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| **Stock Market Charting (Mid-Tier Phase 4) v2.0** |
| Case Study |
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| This document covers Software Requirements of Stock Market Charting, along with list of Technologies to be used to develop this Software System, and also includes some details on the Architecture |
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| **IIHT** |
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# Business Requirement (Stock Market Charting)

This Software System lets Admin to upload Stock Price of a Company(which is listed in a Stock Exchange) at different points of time. It need to support multiple Stock Exchanges. And the registered Users should be able to generate various charts to perform Stock Market performance of various Companies or Sectors over certain period of time. More details on the features which need to be supported are specified, below.

This Case study supports below two different Roles:

1. Admin
2. User

## Admin Use Cases:

Admin can perform below operations. It is mandatory to implement all the requirements, except the ones mentioned as optional.

1. **Login/Logout:** Login and Logout. To avoid Complexity, there can be a predefined username and password for Admin
2. **Manage Stock Exchanges:** This feature lists all the Stock Exchanges currently supported. BSE, NSE Stock Exchanges need to be available by default. It should be possible to add new Stock Exchanges. Deletion of Stock Exchange need not be supported.
3. **Manage Company:**
   1. Add a new company details with fields or edit an already existing Company details
   2. Deactivate an already existing company
   3. Update any IPO related data
4. **Import Data(Excel Format):**
   1. Data can be imported(in Excel format), it's basically to feed stock price of a company at various points of time.
   2. Uploaded Excel need to be in a specific format, if not error message need to be displayed. While uploading Excel, specify the Stock Exchange to which the uploaded data belong to. If such company exists.
   3. The company code, date ranges need to be appropriately checked, if any data will be over written.
   4. After successfully imported, data need to get stored in a database and Uploaded Summary need to be displayed like which company, Stock Exchange, how many records imported, from and to date range, etc…
5. **Missing Data:** Able to check the dates for which Stock Price of a Company is not available

## User Use Cases:

A User can perform below operations. It is mandatory to implement all the requirements, except the ones mentioned as optional.

1. **User Signup/Login/Logout:** An User can
   1. Signup for a new Account. When signed up, an email needs to be sent to the User with confirmation link.
   2. Login to an existing and Email confirmed account. User should be able to Login only after E-Mail Confirmation is done.
   3. Logout from an account.
2. User can update profile, password of an already existing Account
3. Able to search for a company to display Company profile & Turn over, CEO, board members, Industry, brief write up, current/latest Stock market price
4. Whenever user requests charts/data for certain period, the period need to be divided into appropriate intervals(Week or Month or Quarter or Year), to display the chart
5. View IPOs planned in a Chronological order
6. When user types in 2 or more characters for a company name or company code, it should display matching company names(using ajax), so that user can select one of them, if required
7. Comparison Charts. It should be possible to perform below comparisons of
   1. a single company over different periods of time
   2. different companies over a specific period
   3. a single sector over different periods of time
   4. different sectors over a specific period
   5. between a Sector and a company over a specific period of time
8. Should be possible to select if comparisons need to be displayed in a single chart
9. Use different colors when multiple Companies/sectors are displayed in a single chart and display legend
10. Should be possible to select Chart type(line chart, bar chart, pie chart, etc…)
11. For a displayed chart, it should be possible to export data and download in Excel
12. Whenever a chart is displayed, display Average, Min, Max, Growth for that specific period
13. Possibility to perform multiple comparisons between Company’s or Sectors, over a period of time.
14. When data does not exist for certain period in between, that need to be appropriately indicated in the chart
15. View future Trend /Basic Prediction for a Company or Sector - Optional

## Company related Data Fields:

1. Company Name
2. Turnover
3. CEO
4. Board of Directors
5. Listed in Stock Exchanges
6. Sector
7. Brief writeup
8. Stock code in each Stock Exchange

## Stock Price details Excel:

1. Company Code
2. Stock Exchange
3. Current Price
4. Date
5. Time

## IPOs planned:

1. id
2. Company Name
3. Stock Exchange
4. Price per share
5. Total number of Shares
6. Open Date Time
7. Remarks

## Sectors data Fields:

1. Id
2. Sector Name
3. Brief

You may consider 3 or 4 sample sectors, as a sample data

## User DB Table:

1. Id
2. Username
3. Password
4. UserType(if Admin or normal User)
5. E-mail
6. Mobile number
7. Confirmed

## Stock Exchange Data Fields:

1. Id
2. Stock Exchange
3. Brief
4. Contact Address
5. Remarks

# Development of individual Microservices

This specific Phase is to design/develop individual Microservices. Analyze the requirement and divide back end functionality into multiple Microservices. Based on the Mentor on Demand requirements, below can be possible Microservices

1. Microservice to upload excel. All required Error Handling including below cases need to be implemented

uploadExcel

1. Microservice to retrieve data of a company, for certain period, getCompanyStockPrice i/p Company ID, From Period, To Period, periodicity

getMatchingCompanies – used to retrieve list of Companies based on pattern matching of Company Name

getCompanyDetails – Basic information about company

getCompanyIPODetails – IPODetails of Company (TBD – Check fi this need to be clubbed with above REST End Point)

1. Microservice to retrieve data of a sector, for certain period: Calculations need to be performed

getList of Companies in a Sector

getSectorPrice Sector ID, From Period, To period, periodicity

1. Microservice for User Login, Signup

User Login

Admin Login

User Signup

1. StockExchange

getStockExchangesList

addStockExchange

getCompaniesList – in a specific Stock Exchange

Each of above Microservice need to comprise below functionality, which need to be developed

1. REST Controllers, with the appropriate REST End points to perform corresponding CRUD operations. Along with End Points which are exposed to Client, you may need additional End point for interaction between Microservices
2. As known, each Microservice is a self-sufficient and standalone application, and owns data stored in specific DB tables or databases.
3. Services
4. Entity & Model classes, including appropriate relationship (like One-One, Many-One, etc…) between Entity Classes. (Entity and Model classes have been developed in the Previous Phase)
5. In case specific Entity or Model classes are required across multiple Microservices, it is recommended to maintain separate copy of Entity or Model classes for each Microservice.
6. Microservice interaction with corresponding DB tables or Databases it owns.
7. It is possible that one Microservice need to interact with other Microservice(using RestTemplate or FeignClient)
8. Repository class which implements JPA or CrudRepository, if RDBMS is used
9. Usage of Custom Queries using @Query where ever custom functionality required
10. Feign Client can be used to invoke one Microservice, from another Microservice
11. Send Email Notifications to Users/Mentors in Use Cases wherever appropriate.
12. Use Postman to test the Microservices by directly passing requests to each REST end Point, of each Microservice
13. Unit Testing code can be developed using JUnit, Mockito, and perform Unit Testing

# Architecture Diagram

Multiple Microservices interacting with Database each one owns.



Architecture of a Single Microservice with REST Controller, Service, Model & Entity Classes and Repository classes



# Full Stack Technologies

The technologies included in Full Stack are not limited to following but may consist of:

* UI Layer (HTML5, CSS3, Bootstrap 4, JavaScript, Jquery, Angular 4/6)
* Middleware Restful API (Spring Boot Restful & MicroServices, JAX-RS, Spring MVC)
* Database Persistence ( Hibernate)
* Database layer (MySQL, MongoDB)
* Ancillary skills (GIT, Jenkins(CI/CD), Docker, Maven) etc.

To complete this case study, you should be comfortable with basic single page web application concepts including REST and CRUD. You may use angular-cli to create your template project. All web pages need to be responsive.

Ref1: https://cli.angular.io/

Ref2: <https://github.com/angular/angular-cli>

# Database Tables

Below are list of Database Tables, for actual fields refer corresponding Entity classes

|  |  |
| --- | --- |
| Table Name | Purpose |
| Company | Stores list of Company details |
| StockPrice | Stores the Stock prices of all companies, which are imported thru Excel Sheet |
| IPODetails | Stores the IPO details of companies |
| Sectors | Stores the list of Sectors(like Health Care, banking, etc…) supported |
| Users | Stores profile & login details of Admin and normal Users |
| StockExchange | Stores the list of Stock Exchanges supported(like |

# Technical Spec – Solution Development Environment

## Front End Layer

|  |  |
| --- | --- |
| **Framework(s)/SDK/Libraries** | **Version** |
| Angular with TypeScript | 4/6 |
| Bootstrap | 3.0 or above |
| CSS | 3 |
| HTML | 5 |
| JavaScript | 1.8 or above |
| JQuery | 1.3 |

## Middle Tier Layer

|  |  |  |
| --- | --- | --- |
| **Technology** | **Framework(s)/SDK/Libraries** | **Version** |
| Java Stack | Spring Boot | 1.5 or above |
| Spring MVC | 4.0 or above |
| JDK | 1.7 or above |
| Maven | 3.x or above |

## Database & Integration Layer

|  |  |  |
| --- | --- | --- |
| **Technology** | **Framework(s)/SDK/Libraries** | **Version** |
| Java Stack | Hibernate | 4.0 or above |
| JAX-RS Jersey/ Spring Restful |  |
| MySQL | 5.7.19 |
| MongoDB | MongoDB | 3.4 |
| NoSQL |  |

## Ancillary Layer

|  |  |  |
| --- | --- | --- |
| **Technology** | **Framework(s)/SDK/Libraries** | **Version** |
| Source Code Management Tool | GIT | 2.14.2 |
| Build Tool/JAVA Stack | Maven | 3.x |
| Testing Tool/JAVA Stack | JUnit/Mockito | 4.x |
| Testing Tool/JAVA Stack | Spring Test | 4.x |
| Controllers can be tested using Postman Tool | | |

## Security

|  |  |
| --- | --- |
| **Name** | **Version** |
| Spring Boot Security |  |
| JWT |  |

## Deployment & Infrastructure

|  |  |  |
| --- | --- | --- |
| **Technology** | **Framework(s)/SDK/Libraries** | **Version** |
| Docker | - |  |
| Apache Tomcat | - |  |
| Jenkins(CI/CD) | - |  |
| Node | - |  |

## Editors

|  |  |
| --- | --- |
| **Name** | **Version** |
| STS(Spring Tool Suite) |  |
| Visual Studio Code |  |

Agile/Scrum Software development Model can be used

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# Other Design constraints

Below are other Design constraints to be considered

* Integrate with any SMTP Server, to send Emails in appropriate Use cases
* Integrate with any Payment Gateway to process Payments

# Assessment Deliverables

1. Checked in(to internal GIT) Source code of all Microservices
2. Screen shots of Usage of Post Man tool to test each End Point of all Microservices
3. Few Steps on how to run the solution.
4. Test code need to be included

# Important Instructions

1. Sample Design provided is just for reference, Associates can make changes over it or follow their own Design.
2. Based on your current work, alternate Technologies can be used, for example ReactJS instead of Angular, etc…, however prior approval from the Mentor is required.
3. Please make sure that your code does not have any compilation errors while submitting your case study solution.
4. The final solution should be a zipped code having solution. Solution code will be used to perform Static code evaluation.
5. Implement the code using best design standards/family Design Patterns.
6. Use Internationalization for all the labels and messages in Rest API Development.
7. Do not use System out statements or console.log for logging in Rest API and FrontEnd respectively. Use appropriate logging methods for logging statements/variable/return values.
8. If you are using Spring Restful or Jersey JAX-RS to develop Rest API, then use Maven to build the project and create WAR file.
9. Write web service which takes input and return required details from database.
10. Use JSON format to transfer the results.