See the Assessment Guide for information on how to interpret this report.

ASSESSMENT SUMMARY

Compilation: PASSED

API: PASSED

Findbugs: FAILED (2 warnings)

Checkstyle: FAILED (8 warnings)

Correctness: 37/42 tests passed

Memory: 0/11 tests passed

Timing: 0/17 tests passed

Aggregate score: 62.86%

[Compilation: 5%, API: 5%, Findbugs: 0%, Checkstyle: 0%, Correctness: 60%, Memory: 10%, Timing: 20%]

ASSESSMENT DETAILS

The following files were submitted:

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7.5K Jun 18 02:50 Board.java

5.1K Jun 18 02:50 Solver.java

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\* COMPILING

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% javac Board.java

\*-----------------------------------------------------------

% javac Solver.java

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================================================================

Checking the APIs of your programs.

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Board:

Solver:

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\* CHECKING STYLE AND COMMON BUG PATTERNS

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% findbugs \*.class

\*-----------------------------------------------------------

H D DLS\_DEAD\_LOCAL\_STORE DLS: Assigns a value to the local variable 'initial' but that value is never used. At Board.java:[line 262]

L P URF\_UNREAD\_FIELD UrF: The instance (or static) variable 'initialBoard' is never read. Consider removing it from the class. At Solver.java:[line 80]

Warnings generated: 2

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% checkstyle \*.java

\*-----------------------------------------------------------

Board.java:1:3: '//' or '/\*' is not followed by whitespace. [IllegalTokenText]

Board.java:3: Do not use .\* in import statements. [AvoidStarImport]

Solver.java:1:3: '//' or '/\*' is not followed by whitespace. [IllegalTokenText]

Solver.java:9:8: Unused import statement for 'java.util.Stack'. [UnusedImports]

Solver.java:29:9: Declare instance variables after static variables but before constructors and methods. [DeclarationOrder]

Solver.java:37:9: Declare instance variables after static variables but before constructors and methods. [DeclarationOrder]

Solver.java:44:9: Declare instance variables after static variables but before constructors and methods. [DeclarationOrder]

Solver.java:50:9: Define constructors after static and instance variables but before methods. [DeclarationOrder]

Checkstyle ends with 8 errors.

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\* TESTING CORRECTNESS

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Testing correctness of Board

\*-----------------------------------------------------------

Running 22 total tests.

Tests 5, 6, 13, and 14 rely upon toString() returning results in prescribed format.

Test 1a: Test hamming() with file inputs

\* puzzle04.txt

\* puzzle00.txt

\* puzzle07.txt

\* puzzle17.txt

\* puzzle27.txt

\* puzzle2x2-unsolvable1.txt

==> passed

Test 1b: Test hamming() with random n-by-n boards

\* 2-by-2

\* 3-by-3

\* 4-by-4

\* 5-by-5

\* 9-by-9

\* 10-by-10

\* 127-by-127

==> passed

Test 2a: Test manhattan() with file inputs

\* puzzle04.txt

\* puzzle00.txt

\* puzzle07.txt

\* puzzle17.txt

\* puzzle27.txt

\* puzzle2x2-unsolvable1.txt

==> passed

Test 2b: Test manhattan() with random n-by-n boards

\* 2-by-2

\* 3-by-3

\* 4-by-4

\* 5-by-5

\* 9-by-9

\* 10-by-10

\* 127-by-127

==> passed

Test 3: Test dimension() with random n-by-n boards

\* 2-by-2

\* 3-by-3

\* 4-by-4

\* 5-by-5

==> passed

Test 4a: Test toString() with file inputs

\* puzzle04.txt

\* puzzle00.txt

\* puzzle06.txt

\* puzzle09.txt

\* puzzle23.txt

\* puzzle2x2-unsolvable1.txt

==> passed

Test 4b: Test toString() with random n-by-n boards

\* 2-by-2

\* 3-by-3

\* 4-by-4

\* 5-by-5

\* 9-by-9

\* 10-by-10

\* 127-by-127

==> passed

Test 5a: Test neighbors() with file inputs

\* puzzle04.txt

\* puzzle00.txt

\* puzzle06.txt

\* puzzle09.txt

\* puzzle23.txt

\* puzzle2x2-unsolvable1.txt

==> passed

Test 5b: Test neighbors() with random n-by-n boards

\* 2-by-2

\* 3-by-3

\* 4-by-4

\* 5-by-5

\* 9-by-9

\* 10-by-10

\* 127-by-127

==> passed

Test 6a: Test neighbors() of neigbors() with file inputs

\* puzzle04.txt

\* puzzle00.txt

\* puzzle06.txt

\* puzzle09.txt

\* puzzle23.txt

\* puzzle2x2-unsolvable1.txt

==> passed

Test 6b: Test neighbors() of neighbors() with random n-by-n boards

\* 2-by-2

\* 3-by-3

\* 4-by-4

\* 5-by-5

\* 9-by-9

\* 10-by-10

==> passed

Test 7a: Test twin() with file inputs

\* puzzle04.txt

\* puzzle00.txt

\* puzzle06.txt

\* puzzle09.txt

\* puzzle23.txt

\* puzzle2x2-unsolvable1.txt

==> passed

Test 7b: Test twin() with random n-by-n boards

\* 2-by-2

\* 3-by-3

\* 4-by-4

\* 5-by-5

\* 9-by-9

\* 10-by-10

==> passed

Test 8a: Test isGoal() on file inputs

\* puzzle00.txt

\* puzzle04.txt

\* puzzle16.txt

\* puzzle06.txt

\* puzzle09.txt

\* puzzle23.txt

\* puzzle2x2-unsolvable1.txt

\* puzzle3x3-unsolvable1.txt

\* puzzle3x3-00.txt

\* puzzle4x4-00.txt

==> passed

Test 8b: Test isGoal() on n-by-n goal boards

\* 2-by-2

\* 3-by-3

\* 4-by-4

\* 5-by-5

\* 6-by-6

\* 100-by-100

==> passed

Test 9: Check whether two Board objects can be created at the same time

\* random 3-by-3 and 3-by-3 boards

\* random 4-by-4 and 4-by-4 boards

\* random 2-by-2 and 2-by-2 boards

\* random 3-by-3 and 4-by-4 boards

\* random 4-by-4 and 3-by-3 boards

==> passed

Test 10a: Check equals()

\* reflexive

\* symmetric

\* checks that individual entries of array are equal

\* argument is object of type String

\* argument is object of type Object

\* argument is null

\* argument is Board of different dimension

==> passed

Test 10b: Test equals() on m-by-m vs. n-by-n goal boards

\* m = 2, n = 2

\* m = 3, n = 3

\* m = 4, n = 4

\* m = 2, n = 5

\* m = 5, n = 2

==> passed

Test 11: Check that Board is immutable by changing argument array after

construction and making sure Board does not mutate

==> passed

Test 12: Check that Board is immutable by testing whether methods

return the same value, regardless of order in which called

\* puzzle10.txt

\* puzzle20.txt

\* puzzle30.txt

\* 2-by-2

\* 3-by-3

\* 4-by-4

==> passed

Test 13: Call hamming() on a board that is kth-neighbor of a board

\* 0th neighbor of puzzle27.txt

\* 1th neighbor of puzzle27.txt

\* 2th neighbor of puzzle27.txt

\* 13th neighbor of puzzle27.txt

\* 13th neighbor of puzzle00.txt

\* 13th neighbor of puzzle2x2-unsolvable1.txt

==> passed

Test 14: Call manhattan() on a board that is a kth-neighbor of a board

\* 0th neighbor of puzzle27.txt

\* 1th neighbor of puzzle27.txt

\* 2th neighbor of puzzle27.txt

\* 13th neighbor of puzzle27.txt

\* 13th neighbor of puzzle00.txt

\* 13th neighbor of puzzle2x2-unsolvable1.txt

==> passed

Total: 22/22 tests passed!

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\* TESTING CORRECTNESS (substituting reference Board)

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Testing correctness of Solver

\*-----------------------------------------------------------

Running 20 total tests.

Test 1: Call moves() with file inputs

\* puzzle00.txt

\* puzzle01.txt

\* puzzle02.txt

\* puzzle03.txt

\* puzzle04.txt

\* puzzle05.txt

\* puzzle06.txt

\* puzzle07.txt

\* puzzle08.txt

\* puzzle09.txt

\* puzzle10.txt

\* puzzle11.txt

\* puzzle12.txt

\* puzzle13.txt

==> passed

Test 2: Call solution() with file inputs

\* puzzle00.txt

\* puzzle01.txt

\* puzzle02.txt

\* puzzle03.txt

\* puzzle04.txt

\* puzzle05.txt

\* puzzle06.txt

\* puzzle07.txt

\* puzzle08.txt

\* puzzle10.txt

\* puzzle15.txt

==> passed

Test 3: Create two Solver objects at the same time

\* puzzle04.txt and puzzle04.txt

\* puzzle00.txt and puzzle04.txt

\* puzzle04.txt and puzzle00.txt

==> passed

Test 4a: Call isSolvable() with file inputs

\* puzzle01.txt

\* puzzle03.txt

\* puzzle04.txt

\* puzzle17.txt

\* puzzle3x3-unsolvable1.txt

\* puzzle3x3-unsolvable2.txt

\* puzzle4x4-unsolvable.txt

==> passed

Test 4b: Call isSolvable() on random n-by-n boards

\* 100 random 2-by-2 boards

==> passed

Test 5: Call moves() on unsolvable puzzles

\* puzzle2x2-unsolvable1.txt

\* puzzle2x2-unsolvable2.txt

\* puzzle3x3-unsolvable1.txt

\* puzzle3x3-unsolvable2.txt

\* puzzle4x4-unsolvable.txt

==> passed

Test 6: Call solution() on unsolvable puzzles

\* puzzle2x2-unsolvable1.txt

\* puzzle2x2-unsolvable2.txt

\* puzzle3x3-unsolvable1.txt

\* puzzle3x3-unsolvable2.txt

\* puzzle4x4-unsolvable.txt

==> passed

Test 7a: Check that Solver is immutable by testing whether methods

return the same value, regardless of order in which called

\* puzzle3x3-00.txt

\* puzzle3x3-01.txt

\* puzzle3x3-05.txt

\* puzzle3x3-10.txt

\* random 2-by-2 solvable boards

==> passed

Test 7b: Check that Solver is immutable by testing whether methods

return the same value, regardless of order in which called

\* puzzle3x3-unsolvable1.txt

\* puzzle3x3-unsolvable2.txt

\* puzzle4x4-unsolvable.txt

\* random 2-by-2 unsolvable boards

==> passed

Test 8: Call moves() with more file inputs

\* puzzle14.txt

\* puzzle15.txt

\* puzzle16.txt

\* puzzle17.txt

\* puzzle18.txt

\* puzzle19.txt

\* puzzle20.txt

\* puzzle21.txt

\* puzzle22.txt

\* puzzle23.txt

\* puzzle24.txt

\* puzzle25.txt

\* puzzle26.txt

\* puzzle27.txt

\* puzzle28.txt

\* puzzle29.txt

\* puzzle30.txt

::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

OperationCountLimitExceededException

Number of calls to insert(), delMin(), and min() in MinPQ exceeds limit: 10000000

::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

==> FAILED

Test 9: Check whether equals() method in Board is called

with an argument of the wrong type

\* puzzle00.txt

\* puzzle05.txt

\* puzzle10.txt

\* puzzle15.txt

==> passed

Test 10: Check that constructor throws exception if board is null

==> passed

Test 11: Check for fragile dependence on toString()

\* puzzle00.txt

\* puzzle04.txt

\* puzzle08.txt

\* puzzle12.txt

==> passed

Test 12a: Call moves() with 2-by-2 file inputs

\* puzzle2x2-00.txt

\* puzzle2x2-01.txt

\* puzzle2x2-02.txt

\* puzzle2x2-03.txt

\* puzzle2x2-04.txt

\* puzzle2x2-05.txt

\* puzzle2x2-06.txt

==> passed

Test 12b: Call solution() with 2-by-2 file inputs

\* puzzle2x2-00.txt

\* puzzle2x2-01.txt

\* puzzle2x2-02.txt

\* puzzle2x2-03.txt

\* puzzle2x2-04.txt

\* puzzle2x2-05.txt

\* puzzle2x2-06.txt

==> passed

Test 13a: Call moves() with 3-by-3 file inputs

\* puzzle3x3-00.txt

\* puzzle3x3-01.txt

\* puzzle3x3-02.txt

\* puzzle3x3-03.txt

\* puzzle3x3-04.txt

\* puzzle3x3-05.txt

\* puzzle3x3-06.txt

\* puzzle3x3-07.txt

\* puzzle3x3-08.txt

\* puzzle3x3-09.txt

\* puzzle3x3-10.txt

\* puzzle3x3-11.txt

\* puzzle3x3-12.txt

\* puzzle3x3-13.txt

\* puzzle3x3-14.txt

\* puzzle3x3-15.txt

\* puzzle3x3-16.txt

\* puzzle3x3-17.txt

\* puzzle3x3-18.txt

\* puzzle3x3-19.txt

\* puzzle3x3-20.txt

\* puzzle3x3-21.txt

\* puzzle3x3-22.txt

\* puzzle3x3-23.txt

\* puzzle3x3-24.txt

\* puzzle3x3-25.txt

\* puzzle3x3-26.txt

\* puzzle3x3-27.txt

\* puzzle3x3-28.txt

\* puzzle3x3-29.txt

\* puzzle3x3-30.txt

::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

OperationCountLimitExceededException

Number of calls to insert(), delMin(), and min() in MinPQ exceeds limit: 10000000

::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

==> FAILED

Test 13b: Call solution() with 3-by-3 file inputs

\* puzzle3x3-00.txt

\* puzzle3x3-01.txt

\* puzzle3x3-02.txt

\* puzzle3x3-03.txt

\* puzzle3x3-04.txt

\* puzzle3x3-05.txt

\* puzzle3x3-06.txt

\* puzzle3x3-07.txt

\* puzzle3x3-08.txt

\* puzzle3x3-09.txt

\* puzzle3x3-10.txt

\* puzzle3x3-11.txt

\* puzzle3x3-12.txt

\* puzzle3x3-13.txt

\* puzzle3x3-14.txt

\* puzzle3x3-15.txt

\* puzzle3x3-16.txt

\* puzzle3x3-17.txt

\* puzzle3x3-18.txt

\* puzzle3x3-19.txt

\* puzzle3x3-20.txt

\* puzzle3x3-21.txt

\* puzzle3x3-22.txt

\* puzzle3x3-23.txt

\* puzzle3x3-24.txt

\* puzzle3x3-25.txt

\* puzzle3x3-26.txt

\* puzzle3x3-27.txt

\* puzzle3x3-28.txt

\* puzzle3x3-29.txt

\* puzzle3x3-30.txt

::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

OperationCountLimitExceededException

Number of calls to insert(), delMin(), and min() in MinPQ exceeds limit: 10000000

::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

==> FAILED

Test 14a: Call moves() with 4-by-4 file inputs

\* puzzle4x4-00.txt

\* puzzle4x4-01.txt

\* puzzle4x4-02.txt

\* puzzle4x4-03.txt

\* puzzle4x4-04.txt

\* puzzle4x4-05.txt

\* puzzle4x4-06.txt

\* puzzle4x4-07.txt

\* puzzle4x4-08.txt

\* puzzle4x4-09.txt

\* puzzle4x4-10.txt

\* puzzle4x4-11.txt

\* puzzle4x4-12.txt

\* puzzle4x4-13.txt

\* puzzle4x4-14.txt

\* puzzle4x4-15.txt

\* puzzle4x4-16.txt

\* puzzle4x4-17.txt

\* puzzle4x4-18.txt

\* puzzle4x4-19.txt

\* puzzle4x4-20.txt

\* puzzle4x4-21.txt

\* puzzle4x4-22.txt

\* puzzle4x4-23.txt

\* puzzle4x4-24.txt

\* puzzle4x4-25.txt

\* puzzle4x4-26.txt

\* puzzle4x4-27.txt

\* puzzle4x4-28.txt

\* puzzle4x4-29.txt

\* puzzle4x4-30.txt

::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

OperationCountLimitExceededException

Number of calls to insert(), delMin(), and min() in MinPQ exceeds limit: 10000000

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==> FAILED

Test 14b: Call solution() with 4-by-4 file inputs

\* puzzle4x4-00.txt

\* puzzle4x4-01.txt

\* puzzle4x4-02.txt

\* puzzle4x4-03.txt

\* puzzle4x4-04.txt

\* puzzle4x4-05.txt

\* puzzle4x4-06.txt

\* puzzle4x4-07.txt

\* puzzle4x4-08.txt

\* puzzle4x4-09.txt

\* puzzle4x4-10.txt

\* puzzle4x4-11.txt

\* puzzle4x4-12.txt

\* puzzle4x4-13.txt

\* puzzle4x4-14.txt

\* puzzle4x4-15.txt

\* puzzle4x4-16.txt

\* puzzle4x4-17.txt

\* puzzle4x4-18.txt

\* puzzle4x4-19.txt

\* puzzle4x4-20.txt

\* puzzle4x4-21.txt

\* puzzle4x4-22.txt

\* puzzle4x4-23.txt

\* puzzle4x4-24.txt

\* puzzle4x4-25.txt

\* puzzle4x4-26.txt

\* puzzle4x4-27.txt

\* puzzle4x4-28.txt

\* puzzle4x4-29.txt

\* puzzle4x4-30.txt

::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

OperationCountLimitExceededException

Number of calls to insert(), delMin(), and min() in MinPQ exceeds limit: 10000000

::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

==> FAILED

Test 15: Call moves() with random solvable n-by-n boards

\* 100 random 2-by-2 boards

\* 200 random 3-by-3 boards that are <= 20 moves from goal

\* 200 random 4-by-4 boards that are <= 20 moves from goal

\* 200 random 5-by-5 boards that are <= 20 moves from goal

==> passed

Total: 15/20 tests passed!

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\* MEMORY

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Computing memory of Board

\*-----------------------------------------------------------

Running 8 total tests.

Memory usage of an n-by-n board

n student (bytes) reference (bytes)

----------------------------------------------------------

=> FAILED 4 472 240

=> FAILED 8 1112 560

=> FAILED 12 2008 1008

=> FAILED 16 3160 1584

=> FAILED 20 4568 2288

=> FAILED 36 12760 6384

=> FAILED 72 46168 23088

=> FAILED 120 122968 61488

==> 0/8 tests passed

Total: 0/8 tests passed!

Student memory = 8.00 n^2 + 64.00 n + 88.00 (R^2 = 1.000)

Reference memory = 4.00 n^2 + 32.00 n + 48.00 (R^2 = 1.000)

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Computing memory of Solver

\*-----------------------------------------------------------

Running 3 total tests.

Test 1: memory with puzzle20.txt (must be <= 2.0x reference solution)

- memory of student Solver = 8340680 bytes

- memory of reference Solver = 4896 bytes

- student / reference = 1703.57

==> FAILED

Test 2: memory with puzzle25.txt (must be <= 2.0x reference solution)

- memory of student Solver = 90571640 bytes

- memory of reference Solver = 6056 bytes

- student / reference = 14955.69

==> FAILED

Total: 0/3 tests passed: Could not complete tests, which results in a reported score of 0.

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\* TIMING

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Timing Solver

\*-----------------------------------------------------------

Running 17 total tests.

Timing tests use your implementation of Board.java and Solver.java.

Maximum time allowed per puzzle is 10 seconds.

filename N seconds insert() delMin() max PQ size

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=> FAILED puzzle20.txt 3 0.09 22125 (4.2x) 12797 (4.1x) 9329 (4.4x)

=> FAILED puzzle21.txt 3 0.09 33374 (1.4x) 19471 (1.4x) 13904 (1.4x)

=> FAILED puzzle22.txt 3 0.10 39851 (2.9x) 23193 (2.9x) 16659 (3.0x)

=> FAILED puzzle23.txt 3 0.22 87681 (2.5x) 50968 (2.5x) 36714 (2.6x)

=> FAILED puzzle24.txt 3 0.28 165270 (5.0x) 95722 (4.8x) 69549 (5.3x)

=> FAILED puzzle25.txt 3 0.27 211520 (3.5x) 122421 (3.5x) 89100 (3.7x)

=> FAILED puzzle26.txt 3 0.42 323041 (6.3x) 188406 (6.3x) 134636 (6.5x)

=> FAILED puzzle27.txt 3 1.15 687213 (7.7x) 401893 (7.4x) 285321 (8.2x)

=> FAILED puzzle28.txt 3 1.72 1324162 (12.8x) 774784 (12.6x) 549379 (13.2x)

=> FAILED puzzle29.txt 3 2.13 1610175 (19.5x) 933368 (18.6x) 676808 (20.9x)

=> FAILED puzzle30.txt 3 3.04 2309390 (10.9x) 1335479 (10.4x) 973912 (11.6x)

Total: 0/17 tests passed: Could not complete tests, which results in a reported score of 0.

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