Phase II
Project Title: [Stocks] Database

Brief Description:

My mini world in this project is a STOCK database. In the stock database, we will manage STOCK, PORTFOLIO, and TRANSACTION as entity types and their relationships, such as OWNS and TRADES.

Phase I [Modified Steps]

Step 2: Problem definition, user requirements [modified]

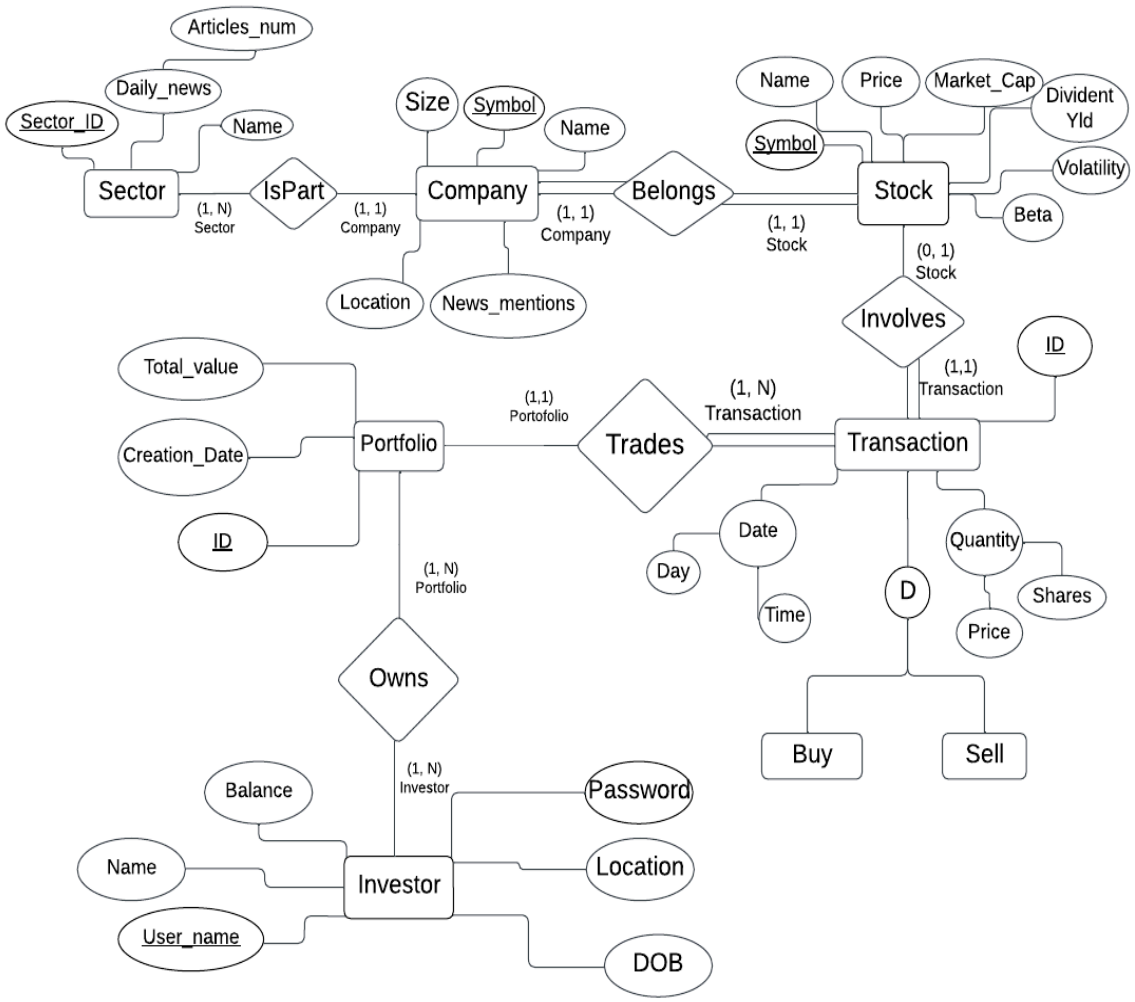
The database is designed to assist a company specializing in managing portfolios for individual investors in efficiently tracking stock metrics. It will store detailed information about stocks, portfolios, and transactions to facilitate informed trading decisions.

- Each STOCK entry has a symbol, name, price, volume, market cap, sector, and volatility.
- Each PORTFOLIO has a name, description, start date, and is owned by an investor.
- Each TRANSACTION will include a date, type (buy/sell), quantity, price, and be associated with a portfolio.

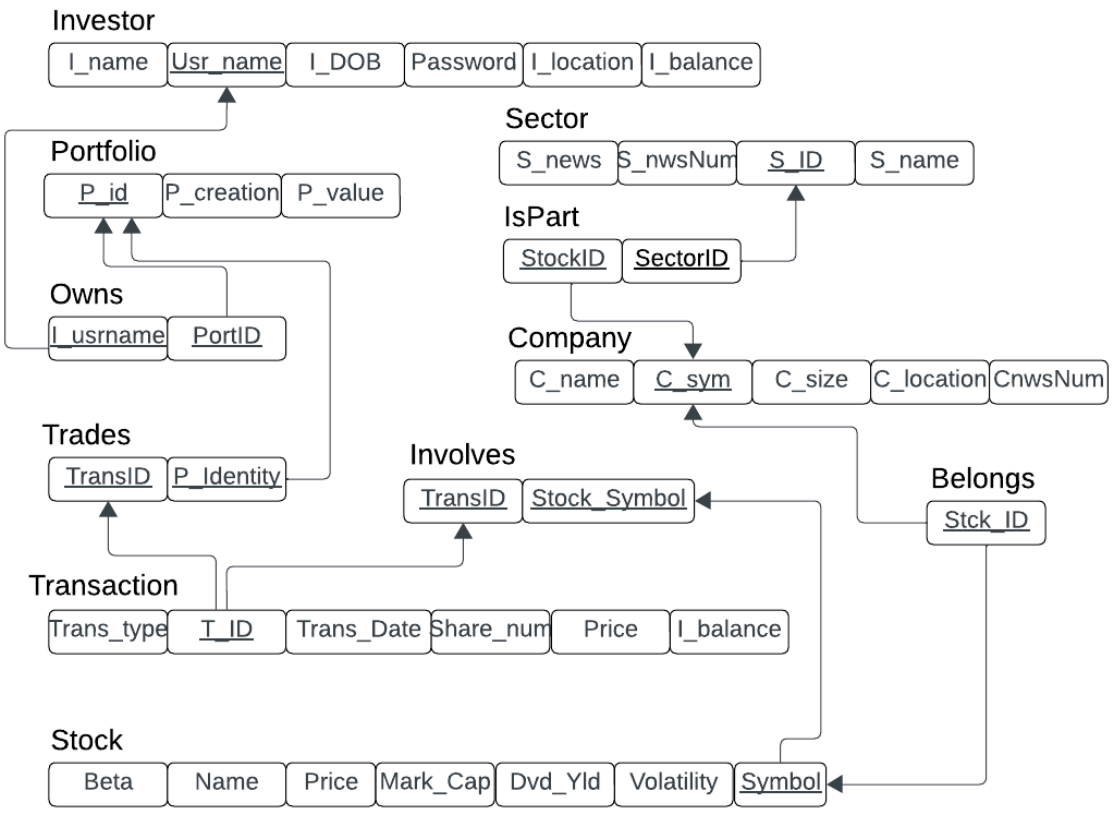
Step 3: 10 English queries [modified]

[No need to list queries here (only [modified] tag). Step 7 should have updated queries with relational algebra expressions]

Step 5: EER modeling



Step 6: Creating Relations



Step 7: Relational Algebra

1. Retrieve the current price of a stock and all portfolios with that specific stock.
   ➔ π StockName, CurrentPrice, PortfolioID (STOCK ⋈ PORTFOLIO)
2. Find the total value of each portfolio based on the current stock prices.
   ➔ π PortfolioID, SUM(CurrentPrice*Quantity) (STOCK ⋈ TRANSACTION)
3. Find the total value of all portfolios.
   ➔ π SUM(CurrentPrice*Quantity) (STOCK ⋈ TRANSACTION)
4. Find the highest, lowest stocks, stocks with the highest trading volume, and highest dividend stocks.
   ➔ π StockName, MAX(CurrentPrice), MIN(CurrentPrice), SUM(Quantity) AS TradingVolume, MAX(Dividend) (STOCK ⋈ TRANSACTION)
5. Find the total value of dividends received by each portfolio.
   ➔ π PortfolioID, SUM(Dividend*Quantity) (STOCK ⋈ TRANSACTION)
6. Retrieve the total investment value of each investor.
   ➔ π InvestorID, SUM(CurrentPrice*Quantity) (STOCK ⋈ TRANSACTION)
7. Find the total value of all investments.
   ➔ π SUM(CurrentPrice*Quantity) (STOCK ⋈ TRANSACTION)
8. Find the total value of dividends received by each investor.
   ➔ π InvestorID, SUM(Dividend*Quantity) (STOCK ⋈ TRANSACTION)
9. Retrieve the names of investors with a total investment value greater than a specified amount.
   ➔ π InvestorName (INVESTOR ⋈ (π InvestorID, SUM(CurrentPrice*Quantity) (STOCK ⋈ TRANSACTION)) σ SUM(CurrentPrice*Quantity) > X)
10. Retrieve the names of investors who have received dividends greater than a specified amount.
    ➔ π InvestorName (INVESTOR ⋈ (π InvestorID, SUM(Dividend*Quantity) (STOCK ⋈ TRANSACTION)) σ SUM(Dividend*Quantity) > X)