**Application Overview:**

The application has been written using Java, with maven as the build tool, and follows Test**-**DrivenDevelopment(TDD) principles. This application is platform-independent and can run on both Windows, Linux. the Java version is 17.

**Application architecture:**

The MVC (Model-View-Controller) pattern was chosen to develop the application because it provides a clear separation of concerns, making the codebase more modular, maintainable, and scalable.

Model:

* Handles the core game logic and state.
* Contains the MinesweeperGridCell class under the model package.
  + MinesweeperGridCell:
    - Represents a single cell in the grid.
    - Maintains state such as:
      * Whether it is a mine.
      * Whether it is revealed.
      * The number of adjacent mines.

View:

* MinesweeperView class:
  + Manages the user display.
  + Handles the game lifecycle.

Controller:

* GameController class:
  + Acts as a bridge between the Model and View.
  + Processes user input.
  + Updates the Model.
  + Refreshes the View.

Service:

* + MinesweeperGrid:
    - Manages a two-dimensional array of cells.
    - Handles:
      * Mine placement.
      * Cell revealing.
      * Win/loss detection.
      * Recursive revealing of adjacent empty cells.

**Error Handling:**

* try-catch blocks have been added at all locations where exceptions can occur.
* Input validations have been implemented for all user inputs.

**Build Configuration (pom.xml):**

* JUnit dependency has been added for unit testing.
* Java version has been specified under the <properties> section.

**Testing:**

* Unit test classes have been created under the test package for all **model** classes and the **controller** class using **JUnit**:
  + MinesweeperGridCellTest.java
    - Tests the basic behaviors of a cell.
  + MinesweeperGridTest.java
    - Tests grid logic including mine placement and cell revealing.
  + GameControllerTest.java
    - Tests the overall functionality of the game controller.

**Assumptions:**

Grid Size:  
  
The grid size must be at least 2x2.  
The user specifies the grid size at the start of the game.  
  
Number of Mines:  
  
The number of mines is between 1 and 35% of the total grid squares.  
The user specifies the number of mines at the start of the game.  
  
User Input:  
  
User input is expected in the format “A1” for grid coordinates.  
If user enters an invalid input, validations are in place to check and prompt for correct input.

**Steps to run**  
  
1. run the below command within the project folder. it will create the jar file withing the target folder  
**mvn clean package**  
  
2. run the below command to start the application  
**java -jar target/MinesweeperApp-1.0-SNAPSHOT-jar-with-dependencies.jar**  
3. run this command to execute test cases  
**mvn test**  
  
all the above commands should run withing the project folder.