Exercise 3 – FocusFlow Data Models and First Unit Tests

In the subsequent sections you will find a set of exercises for week three. Please document your results directly in your project repository and submit the documentation link via Moodle.

We will start the implementation of FocusFlow by focusing on the project setup and the core data models of the application. You can find the latest spec: https://github.com/dgrewe-hse/focusflow/blob/main/docs/spec/spec.md

Exercise 3.1 (10 Points): Project Setup and Environment Configuration

Objective: Create a backend project using the technology you selected during week one (e.g., Java Spring Boot, Python Flask, etc.). Make sure you include all necessary dependencies for the FocusFlow task management application.

Expected Deliverables: A properly configured backend project setup including all required dependencies for unit testing (e.g., in Java `Junit5`, in Python `unittest` or `pytest`, etc.). Make sure your initial setup can be executed and all required pre-requisites and installation steps are documented within your repository.

Exercise 3.2 (10 Points): Core Domain Model Implementation

Objective: Create the core domain models (entities) for the FocusFlow application, e.g., using JPA annotations in a Java-related project and model relationships properly. Implement the following enumerations (or equivalent):

- **TaskPriority** (LOW, MEDIUM, HIGH)
- **TaskStatus** (OPEN, PENDING, IN_REVIEW, CLOSED)

Implement the following entity classes:

- **User**:
    - Basic fields (id, email, password, first_name, last_name)
    - Timestamps (created_at, last_login)
    - Relationships with Team and Task entities
- **Team**:
    - Basic fields (id, name, description)
    - Timestamps (created_at)

  - Relationships with User and Task entities
  - Methods for member management

- **Task**:
  - Basic fields (id, title, short_description, long_description, due_date)
  - Status fields (priority, status)
  - Relationships with User and Team entities
  - Task management methods

Expected Deliverables: Complete implementation of all enums and entities. Helper methods for entity management created and all implementation efforts documented within the repository.

Exercise 2.3 (15 Points): Unit Testing the Domain Models

Objective: Develop a comprehensive collection of unit tests for the core domain models using the most popular unit test framework related to your selected technologies (e.g., Junit5 for Java, unittest/pytest for Python, etc.).

Create test classes for each entity and ensure the following test scenarios:

- Test object creation with valid data
- Test validation constraints
- Test relationships between entities
- Test helper methods and business logic.

For the Task entity, implement specific tests for:

- Status transitions
- Task assignment logic
- Due data validation
- Priority management

Expected Deliverables: Complete test classes for all entities as well as proper documentation of test cases and scenarios.