Deliverable#3:

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Company : Smartsphere

A- Software Project Plan

Work Breakdown Structure (WBS)

1. Project Initiation

- 1.1 Requirement Analysis
- 1.2 Feasibility Study
- 1.3 Project Planning (Trello, GitHub Setup)

2. System Design

- 2.1 High-Level Architecture Design
- 2.2 UML Diagrams
    - 2.2.1 Use Case Diagram
    - 2.2.2 Class Diagram
    - 2.2.3 Sequence Diagram
    - 2.2.4 Package Diagram
- 2.3 Database Schema Design

3. Frontend Development

- 3.1 Authentication Pages
    - 3.1.1 Login
    - 3.1.2 Signup
- 3.2 User Dashboards
    - 3.2.1 Admin Dashboard
    - 3.2.2 Organizer Dashboard
    - 3.2.3 Participant Dashboard

- 3.3 Event Management Pages
    - 3.3.1 Create/Edit/Delete Events
    - 3.3.2 Announcements

- 3.4 Feedback & Notifications UI

4. Backend Development

- 4.1 API Development
    - 4.1.1 User Controller
    - 4.1.2 Event Controller
    - 4.1.3 Ticket & Feedback Controller

- 4.2 Services Implementation
- 4.3 Security Configuration (BCrypt, JWT)
- 4.4 Database Integration

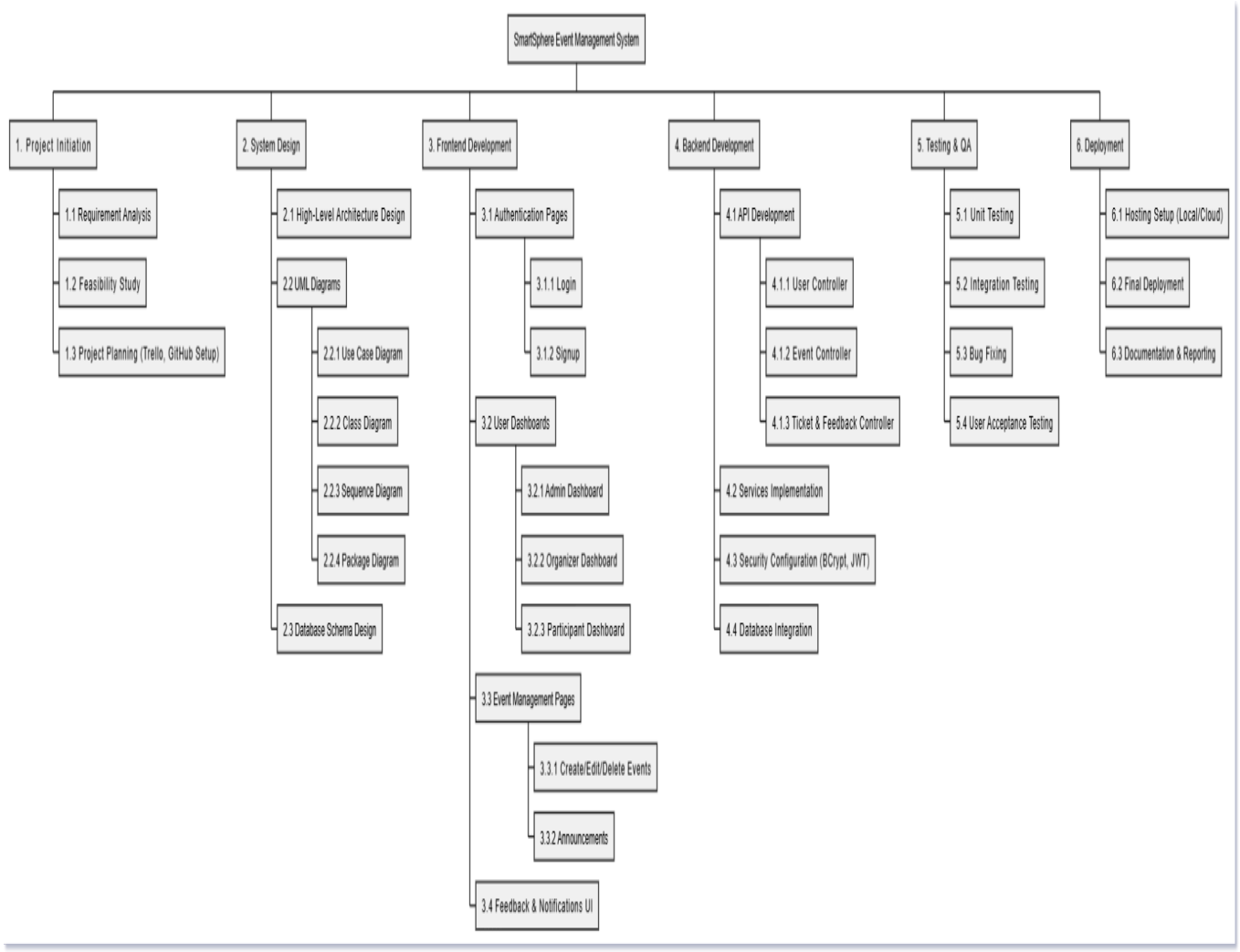
5. Testing & QA

- 5.1 Unit Testing
- 5.2 Integration Testing
- 5.3 Bug Fixing
- 5.4 User Acceptance Testing

6. Deployment

- 6.1 Hosting Setup (Local/Cloud)
- 6.2 Final Deployment
- 6.3 Documentation & Reporting

WBS Chart:


SmartSphere Event Management System
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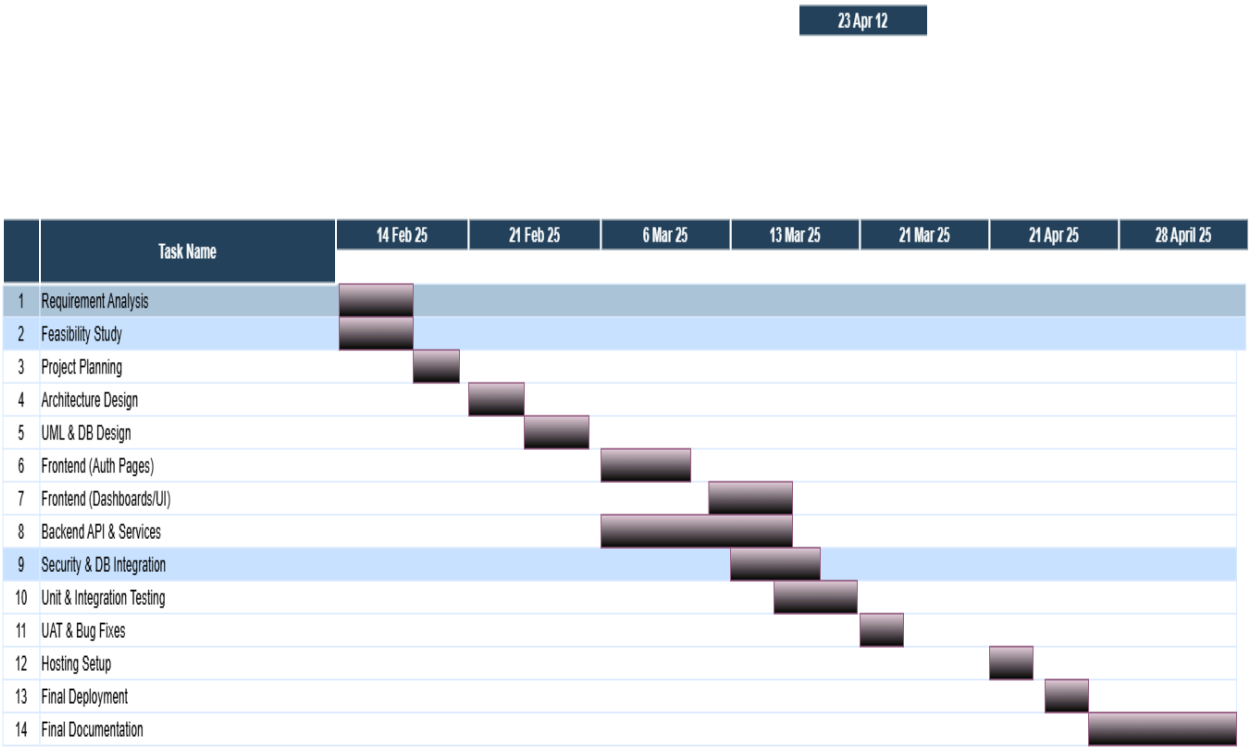
Gantt Chart:



B-System Architecture:

1-Identifying Subsystems:

1. Authentication Subsystem
    a. Handles login, signup, password encryption (BCrypt).
    b. Related Classes: `AuthController`, `SecurityConfig`, `UserService`.

2. User Management Subsystem

    a. Manages user profiles, roles (Admin, Organizer, Participant).
    b. Related Classes: `UserController`, `UserService`, `UserRepository`, `User`.

3. Event Management Subsystem
    a. Creation, modification, deletion of events by organizers.

b. Related Classes: `EventController`, `EventService`, `EventRepository`, `Event`.

4. Notification & Feedback Subsystem

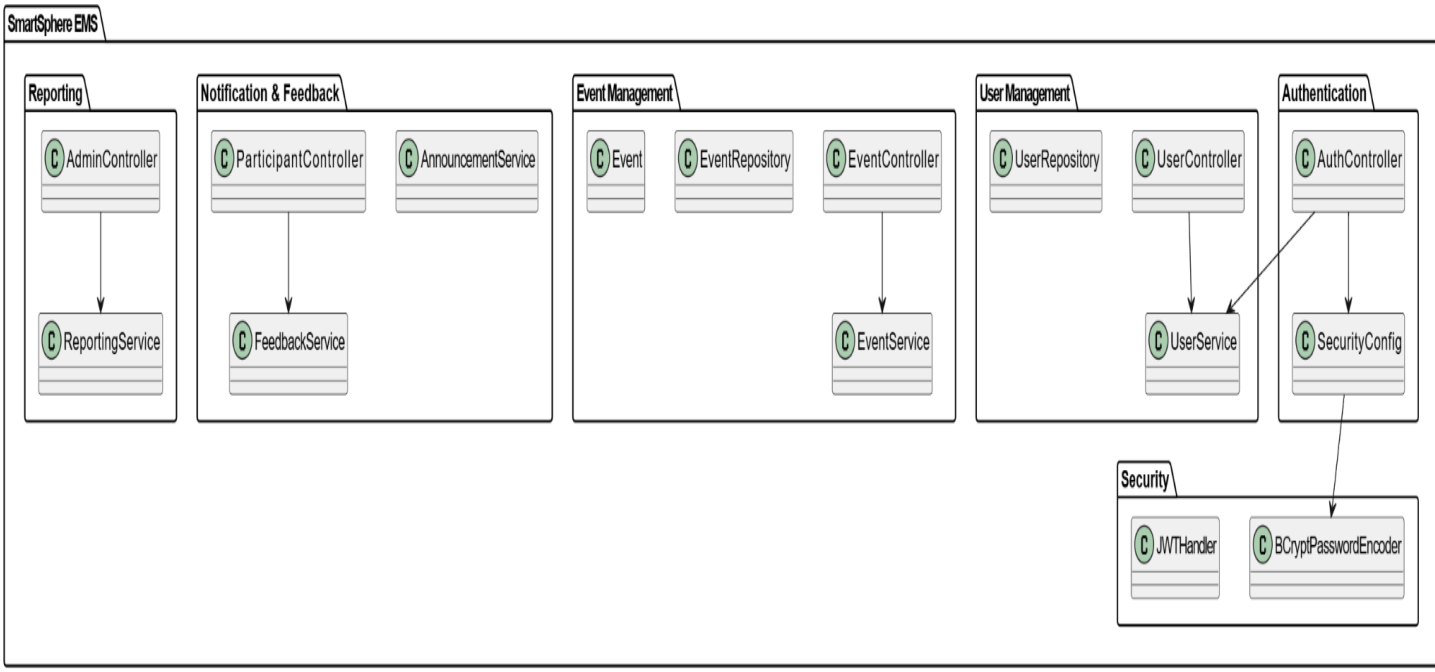
a. Sends announcements, collects feedback from participants.
b. Related Classes: `Announcement`, `Feedback`, `ParticipantController`.

5. Reporting Subsystem

a. Admin views reports, participant lists, feedback.
b. Related Classes: `AdminController`, `Reporting`.

6. Security Subsystem

a. Authentication, authorization, session management.
b. Related Classes: `SecurityConfig`, `JWT` (if used), `Spring Security`.



2-Architecture Styles:

1. Layered Architecture (N-Tier Architecture)

Description:
The system is organized into **separate layers**, each with distinct responsibilities.

Layers in SmartSphere:

- **Presentation Layer**: React.js Frontend UI.
- **Business Logic Layer**: Spring Boot Services handling core operations.
- **Data Access Layer**: Repositories interacting with the database.
- **Database Layer**: MySQL for persistent storage.

Why Used?

- Clear separation of concerns.
- Easier to maintain and scale.
- Independent development of frontend and backend.

2. Client-Server Architecture

Description:
The system follows a **Client-Server model**, where:

- The **client (React.js)** requests resources.
- The **server (Spring Boot)** processes and responds.

Communication:

- Uses **HTTP** protocols.
- **RESTful APIs** serve as the interface between client and server.

Why Used?

- **Scalability**: Clients and servers can scale independently.
- **Modularity**: Frontend and backend can evolve separately.

3. Model-View-Controller (MVC)

Description:
The Spring Boot backend follows the **MVC pattern**:

- **Model**: Data layer (Entities like User, Event, Ticket).
- **View**: Not directly applicable (handled by React), but can include API responses.
- **Controller**: Handles HTTP requests (e.g., `UserController`, `EventController`).

Why Used?

- Makes the backend more organized.
- Separates data, logic, and request handling.

4. RESTful Architecture

Description:
Backend services expose **RESTful APIs**:

- CRUD operations via **HTTP verbs** (GET, POST, PUT, DELETE).

- Stateless interactions.

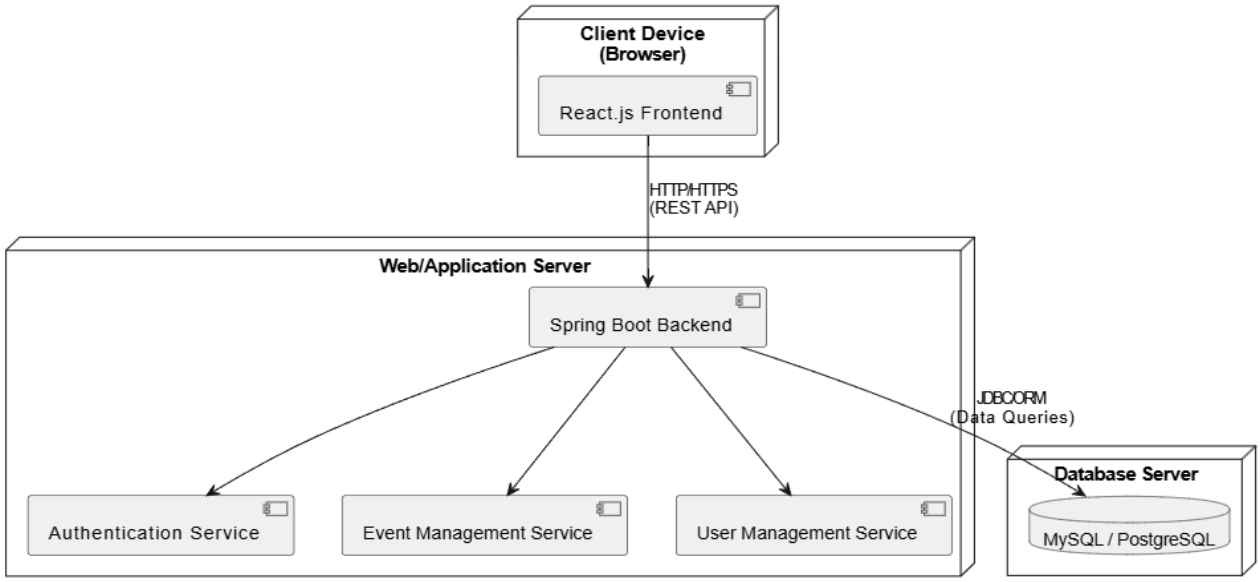
Why Used?

- **Interoperability**: Easily integrates with any frontend.
- **Scalability**: Lightweight, ideal for distributed systems.

3-Deployment diagram for client deployments:

Key Nodes in SmartSphere Deployment:

1. **Client Node** (User's Browser)
    - Runs the **React.js Frontend**.
    - Interacts with the backend via **RESTful APIs**.
2. **Web Server Node**
    - Hosts **static React build** (Optional if hosted separately).
    -
3. **Application Server Node**
    - Runs **Spring Boot Backend** (APIs).
    - Handles business logic, authentication, event management, etc.
4. **Database Server Node**
    - Stores data in **MySQL**
    - Accessed by the Application Server.



Deployment Flow:

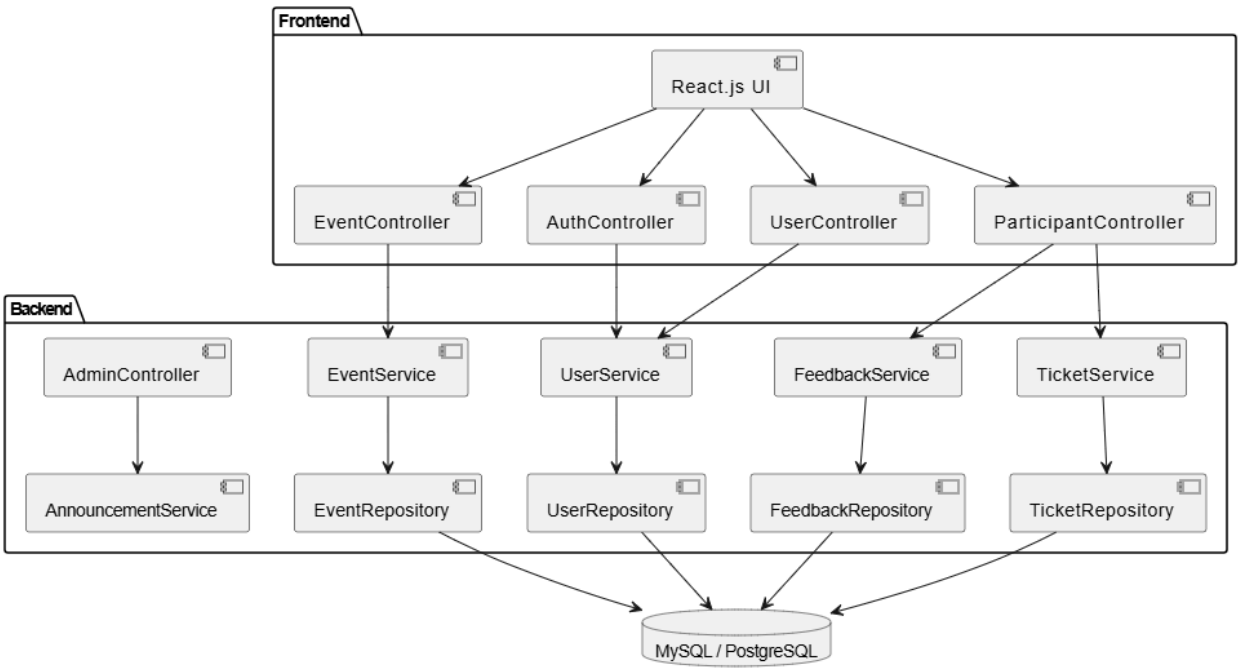
1. User accesses **frontend UI** from the browser.
2. UI sends **HTTP requests** to **Spring Boot REST API**.
3. Backend processes requests and queries **database**.
4. Responses are sent back to the frontend.

4-Component Diagram:

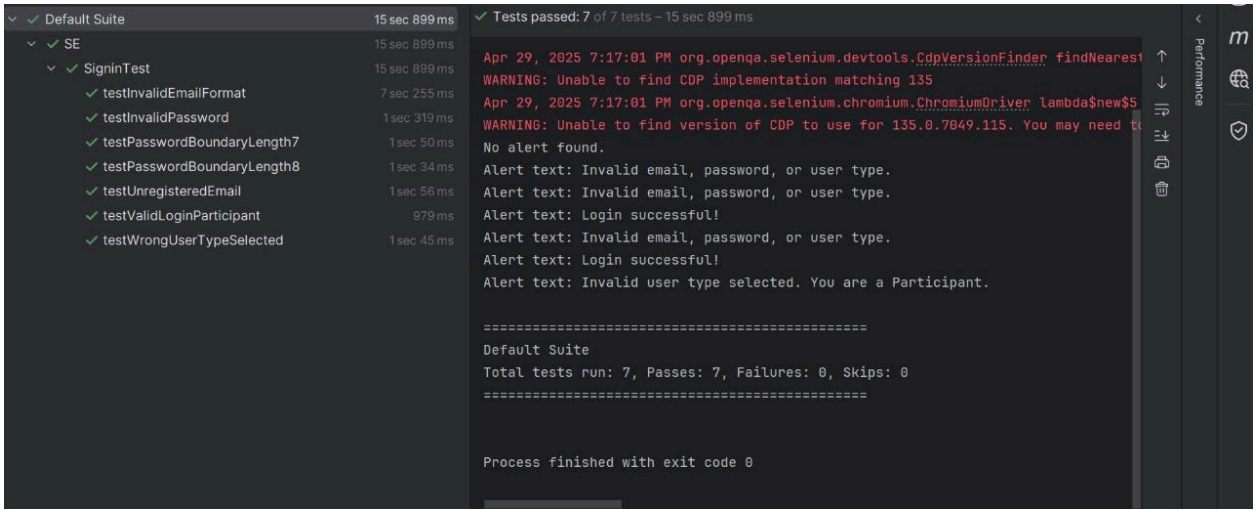
Key Components:

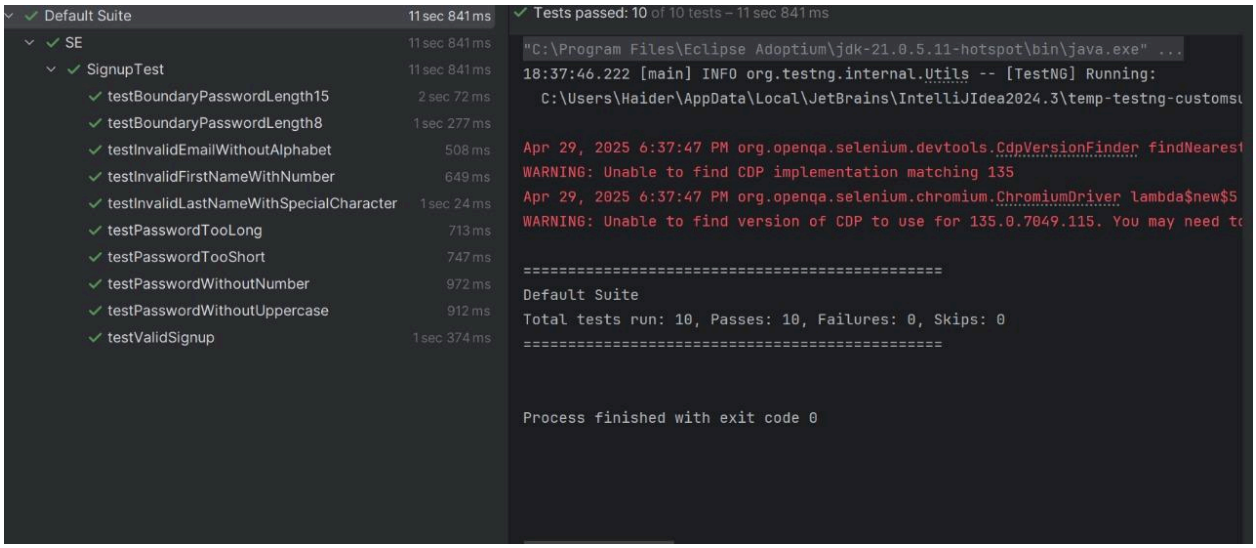
1. **Frontend (React.js)**
    - Interfaces with backend via REST APIs.
2. **Spring Boot Backend Components**:
    - **Controllers**:
        - `AuthController`
        - `UserController`

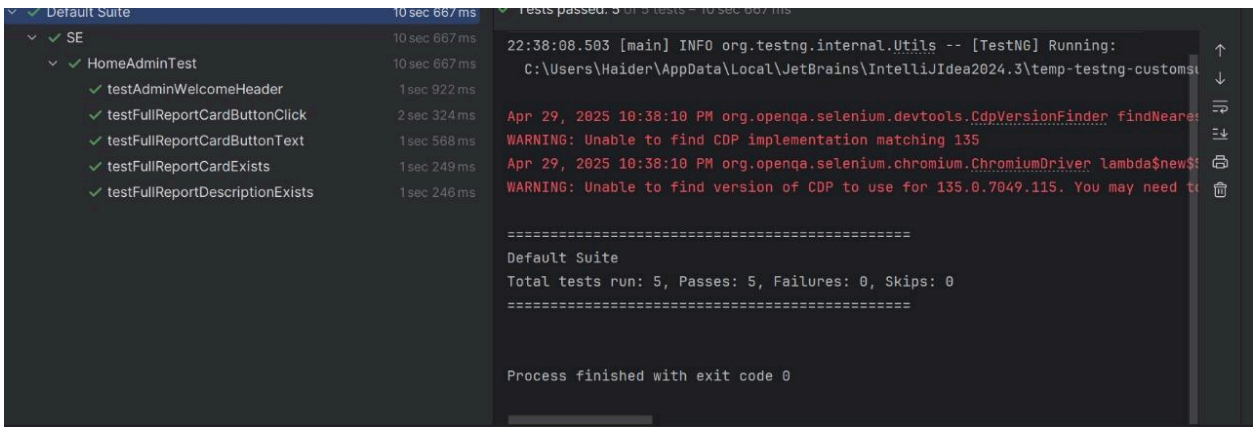
        - `EventController`
        - `ParticipantController`
        - `AdminController`
    - **Services**:
        - `UserService`
        - `EventService`
        - `TicketService`
        - `FeedbackService`
        - `AnnouncementService`
    - **Repositories**:
        - `UserRepository`
        - `EventRepository`
        - `TicketRepository`
        - `FeedbackRepository`
3. **Database**:
    - MySQL



C-TestCases BlackBox:







D-TestCases WhiteBox:

What Is Covered Well:

Controller Layer (controller):
Achieved 100% coverage. All REST endpoints were tested through unit tests, ensuring every path is executed.

Model Layer (models/):
Achieved 100% coverage. Data classes like Event, User, etc., were fully instantiated and used within service/controller tests.

Repository Layer (repository/):
Interface-based with Spring Data JPA – considered covered when interacting through services.

Security Layer (security/):
100% coverage on custom classes (e.g., filters, configs).

Main Application Class (DemoApplication):
Fully covered during application context loading.

Core Logic (EventService & AnnouncementService):
Main methods like createEvent, getAllEvents, and searchEvents were invoked and validated.

What Is Not Covered and Why:

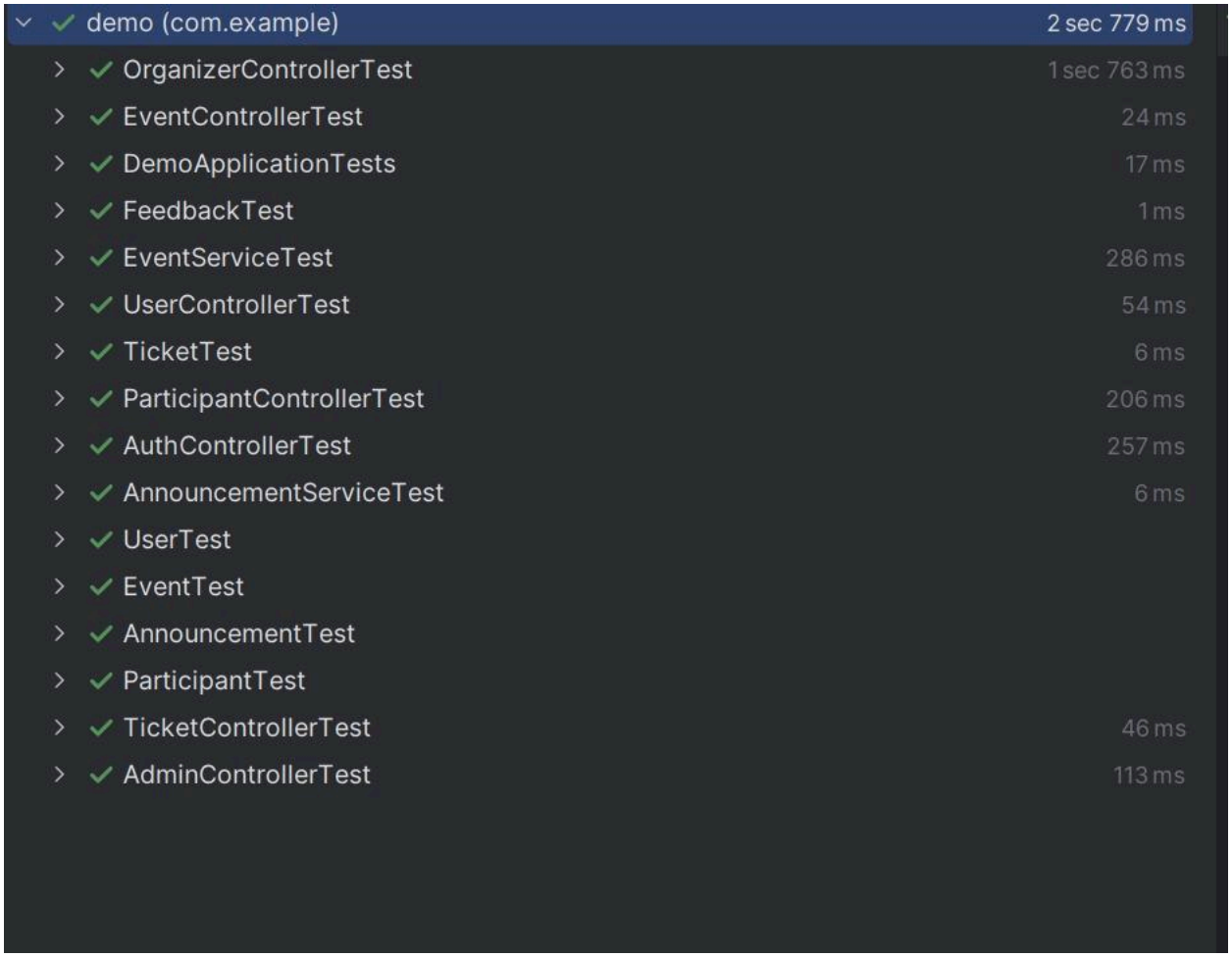
Some Service Methods:
Coverage in service/ layer is around 33%–40% in some files due to incomplete testing of:

Exception branches (e.g., invalid organizer cases).
Optional-based logic where isEmpty() or isPresent() was not triggered for all paths.
update and delete operations were partially tested or skipped.

Branch Coverage Gaps:
if/else and exception-throwing branches need more dedicated negative test cases to boost coverage.

Third-party and Auto-generated Code:
External frameworks (Spring Boot, Hibernate, JWT, etc.) are not included in coverage metrics. These are assumed to work as intended and don't need direct testing.

Unreachable or Rare Execution Paths:
Paths that rely on specific user states, request combinations, or database errors weren't feasible to replicate in unit tests alone.



models	100% (6/6)	100% (77/77)	100% (99/99)	100% (0/0)
Announcement	100% (1/1)	100% (9/9)	100% (12/12)	100% (0/0)
Event	100% (1/1)	100% (18/18)	100% (23/23)	100% (0/0)
Feedback	100% (1/1)	100% (10/10)	100% (13/13)	100% (0/0)
Participant	100% (1/1)	100% (8/8)	100% (10/10)	100% (0/0)
Ticket	100% (1/1)	100% (12/12)	100% (16/16)	100% (0/0)
User	100% (1/1)	100% (20/20)	100% (25/25)	100% (0/0)
controller	100% (10/10)	98% (56/57)	93% (152/162)	67% (39/58)
AdminController	100% (2/2)	100% (18/18)	90% (38/42)	41% (5/12)
AuthController	100% (1/1)	100% (2/2)	92% (12/13)	87% (7/8)
EventController	100% (1/1)	100% (7/7)	100% (14/14)	100% (0/0)
OrganizerController	100% (2/2)	88% (8/9)	82% (24/29)	42% (6/14)
ParticipantController	100% (2/2)	100% (14/14)	100% (44/44)	87% (14/16)
TicketController	100% (1/1)	100% (2/2)	100% (7/7)	75% (3/4)
UserController	100% (1/1)	100% (5/5)	100% (13/13)	100% (4/4)

repository	100% (0/0)	100% (0/0)	100% (0/0)	100% (0/0)
AnnouncementRepository	100% (0/0)	100% (0/0)	100% (0/0)	100% (0/0)
EventRepository	100% (0/0)	100% (0/0)	100% (0/0)	100% (0/0)
FeedbackRepository	100% (0/0)	100% (0/0)	100% (0/0)	100% (0/0)
ParticipantRepository	100% (0/0)	100% (0/0)	100% (0/0)	100% (0/0)
TicketRepository	100% (0/0)	100% (0/0)	100% (0/0)	100% (0/0)
UserRepository	100% (0/0)	100% (0/0)	100% (0/0)	100% (0/0)

com.example.demo	80% (21/26)	88% (151/170)	86% (295/343)	61% (49/80)
controller	100% (10/10)	98% (56/57)	93% (152/162)	67% (39/58)
models	100% (6/6)	100% (77/77)	100% (99/99)	100% (0/0)
repository	100% (0/0)	100% (0/0)	100% (0/0)	100% (0/0)
security	100% (1/1)	100% (4/4)	100% (8/8)	100% (0/0)
service	33% (2/6)	40% (11/27)	45% (30/66)	45% (10/22)
DemoApplication	100% (2/2)	75% (3/4)	85% (6/7)	100% (0/0)
HelloController	0% (0/1)	0% (0/1)	0% (0/1)	100% (0/0)