

OpenMRS Automated Testing Framework

Abstract: The purpose of this project was to build an automated testing framework for our java HFOSS program OpenMRS that can be ran by simply calling the script runAllTests.sh. Once completed the next task was to then inject 5 faults into our program that will cause some of the 25 testcases to fail, but not all.

```
#compares expected output to actual output and decides if test passed or failed
echo "<td" ">" reports/testReport.html
if [ "${output}" = "${lineStorage[5]}"] ; then
    echo "style=\"color:#007010;\">Passed" ">" reports/testReport.html
else
    echo "style=\"color:#FF0000;\">Failed" ">" reports/testReport.html
fi
echo "</td" ">" reports/testReport.html

echo "</tr" ">" reports/testReport.html #ends a row in the table
echo "test case $testCaseTracker complete"
((testCaseTracker++))
cd testCases
done

cd ../reports #goes to report dir

xdg-open testReport.html #opens the html file
```

Figure 1: excerpt from the end of runAllTests.sh

Framework:

- Created a runAllTests.sh script in bash then a driver.java file.
- These files work together in the following way:
- runAllTests.sh begins setting up our testReport.html from testcase files.
 - Compiles driver.java and reads input from testcase files.
 - Driver outputs results which the script then compares to the expected output.
 - Script then moves to reports directory to open testReport.html

Methods Tested:

- isStringinArray(String str)
- containsDigit(String test)
- convertToInteger(Long longvalue)
- containsUpperAndLowerCase(String test)
- format(Date date)
- nullSafeEqualsIgnoreCase(String s1)

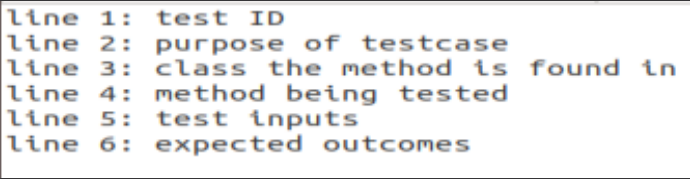


Figure 2: The template for testcase files.

Testing:

Test #	Requirement	class name	method name	input	expected output	actual output	pass/fail
001	true returned when string is in array	OpenmrsUtil.java	isStringinArray(String str	"Sam"&"Sam", "Wright"	true	true	Passed
02	false returned when string is not in array	OpenmrsUtil.java	isStringinArray(String str	"Dylan"&"Sam", "Wright"	false	false	Passed
03	false returned when string is null	OpenmrsUtil.java	isStringinArray(String str	""&"Sam", "Wright"	false	false	Passed
04	true is returned when string contains a digit	OpenmrsUtil.java	containsDigit(String test)	"Sam1"	true	true	Passed
05	false is returned when string does not contains a digit	OpenmrsUtil.java	containsDigit(String test)	"Sam"	false	false	Passed
06	false is returned when string is null	OpenmrsUtil.java	containsDigit(String test)		false	false	Passed
07	Long value is turned into an Integer value	OpenmrsUtil.java	convertToInteger(Long longvalue)	2147483647	2147483647	2147483647	Passed
08	Long value is too large to be turned into an Integer, it throws the correct exception	OpenmrsUtil.java	convertToInteger(Long longvalue)	2147483648	java.lang.IllegalArgumentException: 2147483648 cannot be cast to Integer without changing its value.	java.lang.IllegalArgumentException: 2147483648 cannot be cast to Integer without changing its value.	Passed
09	true is returned when string contains upper and lower case letters	OpenmrsUtil.java	containsUpperAndLowerCase(String test)	"Wright"	true	true	Passed
10	false is returned when string contains only lower case letters	OpenmrsUtil.java	containsUpperAndLowerCase(String test)	"wright"	false	false	Passed
11	false is returned when string contains only upper case letters	OpenmrsUtil.java	containsUpperAndLowerCase(String test)	"WRIGHT"	false	false	Passed
12	false is returned when string is null	OpenmrsUtil.java	containsUpperAndLowerCase(String test)	..	false	false	Passed
13	Take inputted date, location, and format_type:DATE and outputs the formatted date	Format.java	format(Date date	5/13/1998,US,DATE	5/13/98	5/13/98	Passed
14	Take inputted date, location, and format_type:DATE and outputs the formatted date	Format.java	format(Date date	5/13/1998,JAPAN,DATE	98/05/13	98/05/13	Passed

Figure 3: excerpt from testReport.html

Fault Injection:

Test #	Requirement	class name	method name	input	expected output	actual output	pass/fail
001	true returned when string is in array	OpenmrsUtil.java	isStringinArray(String str	"Sam"&"Sam", "Wright"	true	true	Passed
02	false returned when string is not in array	OpenmrsUtil.java	isStringinArray(String str	"Dylan"&"Sam", "Wright"	false	true	Failed
03	false returned when string is null	OpenmrsUtil.java	isStringinArray(String str	""&"Sam", "Wright"	false	true	Failed
04	true is returned when string contains a digit	OpenmrsUtil.java	containsDigit(String test)	"Sam1"	true	true	Passed
05	false is returned when string does not contains a digit	OpenmrsUtil.java	containsDigit(String test)	"Sam"	false	false	Passed
06	false is returned when string is null	OpenmrsUtil.java	containsDigit(String test)		false	false	Passed
07	Long value is turned into an Integer value	OpenmrsUtil.java	convertToInteger(Long longvalue)	2147483647	2147483647	2147483647	Passed
08	Long value is too large to be turned into an Integer, it throws the correct exception	OpenmrsUtil.java	convertToInteger(Long longvalue)	2147483648	java.lang.IllegalArgumentException: 2147483648 cannot be cast to Integer without changing its value.	2147483648	Failed
09	true is returned when string contains upper and lower case letters	OpenmrsUtil.java	containsUpperAndLowerCase(String test)	"Wright"	true	false	Failed
10	false is returned when string contains only lower case letters	OpenmrsUtil.java	containsUpperAndLowerCase(String test)	"wright"	false	false	Passed
11	false is returned when string contains only upper case letters	OpenmrsUtil.java	containsUpperAndLowerCase(String test)	"WRIGHT"	false	false	Passed
12	false is returned when string is null	OpenmrsUtil.java	containsUpperAndLowerCase(String test)	..	false	false	Passed
13	Take inputted date, location, and format_type:DATE and outputs the formatted date	Format.java	format(Date date	5/13/1998,US,DATE	5/13/98	java.text.SimpleDateFormat@8629ad2d	Failed

Figure 4: excerpt from testReport.html after faults were added.

We added 1 fault each to 5 of our 6 methods. Each fault were added in a way so that only a few of our testcases failed for each method, except the format() method which caused every case to fail.

Conclusion: This project was difficult. When we first started no one on our team members had any extensive experience in bash, github, or linux. However, from working on this project, as a team, we feel we are much better equipped to handle tasks of this size going forward. This project has also given us a good idea of what it takes to be a cohesive team, and the importance of communication.