The University of Texas at Dallas

6320 : Database Foundation

Project Report: Investment Management System

Prof. Kannan Srikanth

Presented By

Bhupesh Srivastava

BKS210000

Investment Management System

Table of Contents:

1. Executive Summary:

Investment management encompasses more than just purchasing and selling financial assets and other investments. Developing a short- or long-term strategy for acquiring and disposing of portfolio holdings is part of management.

The phrase most commonly relates to managing an investment portfolio's holdings and trading them to attain a specified investment goal. Money management, portfolio management, and wealth management are all terms used to describe investment management.

While the investment management may offer handsome profits, it also comes with several significant issues. Investment management organizations' profits are inextricably connected to market performance. Because of this direct link, the company's profitability is determined by market valuations. A significant drop in asset values might result in a drop in revenue, especially if the price drop is significant compared to the company's continuous and stable operating costs. During difficult times and bad markets, clients may get impatient, and even above-average fund performance may not be enough to keep a client's account afloat.

According to the Willis Towers Watson analysis, the top 20 investment management firms control a record 43 percent of all worldwide assets under management, totaling $40.6 trillion. The top five corporations in the United States are, in descending order.

With this project we are encouraging firms and organizations to manages investment in various sectors like stocks, communities, mutual funds, real estates and etfs using SQL queries, Stored procedures, and Triggers.

2. Objective:

This investment management system helps any individual to track their investments and manage their portfolios that comprises of stocks, crypto currencies, mutual funds, ETFs, real estate, Roth IRA, 401K, bonds, Fixed deposit, etc. It maintains the account portfolio details, investment instruments and transaction details.

People invest in many areas, and they will not be able to track their details. This investment management system helps them to organize all the investments in one place, track their portfolios, maintain their current investments, and plan their future investments.

3. Business Requirements:

Functionalities that are considered as part of this proposed investment management system are described below:

- List down and maintain the investment details like types of investment, category and total return on the investment.
- Capture all types of instruments, their symbol, instrument name, current price, total quantity and instrument current value, instrument gain/loss, return on investment along with the corresponding account number. Maintain the status of the investments. Status should be "Active" for any invested instrument and update it to "in active" state once that instrument is closed.
- Calculate the gain/loss and return on investment for a particular invested instrument on monthly, quarterly, and annually.
- Calculate the total gain/loss and return on investment of the portfolio monthly, quarterly, and annually.
- Move the closed invested instrument details to history and maintain the history for up to 10 years.
- Capture the top performing, low performing invested instruments data on monthly, quarterly, yearly to analyze and plan for future investments.
- For any closed invested instrument, calculate the return on investment by taking the closed value reference from the history.
- Represent the current holdings and return on investment data graphically for better visualization.
- Compute the derived values using below formulas.

- transaction value = purchase quantity*purchase price
- total quantity = sum of all purchase quantity
- instrument current value = current price*total quantity
- instrument gain/loss = instrument current value – (sum of all transaction values of instrument)

- investment total value = sum of all current values of instruments
- account value = investment total value + cash balance
- total Gain/loss = sum of all instrument gain/loss.
- Return on investment of instrument = instrument gain or loss/sum of all transaction values of that instrument *100
- Total gain/loss of investment = sum of all instrument gain/loss.

4. Scope of Project

The in scope and out of scope features with respect to database design for this project are described below.

In Scope:

1. Track the investments, which would include the return on specific investment type over a period of time.
2. Investment performance.
3. Generate investment reports like current holdings, gain/loss, return on investment in particular date range/month/quarter/year.
4. Perform and provide risk management by providing the highest, lowest, and consistent performers in all the investments.

Out of Scope:

1. Actual buying/selling of portfolios is done outside the investment management system.
2. This system is independent of frontend applications and live data will not be updated in the database.
3. Tax computations of investment transactions are out of the scope.
4. Market predictions and analysis are not considered in this project.

5. Assumptions:

We have assumed that the average annual rate of increment of prices in the performance table as the annual return for all the elements like stocks, real estate, mutual funds, etfs etc.

We have assumed that the forecasted rate of return on any product will be same as the growth in the past years.

We have assumed that there is no relationship between the variation in prices among the tables. Like there is no variation in the prices of commodity because of variation in the stock table.

We have assumed that there is not external factor impact the prices investment in the future.

6. Entity Description & ER Diagram:

1. Investment Table
Investment_ID**,** Investment Type

2. Stocks table
Stock_ID, Symbol, Category, Investment_ID

3. Commodities
Com_Name, Com_Category, Investment_ID

4. Mutual funds:
Mutual Funds ID Mutual funds name, Category, Size, Year, Price

5. ETF
ETF_ID**,** Symbol**,** Category**,** Investment_ID

6. Real estate
RE_Name, RE_Type, Risk, Investment_ID

7. Com_Performance
Investment_ID, com_ID, No_Of_Years, Rate_Of_Return, Initial_Year_Price

8. Com_Price
Com_ID, Com_Year, Com_Price

9. etf_performance
Investment_ID, etf_ID, No_Of_Years, Rate_Of_Return, Initial_Year_Price

10. etf_price
ETF_ID, ETF_Year, ETF_Price

11. mf_performance
Investment_ID, mf_ID, No_Of_Years, Rate_Of_Return, Initial_Year_Price

12. mf_price
MF_ID, MF_Year, MF_Price

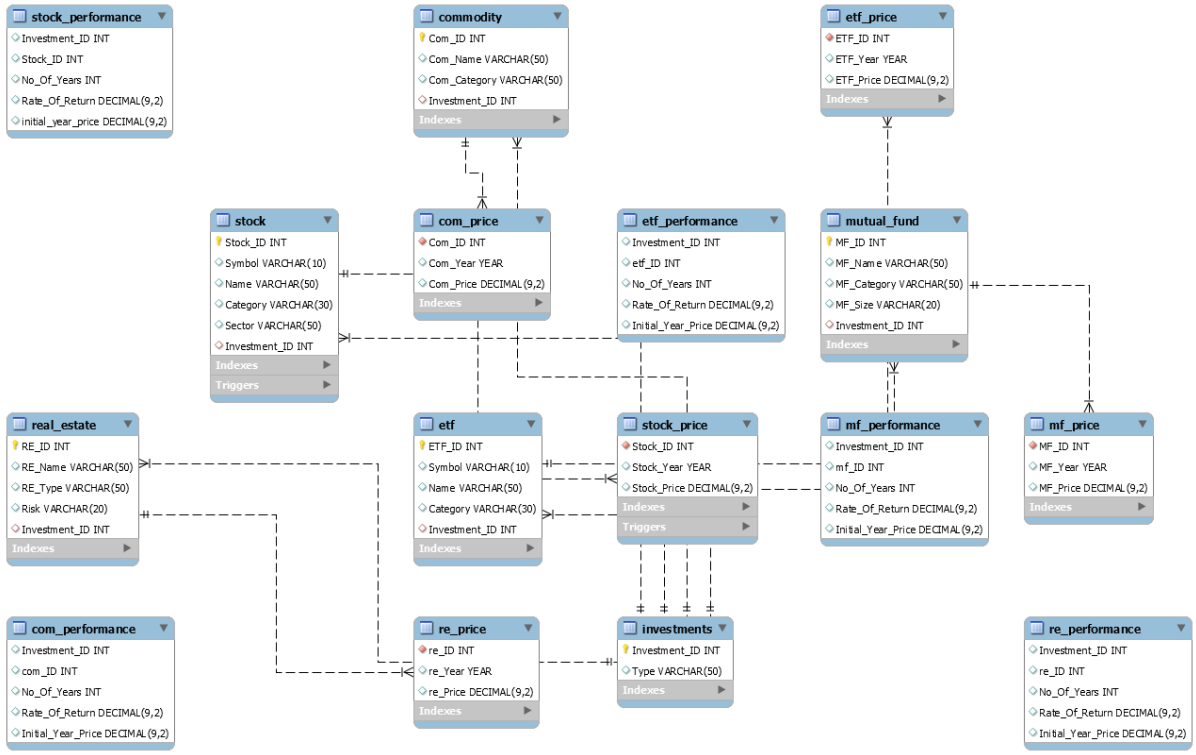
13. re_performance
Investment_ID, re_ID, No_Of_Years, Rate_Of_Return, Initial_Year_Price

14. re_price
re_ID, re_Year, re_Price

15. stock_price
Investment_ID, Stock_ID, No_Of_Years, Rate_Of_Return, initial_year_price

16. stock_performance
Stock_ID, Stock_Year, Stock_Price

ER-Diagrams

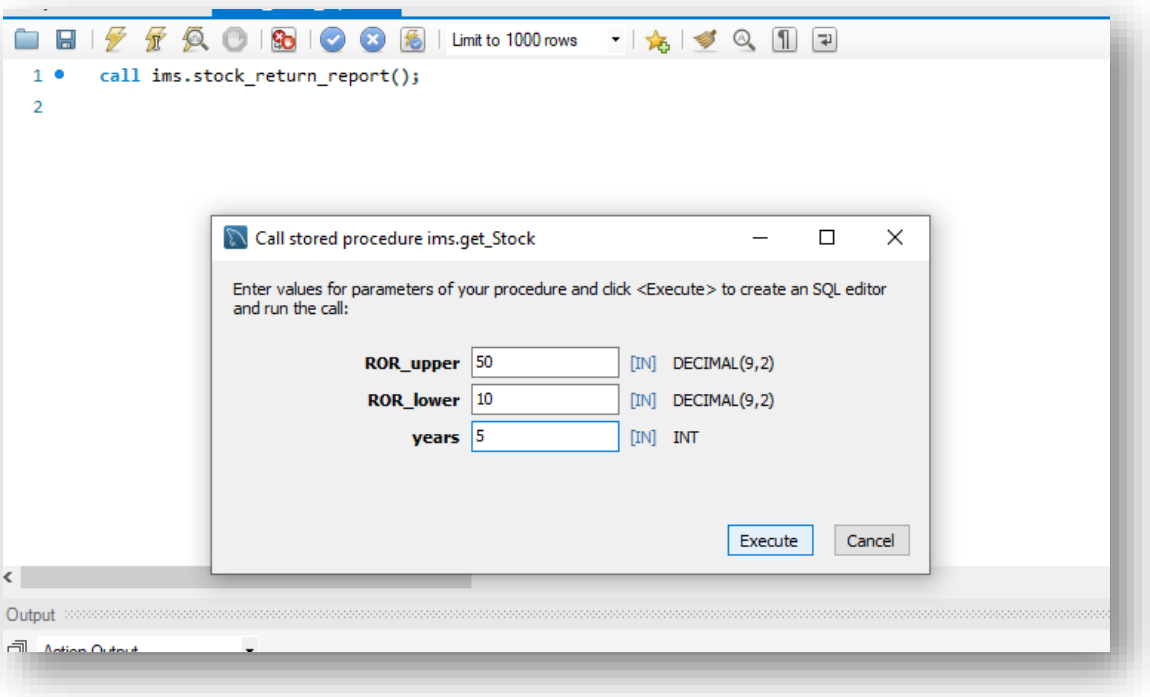


7. Stored Procedures:

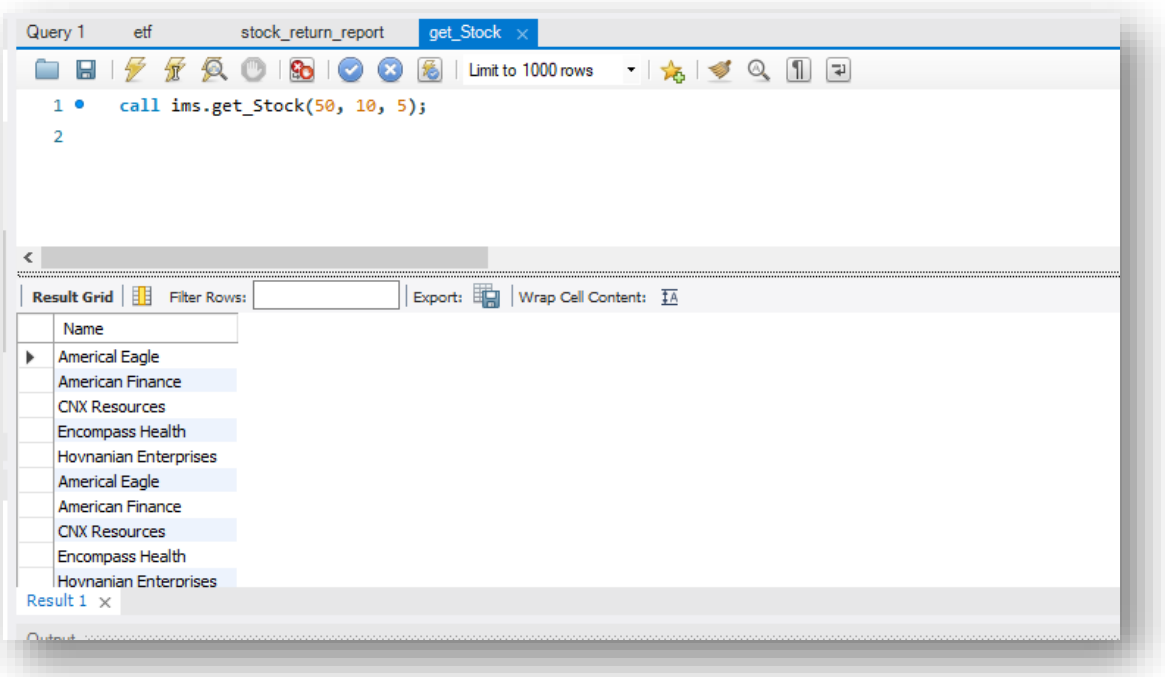
A stored procedure is a collection of Structured Query Language (SQL) statements that are kept together in a relational database management system (RDBMS) so that they can be reused and used by many programs. We have created following stored procedures for every price table in the database.

1. stored procedures to populate the performance table.

2. Stored procedures to find the returns with the inputs like Upper level of rate of return, lower level of rate of return and no of years of investment required. One screenshot is attached to for finding the names of stocks with the required return.



Output of this will be the name of all the stock which will have rate of return between 10-50% over a period of 5 years. The screenshot of the same is attached below.



8. Triggers:

We have used triggers to update data in the performance table and it will initiated whenever there is new entry in the price table of any investment type. One example of trigger is given below. We have used triggers for all the investment types.

```
CREATE TRIGGER Stock_TR_AI AFTER INSERT
ON stock
FOR EACH ROW
CALL ims.stock_return_report;

CREATE TRIGGER Stock_price_TR_AI AFTER INSERT
ON stock_price
FOR EACH ROW
CALL ims.stock_return_report;
```

9. Outcomes:

Use cases:

1: Bindu, a housewife looking for a return of 15% to 20% to purchase few household appliances within span of 1 to 2 years.

After applying lower and higher percentage of her expectation, our tool has recommended following combination of investment options in Stocks, ETF. Furthermore, considering the short span of tenure, our company recommended her to invest 80% in Stocks and 20% in ETF considering her opinion on risk of loss due to volatility.

2. Bhupesh, master's student looking for a standard return of 5% to 7% every year so that he can be able to repay his student loan.

After detailed analysis, our tool returned following list of stocks, bonds, ETF and CDs. As, he is predominantly interested in a standard return to repay his loan on time, we recommended him to invest 40% of his amount in bonds, 20% in ETF, 25% in CVS and 15% in stocks.

3. Mark, perusing his master in USA looking for a return of 25 to 30% within a span of 3 to 4 year so that he can buy his flight tickets to visit his home in Taiwan.

After casually accessing his requirement, our robot generated following list of stocks and ETF. We further recommended him to split his investment to 50% in stocks and 50% in ETF as he told he can take the risk of volatility.

4. Bhargavi, pursuing masters along with part time job is looking for a return of 30% to 50% within a year to buy a car and she can drive to college and job. As it is difficult to achieve her expectation, we recommended her faith following high volatile stocks so that she can get money to buy a car.

Disclaimer: The above use cases are only to show the features of our project/tool based on the historic data we consider for last 10 year on few selected stocks, bonds, ETF. CDs, etc. Investments are subjected to your

own risk and our company is not responsible for any unfavourable outcomes.

Bindu, a housewife looking for a return of 15% to 20% to purchase few household appliances within span of 1 to 2 years.

After applying lower and higher percentage of her expectation, our tool has recommended following combination of investment options in Stocks, ETF.

Furthermore, considering the short span of tenure, our company recommended her to invest 80% in Stocks and 20% in ETF considering her opinion on risk of loss due to volatility.

Stock	ETF
Apple	SPDR S&P 500 ETF Trust
Microsoft	iShares Core S&P 500 ETF
Airbnb	Vanguard S&P 500 ETF

2. Bhupesh, businessman looking for a standard return of 5% to 7% every year so that he can be able to repay his apartment lone.

After detailed analysis, our tool returned following list of stocks, real estate As, he is predominantly interested in a standard return to repay his loan on time, we recommended him to invest 40% of his amount stocks and 20% in real estate, 15% on ETF, and 25% on Mutual Fund

Stock	Real State	ETF	Mutual Fund
Bit Coin	Realtors'	iShares Russell Midcap ETF	American Beacon International Eq Adv
IBM	Hotel Elite'	SPDR S&P Midcap 400 ETF Trust	Ancora/Thelen Small-Mid Cap I
Amazon	landway house'	Vanguard Mid-Cap Value ETF	Virtus AllianzGI Health Sciences Fund Class P

3. Mark, perusing his master in USA looking for a return of 25 to 30% within a span of 3 to 4 year so that he can buy his flight tickets to visit his home in Taiwan.

After casually accessing his requirement, our robot generated following list of stocks and ETF.

We further recommended him to split his investment to 50% in stocks and 50% in ETF as he told he can take the risk of volatility.

Stock	ETF
Joint	Vanguard FTSE Developed Markets ETF
Marine Max	iShares Core S&P Mid-Cap ETF
Americal Eagle	Vanguard Mid-Cap ETF

4. Bhargavi, perusing masters along with part time job is looking for a return of 30% to 50% within a year to buy a car and she can drive to college and job.

As it is difficult to achieve her expectation, we recommended her faith following high volatile mutual find so that she can get money to buy a car.

Mutual Fund	Commodity
Deutsche Real Assets A	copper
Aberdeen Income Builder A	cotton
Thrivent Opportunity Income Plus A	gold

Disclaimer: The above use cases are only to show the features of our project/tool based on the historic data we consider for last 10 year on few selected stocks, bonds, ETF. CDs, etc. Investments are subjected to your own risk and our company is not responsible for any unfavorable outcomes.

10. Conclusion:

Our company will leverage this investment management tool to serve our customers by suggesting the list of stocks, bonds, ETF, mutual funds, etc. Further, our experienced finance consultants will analyze and recommend our customers on percentage of investments to achieve their goals. This project has lot of potential to scale up with many features. We will work on future enhancements by integrating ML algorithms using technology like Python, Tableau and RPA. Our future goal is to create the investment suggestion application that can directly provide the suggestions to individuals considering their income, expenditures, goals and expected rate of returns, etc.

12. Sources:

https://www.nasdaq.com/market-activity/quotes/historical
https://finance.yahoo.com/
https://www.marketwatch.com/
https://www.macrotrends.net/

Thank You