

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 Angular as the frontend. This application stores details of airports, planes, schedules, bookings and passengers.

The application has to be implemented as two versions:

- Version 1: An application with monolithic architecture using Spring Boot.
- Version 2: An application with microservices architecture using Spring Boot and Spring cloud.

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

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

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.

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

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 autogenerated 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.

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.

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.

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

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

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

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:

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

Functional Requirements Backend:

- 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 MySQL.

- 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 Java 8 and advanced features wherever applicable.

Functional Requirements Frontend:

- A. The Application should be implemented using Angular and Twitter Bootstrap.
- B. The application should have a separate routing module.
- C. The URL fragments in the application should be guarded using Route Guards.
- D. The service layer should connect to the existing microservices backend.

Best Practices Backend

- 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.

Best Practices Frontend

- A. Follow proper naming conventions and ensure code quality
- B. Validate Parameter Preconditions
- C. The code should have modularity.
- D. The routes should be placed in its own module.

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 Angular 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 the

- i. The angular 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.