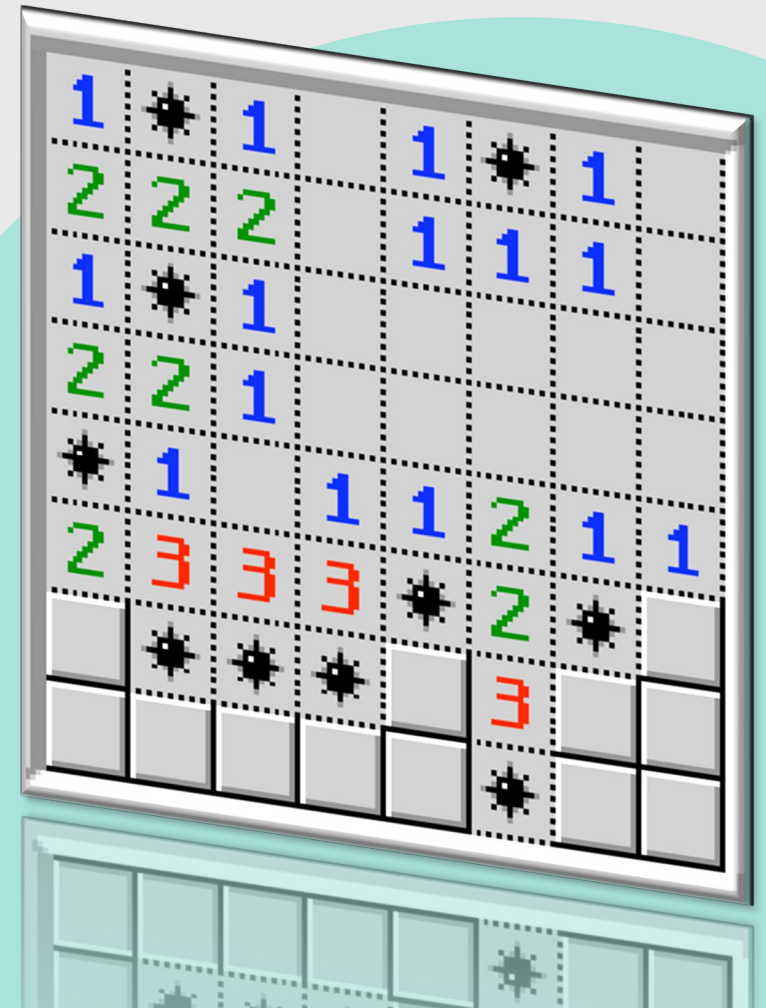


Minesweeper: a SDM project

The steps we took
and how we worked together



1. Introduction

Contributors 4



LauraG88 Laura Gallo



pannafritta Anna Guccione



Marrenk Federico Marengo

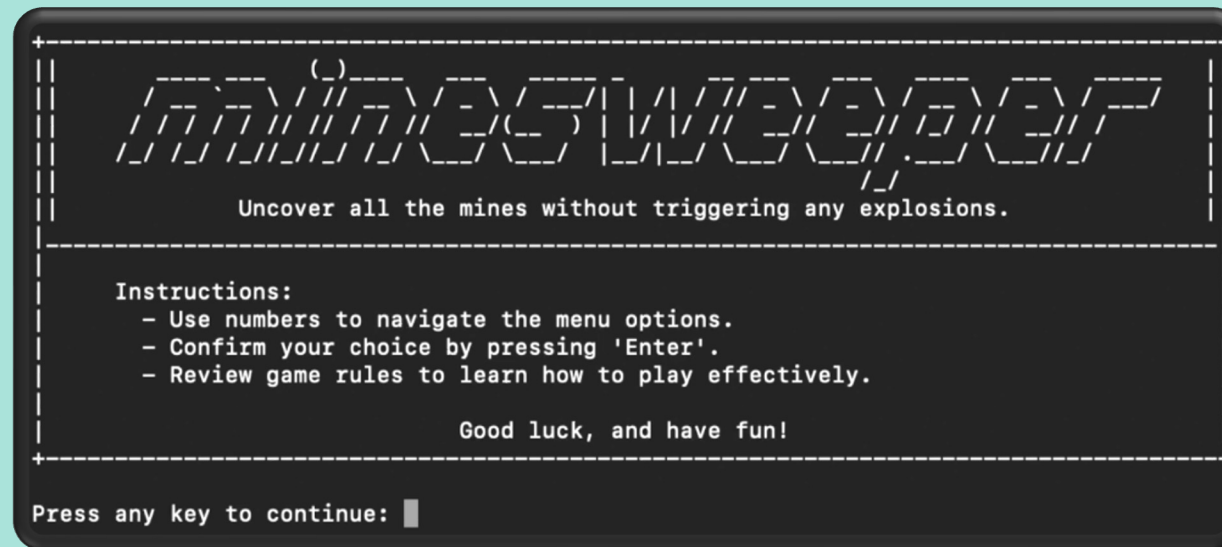


PasqualiniGabriele Gabriele Pasqualini

a. Our team

1. Introduction

b. Minesweeper game



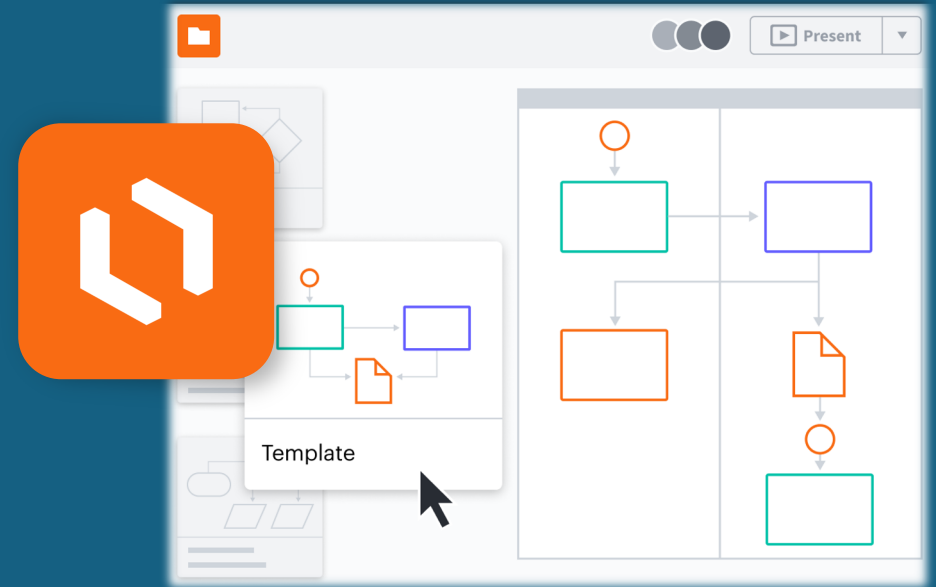
1. Introduction

c. Goals of the project

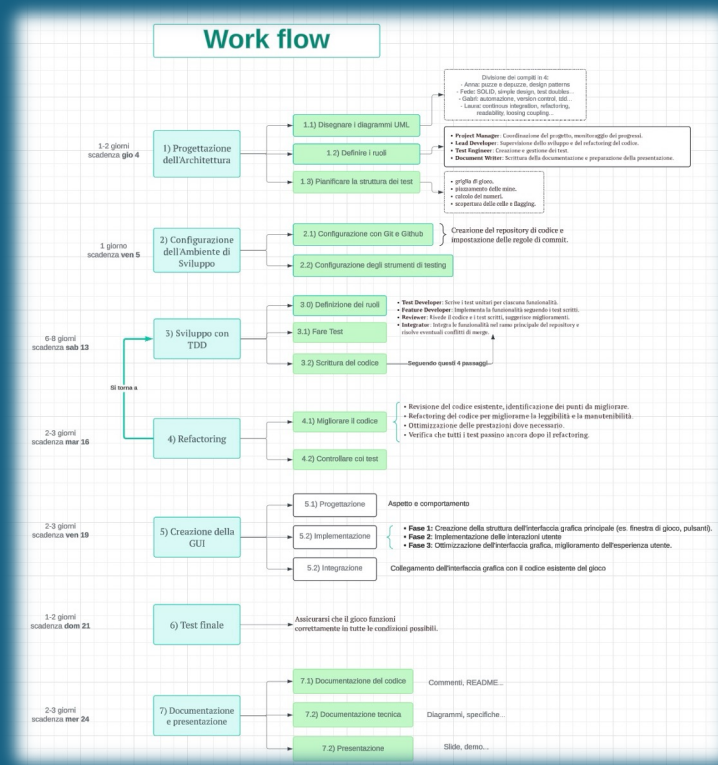
- Agile Development
- Continuous Integration
- Automated tests
- Test Driven Development
- Working software

2. Project planning

a. The software we used
Lucidchart



2. Project planning



b. Defining the steps

1. Architecture design

2. Github Configuration

3. Test Driven Development



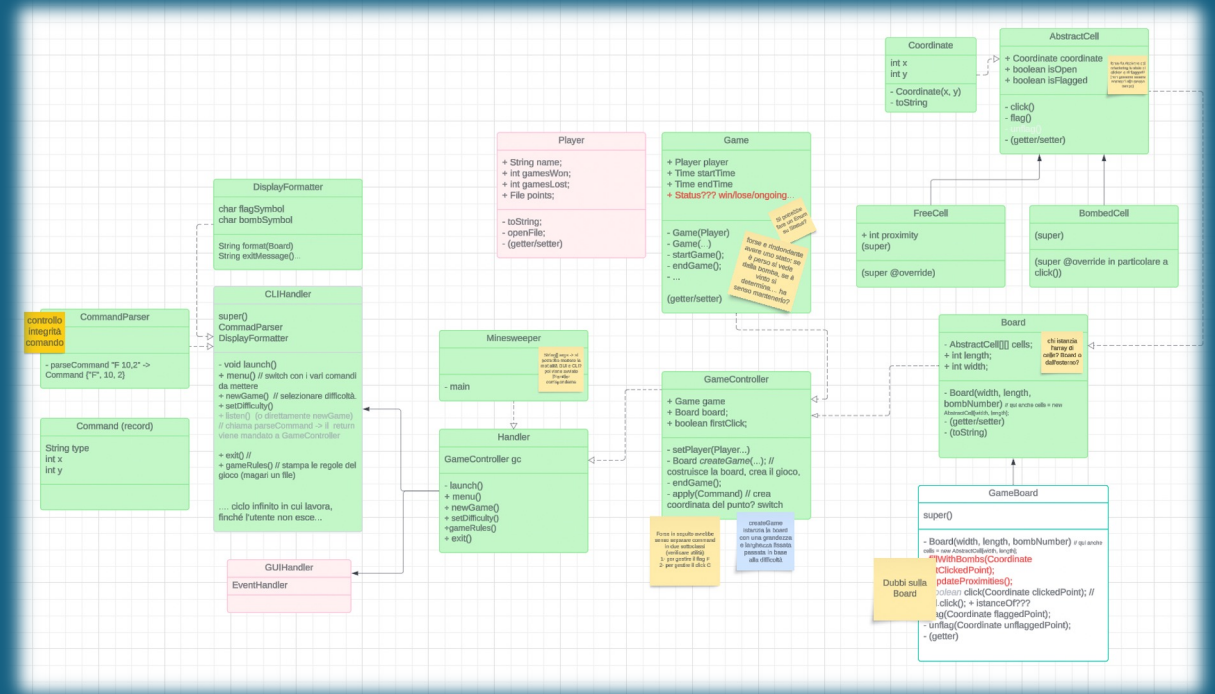
4. Refactoring

5. Final debug

6. Presentation and documentation

2. Project planning

c. Brainstorming a class diagram



3. Environment setup

a. Tools overview



Gradle

JUnit 5

mockito 

3. Environment setup

b. Repository

First commit, project structure

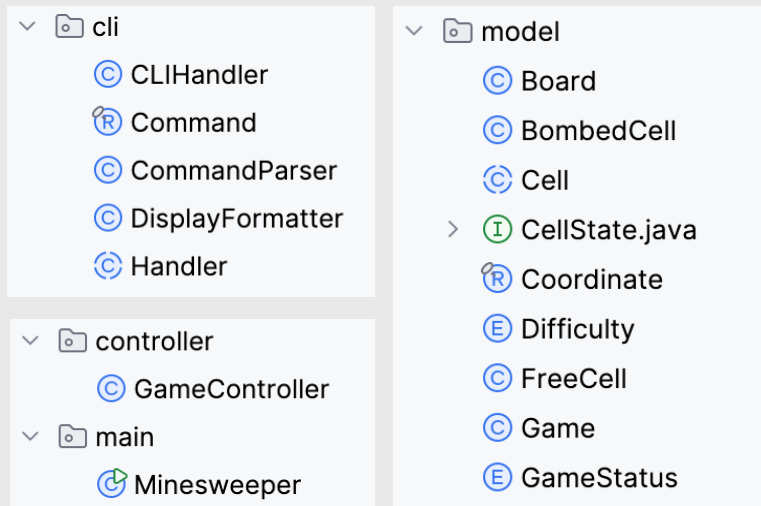


PasqualiniGabriele committed 2 weeks ago



3. Environment setup

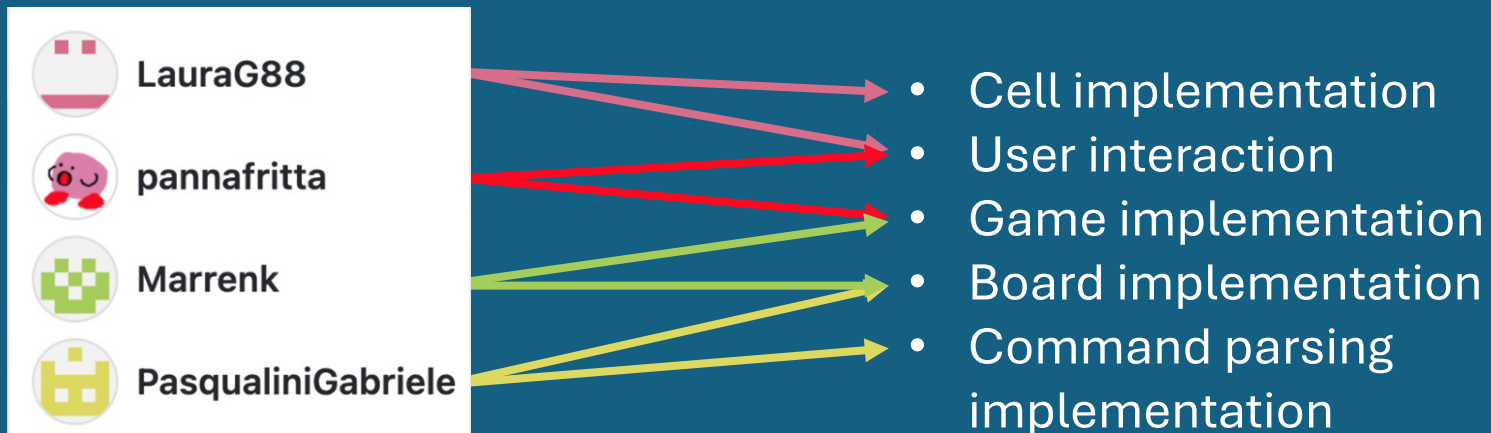
c. First Commit



```
12
13 > dependencies {
14     testImplementation platform('org.junit:junit-bom:5.10.0')
15     testImplementation 'org.junit.jupiter:junit-jupiter'
16     testImplementation 'org.mockito:mockito-core:4.11.0'
17 }
18
19 > test {
20     useJUnitPlatform()
21 }
```

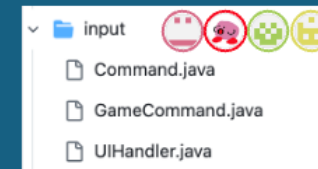
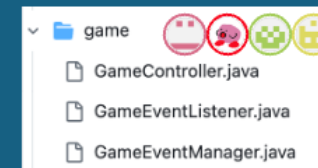
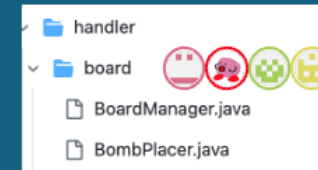
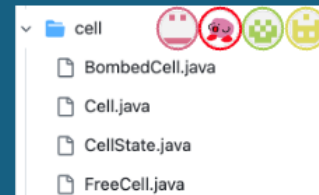
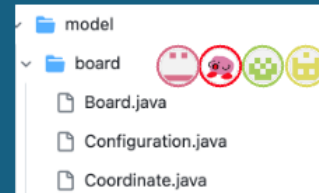
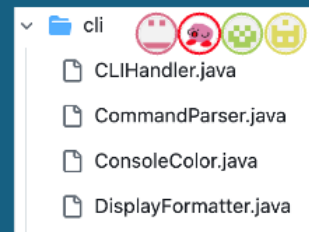
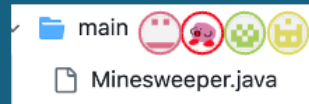
4. Teamwork

a. Initial distribution of responsibilities



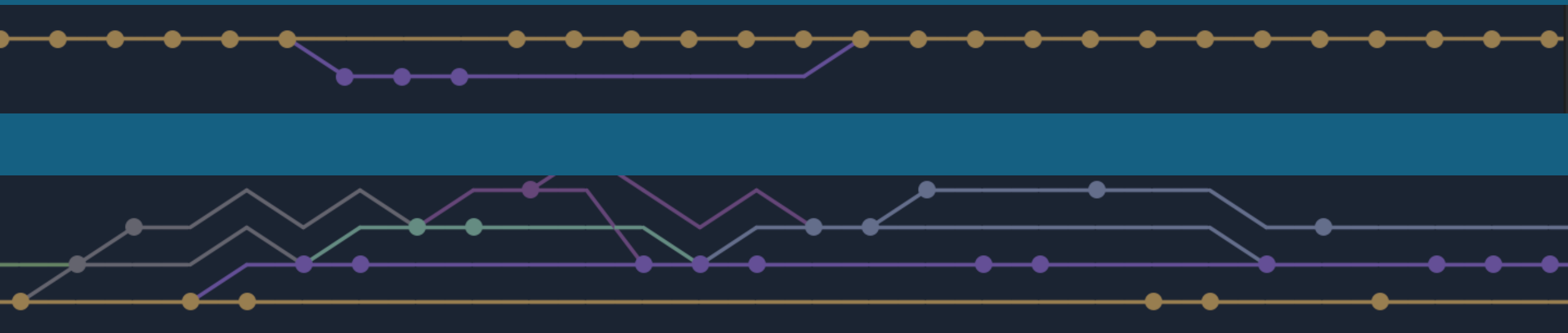
4. Teamwork

b. How it actually went:



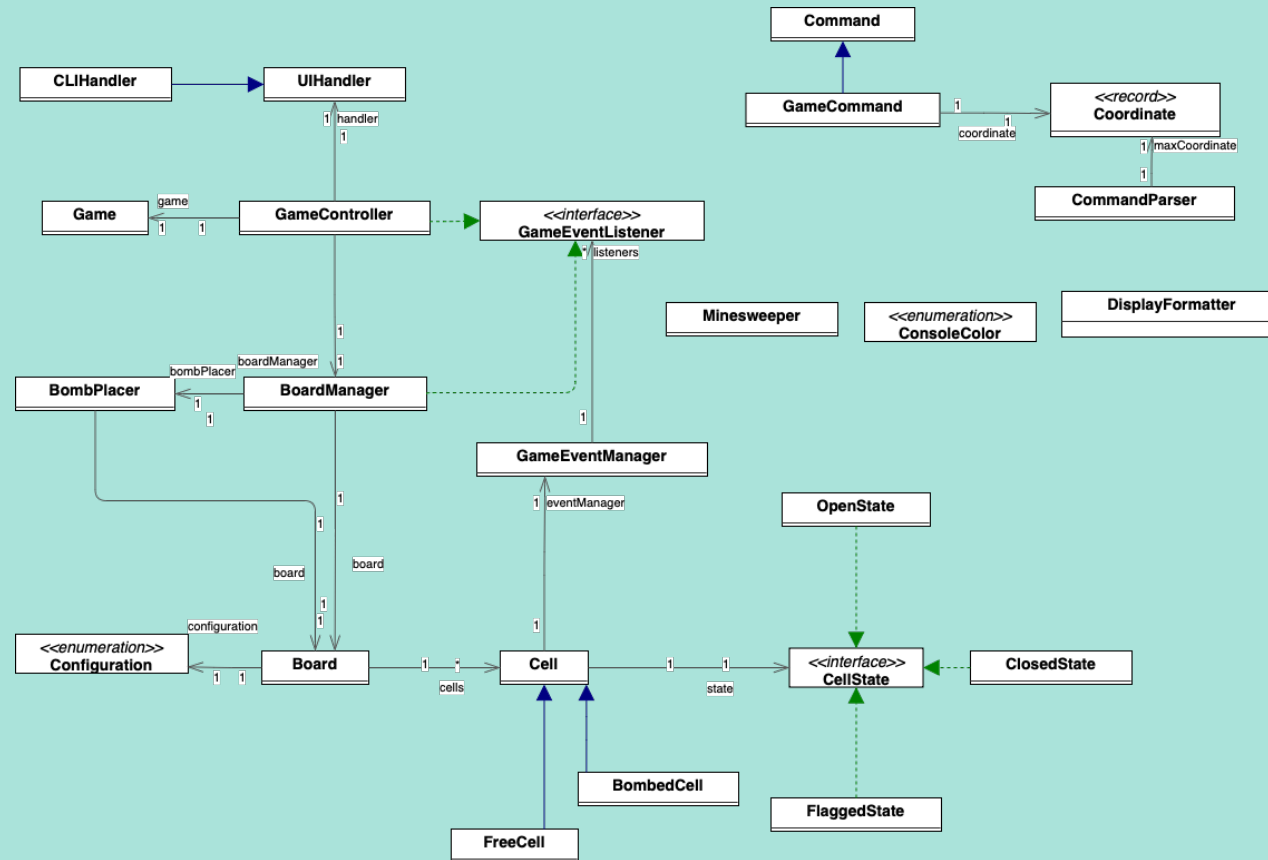
4. Teamwork

c. Our approach at continuous integration



5. Design choices

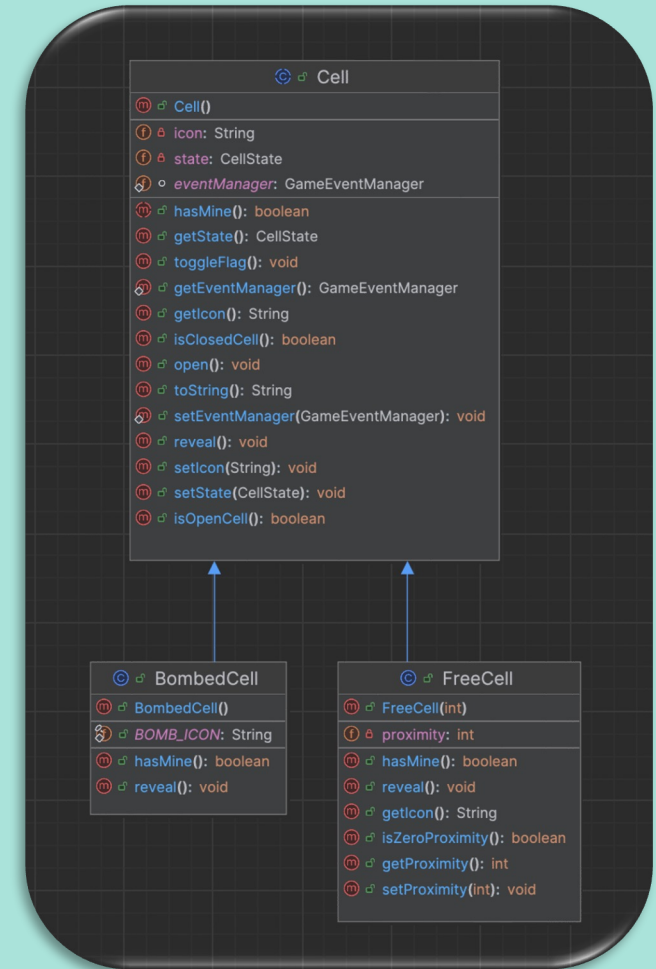
a. The UML diagram



5. Design choices

b. Cell design

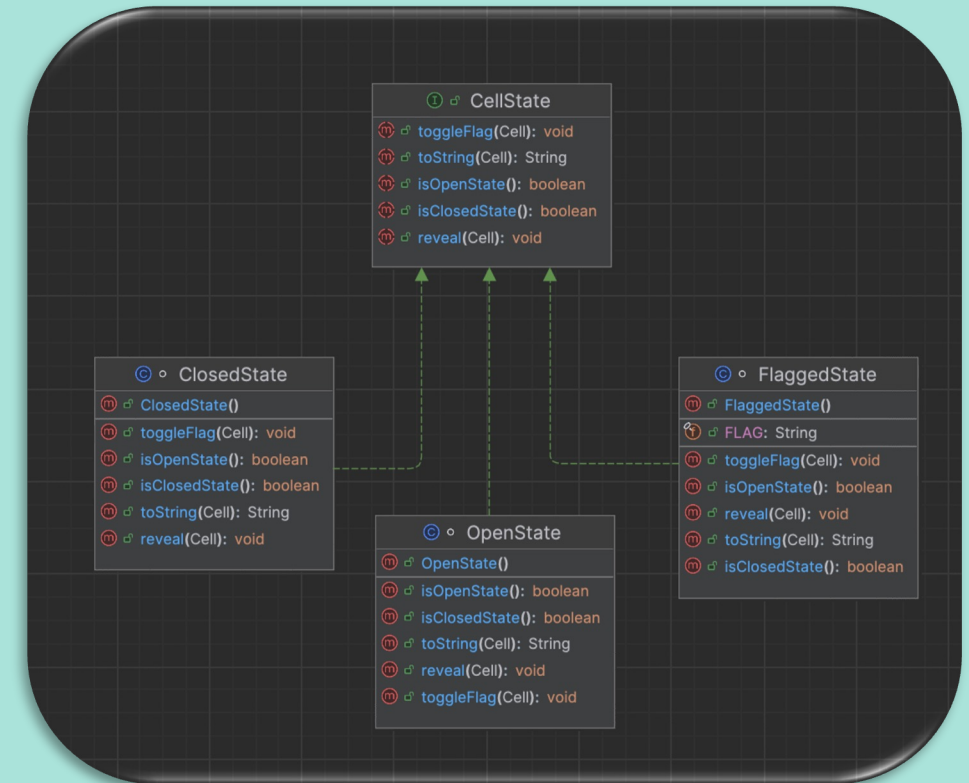
- Distinguishing cell behaviour through hierarchy



5. Design choices

b. Cell design

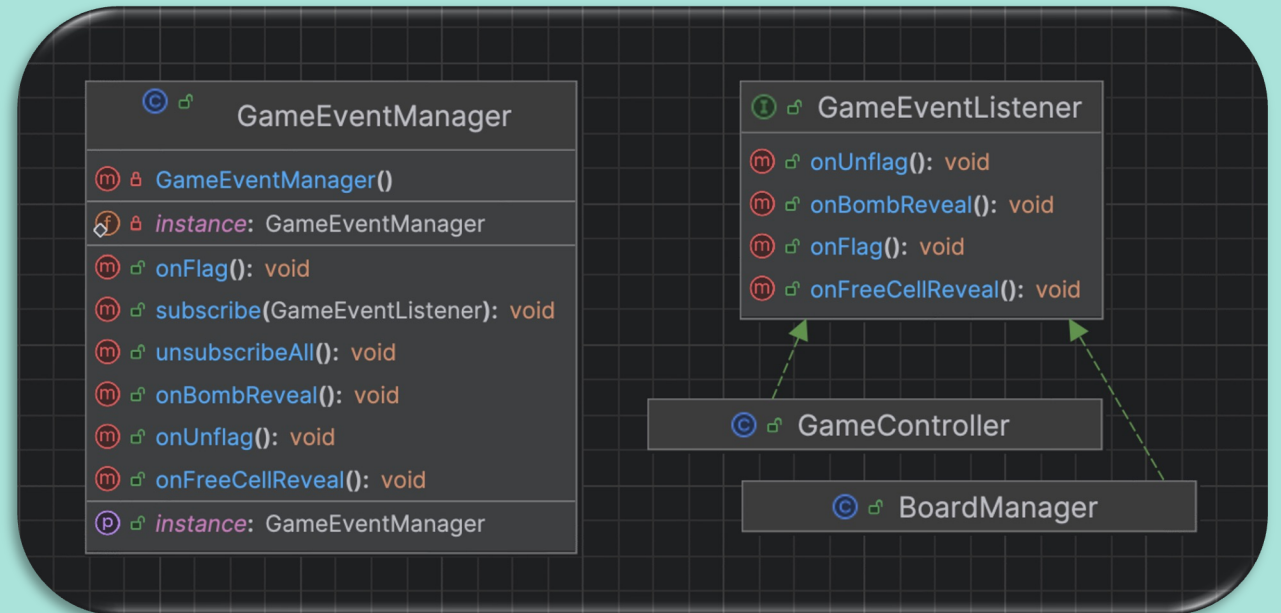
- Distinguishing cell behaviour through hierarchy
- Implemented state classes



5. Design choices

c. GameManager + GameEventListener

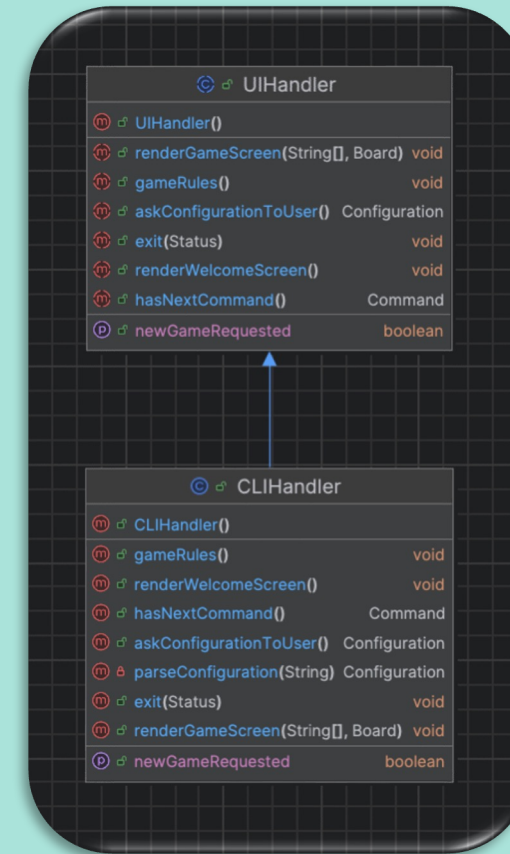
- Observer pattern
- Singleton pattern



5. Design choices

d. UIHandler

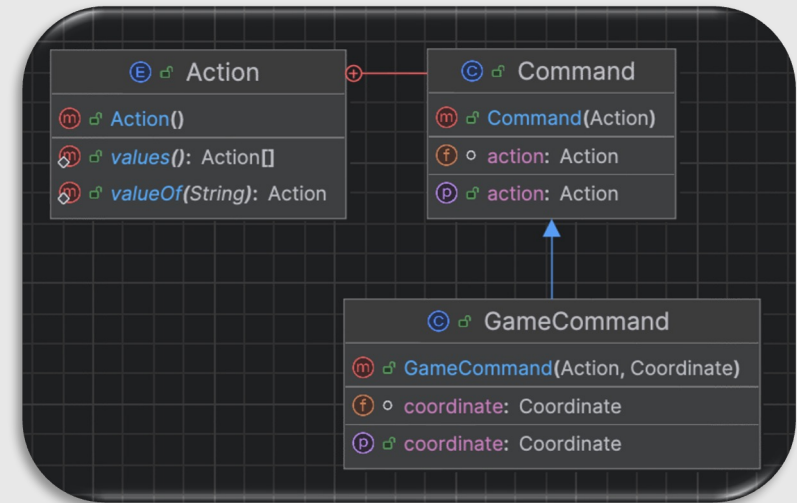
- For a future implementation of a GUI



6. Refactoring choices

a. Command

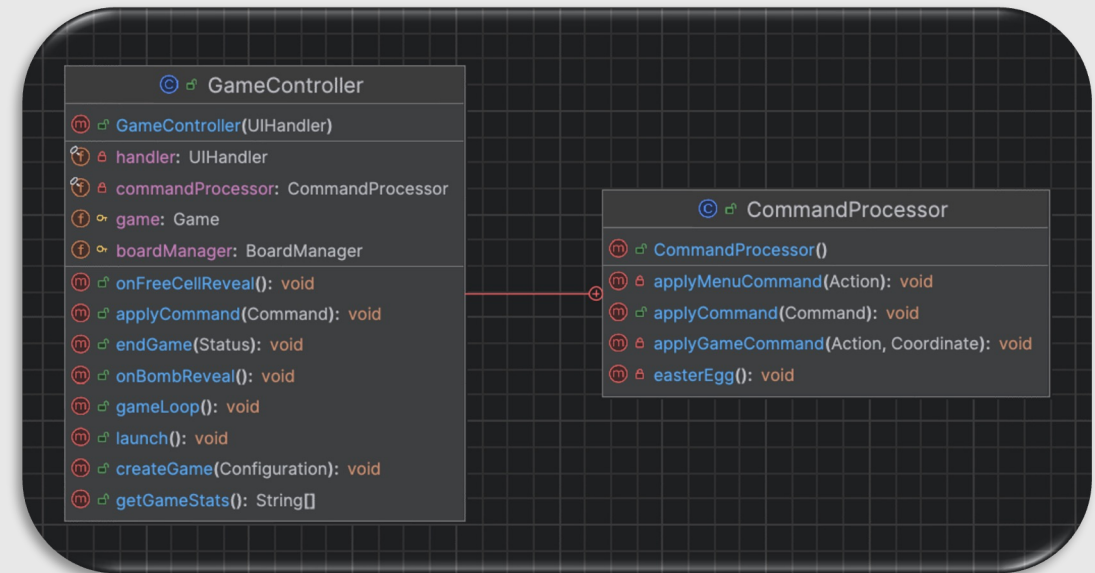
- Command: from record to class
- Subclass GameCommand
- Action: from String to Enum



6. Refactoring choices

b. GameController

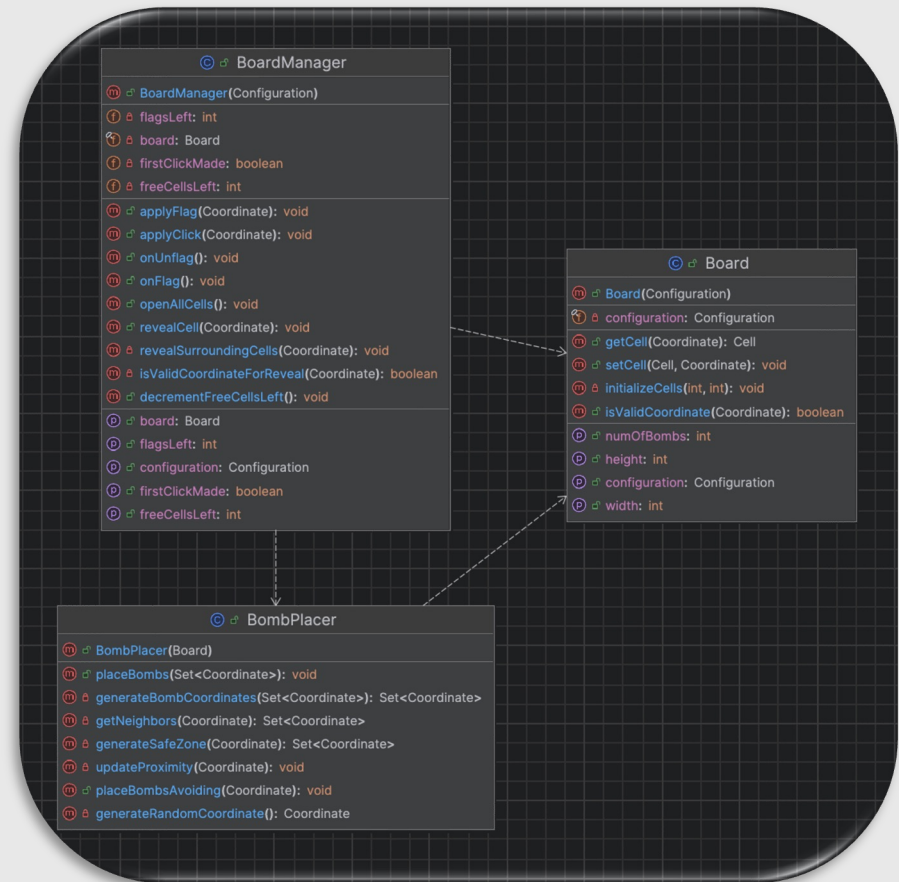
- Moving game loop
- Big class



6. Refactoring choices

c. Board

- From Board to BoardManager
- From BoardManager to BombPlacer



7. Testing

a. TDD

- Basic classes → fully tested
- Game Control Classes → partially tested
- User input → only a few tests

 ◦ OpenStateTest

 ◦ ClosedStateTest

 ◦ FlaggedStateTest

 ◦ FreeCellTest

 ◦ BombedCellTest

 ◦ CLIHandlerTest

 ◦ GameControllerTest

7. Testing

b. Unit tests

 ◦ OpenStateTest

 ◦ ClosedStateTest

 ◦ FlaggedStateTest

 ◦ CommandParserTest

```
@Test  @lauragallo
void testStateAfterReveal() {
    cell.reveal();
    assertInstanceOf(OpenState.class, cell.getState());
}
```

7. Testing

c. Service tests

 ◦ BoardManagerTest

 ◦ BombPlacerTest

 ◦ GameControllerTest

```
@Test  ▲ Gabriele Pasqualini +1
void testFreeCellsLeft() {
    bombPlacer.placeBombsAvoiding(new Coordinate(x: 4, y: 4));
    Command command = new GameCommand(CLICK_ACTION, new Coordinate(x: 4, y: 4));
    gameController.createGame(Configuration.EASY);
    gameController.applyCommand(command);

    int expectedFreeCellsLeft = boardManager.getFreeCellsLeft();
    int actualFreeCellsLeft = 0;

    for (int i = 0; i < 8; i++) {
        for (int j = 0; j < 8; j++) {
            if (board.getCell(new Coordinate(i, j)) instanceof FreeCell freeCell && freeCell.isClosedCell()) {
                actualFreeCellsLeft++;
            }
        }
    }

    assertEquals(expectedFreeCellsLeft, actualFreeCellsLeft);
}
```

8. Conclusion

a. Challenges

- github
- continuous integration
- gradle
- test
- teamwork
- classes' responsibilities

8. Conclusion

b. Our results

Element ^	Class, %	Method, %	Line, %	Branch, %
▼  all	96% (26/27)	91% (141/154)	86% (313/360)	80% (109/135)
>  cli	100% (4/4)	76% (26/34)	72% (78/107)	77% (24/31)
▼  handler	100% (11/11)	94% (55/58)	94% (138/146)	88% (59/67)
>  board	100% (2/2)	100% (23/23)	100% (68/68)	95% (40/42)
>  game	100% (5/5)	92% (25/27)	89% (57/64)	76% (19/25)
>  input	100% (4/4)	87% (7/8)	92% (13/14)	100% (0/0)
>  main	0% (0/1)	0% (0/1)	0% (0/2)	100% (0/0)
▼  model	100% (11/11)	98% (60/61)	92% (97/105)	70% (26/37)
>  board	100% (3/3)	100% (16/16)	100% (28/28)	100% (12/12)
>  cell	100% (6/6)	97% (38/39)	88% (54/61)	52% (11/21)
>  game	100% (2/2)	100% (6/6)	93% (15/16)	75% (3/4)

8. Conclusion

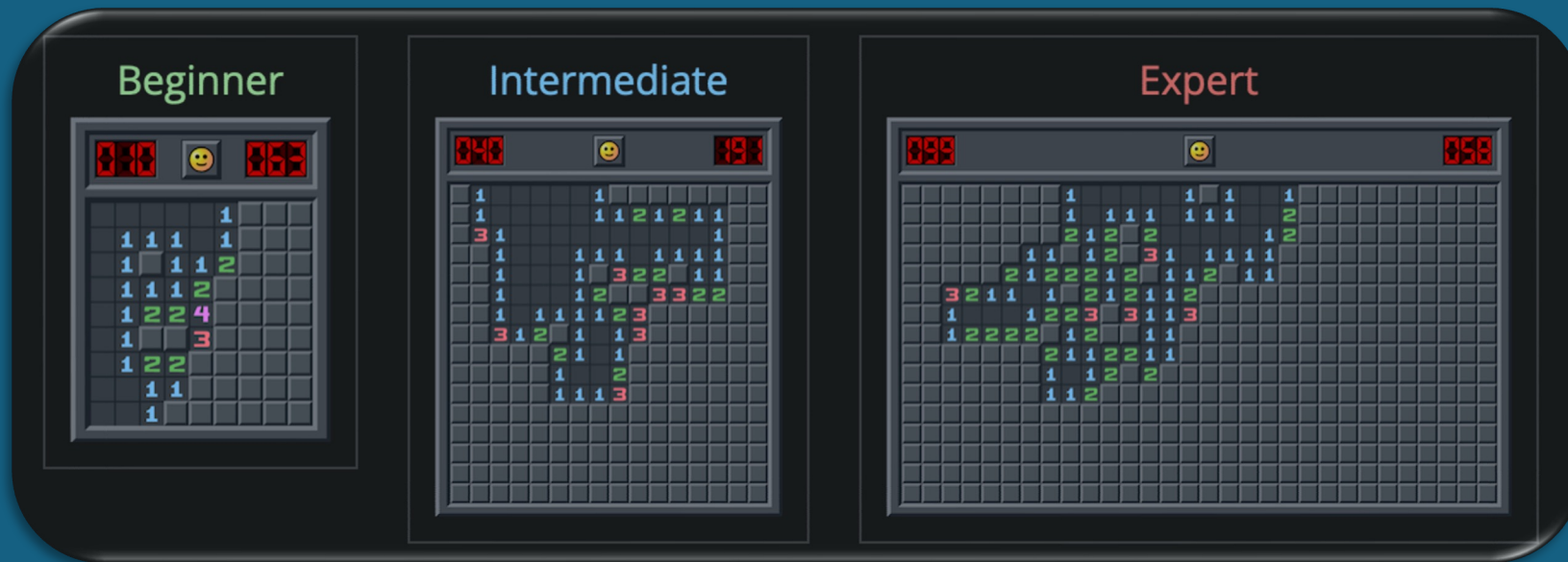
b. Our results

 275 Commits

Packages	
Package	Description
cli	This package contains classes for handling the command-line interface (CLI) for the Minesweeper game.
handler.board	This package contains classes that manage the board of the Minesweeper game, including placing bombs and handling board configurations.
handler.game	This package contains classes that manage the game flow and the events for the Minesweeper game.
handler.input	This package contains classes for handling user input and commands in the Minesweeper game.
main	This package contains the entry point for the Minesweeper game application.
model.board	This package contains classes representing the board and its configurations for the Minesweeper game.
model.cell	This package contains classes representing the cells and their various states.
model.game	This package contains classes representing the game state and its status for the Minesweeper game.

8. Conclusion

c. Future Implementations: GUI



9. Demo Live

```
Level: EASY  Flags: 10  Time: 4

■ 1 - - - 1 ■ |1
■ 2 1 1 - - 1 ■ |2
■ ■ ■ 2 - 1 2 ■ |3
■ ■ ■ 2 - 1 ■ ■ |4
■ ■ ■ 1 - 1 ■ ■ |5
■ ■ ■ 1 2 2 ■ ■ |6
■ ■ ■ ■ ■ ■ ■ |7
■ ■ ■ ■ ■ ■ ■ |8
- - - - - - -
1 2 3 4 5 6 7 8

I Game Rules  Q Exit
Command: c 2 6
```

```
Level: EASY  Flags: 9  Time: 18

■ ■ ■ ■ ■ ■ ■ |1
■ ■ 1 1 ■ ■ ■ |2
■ 1 - 1 ■ ■ ■ |3
■ 1 1 2 ■ ■ ■ |4
■ ■ ■ 2 1 1 2 ■ |5
■ ■ ■ 1 - - 2 ■ |6
■ ■ ■ 1 1 - 1 1 |7
■ ■ ■ 1 - - - |8
- - - - - - -
1 2 3 4 5 6 7 8

I Game Rules  Q Exit
Command: f 5 4
```

```
Level: EASY  Flags: 9  Time: 46

1 1 1 ● 2 ● 3 ● |1
● 1 1 1 2 2 ● 2 |2
1 1 - 1 1 2 1 1 |3
- 1 1 2 ● 1 1 1 |4
- 1 ● 2 1 1 2 ● |5
- 1 1 1 - - 2 ● |6
- - 1 1 1 - 1 1 |7
- - 1 ● 1 - - - |8
- - - - - - -
1 2 3 4 5 6 7 8

Want to play again? (y/n)
```

