The Patches of the Nopol Automatic Repair System on the Bugs of Defects4J version 1.1.0

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The Patches of the Nopol Automatic Repair System on the Bugs of Defects4J version 1.1.0

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Technical report hal-01480084
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This report lists the test-suite adequate patches found by the Nopol automatic repair system [3] on version 1.1.0 of the Defects4J benchmark of bugs [2]. In total, Nopol finds a test-suite adequate patches for 103 different bugs, as shown in Table 1.

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We the Oracle JDK 1.7.0_7 to run Nopol and OpenJDK 1.8.0 for compiling the project Mockito. We give a time budget of three hours to Nopol to find a patch. The experiment has been conducted on machines that are equipped of Xeon X3440 Quad-core processor and 15GB RAM, the machines are part of the Grid5000 infrastructure [1].

Reproduction information:
• Nopol source code: https://github.com/SpoonLabs/nopol/
  Commit used: 473964c2d5c668517bd45be1d878074858cb934f
• Defects4j version: https://github.com/rjust/defects4j/releases/tag/v1.1.0/
• Execution traces: https://github.com/Spirals-Team/defects4j-repair/tree/master/results/2017-march/

1 Chart
Nopol repairs 9 bugs in the project Chart.

1.1 Chart 3

--- /tmp/chart_3_Nopol/source/org/jfree/data/time/TimeSeries.java
+++ /tmp/chart_3_Nopol/source/org/jfree/data/time/TimeSeries.java
@@ -884,3 +884,3 @@
    }
-   if (removed) {
+   if (removed) {
Table 1: The number of synthesized test-suite adequate patches for each project.

<table>
<thead>
<tr>
<th>Project</th>
<th># Patches</th>
<th># Bugs</th>
<th>Repair Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chart</td>
<td>9</td>
<td>26</td>
<td>37%</td>
</tr>
<tr>
<td>Closure</td>
<td>56</td>
<td>133</td>
<td>42%</td>
</tr>
<tr>
<td>Lang</td>
<td>4</td>
<td>65</td>
<td>6%</td>
</tr>
<tr>
<td>Math</td>
<td>24</td>
<td>106</td>
<td>22%</td>
</tr>
<tr>
<td>Mockito</td>
<td>2</td>
<td>38</td>
<td>5%</td>
</tr>
<tr>
<td>Time</td>
<td>8</td>
<td>27</td>
<td>29%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>103</strong></td>
<td><strong>395</strong></td>
<td><strong>26%</strong></td>
</tr>
</tbody>
</table>

Listing 1: "The generated patch for the bug Chart 3"

Number of tests that execute the patch: 86
Execution time: 50 seconds

Listing 2: "The generated patch for the bug Chart 4"

Number of tests that execute the patch: 18
Execution time: 7 minutes, 32 seconds

Listing 3: "The generated patch for the bug Chart 5"

Number of tests that execute the patch: 6
Execution time: 38 seconds

Listing 4: "The generated patch for the bug Chart 9"

Number of tests that execute the patch: 4
Execution time: 34 seconds

Listing 4: "The generated patch for the bug Chart 13"
Listing 5: "The generated patch for the bug Chart 13"

Number of tests that execute the patch: 2
Execution time: 42 seconds

1.6 Chart 17

Listing 6: "The generated patch for the bug Chart 17"

Number of tests that execute the patch: 4
Execution time: 33 seconds

1.7 Chart 21

Listing 7: "The generated patch for the bug Chart 21"

Number of tests that execute the patch: 12
Execution time: 37 seconds

1.8 Chart 25
Listing 8: "The generated patch for the bug Chart 25"

Number of tests that execute the patch: 10
Execution time: 33 seconds

1.9 Chart 26

Listing 9: "The generated patch for the bug Chart 26"

Number of tests that execute the patch: 48
Execution time: 1 minute, 40 seconds

2 Closure

Nopol repairs 56 bugs in the project Closure.

2.1 Closure 1

Listing 10: "The generated patch for the bug Closure 1"

Number of tests that execute the patch: 15
Execution time: 2 minutes, 4 seconds

2.2 Closure 2

Listing 11: "The generated patch for the bug Closure 2"

Number of tests that execute the patch: 17
Execution time: 2 minutes, 7 seconds

2.3 Closure 3
Listing 12: "The generated patch for the bug Closure 3"

Number of tests that execute the patch: 10
Execution time: 7 minutes, 8 seconds

2.4 Closure 5

Listing 13: "The generated patch for the bug Closure 5"

Number of tests that execute the patch: 8
Execution time: 1 minute, 51 seconds

2.5 Closure 7

Listing 14: "The generated patch for the bug Closure 7"

Number of tests that execute the patch: 358
Execution time: 3 minutes, 26 seconds

2.6 Closure 8
Listing 15: "The generated patch for the bug Closure 8"

Number of tests that execute the patch: 8
Execution time: 2 minutes, 28 seconds

2.7 Closure 10

Listing 16: "The generated patch for the bug Closure 10"

Number of tests that execute the patch: 8
Execution time: 4 minutes, 28 seconds

2.8 Closure 12

Listing 17: "The generated patch for the bug Closure 12"

Number of tests that execute the patch: 8
Execution time: 7 minutes, 35 seconds

2.9 Closure 14

Listing 18: "The generated patch for the bug Closure 14"

Number of tests that execute the patch: 7
2.10 Closure 15

--- /tmp/closure_15_Nopol/src/com/google/javascript/rhino/Node.java
+++ /tmp/closure_15_Nopol/src/com/google/javascript/rhino/Node.java
@@ -1429,7 +1429,9 @@
         if (diff != null) {
             return "Node tree inequality:" +
             "\nTree1:\n" + toStringTree() +
-           "\n\nTree2:\n" + node2.toStringTree() +
+           "\n\nTree2:\n" + node2.toStringTree() +
             "\nSubtree1: " + diff.nodeA.toStringTree() +
+           "\n\nSubtree2: " + diff.nodeB.toStringTree();
+         } else if (com.google.javascript.rhino.Node.this.type < 32) {
             return "Node tree inequality:" +
             "\nTree1:\n" + toStringTree() +
+           "\n\nTree2:\n" + node2.toStringTree() +
             "\nSubtree1: " + diff.nodeA.toStringTree() +
+           "\n\nSubtree2: " + diff.nodeB.toStringTree();
         }

Listing 19: "The generated patch for the bug Closure 15"

Number of tests that execute the patch: 8
Execution time: 7 minutes, 28 seconds

2.11 Closure 16

--- /tmp/closure_16_Nopol/src/com/google/javascript/rhino/Node.java
+++ /tmp/closure_16_Nopol/src/com/google/javascript/rhino/Node.java
@@ -1445,3 +1445,5 @@
         if (! isEquivalentTo(node2, false, false)) {
             return new NodeMismatch(this, node2);
+            if (com.google.javascript.rhino.Node.this.sourcePosition <= 1) {
+                return new NodeMismatch(this, node2);
+            }
         } else if (rValue.isOr()) {

Listing 20: "The generated patch for the bug Closure 16"

Number of tests that execute the patch: 12
Execution time: 4 minutes, 12 seconds

2.12 Closure 17

--- /tmp/closure_17_Nopol/src/com/google/javascript/jscomp/TypedScopeCreator.java
+++ /tmp/closure_17_Nopol/src/com/google/javascript/jscomp/TypedScopeCreator.java
@@ -1294,3 +1294,5 @@
         // then we can safely use that.
         return rValue.getJSType();
+        if (!FunctionAnalysisResults.size().length() == -1 +
            com.google.javascript.jscomp.TypedScopeCreator.DELEGATE_PROXY_SUFFIX.
            functionAnalysisResults.size()) { return rValue.getJSType();
+        } else if (rValue.isOr()) {

Listing 21: "The generated patch for the bug Closure 17"

Number of tests that execute the patch: 25
Execution time: 2 minutes, 1 second

2.13 Closure 18

--- /tmp/closure_18_Nopol/src/com/google/javascript/rhino/Node.java
+++ /tmp/closure_18_Nopol/src/com/google/javascript/rhino/Node.java
@@ -1429,7 +1429,9 @@
         if (diff != null) {
             return "Node tree inequality:" +
             "\nTree1:\n" + toStringTree() +
-           "\n\nTree2:\n" + node2.toStringTree() +
+           "\n\nTree2:\n" + node2.toStringTree() +
             "\nSubtree1: " + diff.nodeA.toStringTree() +
+           "\n\nSubtree2: " + diff.nodeB.toStringTree();
+         }

Listing 22: "The generated patch for the bug Closure 18"

Number of tests that execute the patch: 1
Execution time: 2 minutes, 1 second
2.14 Closure 20

```java
--- /tmp/closure_20_Nopol/src/com/google/javascript/rhino/Node.java
+++ /tmp/closure_20_Nopol/src/com/google/javascript/rhino/Node.java
@@ -1429,7 +1429,9 @@
   if (diff != null) {
     return "Node tree inequality:"
     + "\nTree1:\n" + toStringTree() +
     + "\nTree2:\n" + node2.toStringTree() +
     + "\nSubtree1: " + diff.nodeA.toStringTree() +
     + "\nSubtree2: " + diff.nodeB.toStringTree();
+ if (com.google.javascript.rhino.Node.this.type < 32) {
+ return "Node tree inequality:" +
+ "\nTree1:\n" + toStringTree() +
+ "\nTree2:\n" + node2.toStringTree() +
+ "\nSubtree1: " + diff.nodeA.toStringTree() +
+ "\nSubtree2: " + diff.nodeB.toStringTree();
   }
}
```

Listing 23: "The generated patch for the bug Closure 20"

Number of tests that execute the patch: 8
Execution time: 2 minutes

2.15 Closure 21

```java
--- /tmp/closure_21_Nopol/src/com/google/javascript/jscomp/CheckSideEffects.java
+++ /tmp/closure_21_Nopol/src/com/google/javascript/jscomp/CheckSideEffects.java
@@ -115,6 +115,8 @@
+ if (com.google.javascript.jscomp.CheckSideEffects.PROTECTOR_FN.length()==0) {
+   for (Node an : parent.getAncestors()) {
+   int ancestorType = an.getType();
+   if (ancestorType == Token.COMMA) continue;
+   if (ancestorType != Token.EXPR_RESULT && ancestorType != Token.BLOCK) return;
+   else break;
+   }
+ }
```

Listing 24: "The generated patch for the bug Closure 21"

Number of tests that execute the patch: 3
Execution time: 1 minute, 59 seconds

2.16 Closure 22

```java
--- /tmp/closure_22_Nopol/src/com/google/javascript/jscomp/CheckSideEffects.java
+++ /tmp/closure_22_Nopol/src/com/google/javascript/jscomp/CheckSideEffects.java
@@ -115,6 +115,8 @@
+ if (com.google.javascript.jscomp.CheckSideEffects.PROTECTOR_FN.length()==0) {
+   if (ancestorType != Token.EXPR_RESULT && ancestorType != Token.BLOCK) return;
+   else break;
+ }
```

Listing 25: "The generated patch for the bug Closure 22"

Number of tests that execute the patch: 3
2.17 Closure 26

```
--- /tmp/closure_26_Nopol/src/com/google/javascript/rhino/Node.java
+++ /tmp/closure_26_Nopol/src/com/google/javascript/rhino/Node.java
@@ -1429,7 +1429,9 @@
     if ( diff != null ) {
         return "Node tree inequality:" +
         "\nTree1:\n" + toStringTree() +
-        "\n\nTree2:\n" + node2.toStringTree() +
-        "\n\nSubtree1: " + diff.nodeA.toStringTree() +
-        "\n\nSubtree2: " + diff.nodeB.toStringTree();
+        if ((com.google.javascript.rhino.Node.this.type) != (node2.type)) {
+            return "Node tree inequality:" +
+            "\nTree1:\n" + toStringTree() +
+            "\nTree2:\n" + node2.toStringTree() +
+            "\nSubtree1: " + diff.nodeA.toStringTree() +
+            "\nSubtree2: " + diff.nodeB.toStringTree();
         }
+     }
```

Listing 26: "The generated patch for the bug Closure 26"

Number of tests that execute the patch: 14
Execution time: 3 minutes, 34 seconds

2.18 Closure 28

```
--- /tmp/closure_28_Nopol/src/com/google/javascript/rhino/Node.java
+++ /tmp/closure_28_Nopol/src/com/google/javascript/rhino/Node.java
@@ -1429,7 +1429,9 @@
     if ( diff != null ) {
         return "Node tree inequality:" +
         "\nTree1:\n" + toStringTree() +
-        "\n\nTree2:\n" + node2.toStringTree() +
-        "\n\nSubtree1: " + diff.nodeA.toStringTree() +
-        "\n\nSubtree2: " + diff.nodeB.toStringTree();
+        if (com.google.javascript.rhino.Node.this.type < 32) {
+            return "Node tree inequality:" +
+            "\nTree1:\n" + toStringTree() +
+            "\nTree2:\n" + node2.toStringTree() +
+            "\nSubtree1: " + diff.nodeA.toStringTree() +
+            "\nSubtree2: " + diff.nodeB.toStringTree();
         }
+     }
```

Listing 27: "The generated patch for the bug Closure 28"

Number of tests that execute the patch: 8
Execution time: 1 minute, 55 seconds

2.19 Closure 29

```
--- /tmp/closure_29_Nopol/src/com/google/javascript/rhino/Node.java
+++ /tmp/closure_29_Nopol/src/com/google/javascript/rhino/Node.java
@@ -1429,7 +1429,9 @@
     if ( diff != null ) {
         return "Node tree inequality:" +
         "\nTree1:\n" + toStringTree() +
-        "\n\nTree2:\n" + node2.toStringTree() +
-        "\n\nSubtree1: " + diff.nodeA.toStringTree() +
-        "\n\nSubtree2: " + diff.nodeB.toStringTree();
+        if ((com.google.javascript.rhino.Node.this.type) != (node2.type)) {
+            return "Node tree inequality:" +
+            "\nTree1:\n" + toStringTree() +
+            "\nTree2:\n" + node2.toStringTree() +
+            "\nSubtree1: " + diff.nodeA.toStringTree() +
+            "\nSubtree2: " + diff.nodeB.toStringTree();
         }
+     }
```

Listing 28: "The generated patch for the bug Closure 29"

Number of tests that execute the patch: 12
Execution time: 2 minutes

2.20 Closure 30
Listing 29: "The generated patch for the bug Closure 30"
Number of tests that execute the patch: 5
Execution time: 1 minute, 45 seconds

2.21 Closure 31

Listing 30: "The generated patch for the bug Closure 31"
Number of tests that execute the patch: 3
Execution time: 1 minute, 54 seconds

2.22 Closure 33

Listing 31: "The generated patch for the bug Closure 33"
Number of tests that execute the patch: 8
Execution time: 1 minute, 52 seconds

2.23 Closure 35

Number of tests that execute the patch: 8
Execution time: 1 minute, 52 seconds
if ((fieldName.length()) != (5)) {
    if (builder.addProperty(fieldName, fieldType, fieldNameNode) == null) {
        // Duplicate field name, warning and skip
        reporter.warning("Duplicate record field " + fieldName,
                         sourceName,
                         n.getLineNo(), fieldNameNode.getLineNo());
    }
}

Number of tests that execute the patch: 26
Execution time: 2 minutes, 43 seconds

Listing 32: "The generated patch for the bug Closure 35"

2.24 Closure 36

--- /tmp/closure_36_Nopol/src/com/google/javascript/rhino/Node.java
+++ /tmp/closure_36_Nopol/src/com/google/javascript/rhino/Node.java
@@ -1416 ,7 +1416 ,9 @@
     if (diff != null) {
         return "Node tree inequality:" +
             "\nTree1:\n" + toStringTree() +
-        "\nTree2:\n" + node2.toStringTree() +
-        "\nSubtree1: " + diff.nodeA.toStringTree() +
-        "\nSubtree2: " + diff.nodeB.toStringTree();
+        if (com.google.javascript.rhino.Node.this.type <= com.google.javascript.rhino.Node.IS_DISPATCHER) {
+            return "Node tree inequality:" +
+                "\nTree1:\n" + toStringTree() +
+                "\nTree2:\n" + node2.toStringTree() +
+                "\nSubtree1: " + diff.nodeA.toStringTree() +
+                "\nSubtree2: " + diff.nodeB.toStringTree();
+        }
}

Number of tests that execute the patch: 3
Execution time: 1 minute, 48 seconds

Listing 33: "The generated patch for the bug Closure 36"

2.25 Closure 38

--- /tmp/closure_38_Nopol/src/com/google/javascript/jscomp/CodeConsumer.java
+++ /tmp/closure_38_Nopol/src/com/google/javascript/jscomp/CodeConsumer.java
@@ -244 ,3 +244 ,3 @@
     boolean negativeZero = isNegativeZero(x);
-    if (x < 0 && prev == '-') {
+    if ((prev == '-')) {
            add(" ");

Number of tests that execute the patch: 1665
Execution time: 3 minutes, 11 seconds

Listing 34: "The generated patch for the bug Closure 38"

2.26 Closure 40

--- /tmp/closure_40_Nopol/src/com/google/javascript/rhino/Node.java
+++ /tmp/closure_40_Nopol/src/com/google/javascript/rhino/Node.java
@@ -1411 ,7 +1411 ,9 @@
     if (diff != null) {
         return "Node tree inequality:" +
             "\nTree1:\n" + toStringTree() +
-        "\nTree2:\n" + node2.toStringTree() +
-        "\nSubtree1: " + diff.nodeA.toStringTree() +
-        "\nSubtree2: " + diff.nodeB.toStringTree();
+        if (com.google.javascript.rhino.Node.this.type < 32) {
+            return "Node tree inequality:" +
+                "\nTree1:\n" + toStringTree() +
+                "\nTree2:\n" + node2.toStringTree() +
+                "\nSubtree1: " + diff.nodeA.toStringTree() +
+                "\nSubtree2: " + diff.nodeB.toStringTree();
+        }
}

Listing 35: "The generated patch for the bug Closure 40"
Number of tests that execute the patch: 3
Execution time: 2 minutes, 7 seconds

2.27 Closure 45

Listing 36: "The generated patch for the bug Closure 45"

Number of tests that execute the patch: 68
Execution time: 1 minute, 47 seconds

2.28 Closure 49

Listing 37: "The generated patch for the bug Closure 49"

Number of tests that execute the patch: 4
Execution time: 1 minute, 50 seconds

2.29 Closure 50

Listing 38: "The generated patch for the bug Closure 50"

Number of tests that execute the patch: 4
Execution time: 1 minute, 50 seconds

2.30 Closure 55
Listing 39: "The generated patch for the bug Closure 55"

Number of tests that execute the patch: 11
Execution time: 2 minutes, 14 seconds

2.31 Closure 60

Listing 40: "The generated patch for the bug Closure 60"

Number of tests that execute the patch: 31
Execution time: 12 minutes, 12 seconds

2.32 Closure 61

Listing 41: "The generated patch for the bug Closure 61"

Number of tests that execute the patch: 4
Execution time: 1 minute, 39 seconds

2.33 Closure 62
if ( error != null ) {
    for ( int i = 0; i < charno; i++) {
        // at the end of the line
        if (excerpt.equals(LINE)) {
            & & 0 <= charno & & charno < sourceExcerpt.length() ) {
                for ( int i = 0; i < charno; i++) {

Listing 43: "The generated patch for the bug Closure 63"

Number of tests that execute the patch: 5
Execution time: 1 minute, 31 seconds

2.35 Closure 66

--- /tmp/closure_66_Nopol/src/com/google/javascript/jscomp/TypeCheck.java
+++ /tmp/closure_66_Nopol/src/com/google/javascript/jscomp/TypeCheck.java
@@ -821,3 +821,5 @@
    if ( type == null ) {
-        nullCount ++;
+        if (com.google.javascript.jscomp.TypeCheck.this.inExterns) {
+            nullCount ++;
+        }
    } else if (type.isUnknownType()) {

Listing 44: "The generated patch for the bug Closure 66"

Number of tests that execute the patch: 166
Execution time: 2 minutes, 21 seconds

2.36 Closure 67

--- /tmp/closure_67_Nopol/src/com/google/javascript/rhino/Node.java
+++ /tmp/closure_67_Nopol/src/com/google/javascript/rhino/Node.java
@@ -1384,7 +1384,9 @@
    if ( diff != null ) {
        return "Node tree inequality:" +
-            "\nTree1:\n" + toStringTree() +
-            "\nTree2:\n" + node2.toStringTree() +
-            "\nSubtree1: " + diff.nodeA.toStringTree() +
-            "\nSubtree2: " + diff.nodeB.toStringTree();
+            if ((com.google.javascript.rhino.Node.this.type) != (node2.type)) {
+                return "Node tree inequality:" +
+                    "\nTree1:\n" + toStringTree() +
+                    "\nTree2:\n" + node2.toStringTree() +
+                    "\nSubtree1: " + diff.nodeA.toStringTree() +
+                    "\nSubtree2: " + diff.nodeB.toStringTree();
+    }

Listing 45: "The generated patch for the bug Closure 67"

Number of tests that execute the patch: 2
Execution time: 1 minute, 37 seconds
TreeNode: toStringTree() +
  "\n\nTree1: " + toStringTree() +
  "\n\nTree2: " + node2.toStringTree() +
  "\n\nSubtree1: " + diff.nodeA.toStringTree() +
  "\n\nSubtree2: " + diff.nodeB.toStringTree();
+ }
}

Listing 46: "The generated patch for the bug Closure 72"

Number of tests that execute the patch: 2
Execution time: 1 minute, 32 seconds

2.38 Closure 75

--- /tmp/closure_75_Nopol/src/com/google/javascript/rhino/Node.java
+++ /tmp/closure_75_Nopol/src/com/google/javascript/rhino/Node.java
@@ -1410 ,3 +1410 ,5 @@
+    if (node2.type < com.google.javascript.rhino.Node.FUNCTION_PROP) {
+      if (res != null) {
+        return "Node tree inequality:"
+          "\n\nTree1: " + toStringTree() +
+          "\n\nTree2: " + node2.toStringTree() +
+          "\n\nSubtree1: " + diff.nodeA.toStringTree() +
+          "\n\nSubtree2: " + diff.nodeB.toStringTree();
+      }
+    }
+
Listing 47: "The generated patch for the bug Closure 75"

Number of tests that execute the patch: 3164
Execution time: 24 minutes, 1 second

2.39 Closure 76

--- /tmp/closure_76_Nopol/src/com/google/javascript/rhino/Node.java
+++ /tmp/closure_76_Nopol/src/com/google/javascript/rhino/Node.java
@@ -1368 ,7 +1368 ,9 @@
-    if (diff != null) {
-      return "Node tree inequality:"
-        "\n\nTree1: " + toStringTree() +
-        "\n\nTree2: " + node2.toStringTree() +
-        "\n\nSubtree1: " + diff.nodeA.toStringTree() +
-        "\n\nSubtree2: " + diff.nodeB.toStringTree();
+    if (node2.type < com.google.javascript.rhino.Node.FUNCTION_PROP) {
+      if (res != null) {
+        return "Node tree inequality:"
+          "\n\nTree1: " + toStringTree() +
+          "\n\nTree2: " + node2.toStringTree() +
+          "\n\nSubtree1: " + diff.nodeA.toStringTree() +
+          "\n\nSubtree2: " + diff.nodeB.toStringTree();
+      }
+    }
+
Listing 48: "The generated patch for the bug Closure 76"

Number of tests that execute the patch: 5
Execution time: 1 minute, 30 seconds

2.40 Closure 78

--- /tmp/closure_78_Nopol/src/com/google/javascript/jscomp/PeepholeFoldConstants.java
+++ /tmp/closure_78_Nopol/src/com/google/javascript/jscomp/PeepholeFoldConstants.java
@@ -717 ,3 +717 ,5 @@
-    if (53 == 0) {
-      error(DiagnosticType.error("JSC_DIVIDE_BY_0_ERROR", "Divide by 0"), right);
+    if (53 == 0) {
+      error(DiagnosticType.error("JSC_DIVIDE_BY_0_ERROR", "Divide by 0"), right);
+      return null;
+
Listing 49: "The generated patch for the bug Closure 78"

Number of tests that execute the patch: 1
Execution time: 1 minute, 25 seconds

2.41 Closure 111

--- /tmp/closure_111_Nopol/src/com/google/javascript/rhino/testing/Asserts.java
+++ /tmp/closure_111_Nopol/src/com/google/javascript/rhino/testing/Asserts.java
@@ -102 ,3 +102 ,3 @@
-    if (a == null) {
-      (a == null) == (b == null));
-    if (a == null) {
-
Listing 50: "The generated patch for the bug Closure 111"

Number of tests that execute the patch: 381
Execution time: 2 minutes, 49 seconds

2.42 Closure 113

Number of tests that execute the patch: 26
Execution time: 2 minutes, 22 seconds

2.43 Closure 114

Number of tests that execute the patch: 8
Execution time: 2 minutes, 14 seconds

2.44 Closure 115

Number of tests that execute the patch: 14
Execution time: 2 minutes, 18 seconds

2.45 Closure 116

Number of tests that execute the patch: 14
Execution time: 2 minutes, 18 seconds
Listing 54: "The generated patch for the bug Closure 116"

Number of tests that execute the patch: 13
Execution time: 2 minutes, 13 seconds

Listing 55: "The generated patch for the bug Closure 119"

Number of tests that execute the patch: 394
Execution time: 32 minutes, 2 seconds

Listing 56: "The generated patch for the bug Closure 120"

Number of tests that execute the patch: 8
Execution time: 2 minutes, 11 seconds
Listing 57: "The generated patch for the bug Closure 121"

Number of tests that execute the patch: 8
Execution time: 2 minutes, 12 seconds

2.49 Closure 124

--- /tmp/closure_124_Nopol/src/com/google/javascript/rhino/Node.java
+++ /tmp/closure_124_Nopol/src/com/google/javascript/rhino/Node.java
@@ -1427,-7 +1427,9 @@ if (diff != null) {
-     return "Node tree inequality:" +
-         "\nTree1:\n" + toStringTree() +
-         "\nTree2:\n" + node2.toStringTree() +
-         "\nSubtree1: " + diff.nodeA.toStringTree() +
-         "\nSubtree2: " + diff.nodeB.toStringTree();
+     if (node2.type < com.google.javascript.rhino.Node.SIDE_EFFECT_FLAGS) {
+         return "Node tree inequality:" +
+             "\nTree1:\n" + toStringTree() +
+             "\nTree2:\n" + node2.toStringTree() +
+             "\nSubtree1: " + diff.nodeA.toStringTree() +
+             "\nSubtree2: " + diff.nodeB.toStringTree();
+     }
}

Listing 58: "The generated patch for the bug Closure 124"

Number of tests that execute the patch: 8
Execution time: 17 minutes, 49 seconds

2.50 Closure 126

--- /tmp/closure_126_Nopol/src/com/google/javascript/jscomp/MinimizeExitPoints.java
+++ /tmp/closure_126_Nopol/src/com/google/javascript/jscomp/MinimizeExitPoints.java
@@ -142,-3 +142,5 @@ Node finallyBlock = n.getLastChild();
-     tryMinimizeExits(finallyBlock, exitType, labelName);
+     if (0 == 1) {
+         tryMinimizeExits(finallyBlock, exitType, labelName);
+     }
}

Listing 59: "The generated patch for the bug Closure 126"

Number of tests that execute the patch: 2
Execution time: 2 minutes, 1 second

2.51 Closure 127

--- /tmp/closure_127_Nopol/src/com/google/javascript/rhino/Node.java
+++ /tmp/closure_127_Nopol/src/com/google/javascript/rhino/Node.java
@@ -1427,-7 +1427,9 @@ if (diff != null) {
-     return "Node tree inequality:" +
-         "\nTree1:\n" + toStringTree() +
-         "\nTree2:\n" + node2.toStringTree() +
-         "\nSubtree1: " + diff.nodeA.toStringTree() +
-         "\nSubtree2: " + diff.nodeB.toStringTree();
+     if (node2.type < com.google.javascript.rhino.Node.SIDE_EFFECT_FLAGS) {
+         return "Node tree inequality:" +
+             "\nTree1:\n" + toStringTree() +
+             "\nTree2:\n" + node2.toStringTree() +
+             "\nSubtree1: " + diff.nodeA.toStringTree() +
+             "\nSubtree2: " + diff.nodeB.toStringTree();
+     }
}

Listing 60: "The generated patch for the bug Closure 127"

Number of tests that execute the patch: 13
Execution time: 2 minutes, 4 seconds

2.52 Closure 129
Listing 61: "The generated patch for the bug Closure 129"

Number of tests that execute the patch: 8
Execution time: 2 minutes, 18 seconds

2.53 Closure 130

Listing 62: "The generated patch for the bug Closure 130"

Number of tests that execute the patch: 8
Execution time: 2 minutes, 3 seconds

2.54 Closure 131

Listing 63: "The generated patch for the bug Closure 131"

Number of tests that execute the patch: 9
Execution time: 2 minutes, 21 seconds

2.55 Closure 132
if (diff != null) {
    return "Node tree inequality:" + 
    "\nTree1:\n" + toStringTree() + 
    "\nTree2:\n" + node2.toStringTree() + 
    "\nSubtree1: " + diff.nodeA.toStringTree() + 
    "\nSubtree2: " + diff.nodeB.toStringTree();
}

if (com.google.javascript.rhino.Node.this.type <= com.google.javascript.rhino.Node.INFERRED_FUNCTION) {
    return "Node tree inequality:" + 
    "\nTree1:\n" + toStringTree() + 
    "\nTree2:\n" + node2.toStringTree() + 
    "\nSubtree1: " + diff.nodeA.toStringTree() + 
    "\nSubtree2: " + diff.nodeB.toStringTree();
}

Listing 64: "The generated patch for the bug Closure 132"

Number of tests that execute the patch: 8
Number of tests that execute the patch: 2 minutes, 25 seconds

2.56 Closure 133

--- /tmp/closure_133_Nopol/src/com/google/javascript/jscomp/parsing/JsDocInfoParser.java
+++ /tmp/closure_133_Nopol/src/com/google/javascript/jscomp/parsing/JsDocInfoParser.java
@@ -1412,4 +1412,3 @@
- if (token == JsDocToken.EOC || token == JsDocToken.EOL ||
- token == JsDocToken.EOF) {
+ if (com.google.javascript.jscomp.parsing.JsDocInfoParser.this.unreadToken != null) {
    return new ExtractionInfo("", token);
}

Listing 65: "The generated patch for the bug Closure 133"

Number of tests that execute the patch: 254
Number of tests that execute the patch: 4 minutes, 22 seconds

3 Lang

Nopol repairs 4 bugs in the project Lang.

3.1 Lang 44

--- /tmp/lang_44_Nopol/src/java/org/apache/commons/NumberUtils.java
+++ /tmp/lang_44_Nopol/src/java/org/apache/commons/NumberUtils.java
@@ -192,5 +192,3 @@
    case 'L' :
        if (dec == null 
            && exp == null 
@@ -201,3 +199,3 @@
        try {
            return createBigInteger(numeric);
        
Listing 66: "The generated patch for the bug Lang 44"

Number of tests that execute the patch: 3
Number of tests that execute the patch: 29 seconds

3.2 Lang 51

--- /tmp/lang_51_Nopol/src/java/org/apache/commons/BooleanUtils.java
+++ /tmp/lang_51_Nopol/src/java/org/apache/commons/BooleanUtils.java
@@ -676,6 +676,6 @@
    };
-    if (ch == 'Y') {
-        return 
-        (str.charAt(1) == 'E' || str.charAt(1) == 'e') &&
-        (str.charAt(2) == 'S' || str.charAt(2) == 's');
-    if (str != null) {
-        return 
-        (str.charAt(1) == 'E' || str.charAt(1) == 'e') &&

20
3.3 Lang 53

Listing 67: "The generated patch for the bug Lang 51"

Number of tests that execute the patch: 1
Execution time: 28 seconds

3.4 Lang 58

Listing 68: "The generated patch for the bug Lang 53"

Number of tests that execute the patch: 6
Execution time: 35 seconds

4 Math

Nopol repairs 24 bugs in the project Math.

4.1 Math 2

Listing 69: "The generated patch for the bug Lang 58"

Number of tests that execute the patch: 3
Execution time: 10 minutes, 26 seconds

4.2 Math 4
Listing 71: "The generated patch for the bug Math 4"
Number of tests that execute the patch: 24
Execution time: 6 minutes, 7 seconds

4.3 Math 7

Listing 72: "The generated patch for the bug Math 7"
Number of tests that execute the patch: 14
Execution time: 20 minutes, 6 seconds

4.4 Math 24

Listing 73: "The generated patch for the bug Math 24"
Number of tests that execute the patch: 2
Execution time: 9 minutes, 53 seconds

4.5 Math 28

Listing 74: "The generated patch for the bug Math 28"
Number of tests that execute the patch: 4
Execution time: 10 minutes, 31 seconds

4.6 Math 33
if (org.apache.commons.math3.optimization.linear.SimplexTableau.this.
    numSlackVariables < org.apache.commons.math3.optimization.linear.SimplexTableau.this.
    constraints.size()) {
    columnsToDrop.add(i);
}

Listing 75: "The generated patch for the bug Math 33"

Number of tests that execute the patch: 5
Execution time: 9 minutes, 59 seconds

4.7 Math 39

--- /tmp/math_39_Nopol/src/main/java/org/apache/commons/math/ode/nonstiff/
    AdaptiveStepsizeIntegrator.java
+++ /tmp/math_39_Nopol/src/main/java/org/apache/commons/math/ode/nonstiff/
    AdaptiveStepsizeIntegrator.java
@@ -263 ,3 +263 ,5 @@
    ratio = yDot0[j] / scale[j];
    yDotOnScale2 += ratio * ratio;
        this.maxStep)) {
        yDotOnScale2 += ratio * ratio;
    }

Listing 76: "The generated patch for the bug Math 39"

Number of tests that execute the patch: 101
Execution time: 6 minutes, 49 seconds

4.8 Math 40

--- /tmp/math_40_Nopol/src/main/java/org/apache/commons/math/analysis/solvers/
    BracketingNthOrderBrentSolver.java
+++ /tmp/math_40_Nopol/src/main/java/org/apache/commons/math/analysis/solvers/
    BracketingNthOrderBrentSolver.java
@@ -259 ,3 +259 ,3 @@
    // we have more points before the sign change, drop the lowest point

Listing 77: "The generated patch for the bug Math 40"

Number of tests that execute the patch: 19
Execution time: 10 minutes, 33 seconds

4.9 Math 41

--- /tmp/math_41_Nopol/src/main/java/org/apache/commons/math/stat/descriptive/moment/Mean.java
+++ /tmp/math_41_Nopol/src/main/java/org/apache/commons/math/stat/descriptive/moment/Mean.java
@@ -216 ,3 +216 ,5 @@
    }
    return xbarw + (correction/sumw);
    if (xbarw < length) {
    return xbarw + (correction/sumw);
    }

Listing 78: "The generated patch for the bug Math 41"

Number of tests that execute the patch: 6
Execution time: 4 minutes, 31 seconds

4.10 Math 42

    java
    java
@@ -346 ,3 +346 ,5 @@
    numSlackVariables <= org.apache.commons.math.optimization.linear.SimplexTableau.this.
    columnsToDrop.add(col);
    if (1 <= org.apache.commons.math.optimization.linear.SimplexTableau.this.
    numSlackVariables) {
    columnsToDrop.add(col);

Listing 79: "The generated patch for the bug Math 42"

Number of tests that execute the patch: 70
Execution time: 6 minutes, 23 seconds

23
Number of tests that execute the patch: 16
Execution time: 4 minutes, 39 seconds

4.11 Math 44

Listing 79: "The generated patch for the bug Math 42"

Number of tests that execute the patch: 137
Execution time: 7 minutes, 10 seconds

4.12 Math 49

Listing 80: "The generated patch for the bug Math 44"

Number of tests that execute the patch: 3
Execution time: 3 minutes, 18 seconds

4.13 Math 50
Listing 82: "The generated patch for the bug Math 50"

Number of tests that execute the patch: 21
Execution time: 8 minutes, 22 seconds

4.14 Math 57

--- /tmp/math_57_Nopol/src/main/java/org/apache/commons/math/stat/clustering/EuclideanIntegerPoint.java
+++ /tmp/math_57_Nopol/src/main/java/org/apache/commons/math/stat/clustering/EuclideanIntegerPoint.java
@@ -84,4 +84,6 @@
   for (int i = 0; i < point.length; i++) {
     if (point[i] != otherPoint[i]) {
       return false;
   + if (((otherPoint[i]) != (otherPoint.length)) {
   +   if (point[i] != otherPoint[i]) {
   +     return false;
   +   }
   + }

Listing 83: "The generated patch for the bug Math 57"

Number of tests that execute the patch: 5
Execution time: 3 minutes, 10 seconds

4.15 Math 58

--- /tmp/math_58_Nopol/src/main/java/org/apache/commons/math/analysis/function/Gaussian.java
+++ /tmp/math_58_Nopol/src/main/java/org/apache/commons/math/analysis/function/Gaussian.java
@@ -181,4 +181,6 @@
   if (param[2] <= 0) {
     throw new NotStrictlyPositiveException(param[2]);
   + if ((param[2]) == 0) {
   +   if (param[2] <= 0) {
   +     throw new NotStrictlyPositiveException(param[2]);
   +   }

Listing 84: "The generated patch for the bug Math 58"

Number of tests that execute the patch: 10
Execution time: 2 minutes, 54 seconds

4.16 Math 69

--- /tmp/math_69_Nopol/src/main/java/org/apache/commons/math/stat/correlation/PearsonsCorrelation.java
+++ /tmp/math_69_Nopol/src/main/java/org/apache/commons/math/stat/correlation/PearsonsCorrelation.java
@@ -192,3 +192,5 @@
   if (2 < nVars) {
     outMatrix.setEntry(j, i, corr);
   +   outMatrix.setEntry(i, j, corr);
   +   if (2 < nVars) {
   +     outMatrix.setEntry(j, 1, corr);
   +   }

Listing 85: "The generated patch for the bug Math 69"

Number of tests that execute the patch: 11
Execution time: 33 seconds

4.17 Math 73

--- /tmp/math_73_Nopol/src/main/java/org/apache.commons/math/analysis/solvers/UnivariateRealSolverImpl.java
+++ /tmp/math_73_Nopol/src/main/java/org/apache.commons/math/analysis/solvers/UnivariateRealSolverImpl.java
@@ -224,6 +224,6 @@
   protected void verifySequence(final double lower, final double initial, final double upper)
   {
     if (!(isSequence(lower, initial, upper)) {
Listing 86: "The generated patch for the bug Math 73"

Number of tests that execute the patch: 5
Execution time: 34 seconds

4.18 Math 78

Listing 87: "The generated patch for the bug Math 78"

Number of tests that execute the patch: 116
Execution time: 15 minutes, 41 seconds

4.19 Math 80

Listing 88: "The generated patch for the bug Math 80"

Number of tests that execute the patch: 1
Execution time: 39 seconds

4.20 Math 81

Listing 89: "The generated patch for the bug Math 81"

Number of tests that execute the patch: 4
Execution time: 40 seconds

4.21 Math 85
if (fa * fb >= 0.0) {
+ if (maximumIterations == initial) {
  throw new ConvergenceException(
- "number of iterations={0} , maximum iterations={1} , " +
- "initial={2} , lower bound={3} , upper bound={4} , final a value={5} , " +
- "final b value={6} , f(a)={7} , f(b)={8}" ,
- numIterations, maximumIterations, initial,
- lowerBound, upperBound, a, b, fa, fb);
+ "number of iterations={0} , maximum iterations={1} , " +
+ "initial={2} , lower bound={3} , upper bound={4} , final a value={5} , " +
+ "final b value={6} , f(a)={7} , f(b)={8}" ,
+ numIterations, maximumIterations, initial,
+ lowerBound, upperBound, a, b, fa, fb);
}

Listing 90: "The generated patch for the bug Math 85"

Number of tests that execute the patch: 17
Execution time: 37 seconds

4.22 Math 87

--- /tmp/math_87_Nopol/src/java/org/apache/commons/math/optimization/linear/SimplexTableau.java
+++ /tmp/math_87_Nopol/src/java/org/apache/commons/math/optimization/linear/SimplexTableau.java
@@ -160,4 +160,6 @@
 if (! restrictToNonNegative) {
- matrix[row][getSlackVariableOffset () - 1] =
+ if ((1) != (constraints.size())) {
+ matrix[row][getSlackVariableOffset () - 1] =
- getInvertedCoefficientSum (constraint.getCoefficients ());
+ getInvertedCoefficientSum (constraint.getCoefficients ());
+ }
+ }
}

Listing 91: "The generated patch for the bug Math 87"

Number of tests that execute the patch: 12
Execution time: 50 seconds

4.23 Math 88

--- /tmp/math_88_Nopol/src/java/org/apache/commons/math/optimization/linear/SimplexTableau.java
+++ /tmp/math_88_Nopol/src/java/org/apache/commons/math/optimization/linear/SimplexTableau.java
@@ -338,3 +338,5 @@
 if (tableau.getEntry (basicRow , j) == 1) {
- coefficients[i] = 0;
+ if (org.apache.commons.math.optimization.linear.SimplexTableau.this.
+ constraints.size() < org.apache.commons.math.optimization.linear.SimplexTableau.this.
+ numDecisionVariables) {
+ coefficients[i] = 0;
+ }
+ }
}

Listing 92: "The generated patch for the bug Math 88"

Number of tests that execute the patch: 3
Execution time: 23 seconds

4.24 Math 105

--- /tmp/math_105_Nopol/src/java/org/apache/commons/math/stat/regression/SimpleRegression.java
+++ /tmp/math_105_Nopol/src/java/org/apache/commons/math/stat/regression/SimpleRegression.java
@@ -107,3 +107,5 @@
 xbar = x;
 ybar = y;
+ if (y <= x) {
+ ybar = y;
+ }
+ } else {
+ }

Listing 93: "The generated patch for the bug Math 105"

Number of tests that execute the patch: 9
Execution time: 35 seconds

5 Mockito

Nopol repairs 2 bugs in the project Mockito.
5.1 Mockito 29

Listing 94: "The generated patch for the bug Mockito 29"

Number of tests that execute the patch: 5
Execution time: 18 seconds

5.2 Mockito 38

Listing 95: "The generated patch for the bug Mockito 38"

Number of tests that execute the patch: 173
Execution time: 3 minutes, 12 seconds

6 Time

Nopol repairs 8 bugs in the project Time.

6.1 Time 4

Listing 96: "The generated patch for the bug Time 4"

Number of tests that execute the patch: 75
Execution time: 56 seconds

6.2 Time 7

Listing 97: "The generated patch for the bug Time 7"

Number of tests that execute the patch: 84
Execution time: 43 seconds

6.3 Time 11
Listing 98: "The generated patch for the bug Time 11"

Number of tests that execute the patch: 18
Execution time: 53 seconds

6.4 Time 12

Listing 99: "The generated patch for the bug Time 12"

Number of tests that execute the patch: 159
Execution time: 1 minute, 29 seconds

6.5 Time 14

Listing 100: "The generated patch for the bug Time 14"

Number of tests that execute the patch: 63
Execution time: 37 seconds

6.6 Time 16

Listing 101: "The generated patch for the bug Time 16"

Number of tests that execute the patch: 20
Execution time: 85 seconds
Listing 101: "The generated patch for the bug Time 16"

Number of tests that execute the patch: 54
Execution time: 40 seconds

6.7 Time 18

```java
--- /tmp/time_18_Nopol/src/main/java/org/joda/time/chrono/BasicChronology.java
+++ /tmp/time_18_Nopol/src/main/java/org/joda/time/chrono/BasicChronology.java
@@ -604,3 +604,5 @@
    FieldUtils.verifyValueBounds(DateTimeFieldType.monthOfYear(), monthOfYear, 1,
    getMaxMonth(year));
- FieldUtils.verifyValueBounds(DateTimeFieldType.dayOfMonth(), dayOfMonth, 1,
+ if (!(10 == monthOfYear) && (((31) - (2)) != (dayOfMonth))) {
+    FieldUtils.verifyValueBounds(DateTimeFieldType.dayOfMonth(), dayOfMonth, 1,
    getDaysInYearMonth(year, monthOfYear));
    return getYearMonthDayMillis(year, monthOfYear, dayOfMonth);
```

Listing 102: "The generated patch for the bug Time 18"

Number of tests that execute the patch: 3456
Execution time: 7 minutes, 48 seconds

6.8 Time 19

```java
--- /tmp/time_19_Nopol/src/main/java/org/joda/time/DateTimeZone.java
+++ /tmp/time_19_Nopol/src/main/java/org/joda/time/DateTimeZone.java
@@ -899,3 +899,3 @@
    } else if (org.joda.time.DateTimeZone.this.iID != null) {
        long prev = previousTransition(instantAdjusted);
    }
```

Listing 103: "The generated patch for the bug Time 19"

Number of tests that execute the patch: 2139
Execution time: 3 minutes, 24 seconds

References

