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: 473964e2d5c66517bd45be1d878074858cbeb93d
• 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>Total</td>
<td>103</td>
<td>395</td>
<td>26%</td>
</tr>
</tbody>
</table>

```java
if ((( removed ) && ( removed )) || ( org . jfree . data . time . TimeSeries .
DEFAULT_RANGE_DESCRIPTION . length () <= org . jfree . data . time . TimeSeries .this .maxY )) {
findBoundsByIteration();
}
```

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

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

1.2 Chart 4

```java
--- /tmp/chart_4_Nopol/source/org/jfree/chart/plot/XYPlot.java
+++ /tmp/chart_4_Nopol/source/org/jfree/chart/plot/XYPlot.java
@@ -1606 ,3 +1606 ,5 @@
public void setRenderer ( XYItemRenderer renderer ) {
- setRenderer (0 , renderer);
+  if ( renderer != null ) {
+    setRenderer (0 , renderer);
+  }
}
```

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

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

1.3 Chart 5

```java
--- /tmp/chart_5_Nopol/source/org/jfree/data/xy/XYSeries.java
+++ /tmp/chart_5_Nopol/source/org/jfree/data/xy/XYSeries.java
@@ -562 ,3 +562 ,3 @@
    // append the value to the list...
-  if ( this . autoSort ) {
+  if ( overwritten != null ) {
    this . data . add (- index - 1, new XYDataItem (x, y));
```

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

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

1.4 Chart 9

```java
--- /tmp/chart_9_Nopol/source/org/jfree/data/time/TimeSeries.java
+++ /tmp/chart_9_Nopol/source/org/jfree/data/time/TimeSeries.java
@@ -882 ,3 +882 ,5 @@
if ( end < start ) {
-    throw new IllegalArgumentException("Requires start <= end.");
+    if ( org . jfree . data . time . TimeSeries .this .data .size () == org . jfree . data . time .
+        TimeSeries .this .range .length () ) {
+        throw new IllegalArgumentException("Requires start <= end.");
+    }
}
```

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

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

1.5 Chart 13
h[3] = h[2];

if (this.rightBlock != null) {
    RectangleConstraint c4 = new RectangleConstraint(0.0,
        new Range(0.0, constraint.getWidth() - w[2]),
        LengthConstraintType.RANGE, h[2], null,
        LengthConstraintType.FIXED);
    Size2D size = this.rightBlock.arrange(g2, c4);
    w[3] = size.width;
}

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

if (end < start) {
    throw new IllegalArgumentException("Requires start <= end.");
}

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

if (!(this.lower == range.lower)) {
    return false;
    if (((1 + org.jfree.data.Range.this.lower) - (-1) < org.jfree.data.Range.this.upper) || (org.jfree.data.Range.this.lower <= 0)) {
        return false;
    }
}

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

PlotOrientation orientation = plot.getOrientation();
    if (orientation == PlotOrientation.HORIZONTAL) {
        drawHorizontalItem(g2, state, dataArea, plot, domainAxis,
            rangeAxis, statData, row, column);
    }
    else if (orientation == PlotOrientation.VERTICAL) {
        drawVerticalItem(g2, state, dataArea, plot, domainAxis,
            rangeAxis, statData, row, column);
    }
else if (orientation == PlotOrientation.VERTICAL) {
    drawVerticalItem(g2, state, dataArea, plot, domainAxis, rangeAxis, statData, row, column);
} }

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

--- /tmp/chart_26_Nopol/source/org/jfree/chart/plot/CategoryPlot.java
+++ /tmp/chart_26_Nopol/source/org/jfree/chart/plot/CategoryPlot.java
@@ -2537,3 +2537,3 @@
    boolean b2 = (area.getHeight() <= MINIMUM_HEIGHT_TO_DRAW);
-    if (b1 || b2) {
-        if (org.jfree.chart.plot.CategoryPlot.DEFAULT_CROSSHAIR_STROKE != null) {
-            return;
-        }
+    if (org.jfree.chart.plot.CategoryPlot.DEFAULT_CROSSHAIR_STROKE != null) {
+        return;
+    }

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

--- /tmp/closure_1_Nopol/src/com/google/javascript/rhino/Node.java
+++ /tmp/closure_1_Nopol/src/com/google/javascript/rhino/Node.java
@@ -1410,7 +1410,9 @@
    if (diff != null) {
        if ((node2.type) != (com.google.javascript.rhino.Node.this.type)) {
            return "Node tree inequality:"
+            "+ "\nTree1:\n" + toStringTree() +
+            "\nTree2: \n" + node2.toStringTree() +
+            "\nSubtree1: " + diff.nodeA.toStringTree() +
+            "\nSubtree2: " + diff.nodeB.toStringTree();
            return "Node tree inequality:"
+            "+ "\nTree1:\n" + toStringTree() +
+            "\nTree2: \n" + node2.toStringTree() +
+            "\nSubtree1: " + diff.nodeA.toStringTree() +
+            "\nSubtree2: " + diff.nodeB.toStringTree();
        }
    }

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

--- /tmp/closure_2_Nopol/src/com/google/javascript/jscomp/TypeCheck.java
+++ /tmp/closure_2_Nopol/src/com/google/javascript/jscomp/TypeCheck.java
@@ -1663,4 +1663,6 @@
    currentProperties.clear();
   - checkInterfaceConflictProperties(t, n, functionPrivateName, properties, currentProperties, interfaceType);
   + if (com.google.jscomp.TypeCheck.this.unknownCount < com.google.jscomp.TypeCheck.this.typedCount) {
   +     checkInterfaceConflictProperties(t, n, functionPrivateName, properties, currentProperties, interfaceType);
   + }
   + properties.putAll(currentProperties);

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
+ "\n\nTree2: \n" + node2.toStringTree() +
+ "\nSubtree2: " + diff.nodeB.toStringTree();
+
}

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

--- /tmp/closure_10_Nopol/src/google/javascript/rhino/Node.java
+++ /tmp/closure_10_Nopol/src/google/javascript/rhino/Node.java
@@ -1432,7 +1432,9 @@
- if ( diff != null ) {
- return "Node tree inequality:" +
- "\nTree1: \n" + toStringTree() +
- "\nTree2: \n" + node2.toStringTree() +
- "\nSubtree1: " + diff.nodeA.toStringTree() +
- "\nSubtree2: " + diff.nodeB.toStringTree();
+ QUOTED_PROP ) {
+ return "Node tree inequality:" +
+ "\nTree1: \n" + toStringTree() +
+ "\nTree2: \n" + node2.toStringTree() +
+ "\nSubtree1: " + diff.nodeA.toStringTree() +
+ "\nSubtree2: " + diff.nodeB.toStringTree();
+ }
+
}

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

--- /tmp/closure_12_Nopol/src/google/javascript/rhino/Node.java
+++ /tmp/closure_12_Nopol/src/google/javascript/rhino/Node.java
@@ -1432,7 +1432,9 @@
- if ( diff != null ) {
- return "Node tree inequality:" +
- "\nTree1: \n" + toStringTree() +
- "\nTree2: \n" + node2.toStringTree() +
- "\nSubtree1: " + diff.nodeA.toStringTree() +
- "\nSubtree2: " + diff.nodeB.toStringTree();
+ QUOTED_PROP ) {
+ return "Node tree inequality:" +
+ "\nTree1: \n" + toStringTree() +
+ "\nTree2: \n" + node2.toStringTree() +
+ "\nSubtree1: " + diff.nodeA.toStringTree() +
+ "\nSubtree2: " + diff.nodeB.toStringTree();
+ }
+
}

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

--- /tmp/closure_14_Nopol/src/google/javascript/jscomp/ControlFlowAnalysis.java
+++ /tmp/closure_14_Nopol/src/google/javascript/jscomp/ControlFlowAnalysis.java
@@ -663,3 +663,5 @@
} else {
- finallyMap.put(lastJump, null);
- if ( com.google.javascript.jscpp.ControlFlowAnalysis.this.shouldTraverseFunctions ) {
- finallyMap.put(lastJump, null);
- }
+
}

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

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

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

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

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

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

2.14 Closure 20

```
--- /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

```
--- /tmp/closure_21_Nopol/src/com/google/javascript/jscomp/CheckSideEffects.java
+++ /tmp/closure_21_Nopol/src/com/google/javascript/jscomp/CheckSideEffects.java
@@ -117,7 +117,9 @@
     if (n == parent.getLastChild()) {
         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;
+            if (com.google.javascript.jscomp.CheckSideEffects.PROTECTORFN.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: 2
Execution time: 1 minute, 59 seconds

2.16 Closure 22

```
--- /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 @@
             return;
-            else
-                break;
+            if (com.google.javascript.jscomp.CheckSideEffects.PROTECTORFN.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
Execution time: 2 minutes, 24 seconds

2.17 Closure 26

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

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

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
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.getCharno());
    }
}

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

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

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();
+            IS_DISPATCHER) {
+            return "Node tree inequality:" +
+            "\nTree1:\n" + toStringTree() +
+            "\nTree2:\n" + node2.toStringTree() +
+            "\nSubtree1: " + diff.nodeA.toStringTree() +
+            "\nSubtree2: " + diff.nodeB.toStringTree();
+        }
    }

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

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

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(" ");
    }

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

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

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"
2.27 Closure 45

```java
--- /tmp/closure_45_Nopol/src/com/google/javascript/rhino/Node.java
+++ /tmp/closure_45_Nopol/src/com/google/javascript/rhino/Node.java
@@ -1403,7 +1403,9 @@
 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 36: "The generated patch for the bug Closure 45"

Number of tests that execute the patch: 3
Execution time: 2 minutes, 7 seconds

2.28 Closure 49

```java
--- /tmp/closure_49_Nopol/src/com/google/javascript/rhino/Node.java
+++ /tmp/closure_49_Nopol/src/com/google/javascript/rhino/Node.java
@@ -1566,7 +1566,9 @@
 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 37: "The generated patch for the bug Closure 49"

Number of tests that execute the patch: 68
Execution time: 1 minute, 41 seconds

2.29 Closure 50

```java
--- /tmp/closure_50_Nopol/src/com/google/javascript/rhino/Node.java
+++ /tmp/closure_50_Nopol/src/com/google/javascript/rhino/Node.java
@@ -1566,7 +1566,9 @@
 if (diff != null) {
     return "Node tree inequality:" +
     "\nTree1:\n" + toStringTree() +
-    "\nTree2:\n" + node2.toStringTree() +
-    "\nSubtree1: " + diff.nodeA.toStringTree() +
-    "\nSubtree2: " + diff.nodeB.toStringTree();
 LABEL_PROP) {
+        return "Node tree inequality:" +
+        "\nTree1:\n" + toStringTree() +
+        "\nTree2:\n" + node2.toStringTree() +
+        "\nSubtree1: " + diff.nodeA.toStringTree() +
+        "\nSubtree2: " + diff.nodeB.toStringTree();
    }
}
```

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

2.31 Closure 60

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

2.32 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++) {

Listing 42: "The generated patch for the bug Closure 62"

Number of tests that execute the patch: 5
Execution time: 1 minute, 32 seconds

2.34 Closure 63

--- /tmp/closure_63_Nopol/src/google/javascript/jscomp/LightweightMessageFormatter.java
+++ /tmp/closure_63_Nopol/src/google/javascript/jscomp/LightweightMessageFormatter.java
@@ -96,4 +96,3 @@
     // at the end of the line
     if (excerpt.equals(LINE)) {
         && 0 <= charno && charno < sourceExcerpt.length()) {
+         if (error!=null) {
             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/google/javascript/jscomp/TypeCheck.java
+++ /tmp/closure_66_Nopol/src/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/google/javascript/rhino/Node.java
+++ /tmp/closure_67_Nopol/src/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();
+          "\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

2.37 Closure 72

--- /tmp/closure_72_Nopol/src/google/javascript/rhino/Node.java
+++ /tmp/closure_72_Nopol/src/google/javascript/rhino/Node.java
@@ -1381,7 +1381,9 @@
     if (diff != null) {
         return "Node tree inequality:" +
         "\nTree1:\n" + toStringTree() +
-          "\nTree2:\n" + node2.toStringTree() +
-          "\nSubtree1: " + diff.nodeA.toStringTree() +
-          "\nSubtree2: " + diff.nodeB.toStringTree();
+          "\nTree1:\n" + toStringTree() +
+          "\nTree2:\n" + node2.toStringTree() +
+          "\nSubtree1: " + diff.nodeA.toStringTree() +
+          "\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, 37 seconds
Number of tests that execute the patch: 2
Execution time: 1 minute, 32 seconds

2.38 Closure 75

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

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

2.39 Closure 76

Listing 47: "The generated patch for the bug Closure 75"

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

2.40 Closure 78

Listing 48: "The generated patch for the bug Closure 76"

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

2.41 Closure 111

Listing 49: "The generated patch for the bug Closure 78"
2.42 Closure 113

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

Listing 50: "The generated patch for the bug Closure 111"

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

Listing 51: "The generated patch for the bug Closure 113"

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

Listing 52: "The generated patch for the bug 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

Listing 53: "The generated patch for the bug 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"
Listing 54: "The generated patch for the bug Closure 116"

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

2.46 Closure 119

--- /tmp/closure_119_Nop1/src/com/google/javascript/jscomp/GlobalNamespace.java
+++ /tmp/closure_119_Nop1/src/com/google/javascript/jscomp/GlobalNamespace.java
@@ -690 ,3 +690 ,5 @@
    handleGet (module, scope, n, parent, name, type);
    if (diff != null) {
        handleGet (module, scope, n, parent, name, type);
    } else {  
        return "Node tree inequality:" +
        "\n\nTree1:\n" + toStringTree() +
        "\n\nTree2:\n" + node2.toStringTree() +
        "\n\nSubtree1: " + diff.nodeA.toStringTree() +
        "\n\nSubtree2: " + diff.nodeB.toStringTree();
    }
}

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

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

2.47 Closure 120

--- /tmp/closure_120_Nop1/src/com/google/javascript/rhino/Node.java
+++ /tmp/closure_120_Nop1/src/com/google/javascript/rhino/Node.java
@@ -1429 ,7 +1429 ,9 @@
    if (diff != null) {
        return "Node tree inequality:" +
        "\n\nTree1:\n" + toStringTree() +
        "\n\nTree2:\n" + node2.toStringTree() +
        "\n\nSubtree1: " + diff.nodeA.toStringTree() +
        "\n\nSubtree2: " + diff.nodeB.toStringTree();
    }
    if (node2.type < com.google.javascript.rhino.Node.JSDOC_INFO_PROP) {
        return "Node tree inequality:" +
        "\n\nTree1:\n" + toStringTree() +
        "\n\nTree2:\n" + node2.toStringTree() +
        "\n\nSubtree1: " + diff.nodeA.toStringTree() +
        "\n\nSubtree2: " + diff.nodeB.toStringTree();
    }
}

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

Number of tests that execute the patch: 8
Execution time: 2 minutes, 11 seconds

2.48 Closure 121

--- /tmp/closure_121_Nop1/src/com/google/javascript/rhino/Node.java
+++ /tmp/closure_121_Nop1/src/com/google/javascript/rhino/Node.java
@@ -1429 ,7 +1429 ,9 @@
    if (diff != null) {
        return "Node tree inequality:" +
        "\n\nTree1:\n" + toStringTree() +
        "\n\nTree2:\n" + node2.toStringTree() +
        "\n\nSubtree1: " + diff.nodeA.toStringTree() +
        "\n\nSubtree2: " + diff.nodeB.toStringTree();
    }
    if (node2.type < com.google.javascript.rhino.Node.JSDOC_INFO_PROP) {
        return "Node tree inequality:" +
        "\n\nTree1:\n" + toStringTree() +
        "\n\nTree2:\n" + node2.toStringTree() +
        "\n\nSubtree1: " + diff.nodeA.toStringTree() +
        "\n\nSubtree2: " + diff.nodeB.toStringTree();
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() +
-   "\n\nTree2:\n" + node2.toStringTree() +
-   "\n\nSubtree1 : " + diff.nodeA.toStringTree() +
-   "\n\nSubtree2: " + diff.nodeB.toStringTree();
+   if ( node2.type < com.google.javascript.rhino.Node.SIDE_EFFECT_FLAGS ) {
+      return "Node tree inequality:" +
+      "\nTree1:\n" + toStringTree() +
+      "\n\nTree2:\n" + node2.toStringTree() +
+      "\n\nSubtree1 : " + diff.nodeA.toStringTree() +
+      "\n\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() +
-   "\n\nTree2:\n" + node2.toStringTree() +
-   "\n\nSubtree1 : " + diff.nodeA.toStringTree() +
-   "\n\nSubtree2: " + diff.nodeB.toStringTree();
+   if ( node2.type < com.google.javascript.rhino.Node.SIDE_EFFECT_FLAGS ) {
+      return "Node tree inequality:" +
+      "\nTree1:\n" + toStringTree() +
+      "\n\nTree2:\n" + node2.toStringTree() +
+      "\n\nSubtree1 : " + diff.nodeA.toStringTree() +
+      "\n\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: " + toStringTree() + "\nTree2: " + 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
Execution time: 2 minutes, 25 seconds

2.56 Closure 133

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

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

3 Lang

Nopol repairs 4 bugs in the project Lang.

3.1 Lang 44

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

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

3.2 Lang 51
3.3 Lang 53

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

3.4 Lang 58

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

Number of tests that execute the patch: 63
Execution time: 6 minutes, 18 seconds

4.2 Math 4
Number of tests that execute the patch: 24
Execution time: 6 minutes, 7 seconds

4.3 Math 7

Number of tests that execute the patch: 14
Execution time: 20 minutes, 6 seconds

4.4 Math 24

Number of tests that execute the patch: 2
Execution time: 9 minutes, 53 seconds

4.5 Math 28

Number of tests that execute the patch: 4
Execution time: 10 minutes, 31 seconds

4.6 Math 33
4.7 Math 39

+++ /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 try again with a lower interpolation order
-    if (signChangeIndex - start >= end - signChangeIndex) {
+    if (((signChangeIndex - start) >= (end - signChangeIndex)) || (xA <= org.apache.commons.math.analysis.solvers.BracketingNthOrderBrentSolver.REDUCTION_FACTOR)) {

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

--- /tmp/math_42_Nopol/src/main/java/org/apache/commons/math/optimization/linear/SimplexTableau.java
+++ /tmp/math_42_Nopol/src/main/java/org/apache/commons/math/optimization/linear/SimplexTableau.java
@@ -346,3 +346,5 @@
     if (getBasicRow(col) == null) {
-        columnsToAdd.add(col);
+        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"
Listing 79: "The generated patch for the bug Math 42"

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

4.11 Math 44

```java
--- /tmp/math_44_Nopol/src/main/java/org/apache/commons/math/ode/AbstractIntegrator.java
+++ /tmp/math_44_Nopol/src/main/java/org/apache/commons/math/ode/AbstractIntegrator.java
@@ -286 ,3 +286 ,5 @@
     statesInitialized = true;
+     if (1 == org.apache.commons.math.ode.AbstractIntegrator.this.stepHandlers.size) {
+         statesInitialized = true;
+     }
+
```

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

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

4.12 Math 49

```java
--- /tmp/math_49_Nopol/src/main/java/org/apache/commons/math/linear/OpenMapRealVector.java
+++ /tmp/math_49_Nopol/src/main/java/org/apache/commons/math/linear/OpenMapRealVector.java
@@ -666 ,3 +666 ,5 @@
 } else if (entries.containsKey(index)) {
     entries.remove(index);
+     if (org.apache.commons.math.linear.OpenMapRealVector.DEFAULT_ZERO_TOLERANCE == org.
+         apache.commons.math.linear.OpenMapRealVector.this.epsilon) {
+         entries.remove(index);
+     }
 
```

Listing 81: "The generated patch for the bug Math 49"

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

4.13 Math 50

```java
--- /tmp/math_50_Nopol/src/main/java/org/apache/commons/math/analysis/solvers/BaseSecantSolver.java
+++ /tmp/math_50_Nopol/src/main/java/org/apache/commons/math/analysis/solvers/BaseSecantSolver.java
@@ -236 ,15 +236 ,17 @@
         return (f1 <= 0) ? x1 : x0;
         case ABOVE_SIDE:
         return (f1 >= 0) ? x1 : x0;
+        default:
+                this.method != null)) || (f0 <= atol)) {
+            switch (allowed) {
+            case ANY_SIDE:
+                return x1;
+            case LEFT_SIDE:
+                return inverted ? x1 : x0;
+            case RIGHT_SIDE:
+                return inverted ? x0 : x1;
+            case BELOW_SIDE:
+                return (f1 <= 0) ? x1 : x0;
+            case ABOVE_SIDE:
+                return (f1 >= 0) ? x1 : x0;
+            default:
+                throw new MathInternalError();
+            }
+        }
 
```

24
Number of tests that execute the patch: 21
Execution time: 8 minutes, 22 seconds

4.14 Math 57

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

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

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
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
4.22 Math 87

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

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

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: 54
Execution time: 40 seconds

6.7 Time 18

--- /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, getDaysInYearMonth(year, monthOfYear));
    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

--- /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

