

Nathan Spangler

CS 1632 - DELIVERABLE 6: Static Analysis of the Sieve of Eratosthenes

[https://github.com/njs55/Nathan\\_Spangler\\_CS1632\\_QA\\_Deliverables/tree/master/Deliverable6](https://github.com/njs55/Nathan_Spangler_CS1632_QA_Deliverables/tree/master/Deliverable6)

## SUMMARY

### FindBugs

- Exception created and dropped rather than thrown
  - Fixed this bug by adding *“throw”* in front of *“new IllegalArgumentException();”*
- Nullcheck of value previously dereferenced
  - Changed *“if (results.length == 0 || results != null) {}”* to *“if (results.length > 1) {}”*
  - The reason for this change is because, if you look closely at the code, the value of ‘1’ is always left in the array. Plus when printing the array the for loop starts at index 1. If we use the statement *“if (results.length > 0) {}”*, the statement *“BLANK”* will never be printed to the screen.
- The class name sieve doesn’t start with an upper case letter
  - Changed the class name and file name to *“Sieve”*
- The method name sieve.PrintSieve(int[]) doesn’t start with a lower case letter
  - Change *“PrintSieve”* to *“printSieve”*
- Method invokes ineffeicient Number constructor; use static valueOf instead (convertResults)
  - In sieve.convertResults(), I changed *“actual.add(new Integer(j + 1));”* to *“actual.add(Integer.valueOf(j + 1));”*

### CheckStyle

- Local variable name 'c' must match pattern *“^[a-z][a-z0-9][a-zA-Z0-9]\*\$”*. [LocalVariableName]
  - Changed ‘c’ to ‘charHolder’ in *printsieve(int[], Boolean[])* even though the method is unused.
- First sentence of Javadoc is incomplete (period is missing) or not present. [SummaryJavadoc]
  - Added a sentence with a period to the Javadoc comment before the *getTrueArray()* method
- Parameter name 's' must match pattern *“^[a-z][a-z0-9][a-zA-Z0-9]\*\$”*. [ParameterName]
  - Changed ‘s’ to ‘size’ in *getTrueArray()* method
- Array brackets at illegal position. [ArrayTypeStyle]
  - Changed *“boolean toReturn[] = new boolean[size];”* to *“Boolean[] toReturn = new boolean[size];”* in the *getTrueArray()* method.
- Array brackets at illegal position. [ArrayTypeStyle]
  - Changed *“convertResults(int[] results, boolean prime[] )”* to *“convertResults(int[] results, Boolean[] prime )”*
- Empty else block. [EmptyBlock]
  - Deleted an extra *else{}* statement within the *calculateMax()* method.
- Catching 'Exception' is not allowed. [IllegalCatch]
  - Change *“Try{}Catch((Exception ex)){}”* to *““Try{}Catch((IllegalArgumentException ex)){}”*

## SUMMARY (continued)

I first ran the FindBugs GUI and fixed all the bugs accordingly. I then wrote Unit Tests for the `calculateMax()` method because the method caused a defect visible to the user. I also found an issue with the `printSieve()` method and saw how the “BLANK” statement would never be printed. So I wrote some unit tests for this method as well. I then finished up with fixing the issues that CheckStyle found.

After completing the fixes for CheckStyle I noticed that 2 of my unit tests were now failing. While fixing the CheckStyle issues I ended up deleting the code that threw the `Illegal Argument Exceptions` and the `TryCatch` in main that caught them because the CheckStyle said ‘*Catching Exception is not allowed*’. So now my Unit Tests were failing because the tests were expecting to see an `IllegalArgumentException()` thrown. This is when I realized I changed the behavior of the `calculateMax()` method which is a big mistake. I then ended up putting the exceptions back along with the `TryCatch` statement that now caught ‘*IllegalArgumentException ex*’ instead of ‘*Exception ex*’. This was a great example of why writing unit tests before changing code is good practice.

Code can be found:

[https://github.com/njs55/Nathan\\_Spangler\\_CS1632\\_QA\\_Deliverables/tree/master/Deliverable6](https://github.com/njs55/Nathan_Spangler_CS1632_QA_Deliverables/tree/master/Deliverable6)

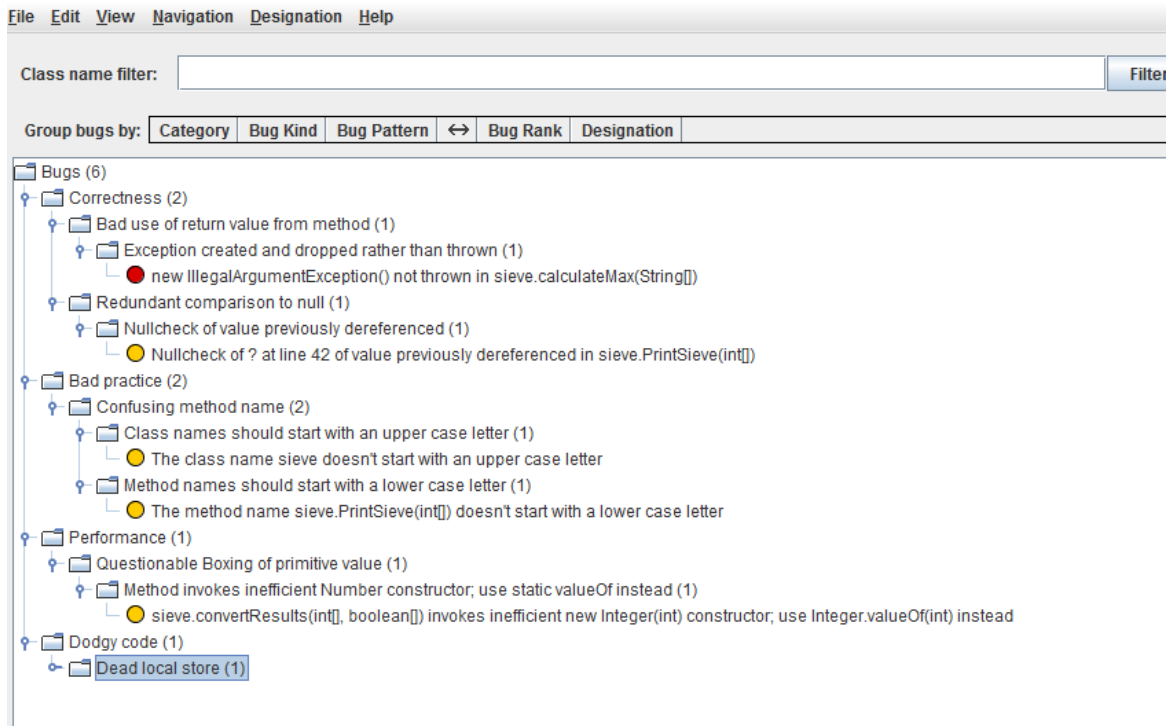
OR

<https://github.com/njs55/bug-fodder>

## SCREENSHOTS

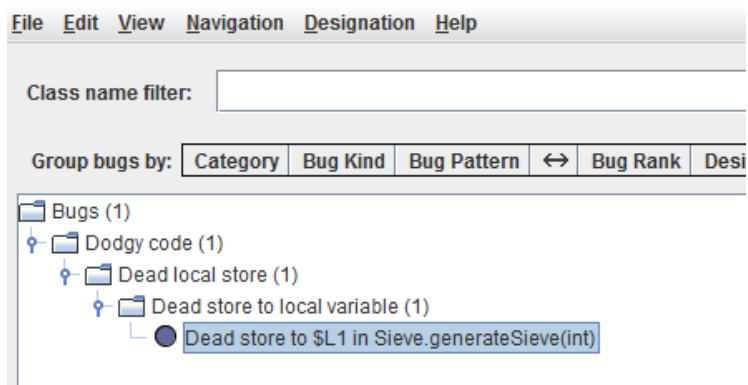
FindBugs untouched.

### FindBugs - deliverable6



FindBugs after 5 Bugs were fixed. (Dead store to local variable ignored)

### FindBugs - deliverable6



CheckStyle results after performing FindBugs fixes.

```
PS C:\Users\Nate\..findbugsworkspace>
PS C:\Users\Nate\..findbugsworkspace> java -jar ./checkstyle-7.0-all.jar -c ./google_checks_modified.xml ./Sieve.java
Starting audit...
[WARN] C:\Users\Nate\Documents\Classes\Summer 2016\Quality Assurance\deliverable6\findbugsworkspace\..Sieve.java:16:18: Local var
iable name 'c' must match pattern '^[a-z][a-z0-9][a-zA-Z0-9]*$'. [LocalVariableName]
[WARN] C:\Users\Nate\Documents\Classes\Summer 2016\Quality Assurance\deliverable6\findbugsworkspace\..Sieve.java:53: First senten
ce of Javadoc is incomplete (period is missing) or not present. [SummaryJavadoc]
[WARN] C:\Users\Nate\Documents\Classes\Summer 2016\Quality Assurance\deliverable6\findbugsworkspace\..Sieve.java:57:46: Parameter
name 's' must match pattern '^[a-z][a-z0-9][a-zA-Z0-9]*$'. [ParameterName]
[WARN] C:\Users\Nate\Documents\Classes\Summer 2016\Quality Assurance\deliverable6\findbugsworkspace\..Sieve.java:58:25: Array bra
ckets at illegal position. [ArrayTypeStyle]
[WARN] C:\Users\Nate\Documents\Classes\Summer 2016\Quality Assurance\deliverable6\findbugsworkspace\..Sieve.java:75:68: Array bra
ckets at illegal position. [ArrayTypeStyle]
[WARN] C:\Users\Nate\Documents\Classes\Summer 2016\Quality Assurance\deliverable6\findbugsworkspace\..Sieve.java:191:20: Empty el
se block. [EmptyBlock]
[WARN] C:\Users\Nate\Documents\Classes\Summer 2016\Quality Assurance\deliverable6\findbugsworkspace\..Sieve.java:224:11: catching
'Exception' is not allowed. [IllegalCatch]
Audit done.
```

CheckStyle results after fixing all issues CheckStyle found above.

```
PS C:\Users\Nate\..findbugsworkspace> java -jar ./checkstyle-7.0-all.jar -c ./google_checks_modified.xml ./Sieve.java
Starting audit...
Audit done.
```