Functional Requirements

Non-functional requirements define the system's quality attributes.

4.1 Usability

The interface should be simple and intuitive.

Font style, button size, and layout should support easy navigation.

4.2 Performance

The system should quickly load, retrieve, and update expense data.

Operations like database read/write must be fast.

4.3 Reliability

Data stored in SQLite must be persistent.

The system should not crash during common operations such as adding or editing entries.

4.4 Maintainability

The source code should be modular, with separate functions handling specific tasks.

Clear naming conventions and comments should help future developers modify the system.

4.5 Portability

As the system uses Python and SQLite, it can run on multiple operating systems (Windows, macOS, Linux).

4.6 Security

Data integrity must be preserved by preventing invalid or incomplete fields when saving.

The system prompts users before deleting records to avoid accidental loss.

5. System Architecture

The system follows a simple three-layer architecture:

5.1 Presentation Layer (User Interface Layer)

Built using Tkinter.

Includes widgets such as Labels, Entry fields, Buttons, OptionMenu, DateEntry, and TreeView.

Supports user interaction for adding, viewing, editing, and deleting expenses.

5.2 Application Logic Layer

Consists of Python functions handling operations:

`add_another_expense()` – Adds new expenses

`edit_expense()` – Updates selected records

`remove_expense()` – Deletes a record

`remove_all_expenses()` – Clears all data

`list_all_expenses()` – Loads all data from database

`view_expense_details()` – Displays details of selected entry

Ensures validation, message prompts, and linking UI with backend.

5.3 Data Layer (Database Layer)

Uses SQLite database named Expense Tracker.db.

Table: ExpenseTracker

Columns: ID, Date, Payee, Description,
Amount, ModeOfPayment

Stores all expenses securely and persistently.

DESIGN DIAGRAMs

Use Case Diagrams



Work Flow Diagram

```

+-----+ | ExpenseTracker | +-----+ | - ID:
Integer | | - Date: Date | | - Payee: String | | - Description: String | | - Amount:
Float | | - ModeOfPayment: String | +-----+ | + addExpense() | | +
deleteExpense() | | + updateExpense() | | + fetchAll() | | + fetchOne() |
+-----+ +-----+ | Database |
+-----+ | + connect() | | + executeQuery() | | + commit() |
+-----+ +-----+ | GUI |
+-----+ | + renderForm() | | + renderTable() | | + clearFields() | |
+ showMessage() | +-----+

```

DFD Level 0

```

+-----+ | USER | +-----+ | v
+-----+ | Expense Tracker | +-----+ | v
+-----+ | Database (SQLite) | +-----+

```

DFD Level 1

```

+-----+ | USER | +-----+ |
+-----+ | | | | v v v v +-----+
+-----+ +-----+ +-----+ | Add Exp | | Edit Exp | | Delete Exp | |
View Expense | +-----+ +-----+ +-----+ +-----+ | | | |
+-----+ Write/Read +-----+ | v +-----+
SQLite Database | +-----+

```

ERD Diagram

```

+-----+ | ExpenseTracker |
+-----+ | ID (PK) INTEGER | | Date DATETIME |
| Payee TEXT | | Description TEXT | | Amount FLOAT | | ModeOfPayment TEXT |
+-----+

```

GUI Layout Diagram

```

+-----+ | EXPENSE TRACKER (Title
Bar) | +-----+ | DATA ENTRY PANEL
| TABLE PANEL | | +-----+ | +-----+ | Date:
[DateEntry] | +-----+ | | Payee: [Textbox] | | ID | Date | Payee
| ... | | | Description: [Textbox] | | +-----+ | | Amount:
[Textbox] | | Data Rows... | | | Mode: [Dropdown] | +-----+ | |
[Add Button] | | | [Convert to Words] | |
+-----+ | BUTTONS PANEL (Delete,
Edit, Clear, etc.) | +-----+

```


1. Design Decisions

The following design choices were made to ensure that the Expense Tracker is simple, efficient, and user-friendly:

1.1 Choice of Programming Language

Python was chosen because:

It offers strong GUI support through Tkinter.

It integrates easily with SQLite for backend storage.

It is simple to learn and widely used in software development.

1.2 GUI Framework (Tkinter)

Tkinter was selected as the GUI framework because:

It comes built-in with Python (no additional installation needed).

It supports widgets like buttons, forms, tables, dropdowns, and message boxes.

It is ideal for desktop applications with moderate complexity.

1.3 Database (SQLite)

SQLite was preferred due to:

Lightweight storage in a single .db file.

No server installation required.

Fast read/write operations for small applications.

1.4 TkCalendar Widget

The DateEntry widget from tkcalendar was used to:

Avoid incorrect date formatting.

Provide a calendar-style selection.

1.5 Table Display (TreeView)

TreeView from Tkinter's ttk module was used for:

Structured representation of expenses.

Horizontal and vertical scrolling.

Easy selection of specific records.

1.6 Modular Function Design

Functions like add_another_expense(), edit_expense(), and remove_expense() were separated to:

Improve readability.

Make the code maintainable.

Allow reuse and easy debugging.

2. Implementation Details

Below is a summary of how the system is built internally:

2.1 Database Initialization

A table named ExpenseTracker is created with fields:

ID (Primary Key)

Date

Payee

Description

Amount

Mode of Payment

This ensures all expenses are stored permanently.

2.2 Main Functional Modules

- Add Expense

Takes form input values.

Validates empty fields.

Inserts values into database.

- View Expense

Loads all values from database into TreeView.

Allows selection to view details.

- Edit Expense

Retrieves selected record.

Updates fields in the form.

Saves modified data back to the database.

- Delete Expense

Deletes the selected item or all items.

Confirmation message ensures safety.

- Clear Fields

Resets the input form to default values.

- Convert Expense to Words

Converts numeric and textual details into a readable sentence.

2.3 GUI Layout

The window is divided into:

Data Entry Frame (left side)

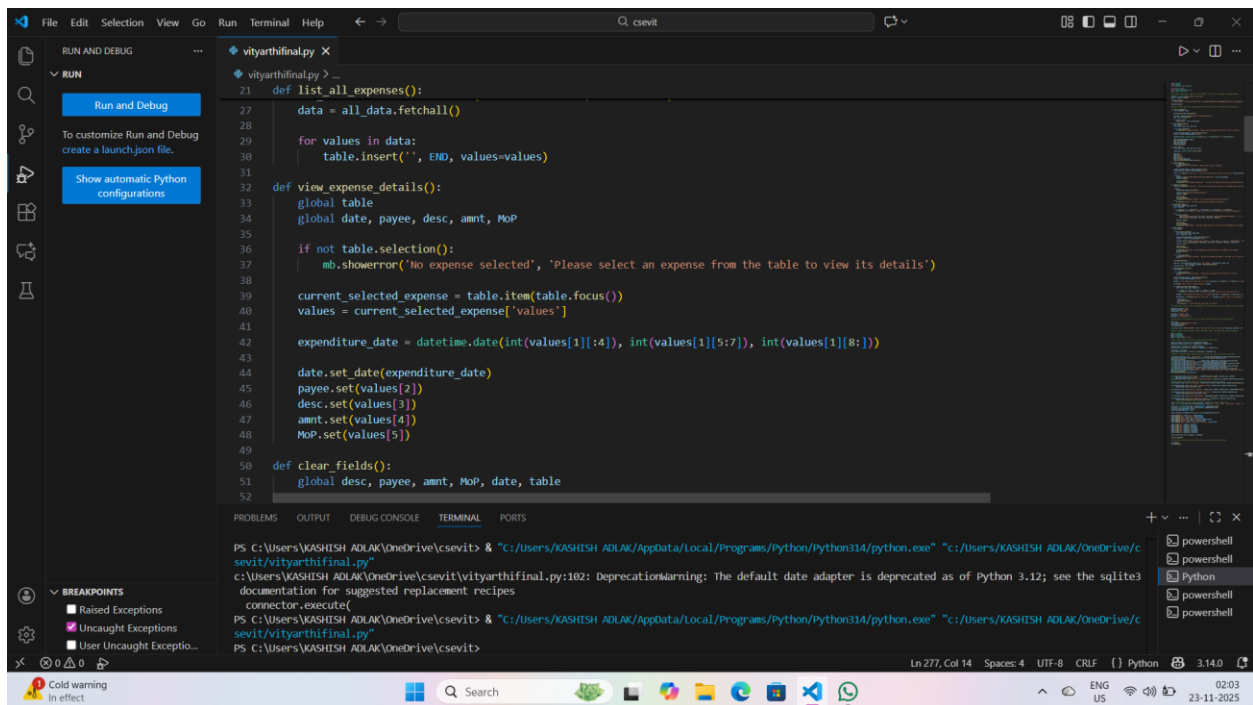
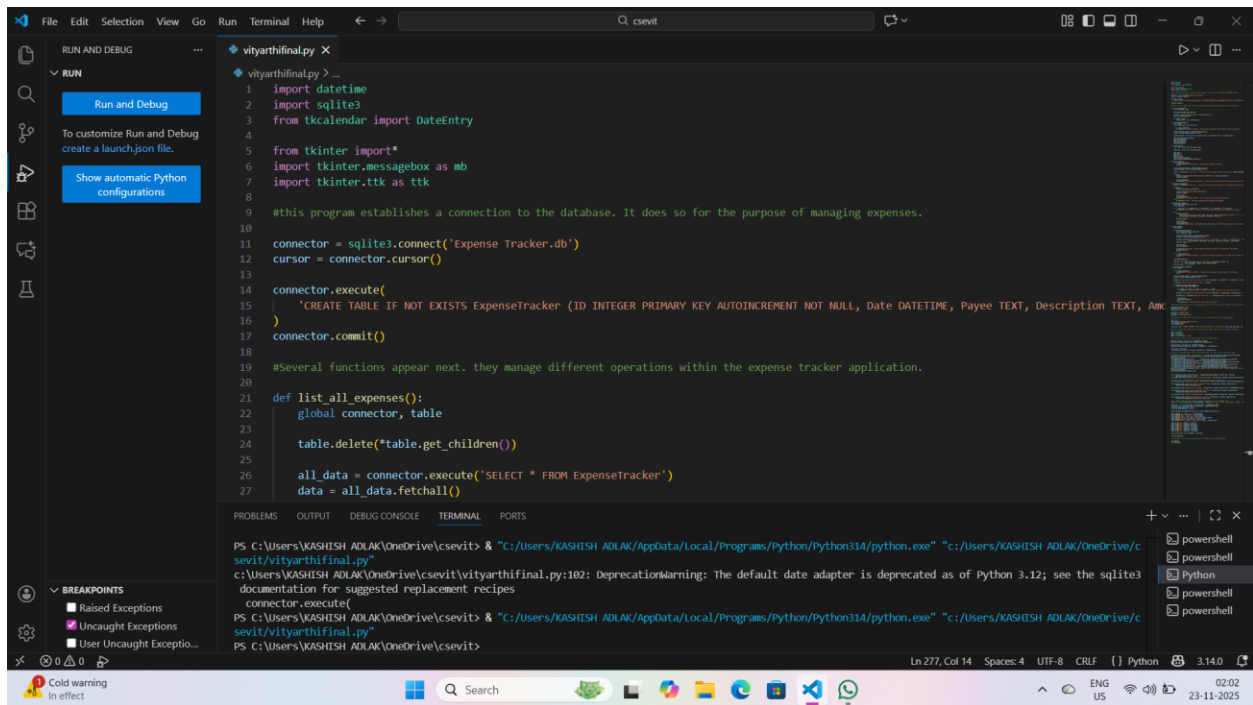
Buttons Frame (top center)

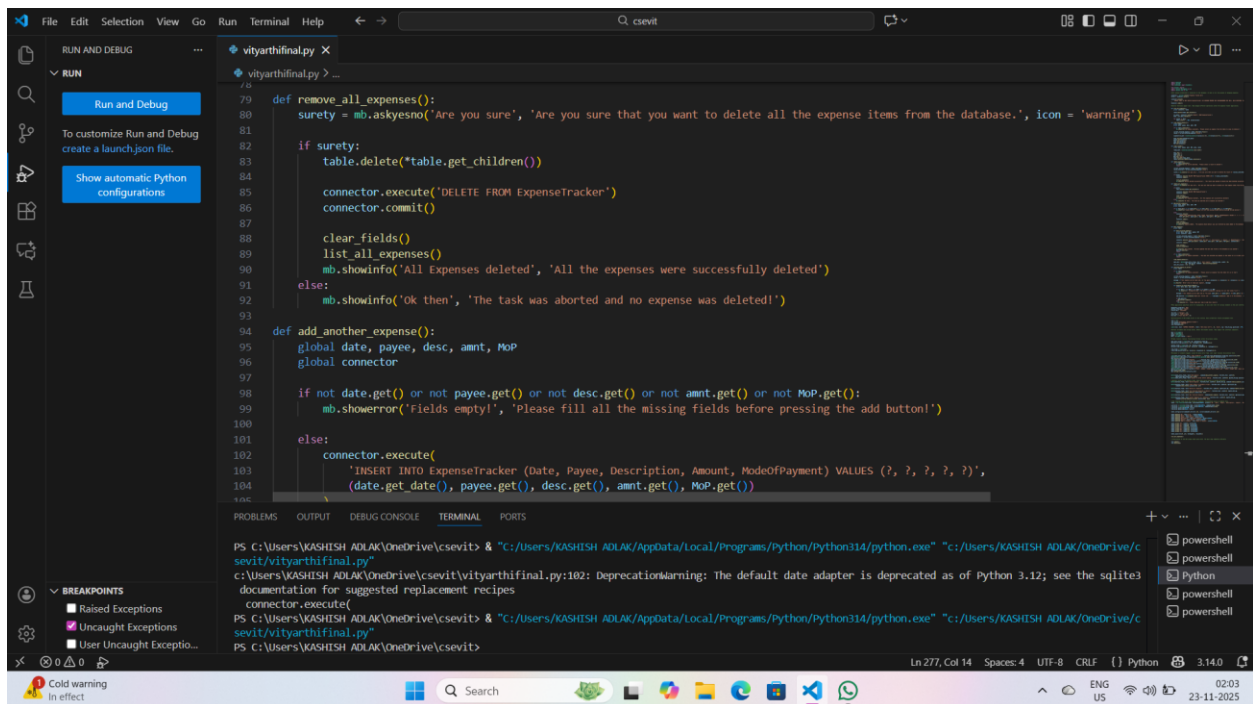
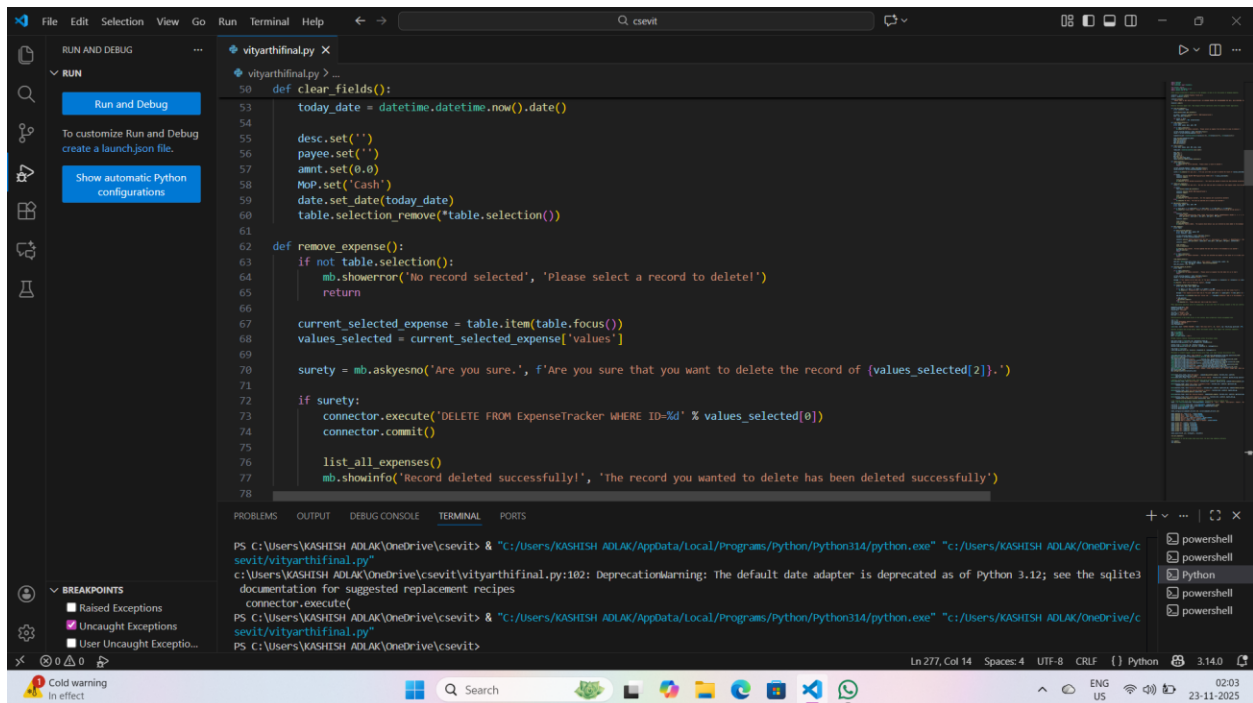
TreeView Frame (right side listing the expenses)

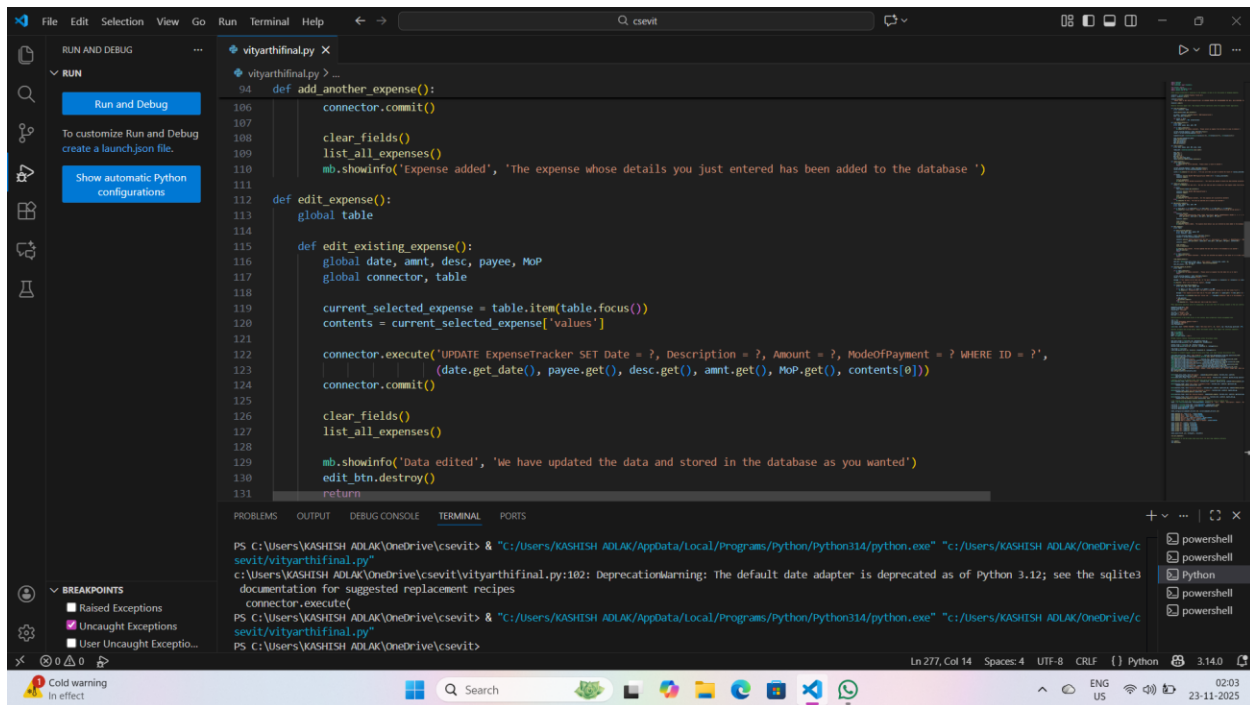
2.4 Application Flow

1. User inputs expense details.
2. Data gets stored in the SQLite database.
3. Data is fetched and displayed in the TreeView.
4. User can edit, delete, or view details of each entry.

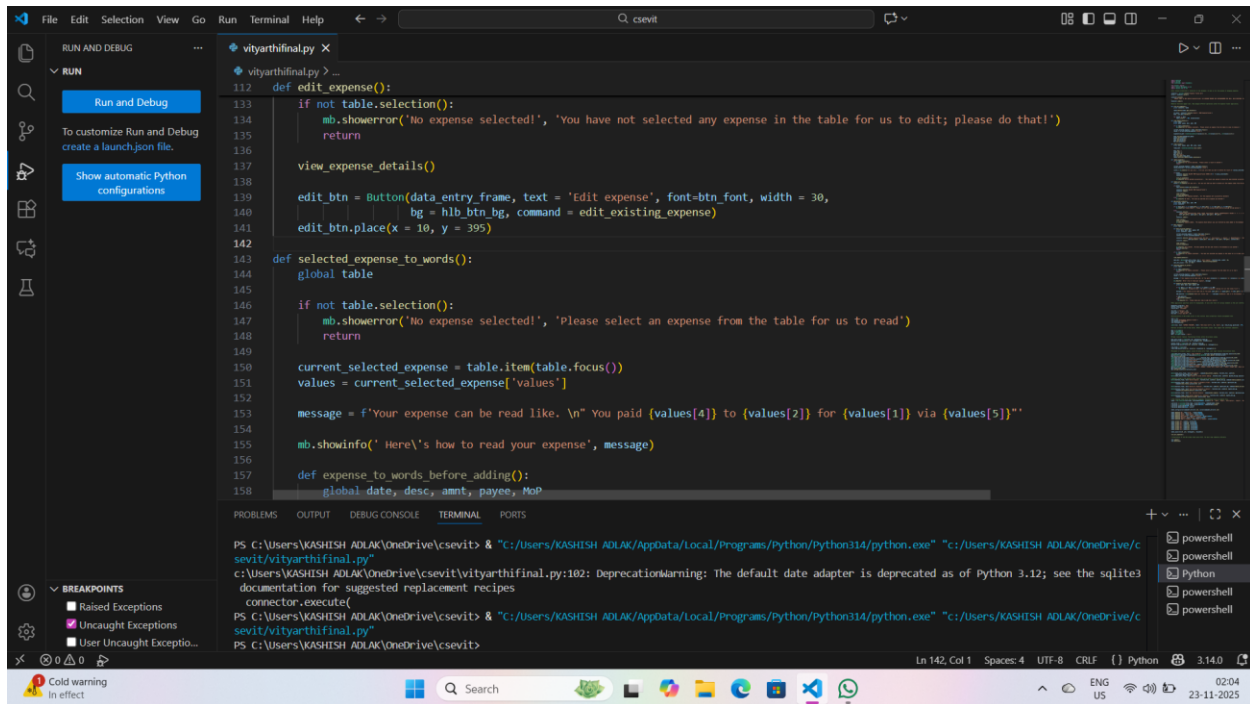
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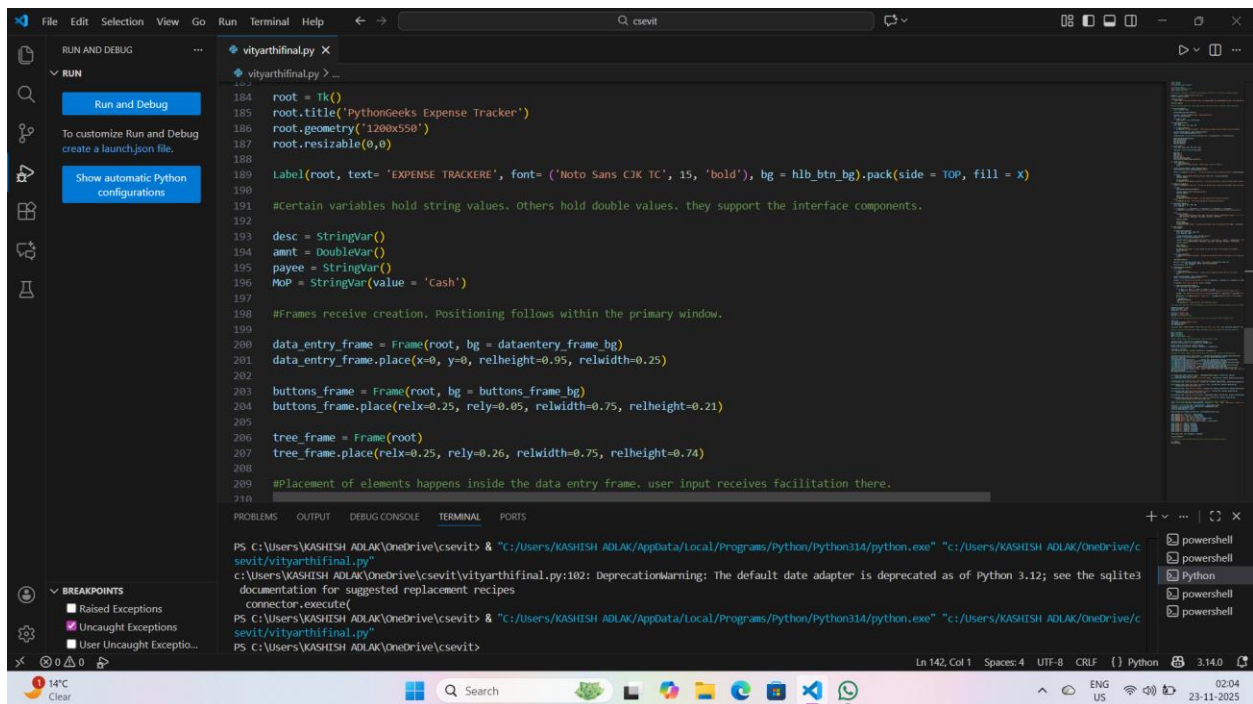
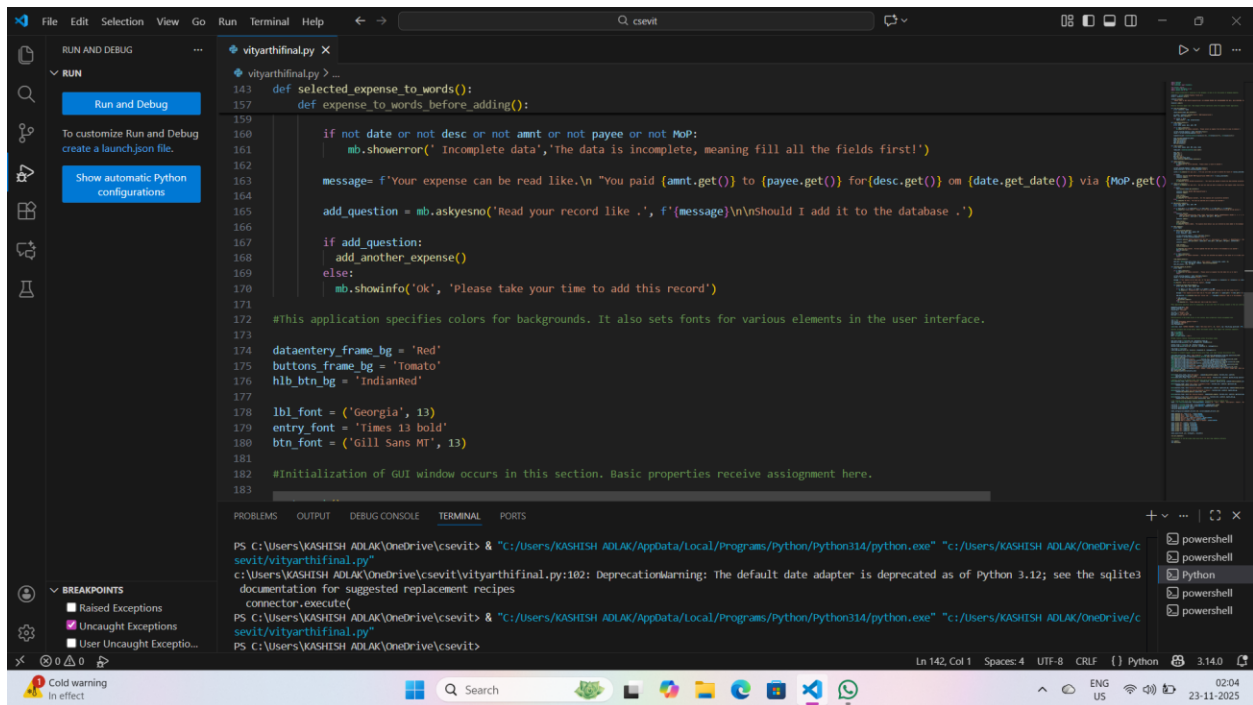


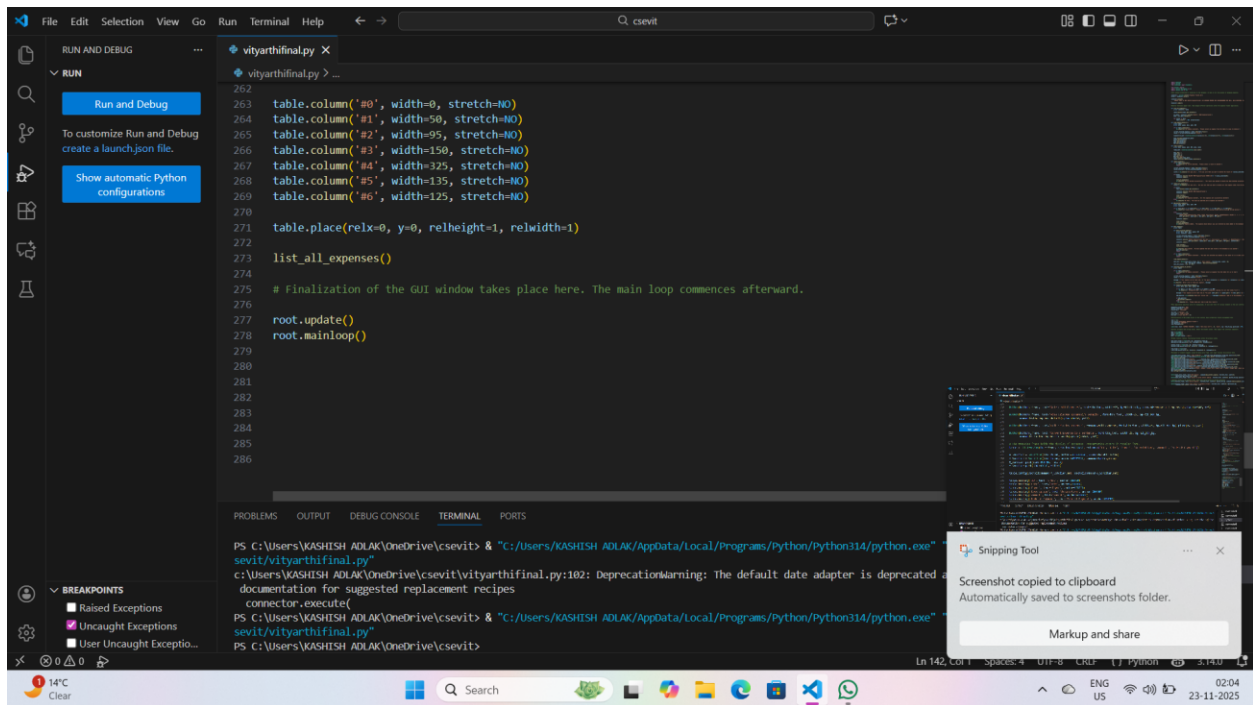


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vityarthifinal.py > ...
94 def add_another_expense():
106     connector.commit()
107
108     clear_fields()
109     list_all_expenses()
110     mb.showinfo('expense added', 'The expense whose details you just entered has been added to the database ')
111
112 def edit_expense():
113     global table
114
115     def edit_existing_expense():
116         global date, amnt, desc, payee, MoP
117         global connector, table
118
119         current_selected_expense = table.item(table.focus())
120         contents = current_selected_expense['values']
121
122         connector.execute('UPDATE ExpenseTracker SET Date = ?, Description = ?, Amount = ?, ModeOfPayment = ? WHERE ID = ?',
123                           (date.get_date(), payee.get(), desc.get(), amnt.get(), MoP.get(), contents[0]))
124         connector.commit()
125
126         clear_fields()
127         list_all_expenses()
128         mb.showinfo('Data edited', 'We have updated the data and stored in the database as you wanted')
129         edit_btn.destroy()
130         return
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File Edit Selection View Go Run Terminal Help
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vityarthifinal.py > ...
112 def edit_expense():
133     if not table.selection():
134         mb.showerror('No expense selected!', 'You have not selected any expense in the table for us to edit; please do that!')
135         return
136
137     view_expense_details()
138
139     edit_btn = Button(data_entry_frame, text = 'Edit expense', font=btn_font, width = 30,
140                      bg = hlb_btn_bg, command = edit_existing_expense)
141     edit_btn.place(x = 10, y = 395)
142
143 def selected_expense_to words():
144     global table
145
146     if not table.selection():
147         mb.showerror('No expense selected!', 'Please select an expense from the table for us to read')
148         return
149
150     current_selected_expense = table.item(table.focus())
151     values = current_selected_expense['values']
152
153     message = f'Your expense can be read like. \n" You paid {values[4]} to {values[2]} for {values[1]} via {values[5]}'
154
155     mb.showinfo(' Here\'s how to read your expense', message)
156
157 def expense_to words_before adding():
158     global date, desc, amnt, payee, MoP
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OUTPUT

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vHITA

3. Testing Approach

Several testing techniques were followed:

3.1 Manual Testing

GUI applications require manual interaction.

The following operations were tested:

Adding new expenses.

Editing existing entries.

Deleting expenses one by one and all at once.

Viewing selected record details.

Ensuring scrollbars work properly.

Checking date selection from the calendar.

3.2 Functional Testing

Each function was tested separately:

Input validation

Correct insertion into DB

Accurate fetching of data

Update and delete operations

3.3 Boundary Testing

Empty fields

Very large entries in description

Zero or negative amount values

Invalid mode of payment selection

3.4 Database Testing

Verified:

Data integrity

Auto-incrementing ID

Correct deletion and refresh in the TreeView

4. Challenges Faced

4.1 Handling Tkinter Layout

Managing multiple frames and widget positions required careful alignment to avoid overlapping.

4.2 Date Formatting Issues

Dates needed conversion between:

TkCalendar format

SQLite storage format

Python datetime object

4.3 Updating TreeView

Refreshing the list required:

Clearing previous entries

Re-fetching updated data

4.4 Editing an Existing Record

Identifying the selected row's ID and updating it correctly required proper mapping between:

TreeView selection

Database entry

4.5 Validations

Preventing empty field submissions and handling invalid input took multiple error checks.

5. Language and Key Takeaways

5.1 Programming Language Used

Python 3 with libraries:

Tkinter (GUI)

Tkcalendar (Date picker)

SQLite3 (Database)

ttk module (TreeView table)

5.2 Key Takeaways

Learned how to build a complete GUI application.

Understood database integration with front-end elements.

Improved program structuring using functions.

Learned how to handle form inputs and data validation.

Gained experience with CRUD operations (Create, Read, Update, Delete).

Enhanced understanding of event-driven programming in Tkinter.

6. Future Enhancements

The application can be improved by adding:

6.1 Expense Categories

Food, Travel, Rent, Shopping, Bills, etc.

6.2 Monthly and Yearly Reports

Automatically calculate:

Total spending

Category-wise breakdown

6.3 Graphs & Charts

Use matplotlib to display:

Pie charts

Bar graphs

Spending trends

6.4 Export Options

Allow user to export data to:

Excel

CSV

PDF

6.5 Authentication System

Add login/logout for user-specific expense tracking.

6.6 Cloud Backup

Sync data with Google Drive or cloud database.

6.7 Mobile App Version

Convert the project into a mobile application using Kivy or Flutter.

7. References

- Python Documentation – <https://docs.python.org>
- Tkinter Official Guide – <https://tkdocs.com>
- SQLite Documentation – <https://sqlite.org/docs.html>

- tkcalendar Library –
<https://github.com/j4321/tkcalendar>
- StackOverflow discussions on Tkinter and TreeView widgets.