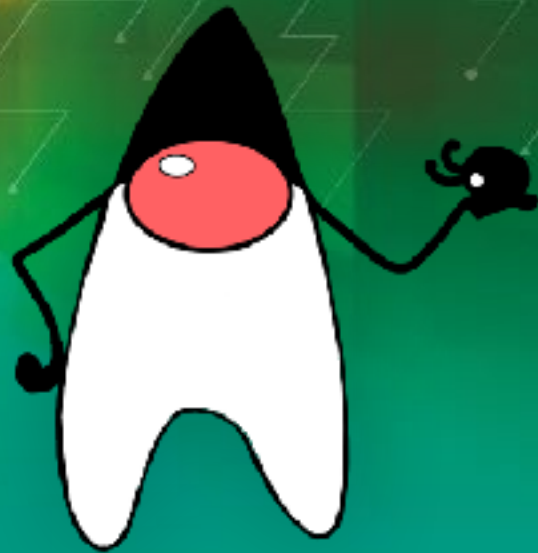


Internal life of your debugger

Nataliia Dziubenko





Nataliia Dziubenko
Software Engineer
Xebia, XSD

 @worth_exploring



```
...  
void do() {  
    int a = 5;  
    double b = 6d;  
    if (a > b) {  
        System.out.pr...  
    } else {  
        a = 0;  
        System.out...  
    }  
    ..  
}
```

App.java

COMPILE

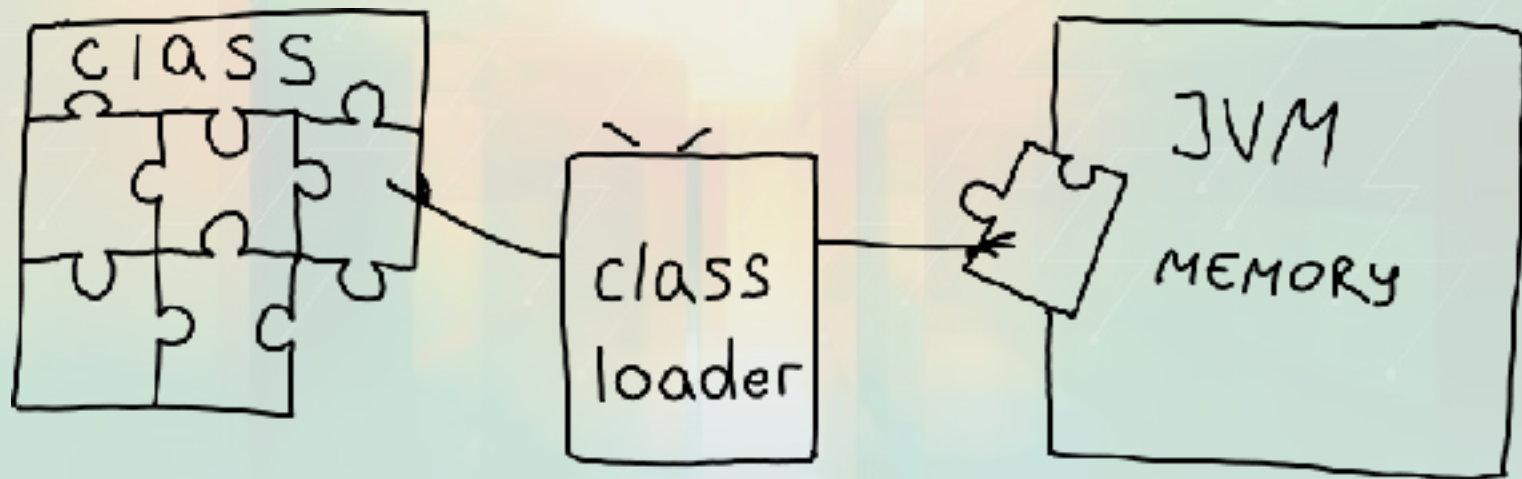
```
0: CA FE BA BE  
10: 63 6F 6D 2F  
20: 69 6E 67 70  
30: 62 74 6F 2F  
40: 63 65 42 54  
50: 6C 61 6E 67  
...
```

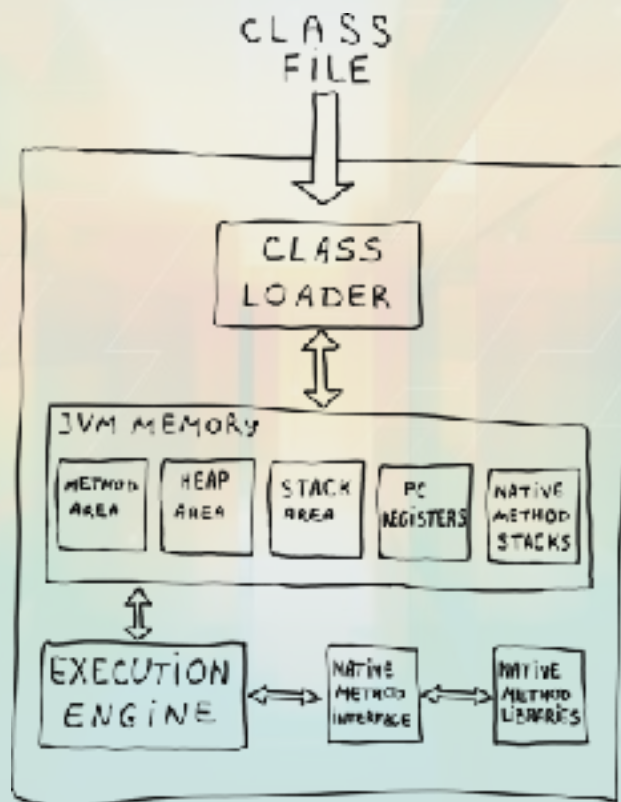
App.class

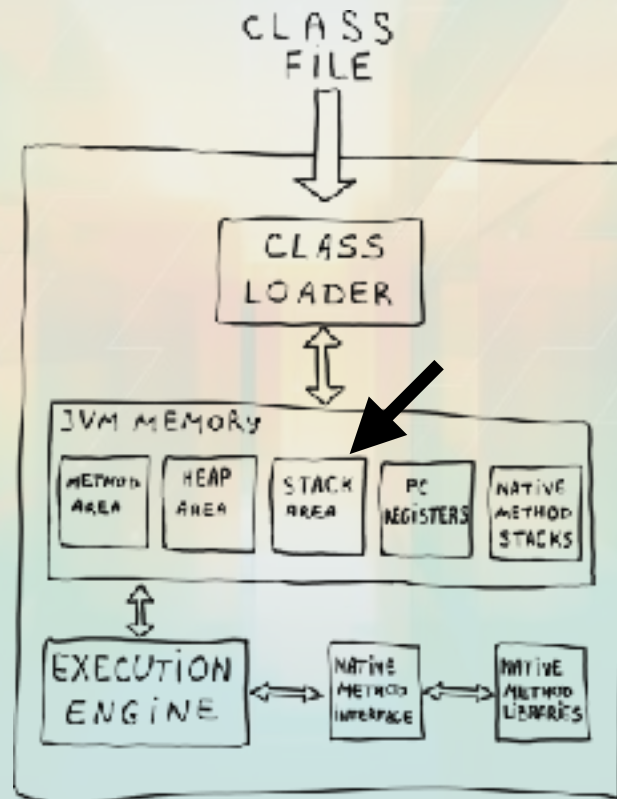

```
5      int a = 0;
6      double b = a + 1.5;
7      if (b > 0) {
8          System.out.println(b);
9      } else {
10         System.out.println("Other output");
11     }
```

javap -c Test

```
0: iconst_0
1: istore_1
2: iload_1
3: l2d
4: ldc2_w    #7          // double 1.5d
7: dadd
8: dstore_2
9: dload_2
10: dconst_0
11: dcmpl
12: ifle      25
15: getstatic  #9          // Field java/lang/System.out:Ljava/io/PrintStream;
18: dload_2
19: invokevirtual #15      // Method java/io/PrintStream.println:(D)V
22: goto      33
25: getstatic  #9          // Field java/lang/System.out:Ljava/io/PrintStream;
28: ldc       #21          // String Other output
30: invokevirtual #23      // Method java/io/PrintStream.println:(Ljava/lang/String;)V
33: return
```

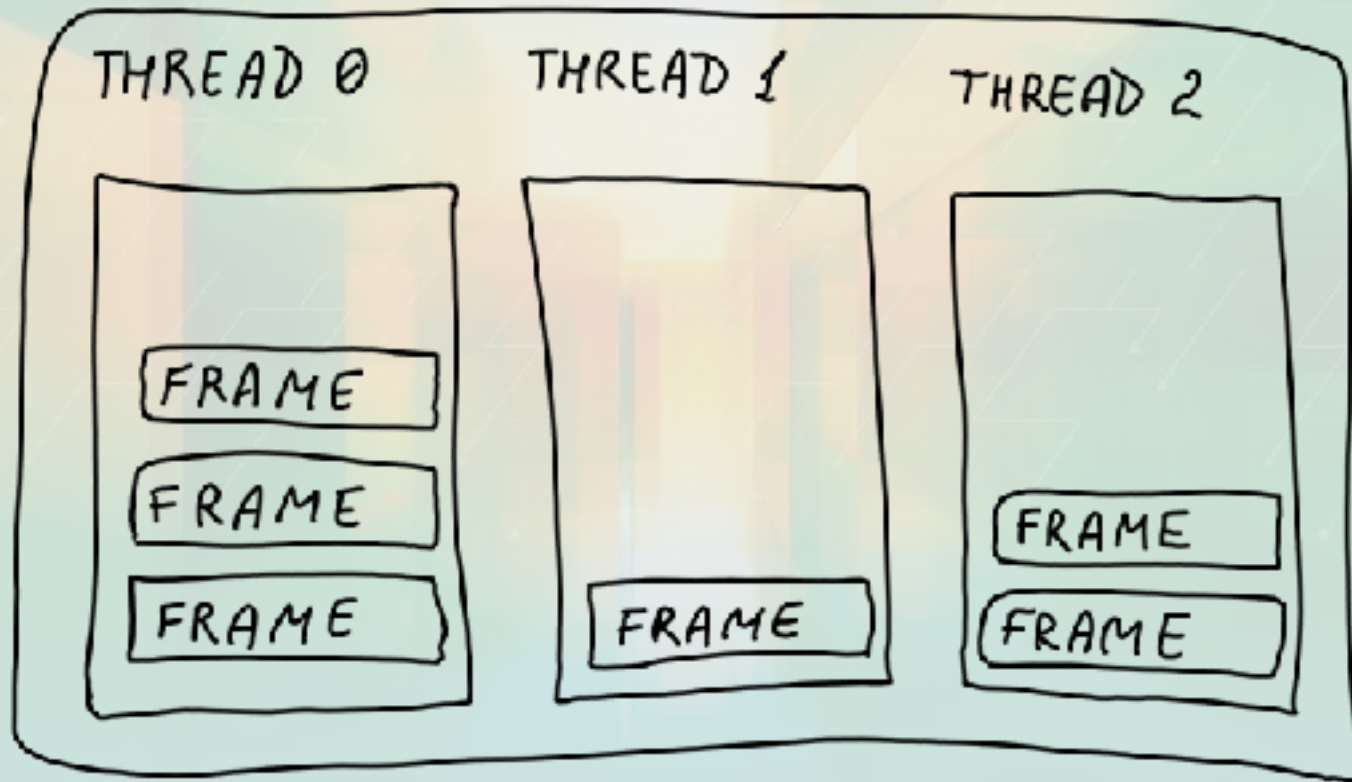






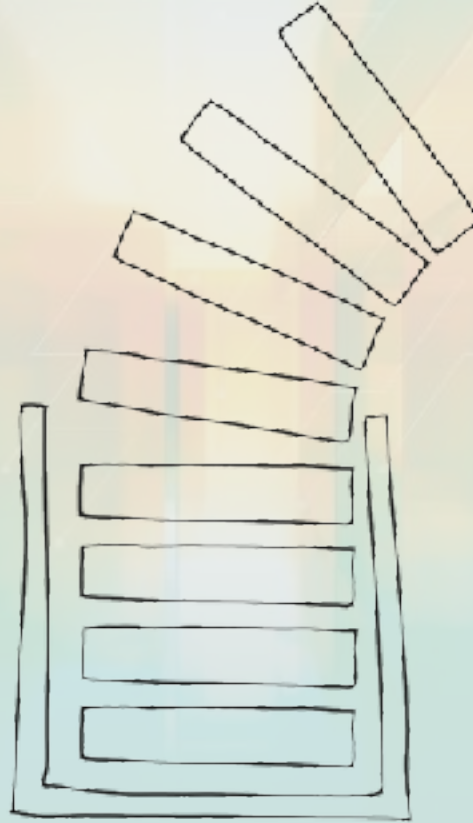
Stack area

@worth_exploring



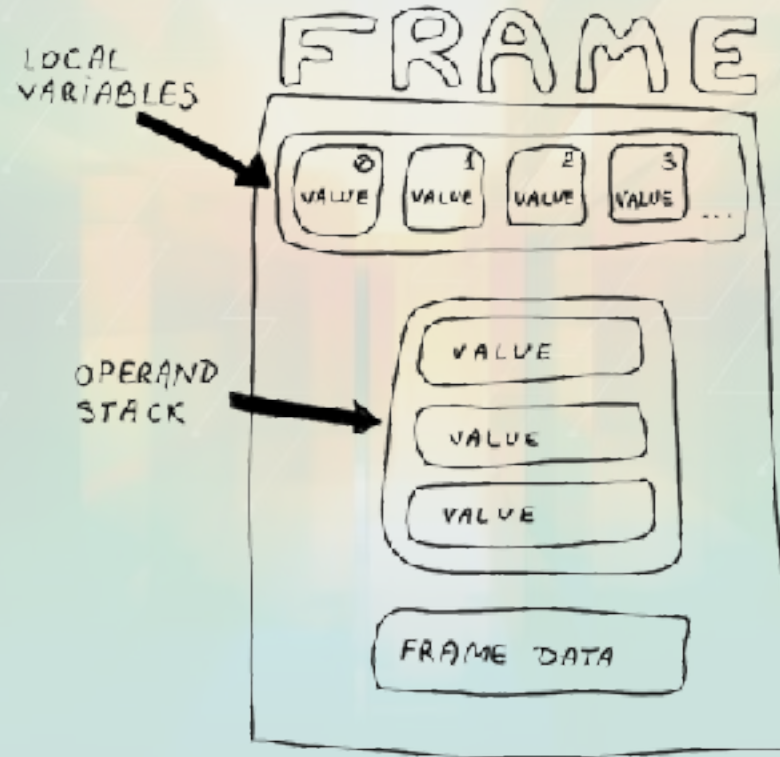
StackOverflowError

@worth_exploring



Frame structure

@worth_exploring



```

0: iconst_0
1: istore_1
2: iload_1
3: i2d
4: ldc2_w      #7          // double 1.5d
7: dadd
8: dstore_2
9: dload_2
10: dconst_0
11: dcmpl
12: ifle        25
15: getstatic    #9          // Field java/lang/System.out:Ljava/io/PrintStream;
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28: ldc         #21          // String Other output
30: invokevirtual #23         // Method java/io/PrintStream.println:(Ljava/lang/String;)V
33: return

```

```

5      int a = 8;
6      double b = a + 1.5;
7      if (b > 8) {
8          System.out.println(b);
9      } else {
10         System.out.println("Other output");
11     }

```

[String]



```
0: iconst_0
1: istore_1
2: iload_1
3: i2d
4: ldc2_w      #7          // double 1.5d
7: dadd
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33: return
```

```
5      int a = 9;
6      double b = a + 1.5;
7      if (b > 9) {
8          System.out.println(b);
9      } else {
10         System.out.println("Other output");
11     }
```


[String]

I (0)

```
0: iconst_0
1: istore_1
2: iload_1
3: i2d
4: ldc2_w      #7          // double 1.5d
7: dadd
8: dstore_2
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```

```
5      int a = 9;
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7      if (b > 9) {
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[String]

I (0)

```
0: iconst_0
1: istore_1
2: iload_1
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```

```
5      int a = 9;
6      double b = a + 1.5;
7      if (b > 9) {
8          System.out.println(b);
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11     }
```



// Field java/lang/System.out:Ljava/io/PrintStream;

// Method java/io/PrintStream.println:(D)V

// Field java/lang/System.out:Ljava/io/PrintStream;

// String Other output

// Method java/io/PrintStream.println:(Ljava/lang/String;)V

[String]

I (0)



```
0: iconst_0
1: istore_1
2: iload_1
3: i2d
4: ldc2_w      #7          // double 1.5d
7: dadd
8: dstore_2
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5      int a = 9;
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```

[String]

I (0)



```
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1: istore_1
2: iload_1
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4: ldc2_w      #7          // double 1.5d
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8: dstore_2
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28: ldc         #21         // String Other output
30: invokevirtual #23       // Method java/io/PrintStream.println:(Ljava/lang/String;)V
33: return
```

```
5:   int a = 9;
6:   double b = a + 1.5;
7:   if (b > 8) {
8:       System.out.println(b);
9:   } else {
10:      System.out.println("Other output");
11:   }
```


[String]

I (0)

I (0)

```
0: iconst_0
1: istore_1
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8: dstore_2
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[String]

I (0)

I (0)

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4: ldc2_w      #7          // double 1.5d
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8: dstore_2
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33: return
```

```
5      int a = 9;
6      double b = a + 1.5;
7      if (b > 9) {
8          System.out.println(b);
9      } else {
10         System.out.println("Other output");
11     }
```



// double 1.5d

// Field java/lang/System.out:Ljava/io/PrintStream;

// Method java/io/PrintStream.println:(D)V

// Field java/lang/System.out:Ljava/io/PrintStream;

// String Other output

// Method java/io/PrintStream.println:(Ljava/lang/String;)V

[String]

I (0)

D (0.0)

```
0: iconst_0
1: istore_1
2: iload_1
3: i2d
4: ldc2_w      #7          // double 1.5d
7: dadd
8: dstore_2
9: dload_2
10: dconst_0
11: dcmpl
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15: getstatic   #9          // Field java/lang/System.out:Ljava/io/PrintStream;
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5      int a = 9;
6      double b = a + 1.5;
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```



// double 1.5d

// Field java/lang/System.out:Ljava/io/PrintStream;

// Method java/io/PrintStream.println:(D)V

// Field java/lang/System.out:Ljava/io/PrintStream;

// String Other output

// Method java/io/PrintStream.println:(Ljava/lang/String;)V

[String]

I (0)

D (0.0)

```
0: iconst_0
1: istore_1
2: iload_1
3: i2d
4: ldc2_w      #7
7: dadd
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9: dload_2
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11: dcmpl
12: ifle        25
15: getstatic   #9
18: dload_2
19: invokevirtual #15
22: goto        33
25: getstatic   #9
28: ldc         #21
30: invokevirtual #23
33: return
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```
5      int a = 9;
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```

// double 1.5d

// Field java/lang/System.out:Ljava/io/PrintStream;

// Method java/io/PrintStream.println:(D)V

// Field java/lang/System.out:Ljava/io/PrintStream;

// String Other output

// Method java/io/PrintStream.println:(Ljava/lang/String;)V



[String]

I (0)

D (1.5)

D (0.0)

```
0: iconst_0
1: istore_1
2: iload_1
3: i2d
4: ldc2_w      #7
7: dadd
8: dstore_2
9: dload_2
10: dconst_0
11: dcmpl
12: ifle        25
15: getstatic   #9
18: dload_2
19: invokevirtual #15
22: goto        33
25: getstatic   #9
28: ldc         #21
30: invokevirtual #23
33: return
```

```
5:   int a = 9;
6:   double b = a + 1.5;
7:   if (b > 8) {
8:       System.out.println(b);
9:   } else {
10:      System.out.println("Other output");
11:   }
```

// double 1.5d

// Field java/lang/System.out:Ljava/io/PrintStream;

// Method java/io/PrintStream.println:(D)V

// Field java/lang/System.out:Ljava/io/PrintStream;

// String Other output

// Method java/io/PrintStream.println:(Ljava/lang/String;)V



[String]

I (0)

D (1.5)

D (0.0)

```
0: iconst_0
1: istore_1
2: iload_1
3: i2d
4: ldc2_w      #7          // double 1.5d
5: dadd
6: dstore_2
7: dload_2
8: dconst_0
9: dcmpl
10: ifle        25
11: getstatic   #9          // Field java/lang/System.out:Ljava/io/PrintStream;
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13: invokevirtual #15       // Method java/io/PrintStream.println:(D)V
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7:   if (b > 8) {
8:       System.out.println(b);
9:   } else {
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// double 1.5d

// Field java/lang/System.out:Ljava/io/PrintStream;

// Method java/io/PrintStream.println:(D)V

// Field java/lang/System.out:Ljava/io/PrintStream;

// String Other output

// Method java/io/PrintStream.println:(Ljava/lang/String;)V

[String]

I (0)

D (1.5)

```
0: iconst_0
1: istore_1
2: iload_1
3: i2d
4: ldc2_w      #7          // double 1.5d
5: dadd
6: dstore_2
7: dload_2
8: dconst_0
9: dcmpl
10: ifle        25
11: getstatic   #9          // Field java/lang/System.out:Ljava/io/PrintStream;
12: dload_2
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17: invokevirtual #23       // Method java/io/PrintStream.println:(Ljava/lang/String;)V
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```

```
5:   int a = 9;
6:   double b = a + 1.5;
7:   if (b > 8) {
8:       System.out.println(b);
9:   } else {
10:      System.out.println("Other output");
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```



// double 1.5d

// Field java/lang/System.out:Ljava/io/PrintStream;

// Method java/io/PrintStream.println:(D)V

// Field java/lang/System.out:Ljava/io/PrintStream;

// String Other output

// Method java/io/PrintStream.println:(Ljava/lang/String;)V

[String]

I (0)

D (1.5)

```
0: iconst_0
1: istore_1
2: iload_1
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// double 1.5d

// Field java/lang/System.out:Ljava/io/PrintStream;

// Method java/io/PrintStream.println:(D)V

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[String]

I (0)

D (1.5)



```
0: iconst_0
1: istore_1
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```

// double 1.5d

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// Method java/io/PrintStream.println:(D)V

// Field java/lang/System.out:Ljava/io/PrintStream;

// String Other output

// Method java/io/PrintStream.println:(Ljava/lang/String;)V

[String]

I (0)

D (1.5)



```
0: iconst_0
1: istore_1
2: iload_1
3: i2d
4: ldc2_w      #7          // double 1.5d
7: dadd
8: dstore_2
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[String]

I (0)

D (1.5)

D (1.5)

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0: iconst_0
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```



// double 1.5d

// Field java/lang/System.out:Ljava/io/PrintStream;

// Method java/io/PrintStream.println:(D)V

// Field java/lang/System.out:Ljava/io/PrintStream;

// String Other output

// Method java/io/PrintStream.println:(Ljava/lang/String;)V

[String]

I (0)

D (1.5)

D (1.5)

```
0: iconst_0
1: istore_1
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// double 1.5d

// Field java/lang/System.out:Ljava/io/PrintStream;

// Method java/io/PrintStream.println:(D)V

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// String Other output

// Method java/io/PrintStream.println:(Ljava/lang/String;)V



[String]

I (0)

D (1.5)

D (0.0)

D (1.5)

```
0: iconst_0
1: istore_1
2: iload_1
3: i2d
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// double 1.5d

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// Method java/io/PrintStream.println:(D)V

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[String]

I (0)

D (1.5)

D (0.0)

D (1.5)

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[String]

I (0)

D (1.5)

I (1)

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[String]

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D (1.5)

I (1)

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[String]

I (0)

D (1.5)



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[String]

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[String]

I (0)

D (1.5)

Print
Stream

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[String]

I (0)

D (1.5)

Print
Stream

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[String]

I (0)

D (1.5)

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[String]

I (0)

D (1.5)

D (1.5)

Print
Stream

objectref

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[String]

I (0)

D (1.5)



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[String]

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[String]

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I (0)

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[String]

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[String]

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[String]

I (0)

D (1.5)

Print
Stream

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[String]

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[String]

I (0)

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String

Print
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[String]

I (0)

D (1.5)

String

Print
Stream

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2: iload_1
3: i2d
4: ldc2_w      #7          // double 1.5d
7: dadd
8: dstore_2
9: dload_2
10: dconst_0
11: dcmpl
12: ifle        25
15: getstatic   #9          // Field java/lang/System.out:Ljava/io/PrintStream;
18: dload_2
19: invokevirtual #15       // Method java/io/PrintStream.println:(D)V
22: goto       33
25: getstatic   #9          // Field java/lang/System.out:Ljava/io/PrintStream;
28: ldc        #21          // String Other output
30: invokevirtual #23       // Method java/io/PrintStream.println:(Ljava/lang/String;)V
33: return
```

```
5:   int a = 9;
6:   double b = a + 1.5;
7:   if (b > 9) {
8:       System.out.println(b);
9:   } else {
10:      System.out.println("Other output");
11:   }
```



// Field java/lang/System.out:Ljava/io/PrintStream;

// Method java/io/PrintStream.println:(D)V

// Field java/lang/System.out:Ljava/io/PrintStream;

// String Other output

// Method java/io/PrintStream.println:(Ljava/lang/String;)V

[String]

I (0)

D (1.5)



```
0: iconst_0
1: istore_1
2: iload_1
3: i2d
4: ldc2_w      #7          // double 1.5d
7: dadd
8: dstore_2
9: dload_2
10: dconst_0
11: dcmpl
12: ifle        25
15: getstatic   #9          // Field java/lang/System.out:Ljava/io/PrintStream;
18: dload_2
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28: ldc         #21         // String Other output
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```

```
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6:   double b = a + 1.5;
7:   if (b > 9) {
8:       System.out.println(b);
9:   } else {
10:      System.out.println("Other output");
11:   }
```

// double 1.5d

// Field java/lang/System.out:Ljava/io/PrintStream;

// Method java/io/PrintStream.println:(D)V

// Field java/lang/System.out:Ljava/io/PrintStream;

// String Other output

// Method java/io/PrintStream.println:(Ljava/lang/String;)V

[String]

I (0)

D (1.5)



```
0: iconst_0
1: istore_1
2: iload_1
3: i2d
4: ldc2_w      #7          // double 1.5d
7: dadd
8: dstore_2
9: dload_2
10: dconst_0
11: dcmpl
12: ifle        25
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5:   int a = 9;
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8:       System.out.println(b);
9:   } else {
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11:   }
```

Invalid bytecode

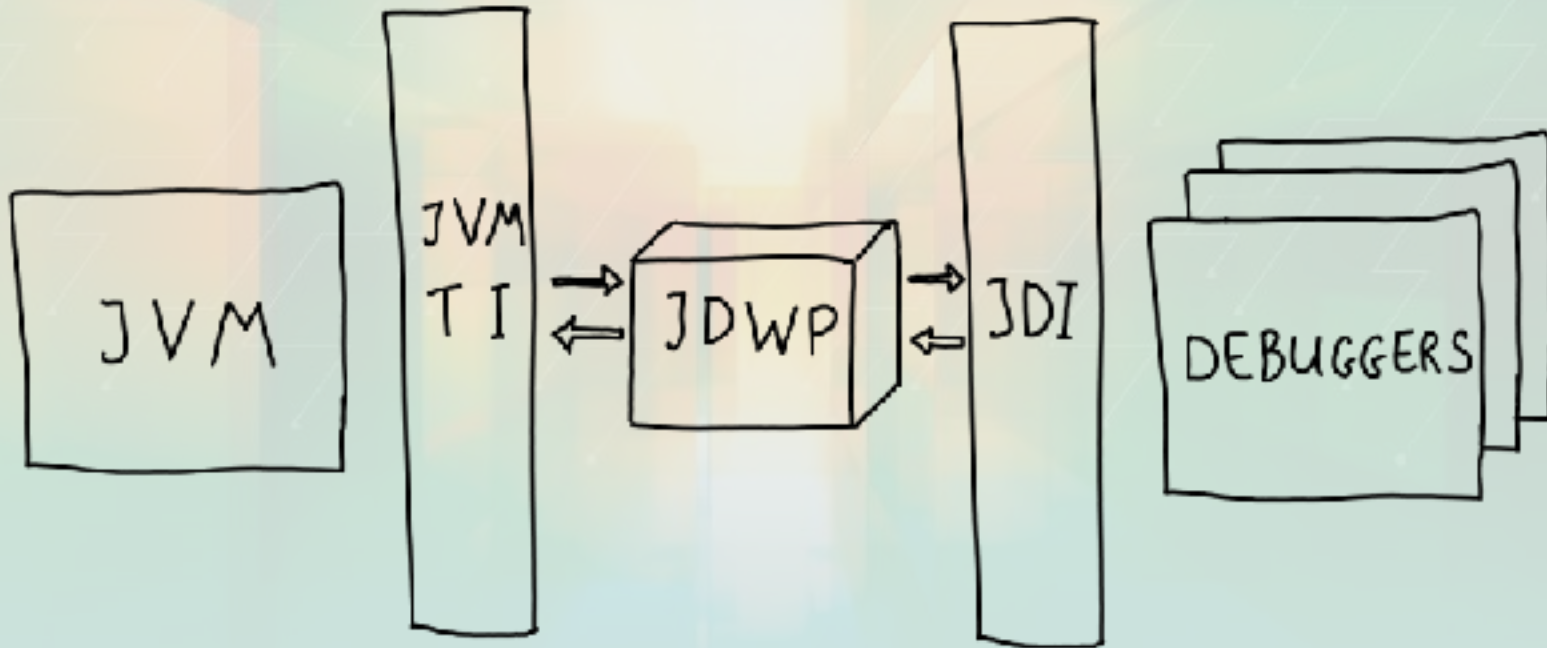
@worth_exploring

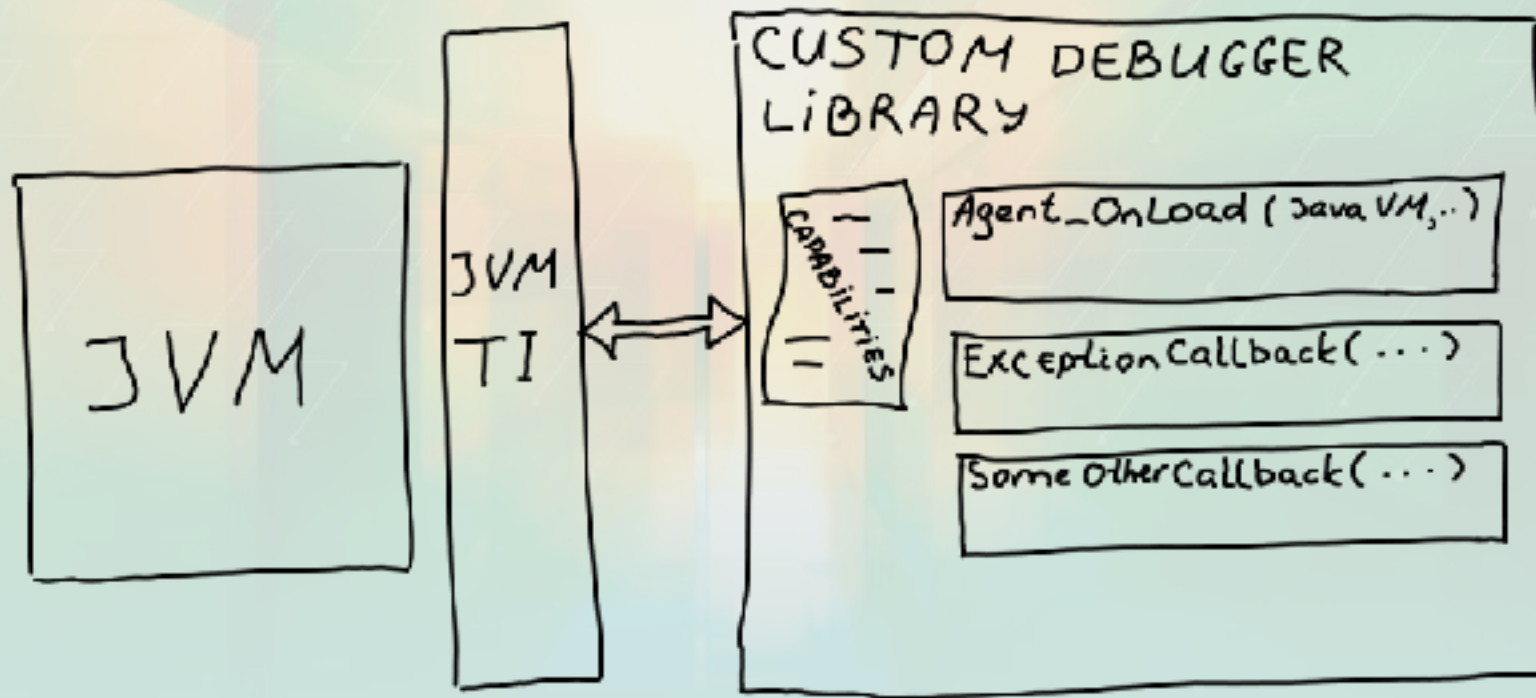


```
Error: Unable to initialize main class WIP
Caused by: java.lang.VerifyError: Bad type on operand stack
Exception Details:
  Location:
    WIP.main([Ljava/lang/String;)V @83: swap
  Reason:
    Type double_2nd (current frame, stack[2]) is not assignable to category1 type
  Current Frame:
    bci: @83
    flags: { }
    locals: { '[Ljava/lang/String;', integer, integer, double, double_2nd, integer }
    stack: { integer, double, double_2nd }
  Bytecode:
    00000000: 1207 1207 603c 1207 1208 1208 6012 0060
    00000010: 1208 6012 0712 0760 6060 1207 1207 6012
    00000020: 0760 1207 6060 1207 1207 1207 6012 0764
    00000030: 6060 1207 601b 603d 1400 0912 0787 6314
    00000040: 000b 6b12 0007 6f4a 1b12 0d60 3605 1207
    00000050: 1400 0e5f 875f 6312 1012 1160 8767 1400
    00000060: 1212 1487 6314 0015 6763 1217 8767 3906
    00000070: 1218 3605 1505 1207 6036 0515 0536 051b
    00000080: 1207 643c 1b36 05b1
```


JPDA architecture

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JDWP-Handshake



Scary stuff



SHODAN

jdwp-handshake

TOTAL RESULTS

134,003

TOP COUNTRIES

China 132,844

Hong ... 1,350

United Sta... 4

Canada 3

Poland 1

More...

View Report

View on Map

2023-02-14T14:47:54Z.879241

Aliyun Computing Co., LTD

China, Beijing

2023-02-14T14:47:26.681609

Aliyun Computing Co., LTD

China, Beijing

2023-02-14T14:46:47.984364

Aliyun Computing Co., LTD

China, Qingdao

Scary stuff



3,013,567 code results

Sort: Best match ▾



chrisglass/puppet-hadoop-modules

templates/environment/etc/profile.d/hstack_options.sh

```
3 export HADOOP_NAMENODE_OPTS="-Xdebug -Xrunjdwp  
:transport=dt_socket,address=1844,server=y,suspend=n"  
4 export HADOOP_SECONDARYNAMENODE_OPTS="-Xdebug -  
Xrunjdwp:transport=dt_socket,address=1845,server=y,suspend=n"  
5 export HADOOP_DATANODE_OPTS="-Xdebug -  
Xrunjdwp:transport=dt_socket,address=1846,server=y,suspend=n"
```



Showing the top two matches Last indexed on Apr 2, 2021



zachrlj/distributed-review-sys

/build.gradle

```
5 apply plugin: 'application'  
6  
7 applicationDefaultJvmArgs = ["-Xdebug", "-Xrunjdwp  
:transport=dt_socket,server=y,suspend=n,address=8080"]  
..  
25 classpath = sourceSets.main.runtimeClasspath  
26 args '1'  
27 jvmArgs '-Xdebug',  
28 '-Xrunjdwp:transport=dt_socket,server=y,suspend=n,address=8080'
```



Showing the top four matches Last indexed on Apr 15, 2021

Through JDWP anyone can:

@worth_exploring

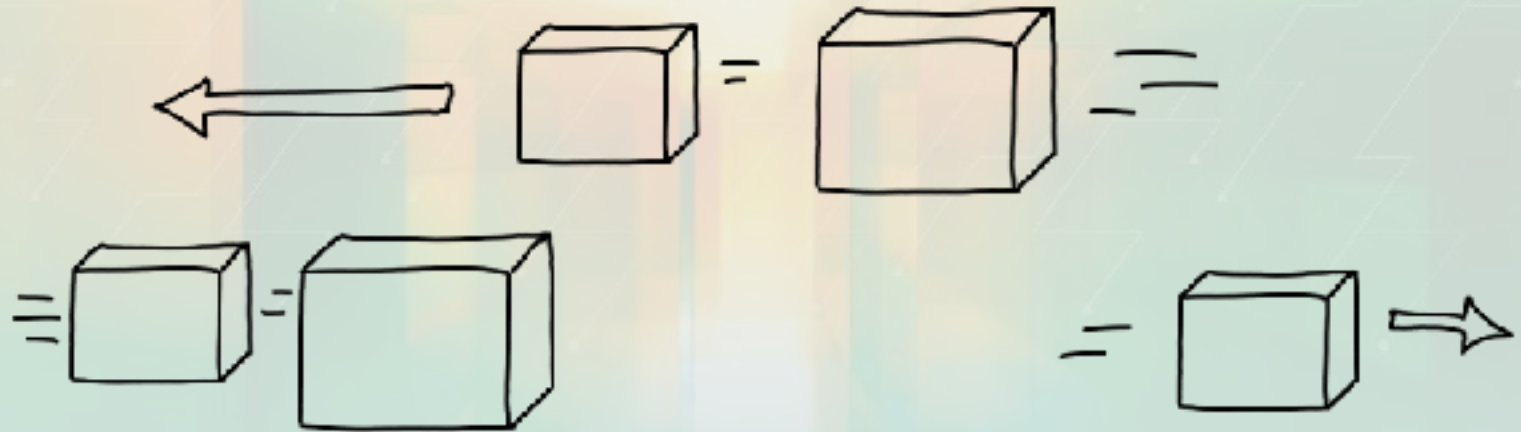


- set values
- instantiate new objects
- invoke methods
- see the values in runtime
- ...
- redefine classes!

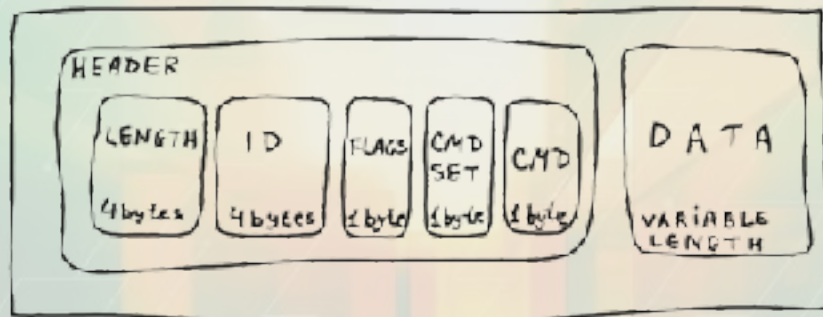
Don't leave remote debugging on!

@worth_exploring

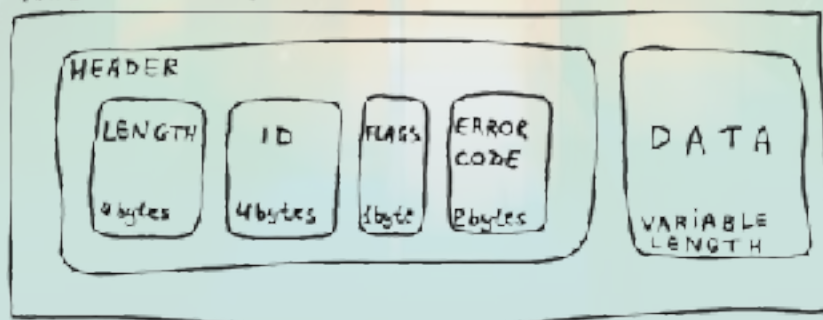




COMMAND PACKET



RESPONSE PACKET



Setting the breakpoint

@worth_exploring



Setting the breakpoint

@worth_exploring



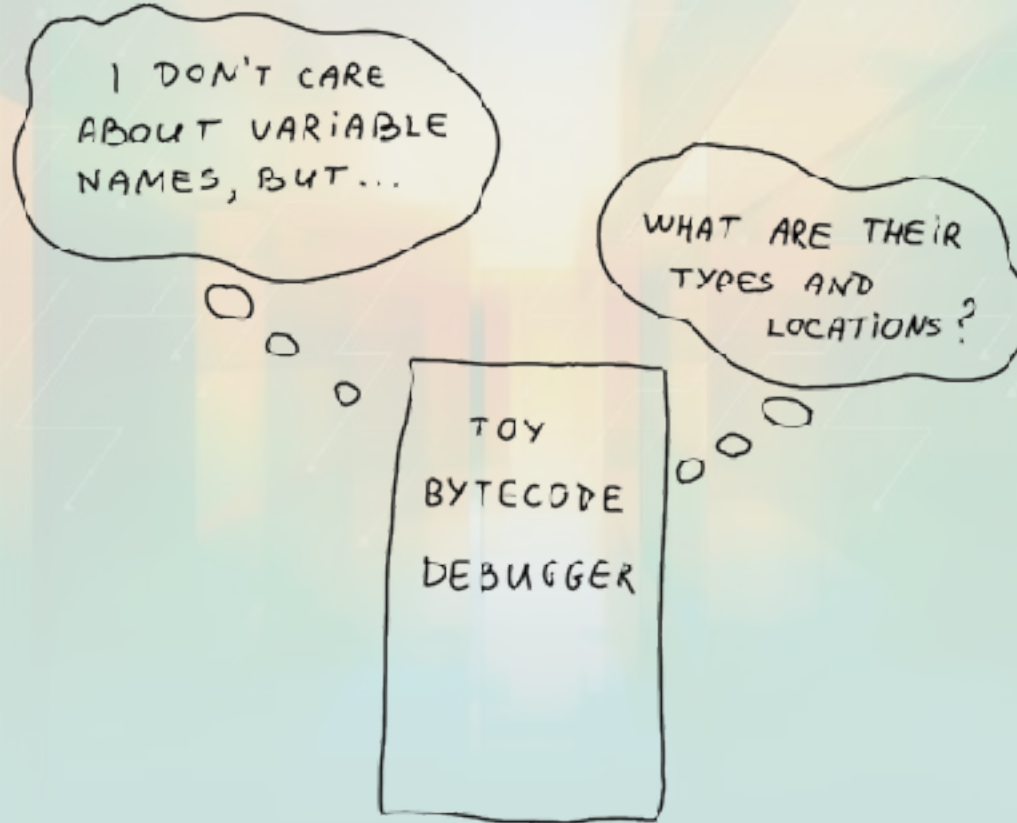
Setting the breakpoint

@worth_exploring



Requesting the values

@worth_exploring



Debug information

@worth_exploring



Compiled from "TheDebuggee.java"

LineNumberTable:

line 5: 0

line 6: 2

line 7: 5

line 8: 12

line 9: 15

line 10: 19

line 11: 26

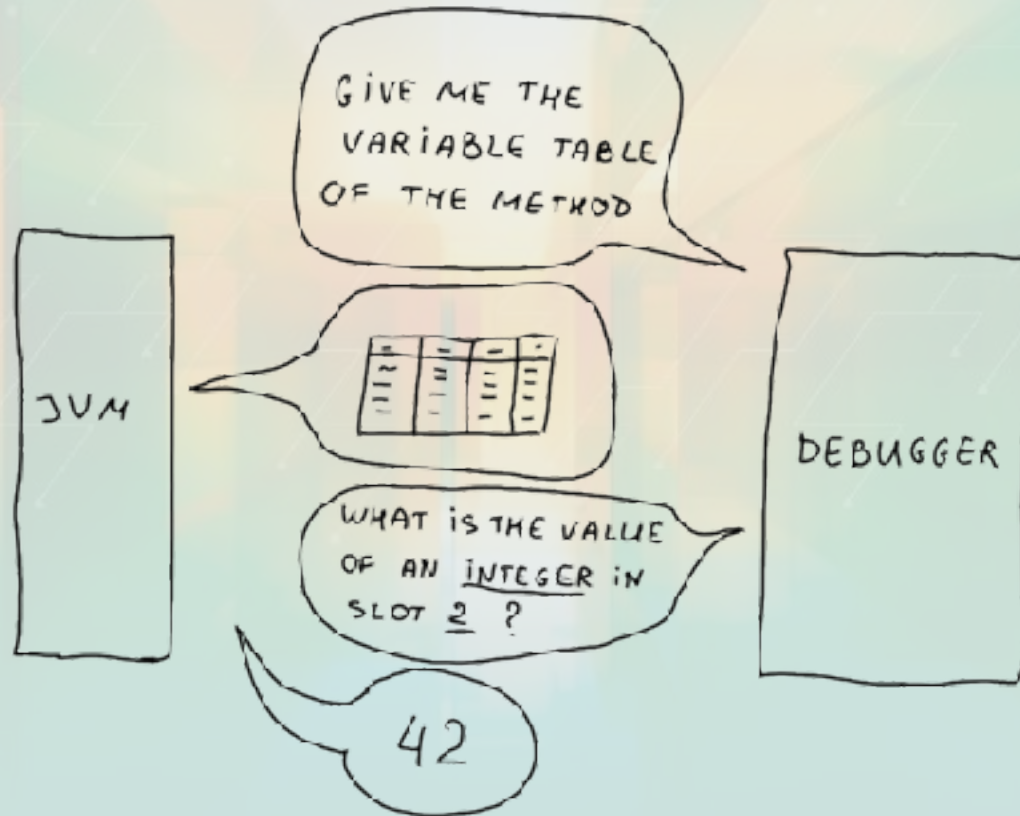
line 12: 38

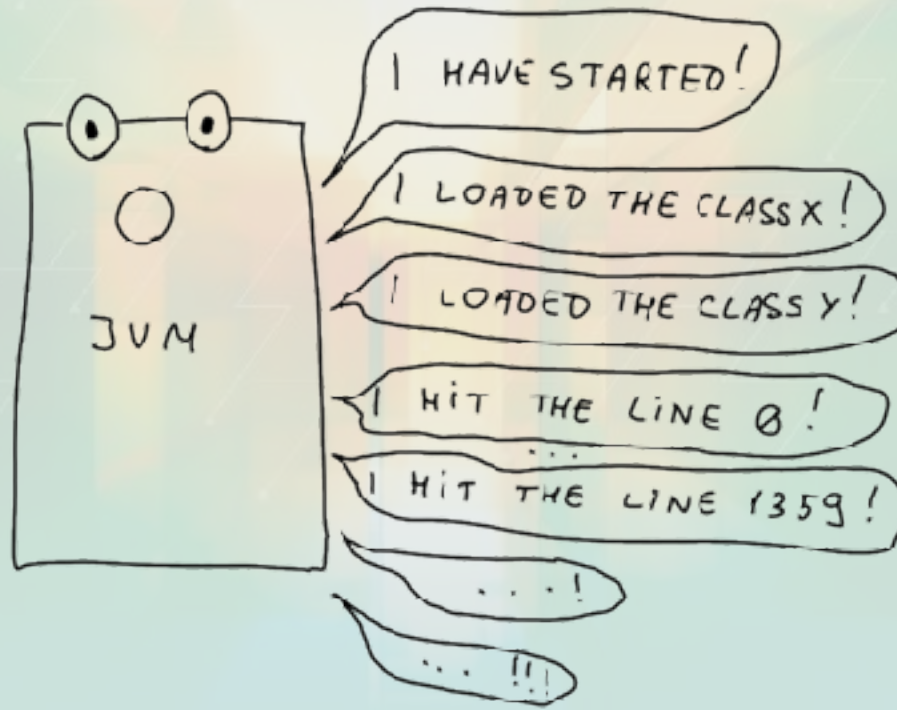
LocalVariableTable:

Start	Length	Slot	Name	Signature
0	39	0	args	[Ljava/lang/String;
2	37	1	a	I
26	13	2	test	Ljava/lang/String;

Requesting the values

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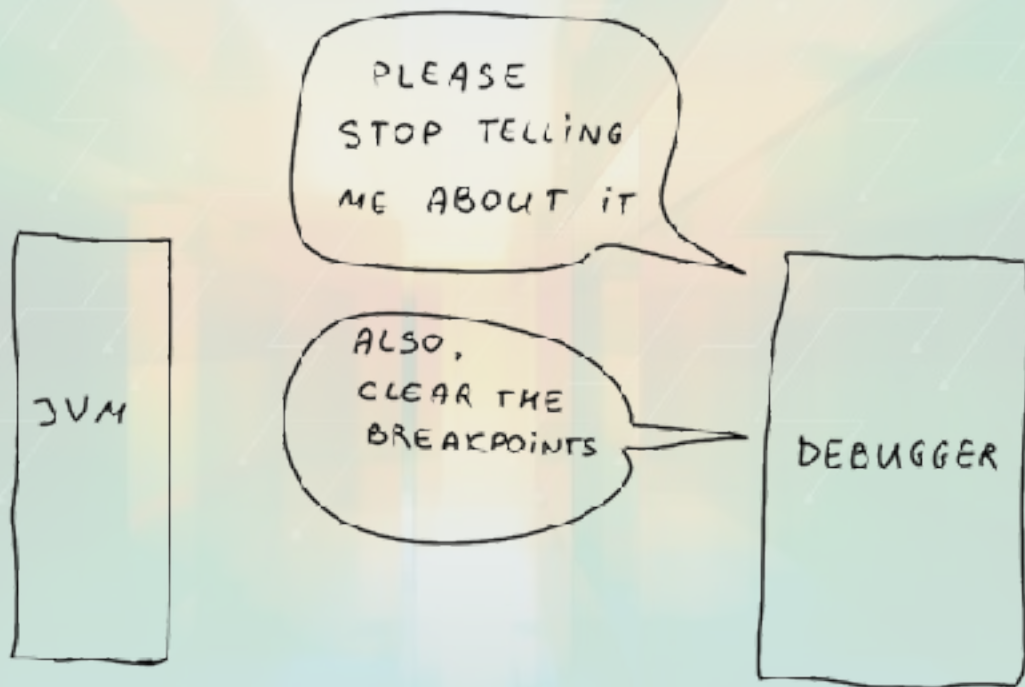


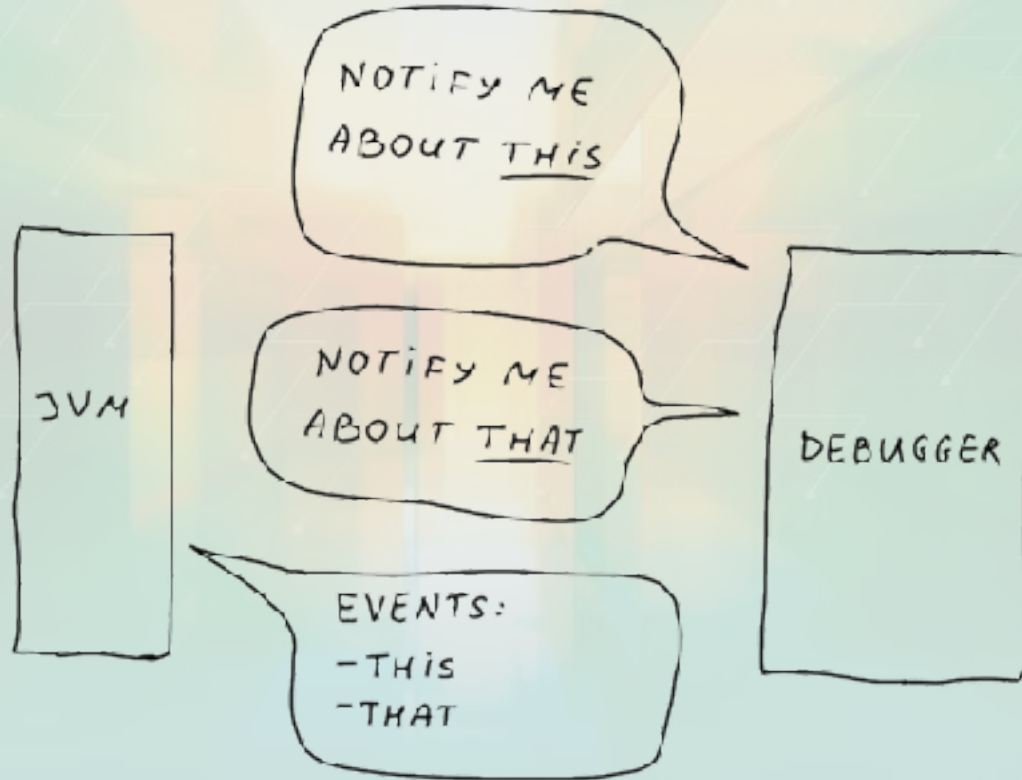


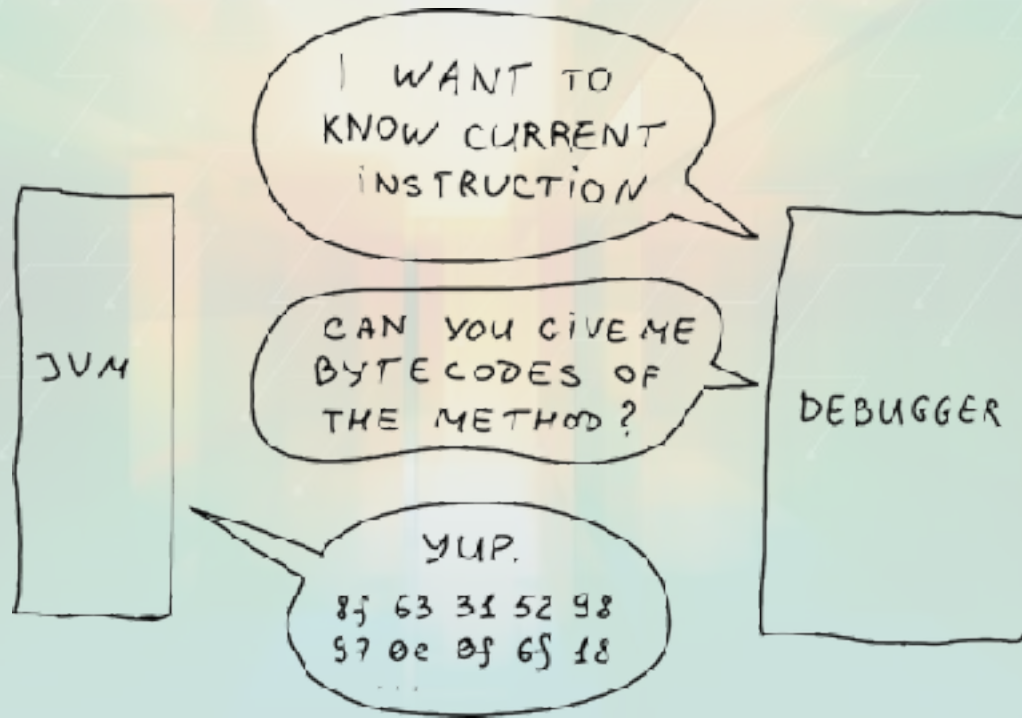
Filters & suspend policy

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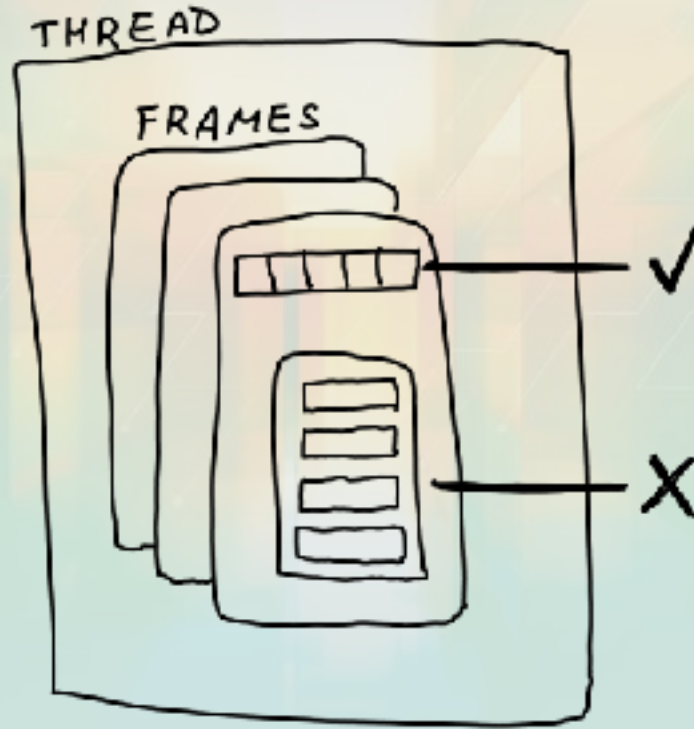






Bytecode debugger: success?

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Let's talk!



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Thanks for your attention

Please rate my session in the NLJUG event app



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