



CS 1632 Software Quality Assurance

Exercise 1

Member 1 Name: Yuliang Xiao (yux37)

Member 2 Name: Yunjie Zhang (yuz173)

1. Traceability Matrix

REQ1: TEST-ARGS-NUMBER-ZERO-ARGS, TEST-ARGS-NUMBER-TWO-ARGS, TEST-ARGS-NUMBER-SEVEN-ARGS

REQ2:

TEST-ARGS-INVALID-NON-INTEGERS-ARG-FOR-THREADS,

TEST-ARGS-INVALID-NON-INTEGERS-ARG-FOR-RUNNING-TIMES

REQ3: TEST-DISPLAY-RESULT-WITH-MAX-INTEGERS-THREADS,

TEST-DISPLAY-RESULT-WITH-MAX-INTEGERS-RUNNING-TIMES

REQ4:

TEST-DISPLAY-ITERATIONS-WITH-NUMBER-OF-THREADS-LARGER-THAN-HEAP-SPACE,

TEST-DISPLAY-ITERATIONS-WITH-NUMBER-OF-RUNNING-TIMES-LARGER-THAN-HEAP-SPACE

REQ5: TEST-SMALL-NUM-WITH-100-RUNNING-TIMES

2. Test Cases

1.

IDENTIFIER: TEST-ARGS-NUMBER-ZERO-ARGS

TEST CASE: When entering 0 argument from the command line, the system shall display the usage information for the program and shut down.

PRECONDITIONS: java version 1.8.0_231

EXECUTION STEPS: 1. Pull the exercise repository from Github.

2. Locate the exercise 1 folder in the repository pulled from Github using the command line.

3. Enter the command line "java -jar GoatGoatCar.jar."

POSTCONDITIONS: The system shall display the usage information for the program and shut down.

2.

IDENTIFIER: TEST-ARGS-NUMBER-TWO-ARGS

TEST CASE: When entering 2 arguments from the command line, the system shall display the usage information for the program and shut down.

PRECONDITIONS: java version 1.8.0_231

EXECUTION STEPS: 1. Pull the exercise repository from Github.

2. Locate the exercise 1 folder in the repository pulled from Github using the command prompt.

3. Enter the command line "java -jar GoatGoatCar.jar Car Goat."

POSTCONDITIONS: The system shall display the usage information for the program and shut down.

3.

IDENTIFIER: TEST-ARGS-NUMBER-SEVEN-ARGS

TEST CASE: When entering 7 arguments from the command line, the system shall display the usage information for the program and shut down.

PRECONDITIONS: java version 1.8.0_231

EXECUTION STEPS: 1. Pull the exercise repository from Github.

2. Locate the exercise 1 folder in the repository pulled from Github using the command line.

3. Enter the command line "java -jar GoatGoatCar.jar Car Goat 10001 10 abc abcd."

POSTCONDITIONS: The system shall display the usage information for the program and shut down.

4.

IDENTIFIER: TEST-ARGS-INVALID-NON-INTEGGER-ARG-FOR-RUNNING-TIMES

TEST CASE: When entering an non-integer argument for running times and threads from the command line, the system shall explain the reason that it cannot run and shall shut down. At no point shall the system display a Java exception or stack trace directly to the user.

PRECONDITIONS: java version 1.8.0_231 [State of the system before performing execution steps]

EXECUTION STEPS: 1. Pull the exercise repository from Github.

2. Locate the exercise 1 folder in the repository pulled from Github using the command prmpt.

3. Enter the command line "java -jar GoatGoatCar.jar Car Goat 128.0 10" to test double data type.

4. Enter the command line "java -jar GoatGoatCar.jar Car Goat hello 10" to test string data type.

POSTCONDITIONS: The system shall display "the number of times should be positive integer" and shut down.

5.

IDENTIFIER: TEST-ARGS-INVALID-NON-INTEGGER-ARG-FOR-THREADS

TEST CASE: When entering an non-integer argument for running times and threads from the command line, the system shall explain the reason that it cannot run and shall shut down. At no point shall the system display a Java exception or stack trace directly to the user.

PRECONDITIONS: java version 1.8.0_231 [State of the system before performing execution steps]

EXECUTION STEPS: 1. Pull the exercise repository from Github.

2. Locate the exercise 1 folder in the repository pulled from Github using

the command prompt.

3. Enter the command line "java -jar GoatGoatCar.jar Car Goat 10001 128.0" to test the double data type.

4. Enter the command line "java -jar GoatGoatCar.jar Car Goat 10001 hello" to test string data type.

POSTCONDITIONS: The system shall display "the number of times should be positive integer" and shut down.

6.

IDENTIFIER: TEST-DISPLAY-RESULT-WITH-MAX-INTEGGER-THREADS

TEST CASE: When entering Integer.MAX_VALUE for running times and threads arguments from the command line, the system shall display the results of Monty Hall simulation to the user, using percentages with up to three places after the decimal, and then stop execution. This display shall print out the passed-in String versions of the "good" and "bad" options as defined in the arguments.

PRECONDITIONS: java version 1.8.0_231

EXECUTION STEPS: 1. Pull the exercise repository from Github.

2. Locate the exercise 1 folder in the repository pulled from Github using the command line.

3. Enter the command line "java -jar GoatGoatCar.jar Car Goat 10001 2147483647"

POSTCONDITIONS: The system shall display the results of Monty Hall simulation to the user, using percentages with up to three places after the decimal, numbers of thread followed by iteration times that the user entered as the argument, and then stop execution.

7.

IDENTIFIER: TEST-DISPLAY-RESULT-WITH-MAX-INTEGGER-RUNNING-TIMES

TEST CASE: When entering Integer.MAX_VALUE for running times and threads arguments from the command line, the system shall display the results of Monty Hall simulation to the user, using percentages with up to three places after the decimal, and then stop execution.

PRECONDITIONS: java version 1.8.0_231

EXECUTION STEPS: 1. Pull the exercise repository from Github.

2. Locate the exercise 1 folder in the repository pulled from Github using the command prompt.

3. Enter the command line "java -jar GoatGoatCar.jar Car Goat 2147483647 10 "

POSTCONDITIONS: The system shall display the results of Monty Hall simulation to the user, using percentages with up to three places after the decimal, numbers of thread followed by iteration times that the user entered as the argument, and then stop execution.

8.

IDENTIFIER:TEST-DISPLAY-ITERATIONS-WITH-NUMBER-OF-THREADS-LARGER-THAN-HEAP-SPACE

TEST CASE: When entering an integer that is larger than java heap space for running times and threads arguments from the command line, the system shall display the number of iterations executed by each thread, where there are as many threads as specified in the arguments. The sum of the number of iterations shall be equal to the number times specified in the arguments. Each thread shall execute an equal share of the number of times or be off by at most 1 if the number of times is not a multiple of the number of threads.

PRECONDITIONS: java version 1.8.0_231 [State of the system before performing execution steps]

EXECUTION STEPS: 1. Pull the exercise repository from Github.

2. Locate the exercise 1 folder in the repository pulled from Github using the command prompt.

3. Enter the command line "java -jar GoatGoatCar.jar Car Goat 10001 50000000"

POSTCONDITIONS: The system shall display the numbers of threads that user entered as the argument and the number of iterations executed by each thread.

9.

IDENTIFIER:TEST-DISPLAY-ITERATIONS-WITH-NUMBER-OF-RUNNING-TIMES-LARGER-THAN-HEAP-SPACE

TEST CASE: When entering an integer that is larger than java heap space for running times and threads arguments from the command line, the system shall display the number of iterations executed by each thread, where there are as many threads as specified in the arguments. The sum of the number of iterations shall be equal to the number times specified in the arguments. Each thread shall execute an equal share of the number of times or be off by at most 1 if the number of times is not a multiple of the number of threads.

PRECONDITIONS: java version 1.8.0_231 [State of the system before performing execution steps]

EXECUTION STEPS: 1. Pull the exercise repository from Github.

2. Locate the exercise 1 folder in the repository pulled from Github using the command prompt.

3. Enter the command line "java -jar GoatGoatCar.jar Car Goat 50000000, 10."

POSTCONDITIONS: The system shall display the numbers of threads that user entered as the argument and the number of iterations executed by each thread.

10.

IDENTIFIER: TEST-SMALL-NUM-WITH-100-RUNNING-TIMES

TEST CASE: When entering an integer 100 for running times and threads arguments from the command line, the system shall not issue a warning and ask the user if they wish to continue.

PRECONDITIONS: java version 1.8.0_231 [State of the system before performing execution steps]

EXECUTION STEPS: 1. Pull the exercise repository from Github.

2. Locate the exercise 1 folder in the repository pulled from Github using the command line.

3. Enter the command line "java -jar GoatGoatCar.jar Car Goat 100, 10."

POSTCONDITIONS: The system shall not issue a warning and ask the user if they wish to continue.

3. Defects

1.

IDENTIFIER: [TEST-ARGS-INVALID-NON-INTEGGER-ARG-FOR-THREADS]

SUMMARY: [The system displays a Java Exception to user which mismatches the requirement]

DESCRIPTION: [When the testers pass the number of threads that cannot be parsed to positive integer as argument, the system will display Java NumberFormatException to the user.]

REPRODUCTION STEPS: [Preconditions: Java version 1.8.0_231. Steps: 1. Open command prompt. 2. Go to the location of the program file. 3. Type command line as following: "java -jar GoatGoatCar.jar car goat 10001 hello" and "java -jar GoatGoatCar.jar car goat 10001 128.0]

EXPECTED BEHAVIOR: [The system shall explain the reason that it cannot run and shall shut down]

OBSERVED BEHAVIOR: [A "java.lang.NumberFormatException" is displayed on the terminal window]

2.

IDENTIFIER: [TEST-SMALL-NUM-WITH-100-RUNNING-TIMES]

SUMMARY: [The system give user a warning which mismatches the requirement]

DESCRIPTION: [When the testers pass the number of times which is 100 as argument , the system will give a warning and ask the users if they want to continue.]

REPRODUCTION STEPS: [Preconditions: Java version 1.8.0_231. Steps: 1. Open command prompt. 2. Go to the location of the program file. 3. Type command line as following: "java -jar GoatGoatCar.jar car goat 100 10"]

EXPECTED BEHAVIOR: [The system shall not give a warning and ask users if they want to continue]

OBSERVED BEHAVIOR: [The system displays a warning to user and ask users if they want to continue]

3.

IDENTIFIER: [TEST-DISPLAY-RESULT-WITH-MAX-INTEGGER-THREADS]

SUMMARY: [The system give user an exception which mismatches the requirement]

DESCRIPTION: [When the testers pass the number of times which is MAX_INETGGER in java as argument, the system will give an exception and cannot display the result as expected.]

REPRODUCTION STEPS: [Preconditions: Java version 1.8.0_231. Steps: 1. Open command prompt. 2. Go to the location of the program file. 3. Type command line as following: "java -jar GoatGoatCar.jar car goat 10001 2147483647"]

EXPECTED BEHAVIOR: [The system shall display the results of Monty Hall simulation to the user, using percentages with up to three places after the decimal, and then stop execution. This display shall print out the passed-in String versions of the "good" and "bad" options as defined in the arguments]

OBSERVED BEHAVIOR: [A "java.lang.OutOfMemoryError" is displayed because requested array size exceeds VM limit]

4.

IDENTIFIER: [TEST-DISPLAY-ITERATIONS-WITH-NUMBER-OF-THREADS-LARGER-THAN-HEAP-SPACE]

SUMMARY: [The number of displayed threads mismatches to the number specified by argument]

DESCRIPTION: [When the testers pass the number of times which is too large (often larger than heap space, but still smaller than MAX_INTEGER) as argument, the system will give an exception and the number of displayed threads is not expected.]

REPRODUCTION STEPS: [Preconditions: Java version 1.8.0_231. Steps: 1. Open command prompt. 2. Go to the location of the program file. 3. Type command line as following: "java -jar GoatGoatCar.jar car goat 10001 50000000"]

EXPECTED BEHAVIOR: [The system shall display the number of iterations executed by each thread, where there are as many threads as specified in the arguments. The sum of the number of iterations shall be equal to the number times specified in the arguments. Each thread shall execute an equal share of the number of times or be off by at most 1 if the number of times is not a multiple of the number of threads.]

OBSERVED BEHAVIOR: [The number of threads is not equal to the number specified by input argument and a "java.lang.OutOfMemoryError" is displayed because the program reaches maximum heap space]