**Assignment: Developing a Chat Application Using TDD, BDD, and FDD Methodologies**

**Objective:**

The objective of this assignment is to develop a chat application similar to WhatsApp using three distinct development methodologies: Test Driven Development (TDD), Behavior Driven Development (BDD), and Feature Driven Development (FDD). This assignment aims to enhance your understanding and practical application of these methodologies in a real-world project.

**Requirements:**

* Basic functionality including user authentication, real-time messaging, group chats, and multimedia sharing.
* Support for notifications, message history, and user status.
* An intuitive user interface (UI) for ease of use.

**Deliverables:**

1. **Project Plan:** Outline the plan using TDD, BDD, and FDD methodologies.
2. **Source Code:** Well-documented source code of the chat application.
3. **Test Cases:** Comprehensive test cases developed using TDD and BDD.
4. **Documentation:** Detailed documentation explaining the implementation process, challenges faced, and solutions applied.
5. **Presentation:** A presentation summarizing the development process, the methodologies used, and the final product.

**Methodologies:**

**1. Test Driven Development (TDD):**

TDD is a software development approach where test cases are developed to specify and validate what the code will do. In TDD, you write a test before you write just enough production code to fulfill that test and refactor the code to pass the test.

**Steps:**

* **Write a Test:** Write a test for the next bit of functionality you want to add.
* **Run the Test:** Run the test, which should fail since the functionality isn't implemented yet.
* **Write Code:** Write the minimum amount of code necessary to make the test pass.
* **Refactor:** Refactor the code while ensuring the test still passes.
* **Repeat:** Repeat the cycle for each new functionality.

**Example:**

1. Write a test for user authentication.
2. Run the test (it should fail).
3. Write the code to handle user authentication.
4. Run the test again (it should pass).
5. Refactor the code if necessary.

**2. Behavior Driven Development (BDD):**

BDD extends TDD by writing test cases in a natural language that non-programmers can read. BDD focuses on the behavior of an application for an end user.

**Steps:**

* **Define Behavior:** Define the behavior of the application using Given-When-Then format.
* **Write Scenarios:** Write scenarios based on user stories.
* **Implement Steps:** Implement the steps defined in the scenarios.
* **Run Tests:** Run the tests to ensure they pass.

**Example:**

1. Define a behavior for sending a message:
   * Given a user is logged in,
   * When the user sends a message,
   * Then the message should be delivered to the recipient.
2. Write scenarios for sending a message.
3. Implement the steps and run the tests.

**3. Feature Driven Development (FDD):**

FDD is a client-centric, architecture-centric, and pragmatic software process. It consists of a five-step process that includes developing an overall model, building a feature list, planning by feature, designing by feature, and building by feature.

**Steps:**

* **Develop Overall Model:** Understand the domain and develop an overall model.
* **Build Feature List:** Break down the model into a feature list.
* **Plan by Feature:** Plan the development of features.
* **Design by Feature:** Design the feature based on requirements.
* **Build by Feature:** Implement the feature.

**Example:**

1. Develop a model for the chat application.
2. Break down the model into features like user authentication, messaging, group chat, etc.
3. Plan the development of each feature.
4. Design and build each feature iteratively.

**Task Breakdown:**

1. **Project Setup:**
   * Create a repository for your project.
   * Set up the development environment.
2. **TDD Implementation:**
   * Develop tests for user authentication.
   * Implement user authentication.
   * Develop tests for messaging.
   * Implement messaging functionality.
   * Repeat for other functionalities (group chat, multimedia sharing, etc.).
3. **BDD Implementation:**
   * Write BDD scenarios for key functionalities.
   * Implement steps for BDD scenarios.
   * Ensure all BDD tests pass.
4. **FDD Implementation:**
   * Develop an overall model of the chat application.
   * Create a feature list.
   * Plan, design, and build features iteratively.
5. **Integration and Testing:**
   * Integrate all features.
   * Perform integration testing.
   * Fix any issues identified during testing.
6. **Finalization:**
   * Ensure all test cases pass.
   * Complete the documentation.
   * Prepare the final presentation.

**Evaluation Criteria:**

* **Completeness:** All required features are implemented.
* **Code Quality:** Code is clean, well-organized, and follows best practices.
* **Testing:** Comprehensive test coverage with passing tests.
* **Documentation:** Clear and thorough documentation.
* **Presentation:** Professional presentation summarizing the project.

**Submission:**

Submit your project repository link, documentation, and presentation by the due date.