CS 1632 Software Quality Assurance

Exercise 1

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1. **Traceability Matrix**

Write your traceability matrix here.

FUN-ARGS-NUMBER: TEST_ARGS_NUMBER_5; TEST_ARGS_NUMBER_3

FUN-ARGS-INVALID: TEST_ARGS_INVALID_DECIMAL_THREADS

FUN-DISPLAY-RESULTS: TEST_DISPLAY_RESULTS

FUN-D ISPLAY-ITERATIONS: TEST_INDIVISIBLE_ITERATIONS

FUN-SMALL-NUM: TEST_SMALL_NUM_EDGE

2. **Test Cases**

Write your test cases here.

TEST_ARGS_NUMBER_3:

    Preconditions: open to directory of GoatGoatCar.jar

    Input Values: command line args: goat car 2000

    Execution Steps: show usage

    Output values:

        Usage: java -jar GoatGoatCar.jar <good_choice> <bad_choice> <num_times> <num_threads>

    Post conditions: None

TEST_ARGS_NUMBER_5:

    Preconditions: open to directory of GoatGoatCar.jar

    Input Values: command line args: goat car 2000 4.1

    Execution Steps: Throw NumberFormatException, print stack trace

    Output values:

        Exception in thread "main" java.lang.NumberFormatException: For input string: "4.1"

    at java.base/java.lang.NumberFormatException.forInputString(NumberFormatException.java:65)

    at java.base/java.lang.Integer.parseInt(Integer.java:652)

    at java.base/java.lang.Integer.parseInt(Integer.java:770)

    at GoatGoatCar.main(GoatGoatCar.java:180)

    Post conditions: None

TEST_ARGS_INVALID_DECIMAL_THREADS:

Preconditions: open to directory of GoatGoatCar.jar

Input Values: command line args: goat car 2000

Execution Steps: show usage

Output values:

Usage: java -jar GoatGoatCar.jar <good_choice> <bad_choice> <num_times> <num_threads>

Post conditions: None

TEST_DISPLAY_RESULTS:

Preconditions: open to directory of GoatGoatCar.jar

Input Values: command line args: boat goat 200000 4

Execution Steps: run simulation

Output values:

Thread 0: 50000 iterations.

Thread 1: 50000 iterations.

Thread 2: 50000 iterations.

Thread 3: 50000 iterations.

Calculating..

Switch:

boat : 66.558%

goat : 33.443%

Stay:

boat : 33.443%

goat : 66.558%

Post conditions: None

TEST_INDIVISIBLE_ITERATIONS:

Preconditions: open to directory of GoatGoatCar.jar

     Input Values: command line args: goat car 1997 4

     Execution Steps: execute simulation

     Output values:

          Thread 0: 500 iterations.

          Thread 1: 499 iterations.

          Thread 2: 499 iterations.

          Thread 3: 499 iterations.

          Calculating..

          Switch:

          goat : 67.451%

          car : 32.549%

          Stay:

          goat : 32.549%

          car : 67.451%

     Post conditions: None

TEST_SMALL_NUM_EDGE:

     Preconditions: open to directory of GoatGoatCar.jar

     Input Values: command line args: goat car 100 1

     Execution Steps: recommend user runs over 100 iterations

                   execute simulation

     Output values:

Thread 0: 100 iterations.

Calculating..

Switch:

goat : 77.000%

car : 23.000%

Stay:

goat : 23.000%

car : 77.000%

Post conditions: None

3. **Defects**

   DEFECT 1:

   Test: TEST_SMALL_NUM_EDGE

   Preconditions: open to directory of GoatGoatCar.jar

   Summary: Unnecessarily prompts user input

   Description: When running the program with exactly 100 iterations, the program asks the user to assure that they'd like to run with less than the recommended number of iterations. If the user says "y", the program will execute normally, though because 100 is not less than 100, this prompt should not happen.

   Reproduction Steps:

   1) in the GoatGoatCar.jar directory, run the following command:

   java -jar GoatGoatCar.jar goat car 100 1

   Expected Behavior: Expected to ONLY show results of 100 iterations of the simulation

   Observed Behavior: Program paused to prompt the user to confirm that they'd like to run the simulation with less than the recommended amount of iterations (100).

   DEFECT 2:

   Test: TEST_ARGS_INVALID_DECIMAL_THREADS:

   Preconditions: open to directory of GoatGoatCar.jar

   Summary: Program crashes when thread request is a non-integer

   Description: When running the program with a decimal number of threads as the <num_threads> argument, the program throws a NumberFormatException. From here, the user must run the program again with a positive integer for the <num_threads> argument to execute the simulation.

   Reproduction Steps:

   1) in the GoatGoatCar.jar directory, run the following command:

   java -jar GoatGoatCar.jar goat car 2000 4.1

   Expected Behavior: Expected code to handle the exception thrown by the integer parsing function when the user passed in "4.1" and show the usage.

   Observed Behavior: Program crashed and printed the stack trace, showing the user that there was an NumberFormatException, which is explicitly against the FUN-ARGS-INVALID requirement.