Testing Manual for the Game of Life Simulation

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Introduction

This testing manual provides detailed instructions for testing the Game of Life simulation program. It includes a comprehensive set of test cases to verify the correct functionality of the program. The test cases cover various scenarios, including valid and invalid inputs, edge cases, and expected outputs.

Test Environment Setup

Prerequisites

- Java Development Kit (JDK) installed on your system.
- A text editor to create and modify seed files.
- Terminal or command prompt access to compile and run the program.

Compiling the Program

1. Open a terminal or command prompt.
2. Navigate to the directory containing the `GameOfLife.java` file.
3. Compile the Java program using the following command:

```
javac GameOfLife.java
```

Test Cases

Test Case 1: Valid Seed File with Small Grid

Description

Test the program with a valid seed file representing a small 3x3 grid and simulate for 2 steps.

Input

Seed File (seed_small.txt)

```
3, 3
0, 1, 0
0, 1, 0
0, 1, 0
```

Command

```
java GameOfLife ../../test/resources/seed_small.txt output 2
```

Expected Output

output_1.txt

```
3, 3
1, 1, 1,
1, 1, 1,
1, 1, 1,
```

output_2.txt

```
3, 3
0, 0, 0,
0, 0, 0,
0, 0, 0,
```

Test Case 2: Valid Seed File with Large Grid

Description

Test the program with a valid seed file representing a larger 5x5 grid and simulate for 3 steps.

Input

Seed File (seed_large.txt)

```
5, 5
0, 1, 0, 0, 0
0, 0, 1, 0, 0
1, 1, 1, 0, 0
0, 0, 0, 0, 0
0, 0, 0, 0, 0
```

Command

```
java GameOfLife ../../test/resources/seed_large.txt output 3
```

Expected Output

output_1.txt

```
5, 5
0, 0, 0, 0, 0,
1, 0, 1, 0, 0,
0, 1, 1, 0, 0,
0, 1, 0, 0, 0,
0, 0, 0, 0, 0,

```

output_2.txt

```
5, 5
0, 0, 0, 0, 0,
0, 0, 1, 0, 0,
1, 0, 1, 0, 0,
0, 1, 1, 0, 0,
0, 0, 0, 0, 0,

```

output_3.txt

```
5, 5
0, 0, 0, 0, 0,
0, 1, 0, 0, 0,
0, 0, 1, 1, 0,
0, 1, 1, 0, 0,
0, 0, 0, 0, 0,

```

Test Case 3: Invalid Seed File Format

Description

Test the program with a seed file that has an incorrect format (missing comma between dimensions).

Input

Seed File (seed_invalid_format.txt)

```
5 5
0, 1, 0, 0, 0
0, 0, 1, 0, 0
1, 1, 1, 0, 0
0, 0, 0, 0, 0
0, 0, 0, 0, 0
```

Command

```
java GameOfLife ../../test/resources/seed_invalid_format.txt output 3
```

Expected Output

```
java.lang.NumberFormatException: For input string: "5 5"
```

Test Case 4: Missing Seed File

Description

Test the program with a non-existent seed file to verify error handling.

Input

n/a

Command

```
java GameOfLife ../../test/resources/nonexistent_seed.txt output 3
```

Expected Output

```
java.io.FileNotFoundException: nonexistent_seed.txt (No such file or
directory)
```

Test Case 5: Zero Steps

Description

Test the program with a valid seed file and simulate for 0 steps to ensure no output files are created.

Input

Seed File (seed_zero_steps.txt)

```
3, 3
0, 1, 0
0, 1, 0
0, 1, 0
```

Command

```
java GameOfLife ../../test/resources/seed_zero_steps.txt output 0
```

Expected Output

```
The number of steps must be greater than 0.
```

Test Case 6: Edge Case with All Cells Alive

Description

Test the program with a seed file where all cells are alive.

Input

Seed File (seed_all_alive.txt)

```
3, 3
1, 1, 1
```

```
1, 1, 1
1, 1, 1
```

Command

```
java GameOfLife ../../test/resources/seed_all_alive.txt output 1
```

Expected Output

output_1.txt

```
3, 3
0, 0, 0,
0, 0, 0,
0, 0, 0,

```

Test Case 7: Edge Case with All Cells Dead

Description

Test the program with a seed file where all cells are dead.

Input

Seed File (seed_all_dead.txt)

```
3, 3
0, 0, 0
0, 0, 0
0, 0, 0
```

Command

```
java GameOfLife ../../test/resources/seed_all_dead.txt output 1
```

Expected Output

output_1.txt

```
3, 3
0, 0, 0
```

```
0, 0, 0
0, 0, 0
```

Test Case 8: Boundary Test with Minimum Grid Size

Description

Test the program with the smallest possible grid (1x1).

Input

Seed File (seed_minimum_grid.txt)

```
1, 1
1
```

Command

```
java GameOfLife ../../test/resources/seed_minimum_grid.txt output 1
```

Expected Output

output_1.txt

```
1, 1
0
```

Conclusion

This testing manual provides a comprehensive set of test cases to validate the functionality of the Game of Life simulation program. By following these test cases, you can ensure the program handles various scenarios, including valid and invalid inputs, edge cases, and different grid sizes. Use the expected outputs to verify the correctness of the program's behavior.