Name of Proponents

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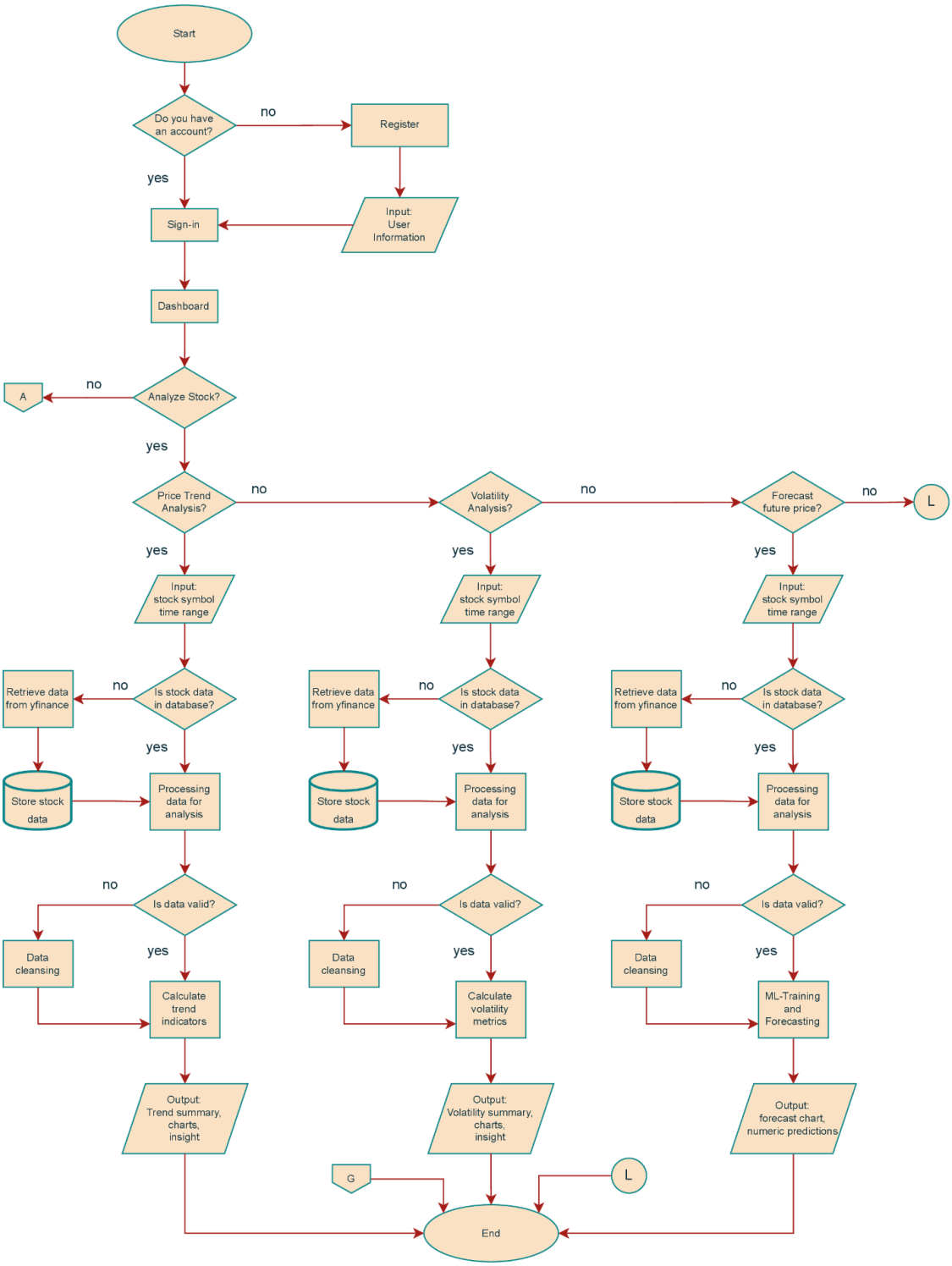
Start-up Name – Start-up Title

RoboAdvisor – AI-powered financial advisor for portfolio management and smart recommendations.

THE PROGRAM WORKFLOW

Workflow 1: Figure – Stock Analysis Tool



Workflow 1: Discussion

The stock analysis tools are a collection of analysis tools that helps users gain knowledge and insight into financial markets. The user can select from 3 types of analysis tools that they can use, particularly, price trend analysis tool, volatility analysis tool, and forecasting future price tool. These tools use pandas and python libraries to retrieve data from the yfinance API and store them in a database for processing and analysis. Aside from these we also integrate a database system where we store our data.

Price trend analysis is the process of identifying the direction that a stock's price is moving over time. It uses tools like moving averages or regression lines to detect patterns in historical price data. Volatility analysis calculates the variation in a stock's price over time. This indicates how much a price fluctuates and helps assess risk level. Forecasting Future Price involves using historical data and statistical models to predict where a stock's price might move in the future. This tool has a slightly different workflow because it uses machine learning to predict price.

In the workflow the user can select which tool they want to use. After selecting they are given a search prompt to retrieve a stock for analysis, then users can enter the stock ticker of their choice. The system checks whether the stock is already in the database or not. If not, it will retrieve the stock data from yahoo finance using yfinance API. After retrieving the data is processed for analysis, during this time the data is cleaned and any missing values are handled. After is to calculate trend indicators such as moving averages, linear regression, or trend direction and visualize them for the user to see.

Here is a summary of the three stock analysis tools:

A. Price Trend Analysis

- User Input
    - Input stock symbol
    - Input time range
- Data Retrieval and Storage
    - Check if data for that ticker and date range already exists in your database
    - If not, pull historical price data from yfinance
    - store the fetched data in a historical_prices table
- Data Preprocessing
    - Cleaning data
    - Handle missing values, format dates, etc.
- Price Trend Calculation

    - Calculate trend indicators such as moving averages, linear regression, or trend direction
- Visualization
    - Generate charts displaying price movements and trend lines
- Output
    - Show chart, trend summary, and insights to the user

B. Volatility Analysis

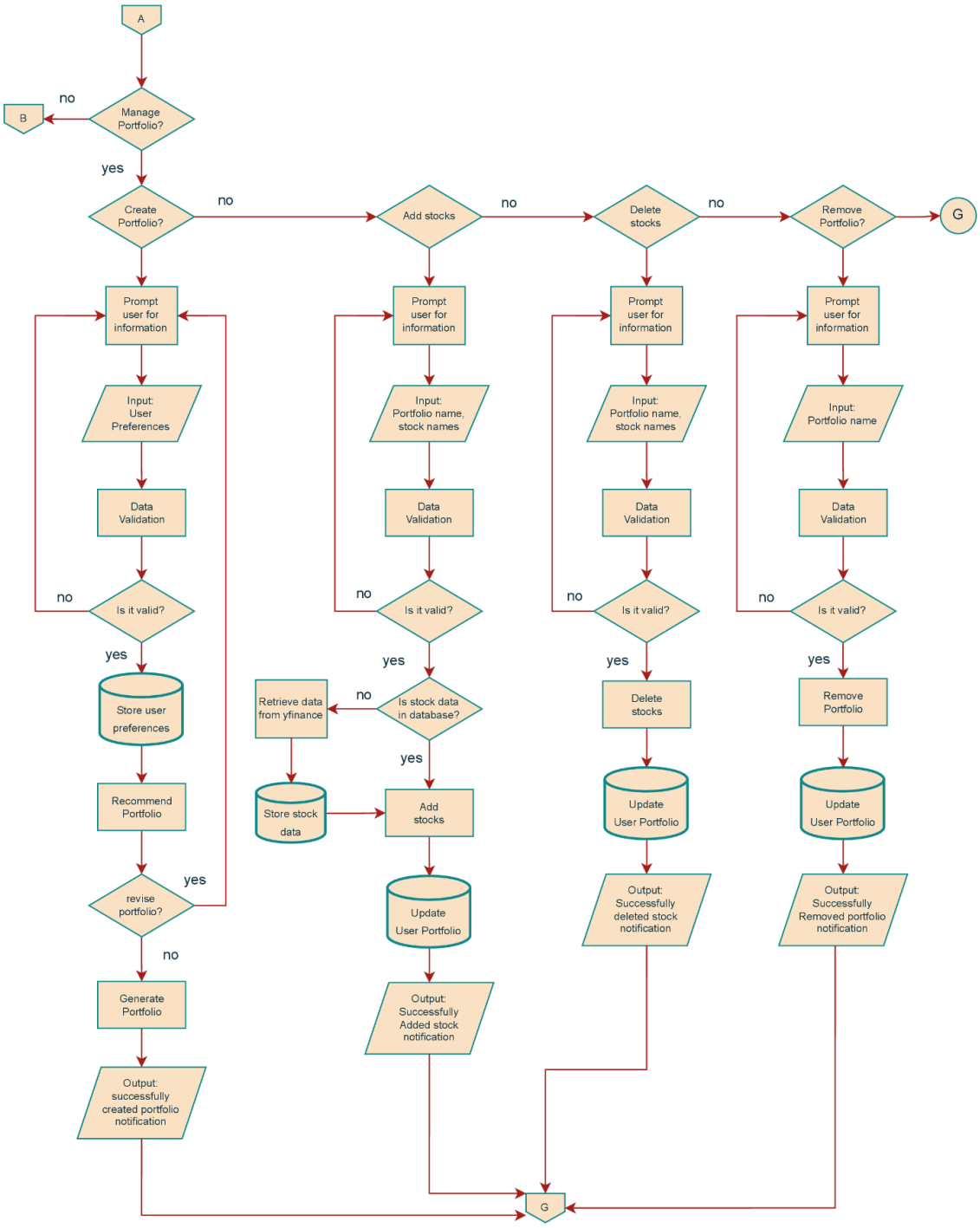
- User Input
    - Input stock symbol
    - Input time range
- Data Retrieval and Storage
    - Check if data for that ticker and date range already exists in your database
    - If not, pull historical price data from yfinance
    - store the fetched data in a historical price table
- Data Preprocessing
    - Clean data
    - Handle missing values, format dates, etc.
- Volatility Calculation
    - Calculate volatility metrics (e.g., standard deviation, variance, Average True Range) over selected windows
- Visualization
    - Generate charts showing price volatility over time (e.g., volatility bands, histograms)
- Output
    - Display volatility charts and summary statistics to the user

C. Forecast Future Prices

- User Input
    - Input stock symbol
    - Input time range for historical data (training window)
    - Specify forecast horizon (e.g., next 30 days)
- Data Retrieval and Storage
    - Check if data for that ticker and date range already exists in your database
    - If not, pull historical price data from yfinance
    - store the fetched data in a historical_prices table
- Data Preprocessing
    - Clean data (handle missing values, format dates)
    - Transform data if needed (e.g., log returns, normalization)
    - Check and enforce stationarity if required (differencing, detrending)
- Model Selection & Training
    - Choose forecasting model (e.g., ARIMA, Prophet, LSTM)

    - Train model on historical data
- Forecast Generation
    - Use trained model to predict future prices over forecast horizon
- Visualization
    - Plot historical prices alongside forecasted future prices with confidence intervals
- Output
    - Display forecast chart and numeric predictions to the user

Workflow 2: Figure – Portfolio Management Tool



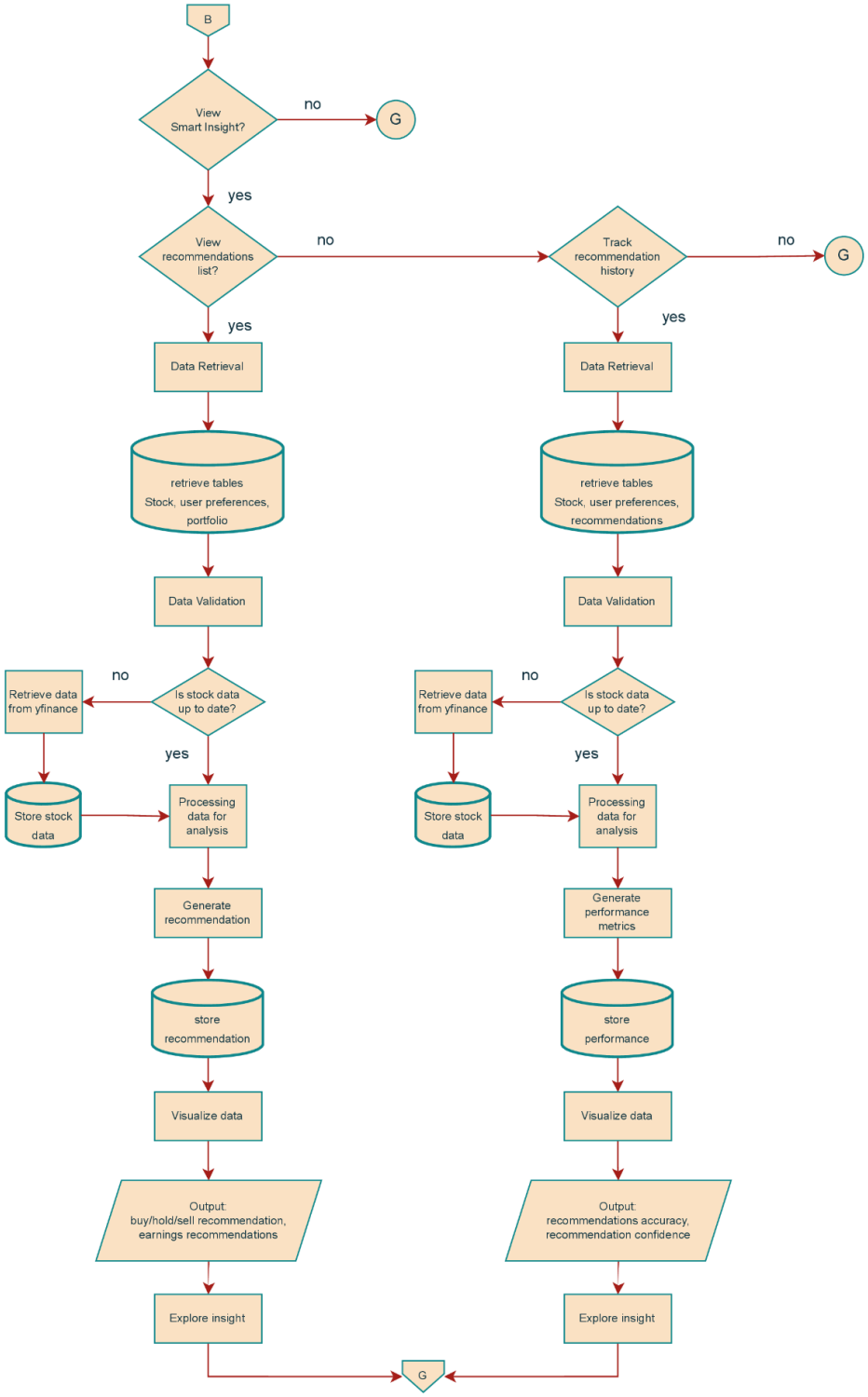
Workflow 2: Discussion

This workflow is the portfolio management tool. It allows users to create, update, delete and remove a stock or a portfolio. This tool uses natural language processing to assist users in building their portfolios. When the user enters this page, they are given a welcome prompt by the system to create a portfolio, remove a portfolio, add a stock to a portfolio, or remove a stock from a portfolio.

When a user selects to create or remove a portfolio, the chatbot will prompt additional information from the user in order to fill in the values in the user preferences database. This process will loop until the chatbot has sufficient information to create a portfolio for the user based on their preferences. If the user accepts the generated portfolio, it will be stored in the database and notify the user. If the user selects to remove a portfolio, the chatbot will prompt the user which one to remove, then remove it from the database and notify the user.

If the user selects update a portfolio, such as adding or deleting a stock data, the chatbot will prompt the user for the stock symbol and from which portfolio to execute the operation. When a stock is added to a portfolio, it checks if the stock is already in the stocks database table and adds it to the user portfolio table. If not it runs the web retrieval module to fetch the stock from yahoo finance using yfinance API. When the operation is successful the user will be notified.

Workflow 3: Figure – Smart Recommendation Tool



Discussion

This workflow is the smart recommendation tool. It is used to provide personalized insight for the user based on their preferences and performance of portfolio. It provides tailored recommendations for users and suggests actions based on historical performance of a portfolio or stock. This features uses a machine learning module but before that, data needs to be processed in multiple phases, particularly, data validation, data retrieval, data processing. This is to prepare data for the machine learning module.

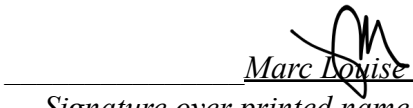
When a user wants to view their recommendations, a data retrieval tool is initialized behind the scenes so that the needed data will be available. After the ML model has trained the data it will generate personalized insight to the user. It can recommend buy-hold-sell timings, and other suggestions. The output will be visualized to the user and they can click on the details to explore each recommendation.

Here is a summary of the smart recommendation tools:

A. Recommendations

- Data Retrieval for ML
    - Retrieve user preferences from the user preferences table to tailor recommendations.
    - Check the stock data table for existing data.
    - If data is missing or stale (e.g., older than 24 hours), fetch fresh data from yfinance API and update the database.
    - Retrieve database table of user's portfolio to indicate stocks already in the portfolio.
- Generate ML recommendation
    - The model scores and ranks stocks based on predicted fit and expected return tailored to the user.
    - Return the top recommendations with associated action suggestions (Buy/Hold/Sell), confidence levels, expected returns, and rationales.
- Visualize Data
    - Display recommendations on the dashboard, allowing filtering, sorting, and further exploration.
- Explore insight
    - User clicks on the "Details" button/link next to any stock recommendation
    - A detailed page or modal opens, showing in-depth info:
        - Buy/Hold/Sell recommendation with confidence score and rationale
        - Financial metrics (P/E ratio, earnings growth, dividends)

I certify to the best of my knowledge that the idea submitted is original.



Marc Louise Goco

Signature over printed name of Project Manager

September 13, 2025

Date Signed/Submitted