



Macromedia University of Applied Sciences

Course Title: Advanced coding skills

Name of Examiner: Prof William Baker

To be completed by students:

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Matriculation

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Last name

First name

The student work will be submitted as:

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I apply for an individual evaluation (i.e. each member of the group will receive an individual mark)

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Berlin, 24.06.2025

.....
Place/Date

Angel Jaen

.....
Complete First Name and Last
Name

Evaluation (according to grading scale), result of initial inspection: total points: _____

Date: Name, first name First Examiner (to be filled in digitally)

To be completed by the examiner: (Text area for the second examiner)

.....
Title Page for Digital Submission, Macromedia version 05/2025

AI Budget Tracker

1. Introduction

Budget Tracker is an application that helps people manage their monthly allowance and helping them save. I personally struggle to track where my money went; that inspired me to develop “AI Budget Tracker”. The main goal is to provide a friendly, all-in-one app that combines expense logging, insightful visualizations, and AI-driven guidance so the users can build healthier spending habits.

2. Key Features

-  AI Assistant: Log expenses and communication in natural language (Gemini API).
-  Interactive Charts: Line and donut charts reveal monthly trends and category breakdowns.
-  Currency Converter: Real-time rates via an external API.
-  Bank Statement Import: Support CSV or PDF statements automatically.
-  Local Database: SQLite backed by SQLAlchemy ORM.
-  Modern UI: Dark theme with reusable CustomTkinter components.



3. Object-Oriented Architecture

The project follows a modular MVC- style layout:

src/ui/ → **Presentation layer**: Reusable components (buttons.py, charts.py), view modules (dashboard.py, analytics.py), theme configuration and utils.

src/core/ → **Business Logic**: ORM models (models.py), database connection (database.py), the AI engine wrapper (ai_engine.py), and (seeder.py) populates the database with demo data.

src/services/ → **Auxiliary services**: Bank statement loaders (CSV/PDF) and the currency API client.

src/assets/ → **Images and emoji**: The emojis icons (icons), the main app image (for the README)

Classes leverage inheritance and composition.

For example: (BankStatementLoaderCSV) and (BankStatementLoaderPDF) inherit from an abstract “StatementLoader” class, sharing validation logic while overriding file-specific parsing behaviour.

4. Database and Persistence

SQLite paired with SQLAlchemy handles persistence.

Core tables include:

- Expense: id, amount, category, date, description

```
class Expense(Base):
    """Model for storing expense records"""
    __tablename__ = 'expenses'

    id = Column(Integer, primary_key=True, index=True)
    amount = Column(Float, nullable=False)
    category = Column(String, nullable=False, index=True)
    description = Column(String, nullable=True)
    date = Column(DateTime, default=datetime.utcnow, nullable=False, index=True)
```

- Budget: id, category, limit

```
class Budget(Base):
    """Model for storing budget limits by category"""
    __tablename__ = 'budgets'

    id = Column(Integer, primary_key=True, index=True)
    category = Column(String, nullable=False, unique=True)
    limit = Column(Float, nullable=False)
```

A singleton “DatabaseSession” ensures a single connection throughout the app.

5. Conclusion and Future Work

AI Budget Tracker transforms raw spending data into clear, actionable insights that encourage smarter money decisions.

- **Fast capture:** Logging an expense takes seconds thanks to the AI assistant and keyboard-friendly forms.
- **Visual awareness:** Interactive line and donut charts reveal where money flows and how it changes month to month.
- **Robust under the hood:** A modular, object-oriented core (UI, Core, Services) and a single shared database session keep the codebase clean, testable, and ready for growth.
- **AI-guided habits:** Personalised tips flag overspending, celebrate savings milestones, and foster healthier financial behaviour.

Sworn Statement

I, Angel Jaen born on 30-07-2005 hereby declare that I have prepared this thesis independently and without external assistance. In doing so, I have not used any aids other than those mentioned in the enclosed list of sources. All points that have been taken from publications literally or adapted form have been identified as such by me.



Berlin - 24.06.2025