Data & Applications Project Phase-1
Mini-World
Team 26

1. Introduction to the mini-world

Most major corporations are publicly owned. Companies offer shares of ownership in their companies called stocks. The price of stocks change by the minute depending on the value investors place on the stock. Corporations sell stocks to raise money and grow the business.

Our Mini World is based on the various Stock Exchanges around the world and the Companies that are listed in them. Through our database we will analyse the companies using various financial ratios and provide user information about these companies.

Every company in our database has its name, sector to which it belongs, current price of its shares,balance sheet,and quarterly results. Every user (shareholder) has its name and unique password. Our database will be useful to anyone across the world as we can include companies listed in various stock markets around the world in our database.

2. Purposes of the database

To provide the user data about :

1) Providing personalised user interface with access control so that each person can have a unique view of the database.
2) Current status of stock indices of various companies.
3) Current value of various currencies and commodities available in the market.
4) Analysis of stocks based on various financial ratios like EBITDA,P/E Ratio etc(included in entity attributes)
5) Providing users with an analysis plot (on request) of the stock prices.
6) Providing users an option to keep some stocks as favourites.

3. Users of the database

1) Any person who is interested in gaining information or getting a detailed analysis of the stock market will use our database.

2) We have also expanded this database to cater to stock markets of different countries and hence this database can be used by anyone around the world
3) Our database will also be used by professional stock market analysts to study the stock market.
4) Investors will use our stock market to keep track of their stocks using the Favourites Option supported in our database.

4. Applications of the database

1) We would maintain net profit/loss for each stock listed in the database.

2) We would be plotting the analysis for the stocks which will be available based on various parameters which can be queried upon by the user:

- Price
- P/E Ratio
- Price to Book
- EBITDA
- Market Cap

3) The database is user specific and can cater to the stocks that a user likes(favourites).

4) Database has been made secure using an Access Control Mechanism for logging in/signing up as a new user.

5) Important Information regarding the Company has also been maintained in the database like No of Stocks held by the board members of the Company as well as the Dividend Yield which is important in deciding the credibility of the company.

5. Database Requirements

a) Assumptions:

- We will be providing stock data on a weekly basis and continuity in providing data will be ensured. Although the stock market indices keep changing by the minute, we have tried to bring continuity in the analysi by maintaining data over a week. As the database is based on a very real life aspect there are no major assumptions as everything has been tried to be kept as real as possible
- We have assumed that email-id of every user will be different(as is the case while creating them on any email service platform),therefore we have kept it as a primary key for Login Interface
- Names of all stock exchanges would be unique
- Company Names of all companies are different

b) Strong Entity Types:

1) User
- Name -> Composite , Not NULL , VARCHAR(75)
- Email ID -> Primary Key , Single Valued , Not NULL , VARCHAR(75)
- Password -> Single Valued , Not NULL , VARCHAR(35)

2) Companies
- Name -> Primary Key , Single Valued , Not NULL , VARCHAR(50)
- Founder ID -> Single Valued , Not NULL , INT
- Sector -> Single Valued , Not NULL , VARCHAR(50)
- Stock Unique ID -> Single Valued , Not NULL , INT , Foreign Key of Companies
- Dividend Yield -> Single Valued, Not NULL , FLOAT
- Quarterly Results -> Composite
- Stocks -> Composite
- High -> Derived , Not NULL , INT
- Low -> Derived , Not NULL , INT

3) Stock Exchanges
- Name -> Single Valued , Not NULL , VARCHAR(60) , Primary Key
- Country -> Single Valued , Not NULL , VARCHAR(50)
- Location -> Single Valued , Not NULL , VARCHAR(50)

- Market Index -> Single Valued , Not NULL , VARCHAR(50)
- Current value of market index -> Single Valued , Not NULL , FLOAT
- No of companies listed -> Single Valued , Not NULL , INT

4) Stocks
- Stock Unique ID -> Primary Key , Single Valued , Not NULL , INT
- Stock Exchange Listed -> Single Valued , Not NULL , VARCHAR(60) , Foreign Key of Stock Exchanges
- Date -> Primary Key,Single Valued , Not NULL , DATE
- Net profit/Loss -> Derived , Not NULL , FLOAT
- Current price -> Single Valued , Not NULL , FLOAT
- P/E Ratio -> Single Valued , Not NULL , FLOAT
- Price to Book -> Single Valued , Not NULL , FLOAT
- EBITDA -> Single Valued , Not NULL , FLOAT
- Market Cap/Sales -> Single Valued , Not NULL , FLOAT
- No of Stocks issued by the company -> Single Valued , Not NULL , INT

Note : Set of Stock UID and Date form Primary Key

c) Weak Entity Types:

1) Favourites
- Email ID -> Single Valued , Not NULL , Primary Key , VARCHAR(75) , Foreign Key of User
- Company Name -> Single Valued , Not NULL , VARCHAR(50), Foreign Key of Companies
- Stock Unique ID -> Single Valued , Not NULL , INT , Foreign Key of Stocks

2) Quarterly Results
- Company Name -> Single Valued , Not NULL , VARCHAR(50) , Foreign Key of Companies
- Quarter -> Single Valued , Not NULL , VARCHAR(50)
- Sales -> Single Valued , Not NULL , FLOAT
- Expenses -> Single Valued , Not NULL , FLOAT
- Operating Profit -> Derived, Not NULL, FLOAT

- Net Profit -> Single Valued , Not NULL , FLOAT

3) Balance Sheet
- Company Name -> Single Valued , Not NULL , VARCHAR(50) , Foreign Key of Companies
- Share Capital -> Single Valued , Not NULL , INT
- Reserves -> Single Valued , Not NULL , INT
- Borrowings -> Single Valued , Not NULL , INT
- Other Liabilities -> Single Valued , Not NULL , INT
- Total Liabilities -> Derived , Not NULL , INT
- Total Assets -> Single Valued , Not NULL , INT

4) Founders
- Founder ID -> Single Valued , Not NULL , INT
- Founder Name -> Single Valued , Not NULL, VARCHAR(50)
- Company which he founded/co-founder -> Single Valued , Not NULL , VARCHAR(50) , Foreign Key of Companies

5) Board Members
- CEO -> Single Valued , Not NULL , VARCHAR(50)
- CFO -> Single Valued , Not NULL , VARCHAR(50)
- COO -> Single Valued , Not NULL , VARCHAR(50)
- CTO -> Single Valued , Not NULL , VARCHAR(50)
- Total no of people in the Board of Directors -> Single Valued , Not NULL , INT
- Company Name -> Composite , Foreign Key of Companies
- Total Percentage of Shares held by Board of Directors -> Single Valued , Not NULL , FLOAT

d) Relationship types
i) Degree
- Stocks **ISSUED** by the Companies -> degree 2
- Companies **FOUNDED** by the Founders -> degree 2
- Favourites **MONITORED** by the Users -> degree 2
- Companies **LISTED** in the Stock Exchanges -> degree 2
- Balance Sheet **RELEASED** by the Companies -> degree 2

- Board Members **CONTROLLING** the Companies -> degree 2
- Stocks **HELD** by the Board Members -> degree 2
- Founder **MEMBER** of Board Members -> degree 2
- Founders **HOLDING** Stocks **OF** the Companies -> degree 3
- Quarterly Results **CALCULATED** from Balance Sheets **OF** the Companies -> degree 3
- Stocks **OF** Companies **BELONGING** to Favourites **OF** Users -> degree 4

ii) Participating entity types and min_max cardinality
1) STOCKS (1,1) , COMPANIES (1,1)
2) COMPANIES(1,N) , FOUNDERS(1,N)
3) FAVOURITES(0,N) , USERS(1,N)
4) COMPANIES(1,N) . STOCK EXCHANGES(1,N)
5) BALANCE SHEET(0,1) , COMPANIES(1,1)
6) BOARD MEMBERS(1,1) , COMPANIES(1,1)
7) STOCKS (0,N) , BOARD MEMBERS (0,N)
8) FOUNDER (0,N) , BOARD MEMBERS(1,N)
9) FOUNDERS(1,N) , STOCKS(1,1) , COMPANIES(1,N)
10) QUARTERLY RESULTS(1,1) , BALANCE SHEETS(1,1) , COMPANIES(1,1)
11) STOCKS(1,1),COMPANIES(1,1) , FAVOURITES(1,N) , USERS(1,N)

iii) Cardinality Ratio (for binary relations)
- 1 : 1
- N : M
- N : M
- N : M
- 1 : 1
- 1 : 1
- 1 : 1
- N : M
- N : 1 : M
- 1 : 1 : 1
- 1 : 1 : K : M

6. Functional Requirements

1) Modifications :
a) Insert - INSERT a new Company details in the database
b) Delete - DELETE a Company details from the favourites of a user
c) Update - UPDATE the details of the stock indices in the database

2) Retrievals :
a) Search: Search (partial text match) for entries in an entity, matching for subparts of the entries. - List name of the Companies whose name starts with 'T'

b) Projection: Query to enable the users to search the database by a particular attribute - Query to Search Companies with dividend yield > 2%

c) Selection : Choosing which rows are to be returned. - Select all companies belonging to the "IT" Sector

d) Aggregate:Calculating average P/E Ratio for Companies belonging to the "IT" Sector

e) Analysis: Try to make creative conclusions and reports by combining functional requirements mentioned before and involving multiple entities.
- Board of Members who hold more than 20% stocks in their companies
- Stocks of Companies who are most favourite among users.

Note : The above stated examples are just a few of the queries that will be supported. Final number of queries supported would be more than those written in this Requirements Document.

Note : Along with the above stated Functional Requirements we will also be supporting Graph based analysis which the user can query.

7. Summary

The above mini world forms a database of the Stock Market as a whole and the Companies listed in the various Stock Exchanges. Through this

database we provide the user with a personalised view of the Stock Market along with in depth analysis of the various financial ratios and factors affecting the credibility of the company.