

Investor Portfolio Management System (Version - 1)

Problem Statement:

In an increasingly environmentally conscious market, EcoVenture Investments aims to spearhead the adoption of sustainable investment practices. This investment firm specialises in identifying and managing assets that not only promise financial returns but also contribute positively to environmental sustainability. EcoVenture seeks to develop a system that enables them to track and manage the intricate details of investor engagements, asset allocations, and the dynamic interplay of market movements, ensuring both profitability and ecological accountability.

EcoVenture Investments manages a diverse set of investors, each with unique investment preferences. The system should maintain detailed records of each investor, including personal information and preferences regarding risk levels and asset types. Each client oversees one or more portfolios, and every portfolio tracks the allocation of funds across various assets. These assets vary widely, ranging from traditional stocks and bonds to innovative options like cryptocurrencies and sustainable bonds.

Each asset has its own market value, which fluctuates based on real-time market data, and historical values are tracked for analysis. Within each portfolio, assets are acquired or sold, with every transaction recording critical details such as the number of units involved, the purchase or sale price, and the resulting impact on the overall value of the group. It is essential that the system ensures the integrity of these transactions—no asset should be sold if the available units are insufficient, and the value of the group should be recalculated after each trade.

Furthermore, the system must support the ability to analyse the growth and performance of these assets over time, providing insights into both the current value and potential future growth based on market trends and risk analysis. An investor can have multiple portfolios, however, each portfolio cannot belong to multiple investors.

Ensure that no portfolio exists without a linked investor, and every portfolio must include at least one asset. Additionally, the system should allow for continuous updates of market prices and must reflect these changes in the value of the relevant asset. This ensures that the investors have real-time insights into the performance of their investments, allowing them to make informed decisions in line with their financial goals and risk tolerance.

Deliverables:

Q1) Draw an E-R Diagram for EcoVenture Investments that allows them to effectively manage their growing needs. Illustrate the various components in the system and their underlying relationships.

Q2) Convert the E-R Diagram to a relational schema depicting the constraints, providing a clear view of the system.

Q3) Develop the database with all relevant tables based on the schema, ensuring proper relationships and constraints. Populate each table with at least 5 records. Attach screenshots showing the SQL queries for table creation and queries displaying the populated data.

Q4) Demonstrate the use of Federated Storage Engine in MySQL on the “asset” table created in your database, establishing a connection between the server and the client. You need to clean up the asset database by removing all the assets with risk level = “Low” to focus on Medium and High risk investments.

Write an SQL query to perform the above operation and attach relevant screenshots demonstrating the federated storage engine.

Q5) Assuming that you have created (investor, portfolio, asset, portfolio_asset, transactions) as part of the database.

You have been tasked with analysing the growth of various assets owned by investors over a period of 20 years. Each asset has a fixed current value and grows at a specified annual compound interest rate.

Using the given asset values and a 5% annual growth rate, calculate the projected values of all assets after 20 years. The output should include the following details (columns) for each asset:

Investor's full name

Portfolio name

Asset name

Projected asset value after 20 years

full_name	portfolio_name	asset_name	projected_value
-----------	----------------	------------	-----------------

Q6) Assuming that you have created (investor, portfolio, asset, portfolio_asset, transactions) tables as part of the database.

Create a stored procedure that handles the process of transferring an asset from one portfolio to another. The procedure should:

1. Deduct the asset units from the source portfolio.
2. Add the asset units to the destination portfolio.
3. Update the current values in both portfolios accordingly.
4. Ensure that both portfolios belong to the same investor.

Q7) Assuming that you have created (investor, portfolio, asset, portfolio_asset, transactions) as part of the database.

Write a SQL trigger that will automatically update the current value of assets in the portfolio_asset table following any buy or sell transactions recorded in the transaction table. Ensure that the trigger:

- Increases the current value of an asset when a 'Buy' transaction is recorded.
- Decreases the current value of an asset when a 'Sell' transaction is recorded.
- Updates the last_updated timestamp for the affected asset record in the portfolio_asset table immediately after the transaction is processed.

Create a front-end using streamlit demonstrating the above triggers execution and attach the relevant screenshots.

Q8) Assuming that you have created (investor, portfolio, asset, portfolio_asset, transactions) as part of the database.

EcoVenture Investments wants to project the future value of assets within investor portfolios, accounting for a constant annual growth rate. You are required to implement a function that takes the asset's current value, interest rate, and number of years as input and returns the projected future value.

- Create a **user-defined SQL function** `calculate_future_value` that takes:
 1. `current_value` (DECIMAL) – the current market value of the asset from the portfolio_asset table.
 2. `interest_rate` (DECIMAL) – a constant annual growth rate.
 3. `years` (INT) – the number of years over which the asset value is projected.
- The function should return the **projected future value** using the formula:
$$\text{Future Value} = \text{Current Value} * (1 + \text{interest_rate}) ^ \text{years}$$
- Use the function to display for each asset:
 - Investor's full name (from the `investor` table)
 - Portfolio name (from the `portfolio` table)
 - Asset name (from the `asset` table)
 - Current asset value (from the `portfolio_asset` table)
 - Projected asset value after 10 years (using the created function)

Q9) Demonstrate Transaction Isolation and identify its type by implementing the following

Create a new portfolio for an investor with an initial investment of ₹5000 under the name 'Retirement Fund'. Start a transaction and update the portfolio by adding ₹1000 to the initial investment. In a separate session, attempt to update the same portfolio by adding ₹500. Please submit screenshots of the portfolio insertion, the transaction and the update of ₹1000, as well as the error received when trying to update from the separate session.