AIR TRANSPORTATION SYSTEM

PRESENTED BY **TEAM ALPHA**

TEAM LEADER: **ASHWIN NAGAPURE**

TEAM MEMBERS:

- **SARANSH BHOLE**
- **AAYUSH MESHRAM**
- **AMARBIRSINGH RANDHAWA**
- **JANAVI JADHAV**

INTRODUCTION

Overview:

- Designed to simplify and enhance the passenger and airline management experience.
- Offers a complete solution to handle flights, bookings, baggage, crew assignments, and passenger interactions, while ensuring system scalability and code quality.

Technologies Used:

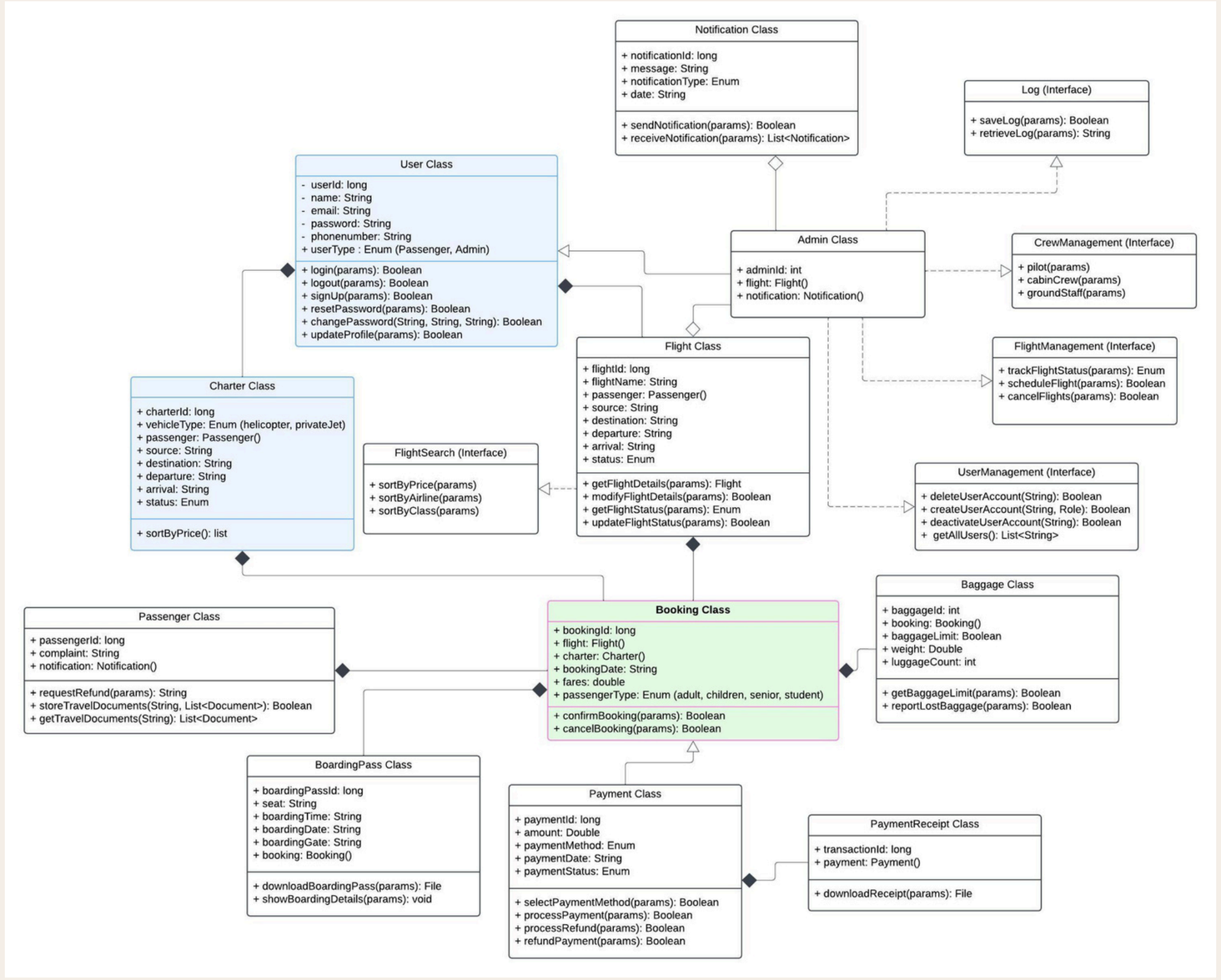
- Backend Framework: **Spring Boot (Java)**
- Frontend Framework: **ReactJS**
- Collaboration Tools: **Swagger, Jira, SonarQube**
- Version Control: **GitHub**
- Database: **MySQL**
- IDE: **IntelliJ IDEA**

INTRODUCTION (CONTD.)

Project Goals:

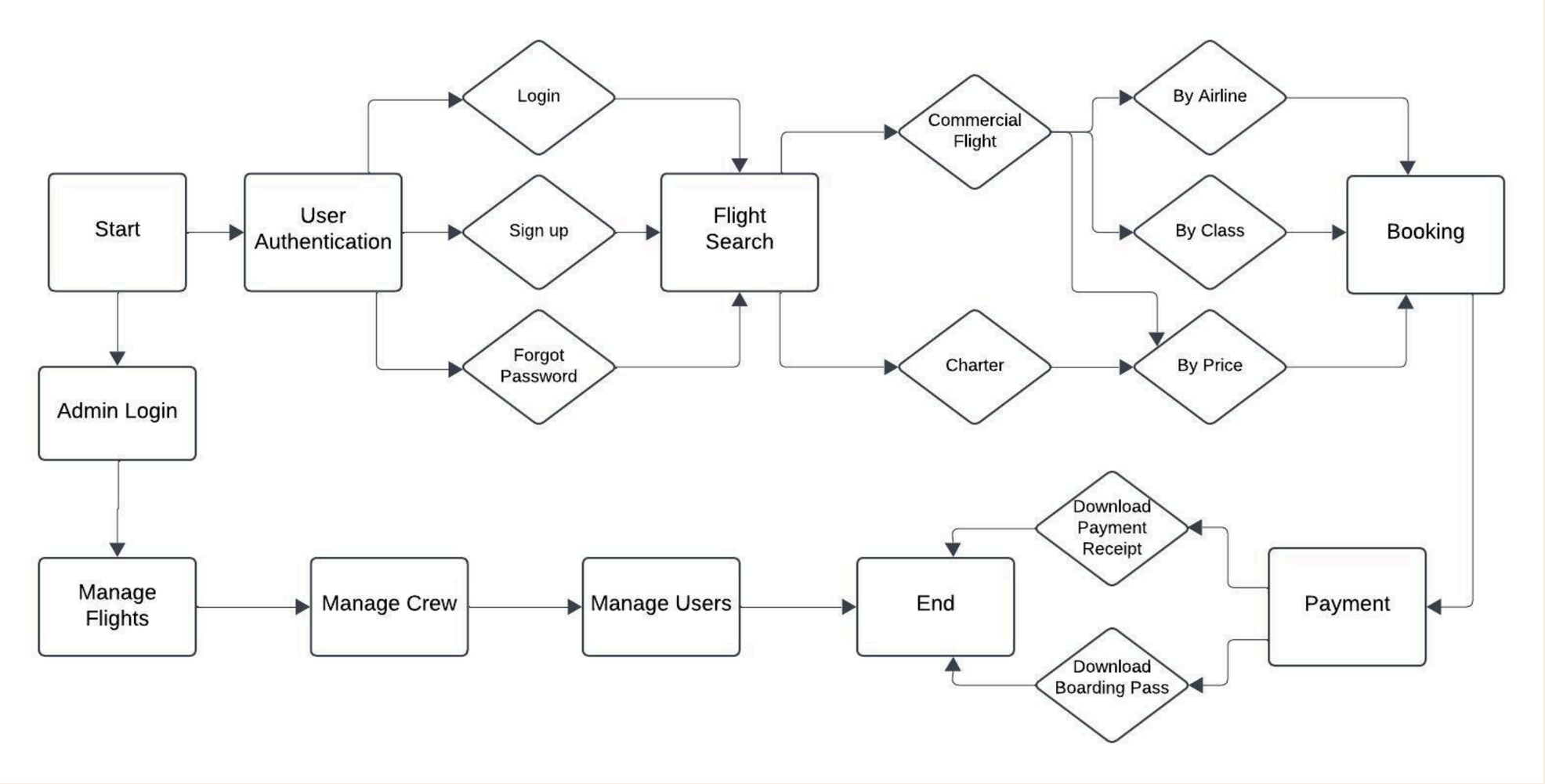
- Enhance passenger convenience with personalized travel options.
- Optimize airline operations, including crew and flight management.
- Provide a robust and scalable architecture for future growth.

SYSTEM DESIGN & WORKFLOW



UML Class Diagram

SYSTEM DESIGN & WORKFLOW (CONTD.)



Workflow Representation Diagram

DEVELOPMENT WORKFLOW WITH AGILE

The project was developed following Agile principles to ensure iterative and incremental progress.

Scrum Framework:

- Sprint duration: 3-4 days per sprint.
- Daily stand-ups to track progress and address issues.

Jira Software:

- Used to frame epics and user stories.
- Managed sprints, assigned tasks, and tracked progress.
- Ensured transparency and collaboration within the team.

Distribution of Modules:

- **Ashwin:** User, Passenger, Admin, User Management
- **Saransh:** Booking, Baggage, Boarding
- **Aayush:** Flight, Flight Search, Flight Management, User Authentication
- **Amarbir:** Crew Management, Charter, Travel Preferences
- **Janavi:** Payment, Payment Receipt, Notification

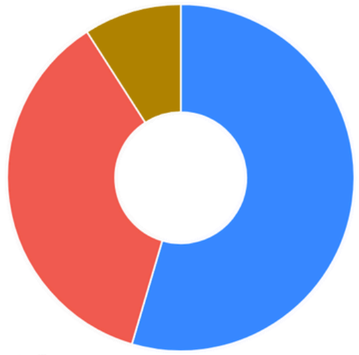
JIRA DASHBOARD

Pie Chart: to do epics

Assignee
Total Issues: **4**

Janavi Jadhav	2
amarbirsingh.randhawa062019	2

Pie Chart: to do stories



Assignee
Total Issues: **11**

amarbirsingh.randhawa062019	6
Janavi Jadhav	4
Ashwin Nagapure	1

Pie Chart: in progress epics

Assignee
Total Issues: **2**

Aayush	1
Unassigned	1

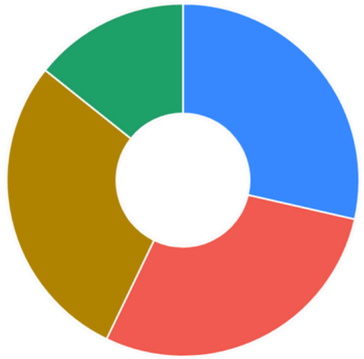
Pie Chart: in progress stories

Assignee
Total Issues: **2**

Aayush	1
Ashwin Nagapure	1

8 minutes ago

Pie Chart: done epics



Assignee
Total Issues: **7**

Aayush	2
Janavi Jadhav	2
amarbirsingh.randhawa062019	2
Saransh Bhole	1

Assignee
Total Issues: **53**

amarbirsingh.randhawa062019	16
Saransh Bhole	13
Aayush	9
Ashwin Nagapure	9
Janavi Jadhav	6

Sprint Health Gadget

SCRUM Sprint 2 - SCRUM board

No estimated issues (Story point estimate)

0 days left

100 %	0%	0	0
Time elapsed	Scope change	Highest	Flagged

Assignees in Sprint

Two Dimensional Filter Statistics: done ...

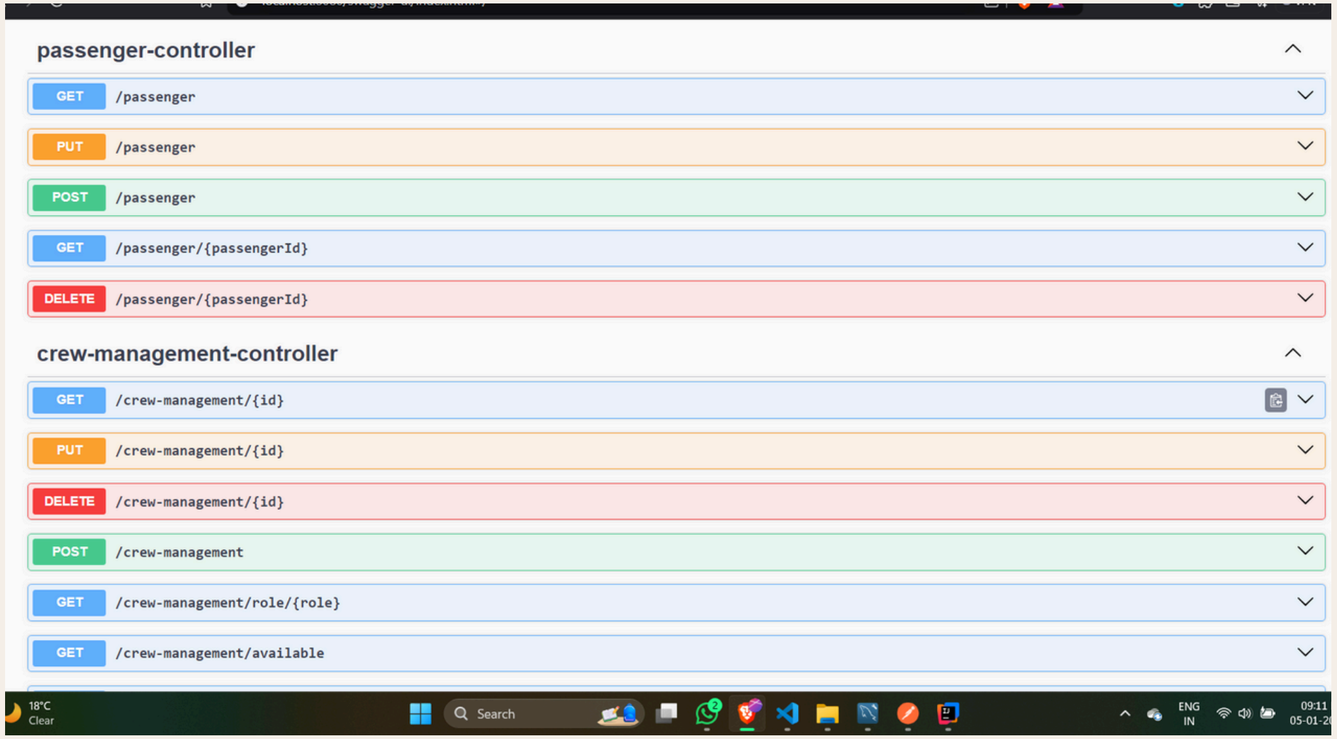
Assignee	DONE	T:
Aayush	9	9
amarbirsingh.randhawa062019	16	16
Ashwin Nagapure	9	9
Janavi Jadhav	6	6
Saransh Bhole	13	13
Total Unique Issues:	53	53

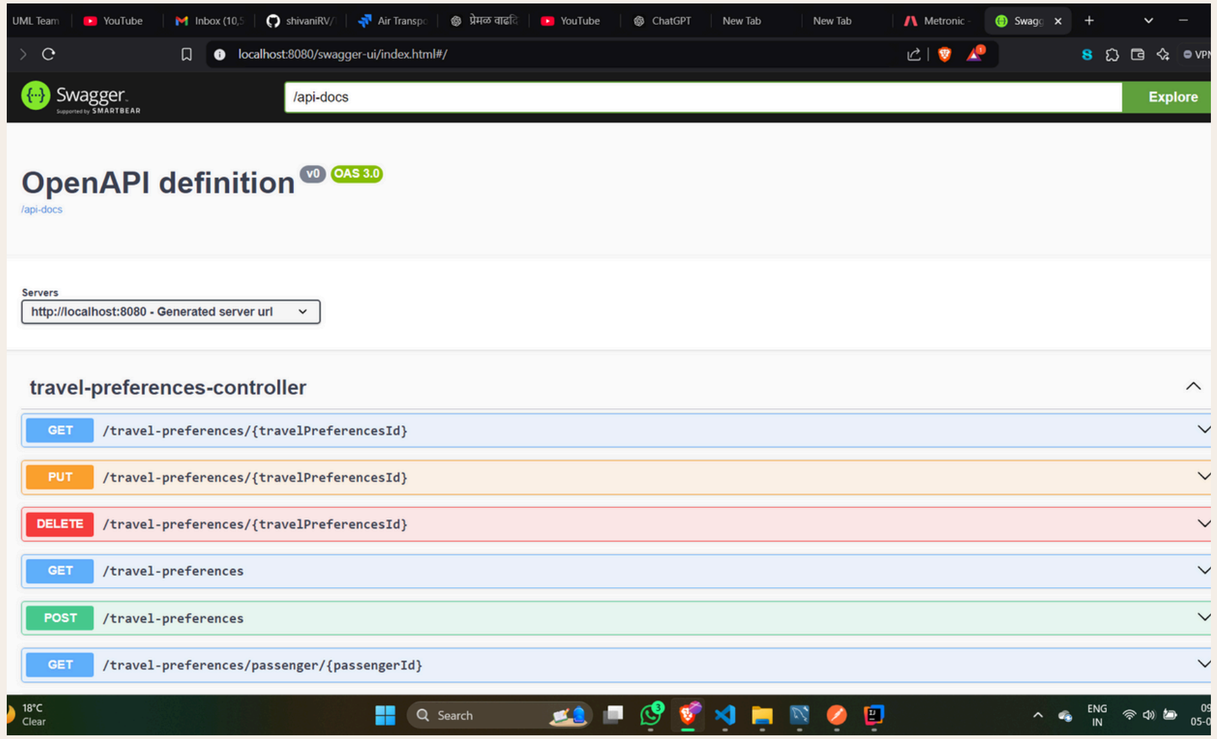
Grouped by: Status

Showing **5** of **5** statistics.

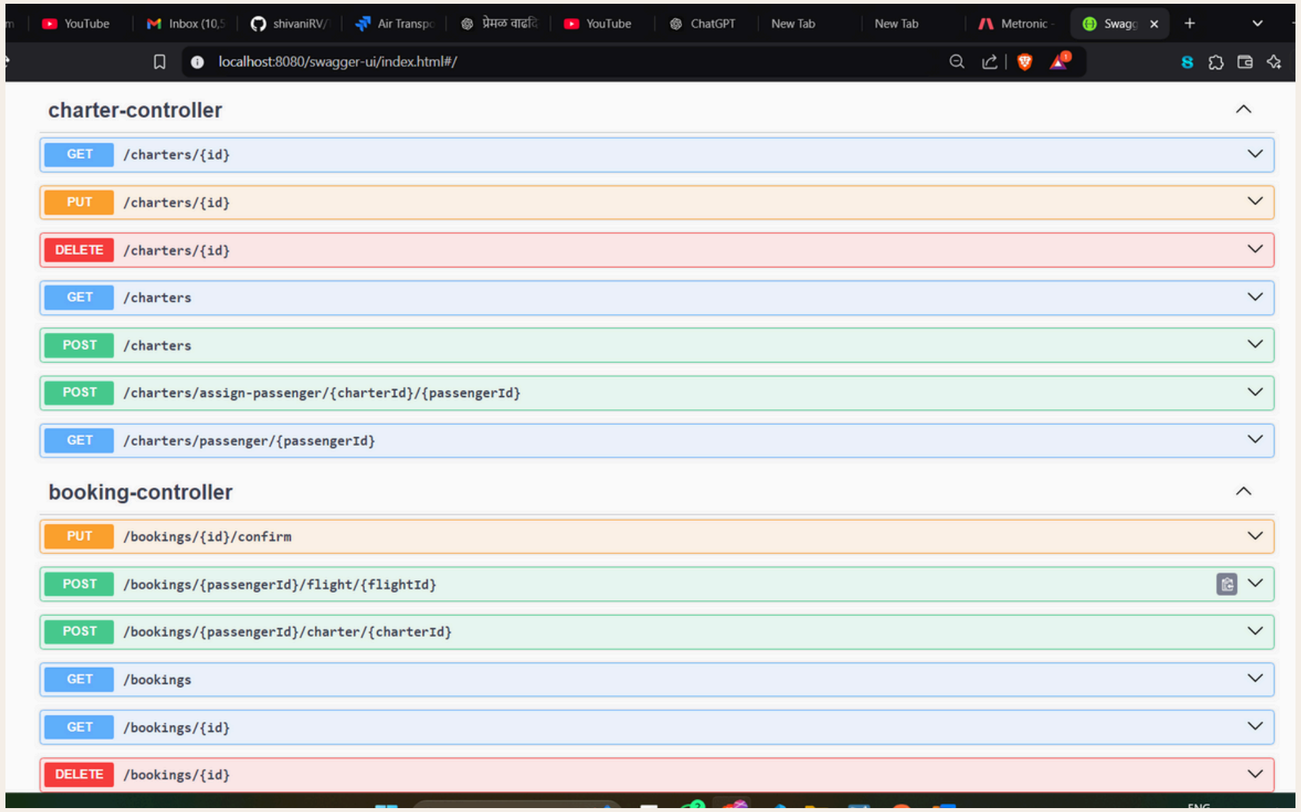
IMPLEMENTATION HIGHLIGHTS

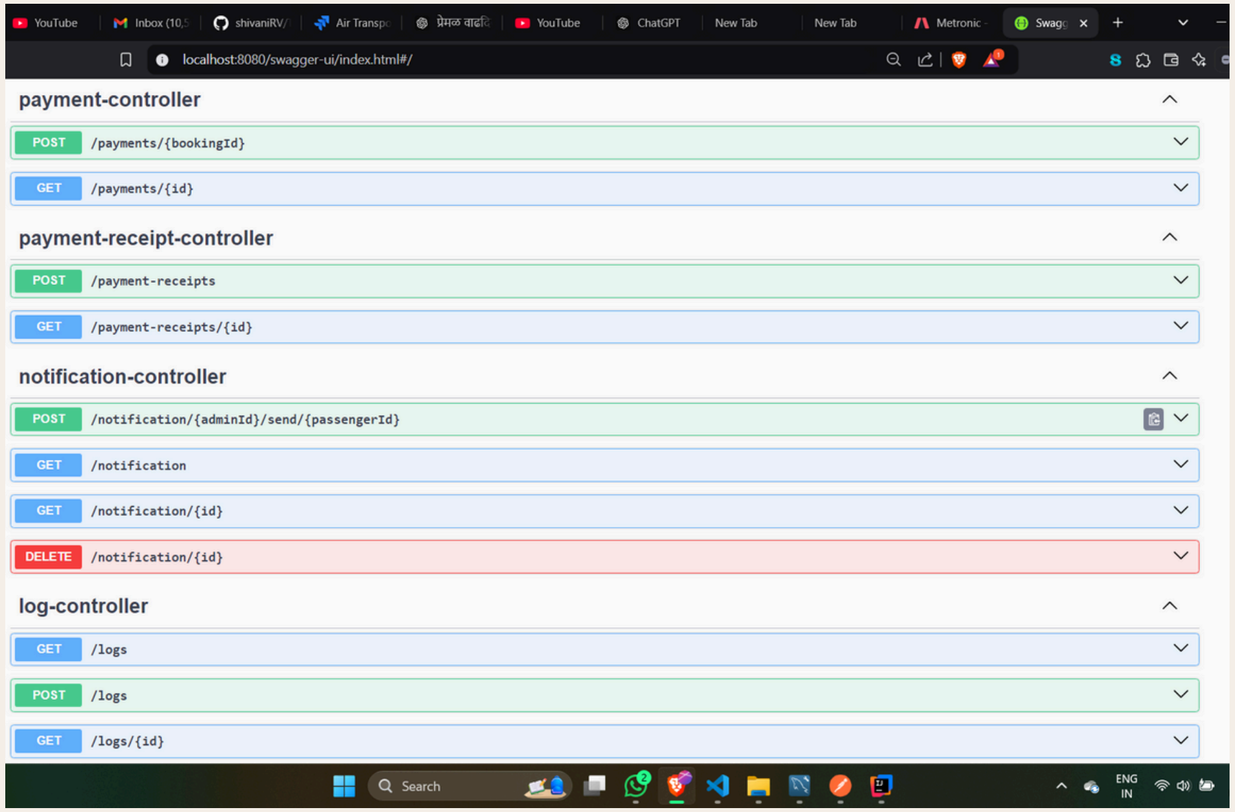
- **Swagger UI Integration**





IMPLEMENTATION HIGHLIGHTS (CONTD.)





IMPLEMENTATION HIGHLIGHTS (CONTD.)

Purpose:

- Swagger UI provides an interactive API documentation interface, allowing developers and testers to visualize, test, and debug APIs directly from the browser.

Benefits of Swagger UI:

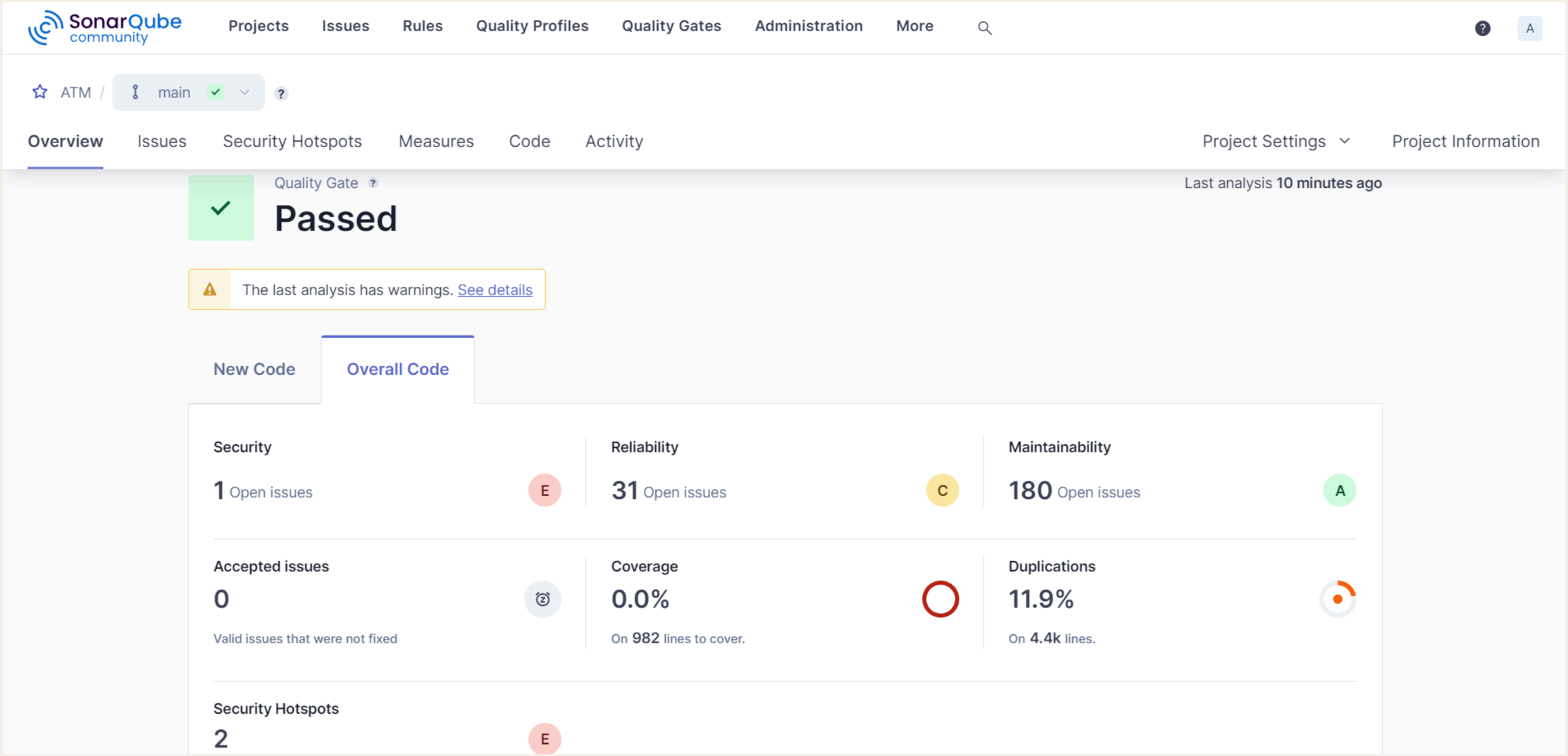
- Centralized documentation for all APIs.
- Easy to test APIs with built-in tools.
- Improves collaboration between developers and stakeholders.
- Helps identify issues early in development.

Impact:

- Simplifies collaboration by enabling team members to understand and test APIs without requiring external tools.

IMPLEMENTATION HIGHLIGHTS (CONTD.)

- **SonarQube Integration**



IMPLEMENTATION HIGHLIGHTS (CONTD.)

Purpose:

- SonarQube ensures high-quality code by spotting bugs, security risks, and areas for improvement.

Metrics:

- **Code Coverage:** How much of the code is tested.
- **Maintainability:** Measures complexity or technical debt.
- **Reliability:** Highlights potential bugs.
- **Security:** Flags vulnerabilities.

Impact:

- It helps keep the system strong, secure, and easy to maintain, ensuring long-term success.

SOLID PRINCIPLES

- **Single Responsibility Principle (SRP):** A class should have one reason to change.
  - DTOs like BaggageDTO, BookingDTO, and CharterDTO focus solely on transferring data.
  - **Benefit:** Improves maintainability and clarity.

- **Open-Closed Principle (OCP):** Open for extension, closed for modification.
  - Interfaces like PaymentService and BookingService allow adding new features (e.g., payment methods) without modifying existing code.
  - **Benefit:** Facilitates easy addition of new functionality.

- **Liskov Substitution Principle (LSP):** Derived classes should substitute base classes without altering program correctness.
  - CharterController can work seamlessly with any implementation of CharterService interface, adhering to LSP.
  - **Benefit:** Ensures consistent behavior across implementations.

SOLID PRINCIPLES (CONTD.)

- **Interface Segregation Principle (ISP):** Classes should not be forced to implement interfaces they don't use.
  - BookingServiceImpl is only responsible for implementing BookingService methods.
  - FlightServiceImpl and PassengerServiceImpl deal only with their specific interfaces.
  - **Benefit:** Prevents bloated and unused interface methods.

- **Dependency Inversion Principle (DIP):** High-level modules depend on abstractions, not concrete implementations.
  - BaggageController depends on the BaggageService interface, not its BaggageServiceImpl.
  - The BoardingPassServiceImpl uses the BoardingPassRepository abstraction.
  - **Benefit:** Increases flexibility and testability.

OOPS CONCEPTS

- **Encapsulation:** Grouping data and methods in classes, restricting access.
  - DTOs like BookingDTO encapsulate fields with getters and setters.
  - Services like BookingService encapsulate business logic.
  - **Benefit:** Prevents unintended changes and enforces data integrity.

- **Abstraction:** Hiding implementation details, focusing on essential features.
  - Repositories like BookingRepository abstract database operations.
  - **Benefit:** Increases code modularity and reusability.

OOPS CONCEPTS (CONTD.)

- **Inheritance:** Reuse code via parent-child relationships.
  - User is extended by Passenger and Admin.
  - **Benefit:** Reduces code duplication and improves maintainability.

- **Polymorphism:** A single interface represents different implementations.
  - At runtime, the interface type CrewManagementService is used to hold an object of the implementing class CrewManagementServiceImpl, enabling polymorphism.
  - **Benefit:** Simplifies switching between implementations.

CHALLENGES FACED

- Integration of Swagger UI and SonarQube with Spring Boot
- Resolving dependency conflicts and maintaining compatibility across modules
- Managing team collaboration and resolving version control merge conflicts
- Designing scalable system architecture and clear workflows
- Ensuring adherence to Agile methodology and timely sprint completion
- Mapping of all the modules with each other for smooth functioning

ACHIEVEMENTS

- Created APIs and CRUD operations for all modules in backend
- Performed mapping among all the modules in the backend
- Designed UML class diagram for our system
- Learnt and integrated SonarQube with Spring Boot
- Learnt and integrated Swagger with Spring Boot
- Learnt and used Jira software for managing sprints and framing epics and user stories
- Implemented SOLID principles and OOPs concepts in the project

CONCLUSION

- Developed a scalable and maintainable system with robust modular architecture
- Followed Agile methodology using Jira for effective planning, tracking, and collaboration
- Ensured code quality and documentation with SonarQube and Swagger UI
- Implemented SOLID principles and OOP concepts for modular, reusable, and testable code

THANK YOU!

TEAM ALPHA