Milestone 2 Regression Document

I. Team Members (Group 6)
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- Yi Niu
- Shaista Usman

II. Shell script for building the test suite (buildTestSuite.sh)

```
#!/bin/bash
#=============================================================================
=====
# CPSC 5210-01
# Group 6: Khanh Phan, Yi Niu, Shaista Usman
# Professor McKee
# 3rd June 2020
#                        Milestone #2
#
# File: buildTestSuite.sh
#
# Description:
# This shell script builds the test suite for the Java Game Tetris
# using the J-Unit tests designed during Milestone 1.
#
#   DEPENDENCIES, LIMITATIONS, & DESIGN NOTES:
#     Dependencies :
#         1. openjdk version "11.0.6" as available in CS1 at $JAVA_HOME/bin.
#         2. junit-4.13.jar needs to be installed at JUNIT_HOME
#         3. hamcrest-all-1.3.jar needs to be installed at JUNIT_HOME
#     Design Notes :
#         1. All source files and all J-Unit test files are built/compiled by this script.
#         2. Artifacts are placed in the $OUT_DIR/tetris directory
#         3. run chmod +x buildTestSuite.sh before executing the script
#     Limitations :
#         1. Due to memory limitations on SU's CS1 server, the $CS1_HACK (-J-Xmx512m)
#            variable is used to limit the memory used by the JVM.
#
#   Example Usage:
```

```bash
#   "./buildTestSuite.sh"
#===========================================================================
=====



set -o nounset



#===========================================================================
=====
# Constants
#===========================================================================
=====
mydir="$( cd "$( dirname "${BASH_SOURCE[0]}" )" > /dev/null && pwd )"
echo $mydir

OUT_DIR="bin"

#JUNIT_HOME=/home/st/susman/junit/Java-TetrisTest-master/lib # Change this to where
junit jar-files are installed
JUNIT_HOME="$mydir/lib"
#HCREST_HOME="lib/"
# Hack required due to memory limitations on CS1
CS1_HACK="-J-Xmx512m"  # Limit heap to 512 MB

export CLASSPATH=.:$JUNIT_HOME/junit-4.13.jar:$JUNIT_HOME/hamcrest-all-1.3.jar
LOG_FILE="buildTestSuiteLog.txt"
#===========================================================================
=====
# Script
#===========================================================================
=====
echo "Building test suite..."

echo "Creating directory for build artifacts..."
mkdir -p $mydir/$OUT_DIR | tee -a $LOG_FILE

echo Removing stale artifacts...
rm -f -v $mydir/$OUT_DIR/tetris/*.class | tee -a $LOG_FILE
```

```
# Remove previous log files
echo Cleaning up stale log files...
rm -f -v $LOG_FILE

echo "Printing javac version..."
javac $CS1_HACK -version | tee -a $LOG_FILE

echo "Building source code..."
  # $JAVA_HOME/bin/javac -J-Xmx512m -d $mydir/$OUT_DIR/ -cp $JUNIT_HOME/junit-
4.13.jar:$JUNIT_HOME/hamcrest-all-1.3.jar:. $mydir/src/tetris/*.java | tee -a $LOG_FILE
 javac -J-Xmx512m -d $mydir/$OUT_DIR/ -cp $JUNIT_HOME/junit-
4.13.jar:$JUNIT_HOME/hamcrest-all-1.3.jar:. $mydir/src/tetris/*.java | tee -a $LOG_FILE
if [ $? != 0 ]; then
     echo "ERROR: Unable to build Aborting build..."
     exit 1
else
echo "Build success!"
fi
exit 0
```

III. **Outputs for "buildTestSuite.sh" script as observed on CS1 server**

```
[susman@cs1 Java-TetrisTest-master]$ ./buildTestSuite.sh
/home/st/susman/junit/Java-TetrisTest-master
Building test suite...
Creating directory for build artifacts...
Removing stale artifacts...
removed '/home/st/susman/junit/Java-TetrisTest-master/bin/tetris/BlockGrid.class'
removed '/home/st/susman/junit/Java-TetrisTest-master/bin/tetris/BlockGridTest.class'
removed '/home/st/susman/junit/Java-TetrisTest-master/bin/tetris/PlayTetris.class'
removed '/home/st/susman/junit/Java-TetrisTest-master/bin/tetris/TetrisBlock.class'
removed '/home/st/susman/junit/Java-TetrisTest-master/bin/tetris/TetrisBlockTest.class'
removed '/home/st/susman/junit/Java-TetrisTest-master/bin/tetris/TetrisComponent.class'
removed '/home/st/susman/junit/Java-TetrisTest-master/bin/tetris/TetrisGrid.class'
removed '/home/st/susman/junit/Java-TetrisTest-master/bin/tetris/TetrisGridTest.class'
Cleaning up stale log files...
removed 'buildTestSuiteLog.txt'
Printing javac version...
javac 11.0.6
Building source code...
```

Note: Some input files use unchecked or unsafe operations.

Note: Recompile with -Xlint:unchecked for details.

Build success!

```
[susman@cs1 Java-TetrisTest-master]$
[susman@cs1 Java-TetrisTest-master]$ ./buildTestSuite.sh
/home/st/susman/junit/Java-TetrisTest-master
Building test suite...
Creating directory for build artifacts...
Removing stale artifacts...
removed '/home/st/susman/junit/Java-TetrisTest-master/bin/tetris/BlockGrid.class'
removed '/home/st/susman/junit/Java-TetrisTest-master/bin/tetris/BlockGridTest.class'
removed '/home/st/susman/junit/Java-TetrisTest-master/bin/tetris/PlayTetris.class'
removed '/home/st/susman/junit/Java-TetrisTest-master/bin/tetris/TetrisBlock.class'
removed '/home/st/susman/junit/Java-TetrisTest-master/bin/tetris/TetrisBlockTest.class'
removed '/home/st/susman/junit/Java-TetrisTest-master/bin/tetris/TetrisComponent.class'
removed '/home/st/susman/junit/Java-TetrisTest-master/bin/tetris/TetrisGrid.class'
removed '/home/st/susman/junit/Java-TetrisTest-master/bin/tetris/TetrisGridTest.class'
Cleaning up stale log files...
removed 'buildTestSuiteLog.txt'
Printing javac version...
javac 11.0.6
Building source code...
Note: Some input files use unchecked or unsafe operations.
Note: Recompile with -Xlint:unchecked for details.
Build success!
[susman@cs1 Java-TetrisTest-master]$
```

IV. Shell script for executing the test suite (runTestSuite.sh)

```bash
#!/bin/bash
#=============================================================================
=====
# 3rd June 2020
#                    Milestone #2
#
# File: runTestSuite.sh
#
# Description:
# This shell script executes all compiled J-Unit test cases in the $OUT_DIR directory
# a specified number of times and e-mails the results to an e-mail address, if
# provided.
#
#   DEPENDENCIES, LIMITATIONS, & DESIGN NOTES:
#     Dependencies :
#         1. openjdk version "11.0.6" as available in CS1 at $JAVA_HOME/bin.
#         2. junit-4.13.jar needs to be installed at JUNIT_HOME
#         3. hamcrest-all-1.3.jar needs to be installed at JUNIT_HOME
#     Design Notes :
#         1. All J-Unit test cases in the $OUT_DIR directory are run.
```

```
#       2. Console output is logged to $LOG_FILE.
#       3. Caller can specify the number of test iterations.
#       4. Caller can optionally specify an e-mail address.
#       5. If an e-mail is provided, the test results are set and the
#          console output is attached to the e-mail.
#       6. Test results are displayed.
#       7. Run chmod +x runTestSuite.sh before executing the script
#    Limitations :
#       1. Due to memory limitations on SU's CS1 server, the $CS1_HACK (-Xms250m -
Xmx512m)
#          variable is used to limit the memory used by the JVM.
#
#   Example Usage:
#   1. Executes the test suite one time
#       ./runTestSuite.sh 1
#   2. Executes the test suite twice and e-mails results to test@gmail.com.
#       ./runTestSuite.sh 2 test@gmail.com
#===========================================================================
=====

#set -o errexit
set -o pipefail
set -o nounset
#set -o xtrace

#===========================================================================
=====
# Constants
#===========================================================================
=====
MIN_ARGS=1
MAX_ARGS=2

mydir="$( cd "$( dirname "${BASH_SOURCE[0]}" )" > /dev/null && pwd )"
echo $mydir

OUT_DIR="bin"

JUNIT_HOME="$mydir/lib"

# Hack required due to memory limitations on CS1
```

```
CS1_HACK="-Xms250m -Xmx512m"  # Limit heap to 512 MB

# Setting the CLASSPATH for JUnit and HCrest jars
export CLASSPATH=.:$JUNIT_HOME/junit-4.13.jar:$JUNIT_HOME/hamcrest-all-1.3.jar

# Setting up the log File
LOG_FILE="runTestSuiteLog.txt"

# Setting the current Date
NOW=$(date +"%m-%d-%Y")

#============================================================================
=====
# Script
#============================================================================
=====

# Check number of arguments
if [ "$#" -lt "$MIN_ARGS" ] || [ "$#" -gt "$MAX_ARGS" ]; then
    echo "ERROR: Invalid number of command-line arguments!"
    echo "Usage:"
    echo "   ./runTestSuite <numIter> [emailRecipient]"
    echo "    - <numIter> - Number of times to run the test suite. Range: [1,10000)"
    echo "    - [emailRecipient] - Optional e-mail address to notify with test results"
    exit 1
fi

# Basic input validation for number of iterations
if [ "$1" -le "0" ]; then
    echo "ERROR: Caller must enter numIter of 1 or more!"
    exit 2
fi

# Remove previous log files
echo Cleaning up stale log files...
rm -f -v $LOG_FILE

# Capture system-level information for future debug-ability
echo -e "
============================================================================
=====
```

```
Environment Variables
==============================================================================
=====
$(env)" >> $LOG_FILE

echo -e "
==============================================================================
=====
Java Version
==============================================================================
=====
" | tee -a $LOG_FILE
echo $(java -Xms250m -Xmx512m -version 2>&1) | tee -a $LOG_FILE
echo JUnit jar file: $JUNIT_HOME/junit-4.13.jar | tee -a $LOG_FILE

echo -e "
==============================================================================
=====
Test Suite Execution
==============================================================================
=====
" | tee -a $LOG_FILE

# Run the test suite
numIter=$1
numPass=0
numFail=0
echo "Start date/time:" $(date)  | tee -a $LOG_FILE
start=$SECONDS
for i in `seq 1 $numIter`; do
    echo "***********************************************" | tee -a $LOG_FILE
    echo "Executing test run $i of $1..." | tee -a $LOG_FILE
    echo "***********************************************" | tee -a $LOG_FILE
  #Running unit tests written for TetrisGrid class
    java -Xms250m -Xmx512m -cp $mydir/$OUT_DIR/:$JUNIT_HOME/junit-
4.13.jar:$JUNIT_HOME/hamcrest-all-1.3.jar org.junit.runner.JUnitCore tetris.TetrisGridTest
| tee -a $LOG_FILE
    rv=$?
    echo "Tests completed with return code: $rv" | tee -a $LOG_FILE
    if [ $rv == 0 ]; then
        let "numPass++"
```

```
    else
        let "numFail++"
    fi
#Running unit tests written for TetrisBlock class
java -Xms250m -Xmx512m -cp $mydir/$OUT_DIR/:$JUNIT_HOME/junit-
4.13.jar:$JUNIT_HOME/hamcrest-all-1.3.jar org.junit.runner.JUnitCore tetris.TetrisBlockTest
| tee -a $LOG_FILE
    rv=$?
echo "Tests completed with return code: $rv" | tee -a $LOG_FILE
if [ $rv == 0 ]; then
let "numPass++"
else
let "numFail++"
fi
#Running unit tests written for BlockGrid class
java -Xms250m -Xmx512m -cp $mydir/$OUT_DIR/:$JUNIT_HOME/junit-
4.13.jar:$JUNIT_HOME/hamcrest-all-1.3.jar org.junit.runner.JUnitCore tetris.BlockGridTest |
tee -a $LOG_FILE
    rv=$?
echo "Tests completed with return code: $rv" | tee -a $LOG_FILE
if [ $rv == 0 ]; then
let "numPass++"
else
let "numFail++"
fi

done
stop=$SECONDS
echo "Stop date/time:" $(date) | tee -a $LOG_FILE

# Calculate statistics
  # Total execution time
duration=$(( $stop - $start ))
  # Search log file for the number of test cases per test suite run

#numCases=$(grep -i -m1 "tests" $LOG_FILE | grep -o -E '[0-9]+')
  # Multiply test cases per run times the number of runs
#numCases=$((numCases * numIter))
  # Search the log file for the number of failing test cases
numCaseFail=$(grep -i -c "AssertionFailedError" $LOG_FILE)
  # The remainder are passing tests
```

```bash
#numCasePass=$((numCases - numCaseFail))
  # Calculate the individual test case passing rate
#testCasePassRate=$(bc -l <<< "scale=2; $numCasePass/$numCases*100")
  # Calculate the test suite passing rate
testSuitePassRate=$(bc -l <<< "scale=2; $numPass/$numIter*100"/3 )

# Determine overall result
rval=3
status="FAIL"
if  ((numPass == numIter*3)); then
    rval=0
    status="PASS"
fi

# Report statistics
echo ""                                            | tee -a $LOG_FILE
echo
"===========================================================================
======" | tee -a $LOG_FILE
echo "Results & Statistics"                                | tee -a $LOG_FILE
echo
"===========================================================================
======" | tee -a $LOG_FILE
echo "Overall test suite result:  $status"               | tee -a $LOG_FILE
echo "Execution time:         $duration [seconds]"             | tee -a $LOG_FILE
echo "# of test suite runs:     $numIter"              | tee -a $LOG_FILE
echo "# of passing runs:       $numPass"                | tee -a $LOG_FILE
echo "# of failing runs:      $numFail"             | tee -a $LOG_FILE
echo "Test suite passing rate:   $testSuitePassRate%"              | tee -a $LOG_FILE
echo "# of failing test cases:   $numCaseFail"              | tee -a $LOG_FILE
echo
"===========================================================================
======" | tee -a $LOG_FILE
echo "Please see the log file for the full console output: $LOG_FILE"
echo ""

# Notify e-mail recipient if one was provided by caller
if [ $# == $MAX_ARGS ]; then
    echo "Sending e-mail report to $2..."
    messageBody="Please find attached the log file outlining the output and results of the
test run as on $NOW."
```

```
         echo $messageBody | mail -s "[$USER] Tetris Test Suite Run - $status!" -a $LOG_FILE $2
      if [ $? != 0 ]; then
         echo "ERROR: Unable to send e-mail! rv = $?"
         exit 4
      fi
   fi
fi


# Return status code
exit $rval
```

V.   Outputs for "runTestSuite.sh" script as observed on CS1 server

[susman@cs1 Java-TetrisTest-master]$ ./runTestSuite.sh 1 susman@seattleu.edu
/home/st/susman/junit/Java-TetrisTest-master
Cleaning up stale log files...
removed 'runTestSuiteLog.txt'

```
=========================================================================
=====
Java Version
=========================================================================
=====

openjdk version "11.0.6" 2020-01-14 LTS OpenJDK Runtime Environment 18.9 (build
11.0.6+10-LTS) OpenJDK 64-Bit Server VM 18.9 (build 11.0.6+10-LTS, mixed mode)
JUnit jar file: /home/st/susman/junit/Java-TetrisTest-master/lib/junit-4.13.jar

=========================================================================
=====
Test Suite Execution
=========================================================================
=====

Start date/time: Tue May 26 21:30:58 PDT 2020
************************************************
Executing test run 1 of 1...
************************************************
JUnit version 4.13
..............
Time: 0.075
```

OK (14 tests)

Tests completed with return code: 0
JUnit version 4.13
....
Time: 0.072

OK (9 tests)

Tests completed with return code: 0
JUnit version 4.13
....
Time: 0.082

OK (9 tests)

Tests completed with return code: 0
Stop date/time: Tue May 26 21:30:59 PDT 2020

===
=====
Results & Statistics
===
=====
Overall test suite result: PASS
Execution time: 1 [seconds]
# of test suite runs: 1
# of passing runs: 3
# of failing runs: 0
Test suite passing rate: 100.00%
# of failing test cases: 0
===
=====
Please see the log file for the full console output: runTestSuiteLog.txt

Sending e-mail report to susman@seattleu.edu...

```
[susman@cs1 Java-TetrisTest-master]$ pwd
/home/st/susman/junit/forZip/Java-TetrisTest-master/Java-TetrisTest-master
[susman@cs1 Java-TetrisTest-master]$ ls -lrt
total 24
-rw-rw----. 1 susman susman  912 May  4 20:07 README.md
drwxrwx---. 2 susman susman   66 May 22 13:49 lib
drwxrwx---. 3 susman susman   27 May 22 19:37 src
drwxrwx---. 3 susman susman   27 May 23 14:46 bin
-rwxrwxrwx. 1 susman susman 3876 May 25 17:11 stressTest.sh
-rwxrwx---. 1 susman susman 2919 May 25 17:58 buildTestSuite.sh
-rwxrwxrwx. 1 susman susman 8283 May 26 21:01 runTestSuite.sh
[susman@cs1 Java-TetrisTest-master]$ ./buildTestSuite.sh
/home/st/susman/junit/forZip/Java-TetrisTest-master/Java-TetrisTest-master
Building test suite...
Creating directory for build artifacts...
Removing stale artifacts...
Cleaning up stale log files...
removed 'buildTestSuiteLog.txt'
Printing javac version...
javac 11.0.6
Building source code...
Note: Some input files use unchecked or unsafe operations.
Note: Recompile with -Xlint:unchecked for details.
Build success!
[susman@cs1 Java-TetrisTest-master]$ ./runTestSuite.sh 1 susman@seattleu.edu
/home/st/susman/junit/forZip/Java-TetrisTest-master/Java-TetrisTest-master
Cleaning up stale log files...

===============================================================================
Java Version
===============================================================================

openjdk version "11.0.6" 2020-01-14 LTS OpenJDK Runtime Environment 18.9 (build 11.0.6+10-LTS) OpenJDK 64-Bit Server VM 18.9 (build 11.0.6+10-LTS, mixed mode
)
JUnit jar file: /home/st/susman/junit/forZip/Java-TetrisTest-master/Java-TetrisTest-master/lib/junit-4.13.jar

===============================================================================
Test Suite Execution
===============================================================================

Start date/time: Tue May 26 21:33:17 PDT 2020
**************************************************
Executing test run 1 of 1...
**************************************************
```

```
[susman@cs1 Java-TetrisTest-master]$ ./runTestSuite.sh 1 susman@seattleu.edu
/home/st/susman/junit/forZip/Java-TetrisTest-master/Java-TetrisTest-master
Cleaning up stale log files...

===============================================================================
Java Version
===============================================================================

openjdk version "11.0.6" 2020-01-14 LTS OpenJDK Runtime Environment 18.9 (build 11.0.6+10-LTS) OpenJDK 64-Bit Server VM 18.9 (build 11.0.6+10-LTS, mixed mode
)
JUnit jar file: /home/st/susman/junit/forZip/Java-TetrisTest-master/Java-TetrisTest-master/lib/junit-4.13.jar

===============================================================================
Test Suite Execution
===============================================================================

Start date/time: Tue May 26 21:33:17 PDT 2020
**************************************************
Executing test run 1 of 1...
**************************************************
JUnit version 4.13
..............
Time: 0.077

OK (14 tests)

Tests completed with return code: 0
JUnit version 4.13
.........
Time: 0.073

OK (9 tests)

Tests completed with return code: 0
JUnit version 4.13
.........
Time: 0.081

OK (9 tests)

Tests completed with return code: 0
Stop date/time: Tue May 26 21:33:18 PDT 2020

===============================================================================
```

```
Tests completed with return code: 0
JUnit version 4.13
.........
Time: 0.081

OK (9 tests)

Tests completed with return code: 0
Stop date/time: Tue May 26 21:33:18 PDT 2020

========================================================================
Results & Statistics
========================================================================
Overall test suite result:   PASS
Execution time:              1 [seconds]
# of test suite runs:        1
# of passing runs:           3
# of failing runs:           0
Test suite passing rate:     100.00%
# of failing test cases:     0
========================================================================
Please see the log file for the full console output: runTestSuiteLog.txt

Sending e-mail report to susman@seattleu.edu...
[susman@cs1 Java-TetrisTest-master]$
```
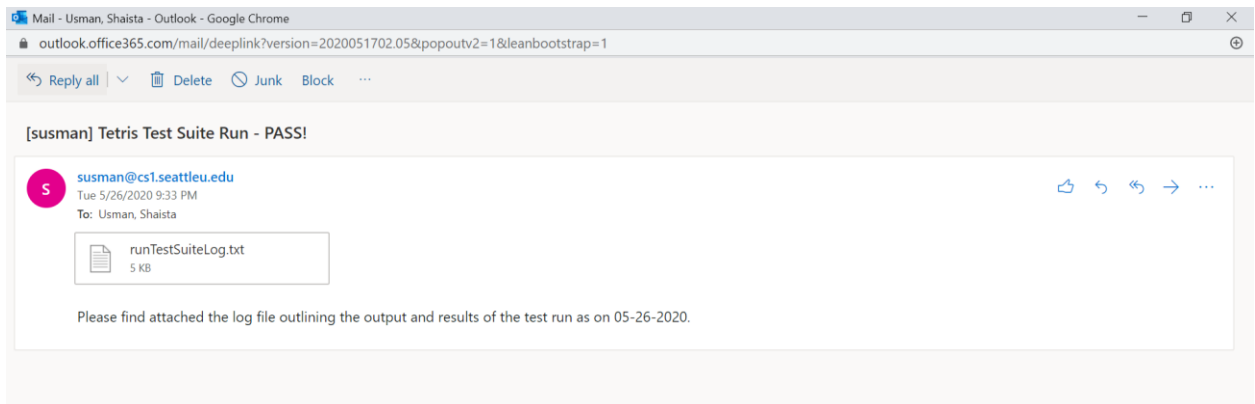
VI.   Email content

- **Screenshot of the email received on SU Mail**

- **Screenshot of the log file attached with the email**

```
================================================================
Environment Variables
================================================================
MANPATH=/opt/rh/rh-git29/root/usr/share/man:
XDG_SESSION_ID=30808
HOSTNAME=cs1.seattleu.edu
SELINUX_ROLE_REQUESTED=
SHELL=/bin/bash
TERM=xterm
HISTSIZE=1000
SSH_CLIENT=76.104.128.210 58637 22
PERL5LIB=/opt/rh/rh-git29/root/usr/share/perl5/vendor_perl
SELINUX_USE_CURRENT_RANGE=
SSH_TTY=/dev/pts/26
X_SCLS=rh-git29
USER=susman
LS_COLORS=rs=0:di=01;34:ln=01;36:mh=00:pi=40;33:so=01;35:do=01;35:bd=40;33;01:cd=40;33;01:or=40;31;01:mi=01;05;37;41:su=37;41:sg=30;43:ca=30;41:tw=30;42:ow=3
;35:*.wmv=01;35:*.asf=01;35:*.rm=01;35:*.rmvb=01;35:*.flc=01;35:*.avi=01;35:*.fli=01;35:*.flv=01;35:*.gl=01;35:*.dl=01;35:*.xcf=01;35:*.xwd=01;35:*.yuv=01;35
LD_LIBRARY_PATH=/opt/rh/devtoolset-8/root/lib64:/opt/rh/devtoolset-8/root/lib/gcc/x86_64-redhat-linux/8:/opt/rh/httpd24/root/usr/lib64
PATH=/usr/local/spark/bin/:/usr/local/scala/bin/:/etc/alternatives/java_sdk_11_openjdk/bin/:/opt/rh/devtoolset-8/root/bin/:/usr/local/openmpi/bin/:/usr/local
MAIL=/var/spool/mail/susman
PWD=/home/st/susman/junit/forZip/Java-TetrisTest-master/Java-TetrisTest-master
DOTNET_ROOT=/usr/local/dotnet
JAVA_HOME=/etc/alternatives/java_sdk_11_openjdk
LANG=en_US.utf8
SELINUX_LEVEL_REQUESTED=
KRB5CCNAME=KEYRING:persistent:3420
HISTCONTROL=ignoredups
HOME=/home/st/susman
SHLVL=2
LOGNAME=susman
CVS_RSH=ssh
CLASSPATH=.:/home/st/susman/junit/forZip/Java-TetrisTest-master/Java-TetrisTest-master/lib/junit-4.13.jar:/home/st/susman/junit/forZip/Java-TetrisTest-master
SSH_CONNECTION=76.104.128.210 58637 10.124.72.20 22
```

```
SSH_CONNECTION=76.104.128.210 58637 10.124.72.20 22
XDG_DATA_DIRS=/home/st/susman/.local/share/flatpak/exports/share:/var/lib/flatpak/exports/share:/usr/local/share:/usr/share
LESSOPEN=||/usr/bin/lesspipe.sh %s
XDG_RUNTIME_DIR=/run/user/3420
_=/usr/bin/env

================================================================
Java Version
================================================================

openjdk version "11.0.6" 2020-01-14 LTS OpenJDK Runtime Environment 18.9 (build 11.0.6+10-LTS) OpenJDK 64-Bit Server VM 18.9 (build 11.0.6+10-LTS, mixed mode
JUnit jar file: /home/st/susman/junit/forZip/Java-TetrisTest-master/Java-TetrisTest-master/lib/junit-4.13.jar

================================================================
Test Suite Execution
================================================================

Start date/time: Tue May 26 21:33:17 PDT 2020
*********************************************
Executing test run 1 of 1...
*********************************************
JUnit version 4.13
..............
Time: 0.077

OK (14 tests)

Tests completed with return code: 0
JUnit version 4.13
.........
Time: 0.073

OK (9 tests)

Tests completed with return code: 0
Stop date/time: Tue May 26 21:33:18 PDT 2020

================================================================
Results & Statistics
================================================================
Overall test suite result:  PASS
Execution time:             1 [seconds]
# of test suite runs:       1
# of passing runs:          3
# of failing runs:          0
Test suite passing rate:    100.00%
# of failing test cases:    0
================================================================
```