Title: CareerCompass: Organize and Track Job Applications

Team Members:

1. Sagar Swami Rao Kulkarni (saku8738)
2. Pavan Sai Appari (paap9049)

Project Overview:

CareerCompass is a web-based application designed to revolutionize the way job seekers manage their job search process. The main goal of CareerCompass is to develop a powerful and user-friendly tool that simplifies and streamlines job application tracking. The application allows users to create personalized job search tags, maintain a comprehensive list of companies they wish to apply to, track application statuses, and store relevant information for each application.

Work Done:

Pavan:

- User Login
- Job Application Creation and Management
- Archive Functionality
- React Components Routing
- React API Mapping and Response Handling

Sagar:

- User Registration and Verification
- Job Tags Creation and Management
- REST APIs for Data Access and Manipulation
- Star/Unstar Job Application Functionality
- React CSS Beautification

Technologies Used:

- React: React was chosen for the frontend development due to its component-based architecture, reusability, and efficient rendering capabilities. It allows for building interactive and responsive user interfaces.
- Java with Spring: Java with the Spring framework was selected for the backend development because of its robustness, scalability, and extensive ecosystem. Spring provides a comprehensive set of tools and libraries for building secure and efficient web applications.
- MySQL: MySQL was chosen as the database management system for its reliability, performance, and compatibility with the chosen backend technologies.

Features

User Registration and Verification: Users can register with their personal details and verify their account via Email, SMS, or Call.
User Login: Registered users can securely log into the application using their credentials.
Tag Creation and Management: Users can create, update, and manage tags to categorize their job applications.
Job Application Creation: Users can create detailed job application records with information such as company name, role, status, and associated tags.
Job Application Management: Users can edit, star/unstar, filter, archive, and unarchive their job applications for effective tracking and organization.
Secure Authentication: The application implements secure authentication using bearer tokens to protect user data and ensure authorized access.
REST API for Data Access and Manipulation: The backend provides a REST API for seamless data access and manipulation, enabling smooth interaction between the frontend and backend.
Error Handling: The application handles errors gracefully, providing informative error messages and maintaining a smooth user experience.
User-Specific Data Management: Each user's data, such as tags and job applications, is associated with their account, ensuring privacy and personalized management.

Key Functionalities:

Frontend:

- Registration: Users can register using their first name, last name, email address, password, and phone number. They are given the option to verify their account using either their email address, phone number, or Call. For phone number and Call verification, an OTP is sent to their mobile number, which needs to be validated. When email verification is chosen, a verification link is sent, and upon clicking the link, the user is successfully verified.
- Login: After successful registration, users can log into the application using their credentials.
- Tags: Upon entering the application, users need to create tags that they can later use to categorize their job applications.
- Job Application Creation: Users can create job applications by entering fields such as company name, job URL, role, application date, status, notes, and tags to which they want to attach the job application.

- Job Application Management: Users have the ability to edit job applications and star/unstar them. They can also filter job applications based on the tags attached to them. Additionally, users can archive job applications they no longer wish to actively track if needed and unarchive them in case they want to track them again.

Backend:
Controllers have been created to manage REST API calls for the above-mentioned functionalities.

- signup: Upon signup, the system checks if the user has already registered with the provided email. If not, it saves the user object to the database and sends a success status to the application.
- sendVerificationChallenge: This endpoint checks if the user with the provided email has already registered and if the email is already verified. If verification is not done, it proceeds with the chosen verification strategy (email, phone, or Call), and based on the strategy, an email verification link or OTP is provided to the user.
- validateChallenge: This endpoint validates the user's input payload and sends a success status accordingly. It also checks for duplicate emails and throws an error if the user has already registered.
- createTag, updateTag, getAllTags: These endpoints handle creating tags, updating tag names, and retrieving all tags created by the user. The user can call these APIs as required.
- inbox/userid, createJobApplication, getJobApplication/{userId}/{jobApplicationId}, updateJobApplication, updateJobApplicationStarStatus/{userId}/{jobApplicationId}: These endpoints handle sending all job applications created by the user, creating a new job application, retrieving a particular job application, updating a job application, and updating the star status of a job application. The user can access these endpoints accordingly.
- archiveJobApplication/{userId}/{jobApplicationId},unarchiveJobApplication/{userId}/{jobApplicationId}: These controllers allow users to archive and unarchive job applications. When a job application is archived, it is no longer actively tracked but remains in the user's records. Unarchiving a job application restores it to the active state.

Issues Encountered and Solutions

Issue 1:

- Problem: Setting multiple fields of the Job Application object using individual setter methods was cumbersome, error-prone, and led to complex object creation and potential data inconsistencies.
- Solution: We overcame this challenge by implementing the Builder Pattern with a fluent interface, which improved code readability, maintainability, and testability by separating the construction logic and ensuring immutable and consistent Job Application objects.

Issue 2:

- Problem: Implementing multiple verification methods (email, Call, SMS) in the backend resulted in conditional logic and tightly coupled code, making it difficult to maintain and extend the verification functionality.
- Solution: We addressed this issue by applying the Strategy Pattern, encapsulating each verification method into separate strategy classes with a common interface. This decoupled the verification logic, improved code modularity and maintainability, and enabled seamless integration of new verification methods.

Design Patterns:

1. Singleton Pattern:

```
public static synchronized CareerCompassUtils getInstance(){
        if(careerCompassUtils==null)
careerCompassUtils = new CareerCompassUtils();
        return careerCompassUtils;
    }
```

- The Singleton Pattern was applied to the CareerCompassUtils class to ensure that only one instance of the class exists throughout the application.
- The constructor is made private to prevent direct instantiation, and a static synchronized getInstance() method is provided to retrieve the single instance of the class.
- This pattern is useful for utility classes or classes that need to maintain a global state across the application.

2. Factory Pattern:

```
public class NotificationFactory {
```

```
    public static NotificationStrategy getEmailNotificationStrategy(){
        return new EmailNotificationStrategy();
    }

    public static NotificationStrategy getSMSNotificationStrategy(){
        return new MessageNotificationStrategy("sms");
    }

    public static NotificationStrategy getCallNotificationStrategy(){
        return new MessageNotificationStrategy("call");
    }
}
```

- The Factory Pattern was utilized to create notification strategy objects (email, SMS, Call) based on user preferences.
- The NotificationFactory class provides static methods to retrieve the appropriate notification strategy, abstracting the object creation process and allowing for easy extensibility.

3. Strategy Pattern:

```
public NotificationStrategy getNotificationStrategy(String strategyType){
    return switch (strategyType) {
    case "sms" -> NotificationFactory.getSMSNotificationStrategy();
    case "call" -> NotificationFactory.getCallNotificationStrategy();
    case "email" -> NotificationFactory.getEmailNotificationStrategy();
    default -> throw new RuntimeException("Invalid verification type");
};
}
```

- The Strategy Pattern was implemented for handling different notification strategies (email, SMS, Call).
- Each notification strategy is encapsulated in a separate class (EmailNotificationStrategy, MessageNotificationStrategy) that implements the NotificationStrategy interface.
- This allows for flexible and interchangeable usage of notification strategies without modifying the client code.

4. Facade Pattern:

```
@PostMapping("/sendVerificationChallenge")
public GenericResponse sendVerificationChallenge(@Valid @RequestBody
```

```
VerificationRequest verificationRequest) {
   accountService.checkIfRegistrationIsCompleted(verificationRequest);
   return accountService.sendVerificationChallenge(verificationRequest);
}


@PostMapping("/validateChallenge")
public GenericResponse validateChallenge(@Valid @RequestBody
VerificationRequest verificationRequest) {
   accountService.checkIfRegistrationIsCompleted(verificationRequest);
   return
accountService.validateVerificationChallenge(verificationRequest);
}
```

- The Facade Pattern was applied in the account service to simplify the process of sending and validating verification challenges.
- The facade methods (sendVerificationChallenge, validateChallenge) provide a simplified interface for clients, encapsulating the complexity of the underlying subsystems.
- This pattern promotes loose coupling and improves maintainability by reducing dependencies between clients and the internal workings of the verification process.

5. Builder Pattern:

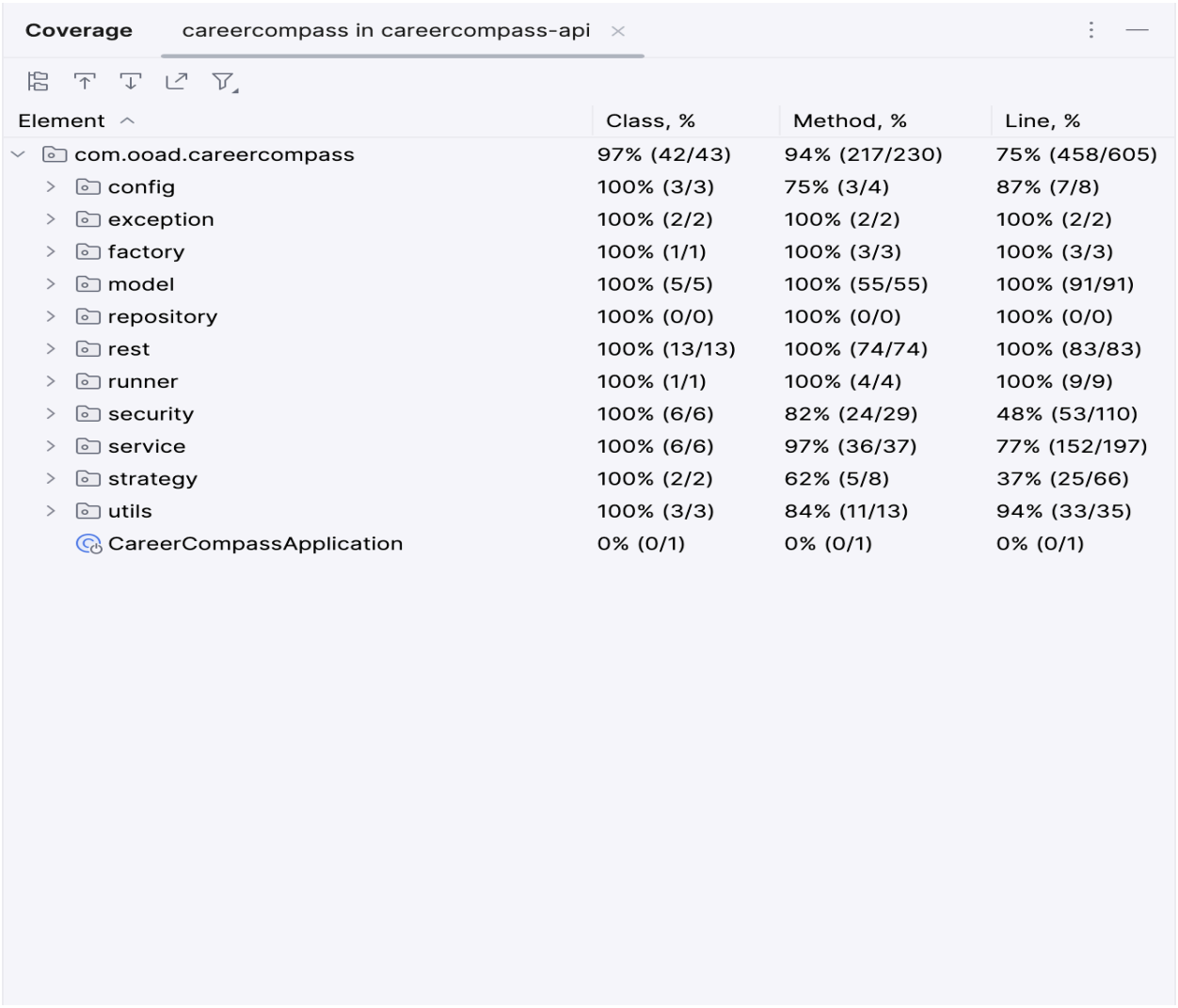
```
private JobApplication(Builder builder) {
   this.id = builder.id;
   this.user = builder.user;
   this.company = builder.company;
   this.position = builder.position;
   this.status = builder.status;
   this.applicationDate = builder.applicationDate;
   this.updatedAt = builder.updatedAt;
   this.companyUrl = builder.companyUrl;
   this.starred = builder.starred;
   this.isArchived = builder.isArchived;
   this.notes = builder.notes;
   this.createdAt = builder.createdAt;
   this.jobTags = builder.jobTags;
}

public static Builder builder() {
   return new Builder();
}
```

```
JobApplication jobApplication=JobApplication.builder().applicationDate(new
Date().toInstant().atZone(ZoneId.systemDefault()).toLocalDate())
       .company(requestJobApplicationDto.getCompany()).createdAt(new
Timestamp(System.currentTimeMillis())).isDeleted(false)
.companyUrl(requestJobApplicationDto.getCompanyUrl()).starred(false).position(reque
stJobApplicationDto.getPosition())
.user(user).position(requestJobApplicationDto.getPosition()).status(requestJobAppli
cationDto.getStatus())
.starred(requestJobApplicationDto.getStarred()).notes(requestJobApplicationDto.getN
otes()).build();
```

- The Builder Pattern was employed for constructing JobApplication objects.
- The JobApplication class has a private constructor and a static builder method that returns a Builder instance.
- The Builder class allows for step-by-step construction of JobApplication objects, setting each field independently.
- This pattern enhances readability, reduces the likelihood of errors, and provides a cleaner way to create objects with many optional fields.

Test Coverage:

- Achieved a test coverage of 94% for the implemented methods
- Below is the screenshot of test coverage showing 94% for methods.



Element	Class, %	Method, %	Line, %
com.ooad.careercompass	97% (42/43)	94% (217/230)	75% (458/605)
config	100% (3/3)	75% (3/4)	87% (7/8)
exception	100% (2/2)	100% (2/2)	100% (2/2)
factory	100% (1/1)	100% (3/3)	100% (3/3)
model	100% (5/5)	100% (55/55)	100% (91/91)
repository	100% (0/0)	100% (0/0)	100% (0/0)
rest	100% (13/13)	100% (74/74)	100% (83/83)
runner	100% (1/1)	100% (4/4)	100% (9/9)
security	100% (6/6)	82% (24/29)	48% (53/110)
service	100% (6/6)	97% (36/37)	77% (152/197)
strategy	100% (2/2)	62% (5/8)	37% (25/66)
utils	100% (3/3)	84% (11/13)	94% (33/35)
CareerCompassApplication	0% (0/1)	0% (0/1)	0% (0/1)

UML Class Diagram:

We intend to create the NotificationFactory class, which will provide the required object instances for SMS, Call, and Email Notification classes.
Note: the term 'Notification' is used because in the future, we plan to further develop the project and send different types of notification events to the users.

Below is the Image file containing the UML Diagram of the classes(please download the Image and zoom in, the document is of high quality and all the class diagrams will be clearly visible)
UML Class Diagram Link: UML Class Diagram

BDD Scenarios:

Job Application Management feature:

```
Feature: Job Application Management

 Scenario: Create a new job application
   Given a user with ID 1
   When the user submits a request to create a new job application
   Then the system should add the job application successfully
   And the system should return a success message

 Scenario: Retrieve all unarchived job applications
   Given a user with ID 1
   When the user requests to view all unarchived job applications
   Then the system should return a list of unarchived job applications

 Scenario: Retrieve all archived job applications
   Given a user with ID 1
   When the user requests to view all archived job applications
   Then the system should return a list of archived job applications

 Scenario: Retrieve a specific job application
   Given a user with ID 1
   And a job application with ID 2
   When the user requests to view the job application with ID 2
   Then the system should return the details of the job application

 Scenario: Update an existing job application
   Given a user with ID 1
   And an existing job application with ID 2
   When the user submits a request to update the job application with ID 2
   Then the system should update the job application successfully
   And the system should return a success message

 Scenario: Archive a job application
   Given a user with ID 1
   And an existing job application with ID 2
   When the user requests to archive the job application with ID 2
   Then the system should archive the job application successfully
   And the system should return a success message

 Scenario: Unarchive a job application
```

```
  Given a user with ID 1
  And an archived job application with ID 2
  When the user requests to unarchive the job application with ID 2
  Then the system should unarchive the job application successfully
  And the system should return a success message

Scenario: Star a job application
  Given a user with ID 1
  And an existing job application with ID 2
  When the user requests to star the job application with ID 2
  Then the system should mark the job application as starred
  And the system should return a success message
```

In this "Job Application Management" feature, we have defined several scenarios that cover different aspects of managing job applications within the system.

One of the scenarios is "Create a new job application". This scenario describes the process of a user successfully creating a new job application. It specifies the precondition of having a user with a specific ID and the action of the user submitting a request to create a new job application. The expected outcome is that the system successfully adds the job application and returns a success message.

Another scenario is "Retrieve all unarchived job applications". This scenario focuses on the functionality of retrieving a list of all unarchived job applications for a specific user. It defines the precondition of having a user with a specific ID and the action of the user requesting to view all unarchived job applications. The expected result is that the system returns a list of unarchived job applications.

Similarly, the "Retrieve all archived job applications" scenario describes the process of retrieving a list of all archived job applications for a specific user. It follows a similar structure to the previous scenario but focuses on archived job applications instead.

The "Retrieve a specific job application" scenario illustrates the functionality of retrieving the details of a specific job application. It specifies the preconditions of having a user with a specific ID and a job application with a specific ID. When the user requests to view the job application with the given ID, the system is expected to return the details of that job application.

The "Update an existing job application" scenario describes the process of updating the information of an existing job application. It specifies the preconditions of having a user with a specific ID and an existing job application with a specific ID. When the user

submits a request to update the job application, the system is expected to update the job application successfully and return a success message.

The "Archive a job application" and "Unarchive a job application" scenarios focus on the functionality of archiving and unarchiving job applications, respectively. They define the preconditions of having a user with a specific ID and an existing job application with a specific ID. When the user requests to archive or unarchive the job application, the system is expected to perform the corresponding action successfully and return a success message.

Lastly, the "Star a job application" scenario describes the process of marking a job application as starred. It specifies the preconditions of having a user with a specific ID and an existing job application with a specific ID. When the user requests to star the job application, the system is expected to mark the job application as starred and return a success message.

User Authentication and Registration feature:

```
Feature: User Authentication and Registration

 Scenario: User login with valid credentials
   Given a user with email "fireflies186@gmail.com" and password "Admin@123"
   When the user submits valid login credentials
   Then the system should authenticate the user successfully
   And the system should generate a JWT token
   And the system should return the authentication response with the token

 Scenario: User login with invalid credentials
   Given a user with email "fireflies186@gmail.com" and password "wrongpassword"
   When the user submits invalid login credentials
   Then the system should reject the authentication attempt
   And the system should return an error message

 Scenario: User sign up with existing email
   Given a user with email "fireflies186@gmail.com" already exists
   When a new user attempts to sign up with the same email
   Then the system should reject the sign-up request
   And the system should return an error message
```

In this "User Authentication and Registration" feature, we have defined scenarios related to user login and sign-up processes.

The "User login with valid credentials" scenario describes the process of a user successfully logging in with valid credentials. It specifies the precondition of having a user with a specific email and password. When the user submits valid login credentials, the system is expected to authenticate the user successfully, generate a JWT token, and return the authentication response with the token.

On the other hand, the "User login with invalid credentials" scenario focuses on the case when a user attempts to log in with invalid credentials. It specifies the precondition of having a user with a specific email and an incorrect password. When the user submits invalid login credentials, the system is expected to reject the authentication attempt and return an error message.

Lastly, the "User sign up with existing email" scenario describes the case when a new user attempts to sign up with an email that already exists in the system. It specifies the precondition of having a user with a specific email already registered. When a new user attempts to sign up with the same email, the system is expected to reject the sign-up request and return an error message.