

## FULL STACK - CAPSTONE PROJECT

### AIR TRANSPORT SYSTEM

You are required to write a software solution for Air Transport System which allows administrators to manage various airports, planes, schedules, bookings and passengers.

The application has to be implemented using Spring Boot & Microservices as the backend and React as the frontend. This application stores details of airports, planes, schedules, bookings and passengers.

This software needs to address the following requirements:

#### BUSINESS REQUIREMENTS:

The project is for administrators who use the system to perform the following operations.

The Administrator module should allow administrators perform:

- A. Login and authentication.
- B. Saving details of airports, planes, schedules, bookings and passengers.
- C. Viewing and deleting the details of airports, planes, schedules, bookings and passengers.
- D. Updating various details periodically.
- E. Search for the required details based on the id and key fields.
- F. New administrators to register.

#### USER STORIES:

##### US01: LOGIN

As an Administrator,

I want to login to the application; so that I can get access to the welcome screen and application menu.

The following conditions and validations are to be performed during login

- a) The login id will be a valid email address.

- b) Password should be a combination of at least an uppercase alphabet, lowercase alphabets, a digit, and a special character.
- c) The email id and password cannot be blank.
- d) The account should get disabled for 30 minutes on three invalid login attempts.
- e) Proper messages should be displayed in case of errors and exceptions.

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#### ACCEPTANCE CRITERIA

Given that I am an administrator,

When I enter correct User Id with Password in the Login screen

Then I should be able access the application menu

And navigate the menu to view the required details

Given that I am an administrator,

When I enter incorrect User Id with Password in the Login screen

Then I should be able prompted for a maximum of three times to reenter the credentials.

Given that I am an administrator,

When I enter incorrect User Id with Password in the Login screen consecutively for three times

Then my account should get disabled for 30 minutes.

#### US02: CREATING AIRPORTS, PLANES, SCHEDULES, BOOKINGS AND PASSENGERS

As an Administrator, I want to create airports, planes, schedules, bookings and passengers.

- a) The airports, planes, schedules, bookings and passengers should be created with a unique id.
- b) The id should be 5 characters in the format "CNNNN" where the first character is an alphabet and last 4 characters are running numbers
- c) The id should be autogenerated.
- d) The id once generated cannot be modified.
- e) The required fields should be accepted and validated.

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#### ACCEPTANCE CRITERIA

Given that I am an administrator,

When I select the option to "Create by clicking the appropriate buttons or links"

And enter the required details

Then I should be able to autogenerate the id

And I should be able to save airports, planes, schedules, bookings and passengers

#### US03: VIEWING AIRPORTS, PLANES, SCHEDULES, BOOKINGS AND PASSENGERS

As an Administrator, I want to view airports, planes, schedules, bookings and passengers.

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#### ACCEPTANCE CRITERIA

Given that I am an administrator,

When I select the option to "View by clicking the appropriate buttons or links"

I should be able to view airports, planes, schedules, bookings and passengers

#### US04: SEARCHING AIRPORTS, PLANES, SCHEDULES, BOOKINGS AND PASSENGERS

As an Administrator, I want to search airports, planes, schedules, bookings and passengers.

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#### ACCEPTANCE CRITERIA

Given that I am an administrator,

When I select the option to "Search by clicking the appropriate buttons or links"

And enter the id or key fields

I should be able to view airports, planes, schedules, bookings and passengers

#### US05: DELETING AIRPORTS, PLANES, SCHEDULES, BOOKINGS AND PASSENGERS

As an Administrator, I want to delete airports, planes, schedules, bookings and passengers.

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#### ACCEPTANCE CRITERIA

Given that I am an administrator,

When I select the option to "Delete by clicking the appropriate buttons or links"

I should be able to delete airports, planes, schedules, bookings and passengers

#### US06: NEW ADMIN REGISTRATION

As a New Administrator, I should be able to register myself to keep track and work on the system.

The following conditions and validations are to be performed when the new admin is registered

- a) An error message is displayed if the email id is already in use by some other user
- b) An error message is displayed if all the details are not filled
- c) An error message is displayed if the name contains numbers or special characters
- d) Password should be a combination of at least an uppercase alphabet, lowercase alphabets, a digit, and a special character.
- e) An error message is displayed if the password entered by the customer is not in the expected format

- f) An error message is displayed if the phone number is already in use by some other user
- g) The user should be able to login with his/her email and password

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#### ACCEPTANCE CRITERIA

Given that I am an administrator,

When I select the option to register a new admin

And enter all the required details

Then I should be able to save the register the administrator.

#### DATABASE DESIGN:

- a) Create the database ER Diagram and implement the database.
- b) Create required constraints, procedures and functions as relevant and applicable.
- c) The database should be well normalized.
- d) Recommended to have a minimum of 3 fields to a maximum of 10 fields in each table.

#### REQUIREMENTS:

- a) The Application should be implemented using Spring boot and Microservices architecture.
- b) The microservices should be registered in a Service Registry.
- c) You should provide access to all microservices using a dynamic API gateway
- d) The API gateway should act to secure the application.
- e) Perform client-side load balancing.
- f) The REST APIs should be tested with Postman.
- g) Perform ORM using the Spring Data JPA and Hibernate framework.
- h) The backend to be used is MSSQL.
- i) Appropriate validations and exception handling should be performed in the relevant layers of the application.
- j) The relevant Design principles and practices should be applied.
- k) Perform Unit Testing.
- l) Write effective java code.
- m) Extensively use features from Java 8 and advanced features till Java 21 wherever applicable.
- n) Use Typescript features

#### BEST PRACTICES

- a) Follow proper naming conventions and ensure code quality
- b) Create meaningful comments to explain the purpose of the class and behaviours.
- c) Use StringBuilder for concatenating large strings
- d) Enforce Compile-Time Type Checking using Generics
- e) Validate Parameter Preconditions
- f) Proper handling of NullPointerException and other relevant exceptions.
- g) Perform validations across the different layers of the project
- h) The code should have modularity.
- i) The deleted records should be flagged as inactive or deleted, but not physically deleted in the database.
- j) Validate Parameter Preconditions
- k) The code should have modularity.

#### SUBMISSION REQUIREMENTS BACKEND:

- A. Submit a single archive containing all the artefacts
- B. The artefacts are
  - a. Project Source Code,
  - b. Presentation,
  - c. Postman Test Collection
  - d. Database Scripts and
  - e. A word document containing the screenshots of the
    - i. Tests in postman collection
    - ii. Instances of microservices running on Eureka and
    - iii. Other relevant screenshots, if any.
- C. Along with the code you are also required to submit a document that mentions
  - a. Project Name
  - b. A tabulation containing
    - i. Application Name of your Microservices
    - ii. Port number assigned to that microservice

#### SUBMISSION REQUIREMENTS FRONTEND:

- A. Submit a single archive containing React source code and resources.
- B. Along with the code you are also required to submit a document that mentions
  - a. Project Name and
  - b. The screenshots of React screens and forms
    - 1. With live data from the microservices.
    - 2. Forms with
      - a. Validation error messages and
      - b. Success Messages

#### PROJECT PRESENTATION REQUIREMENTS:

- A. The Project should be presented individually with execution and presentation.
- B. Explain the details of API used, processes involved, workflows and frameworks utilized.