



Software Testing and Debugging Project Report

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SUT: Super Mario Bros.



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- Desktop game application
- Classic Super Mario Bros. game implemented for a OOSE course
- User base
 - Gamers
 - Software developers
 - Programming students
- Java
- Java Swing: GUI widget toolkit
- Runs on any platform that can run Java applications



Application Demo



Test Suite & Test Results





Faults

“view” package

- Animation class
 - constructor throws unexpected exception with invalid parameters
 - animate() method assumes array of length >2, throwing IndexOutOfBoundsException
- ImageLoader class
 - loading image with invalid path or file will throw unexpected exception
- MapSelectedItem class
 - loading map with invalid path or file will throw unexpected exception

“manager” package

- GameEngine class
 - Game status does not change when going to the map selection page
- MapManager class
 - Exception is thrown when an invalid path is sent for a map image

“model” package

- no faults found
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Summary

“view” package

- 99% statement coverage
- 95% branch coverage
- 95% mutation coverage
- Revealed 6 faults

“manager” package

- 89% statement coverage
- 75% branch coverage
- 53% mutation coverage
- Revealed 2 faults

“model” package

- 80% statement coverage
- 71% branch coverage
- 17% mutation coverage
- Revealed 0 faults

Problems encountered:

- Lack of detailed documentation of method behaviors made blackbox testing difficult.
- Usage of Threads in the SUT breaks jacoco. Common problem encountered by other developers.



Lessons Learned

- Importance of coverage varies from project
- Catch exceptions when objects are initialized as null
- Do heavy work before each unit test
 - For us, do not render a GameEngine object each time, do it in a `@BeforeAll`
- Importance of documentation



Thank You!



TODOS

- Master branch has all tests enabled
 - Check if jacoco runs properly
- Create another branch with failing tests disabled
 - Check if pitest runs properly
- Try to get as much branch coverage in respective packages