JSlice, a Dynamic Slicing Tool for Java Programs

Abhik ROYCHOUDHURY, WANG Tao, GUO Liang
National University of Singapore

Aim/Objective:

Too many functionalities in our daily life are software controlled, and reliable software development is thus of great importance. JSlice is a tool for program debugging and comprehension. It partially automates the search for programming errors, thereby improving software quality as well as programmer productivity.

Why the need?

Current software debugging tools require active participation from the programmer to find the cause(s) of an observable error. This makes software debugging tedious and extremely time-consuming. JSlice reduces the programmer's burden by quickly and automatically identifying likely causes of a given error.

How does it work?

JSlice highlights a fragment of the program that is likely to be responsible for a particular unexpected behavior. This is achieved via automated identification of program dependency chains in an execution trace. To scale up the semantic analysis to huge traces of real-life programs, JSlice employs certain key technical innovations. These include online compression of the execution trace, direct analysis of the compressed trace, as well as analysis at the machine-readable bytecode level to handle programs containing third-party libraries. JSlice works for any Java program and has a user-base spread over 20 different countries. The tool is available from http://jslice.sourceforge.net/
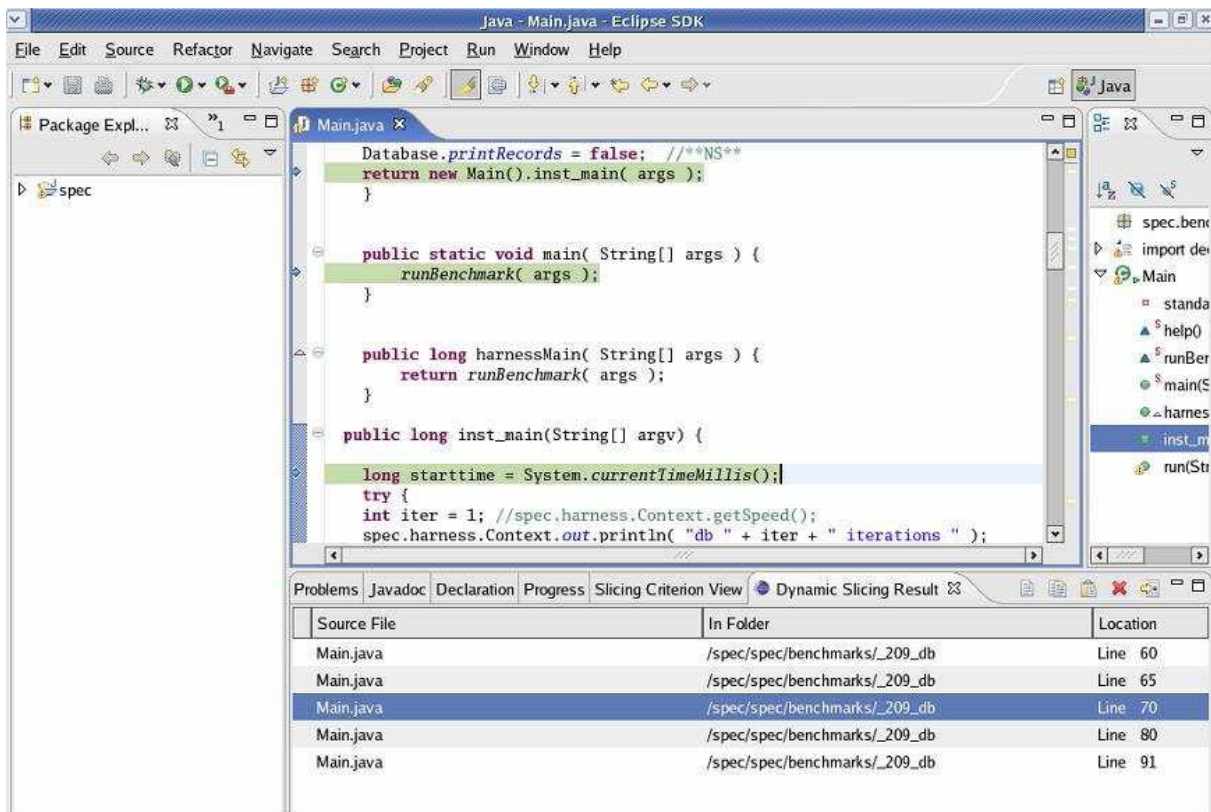

Figure 1: Screenshot of the JSlice tool. Highlighted lines appear in green.

```
1. void setRunningVersion(boolean runningVersion){
2.   if( runningVersion ) {
3.       savedValue = value;
     }
     else{
4.       savedValue = " ";
     }
5    this.runningVersion = runningVersion;

6.   if ( savedValue == null ){
```

Example of program dependency

Figure 2: JSlice infers program dependency chains leading to an error, and summarizes them in a bug report.

GUI (a Eclipse plug-in)

Execute the program

Select

Slice

Java Virtual Machine

Instrument

Compressed Bytecode Trace

Criterion = (Inp, Var, Line#)
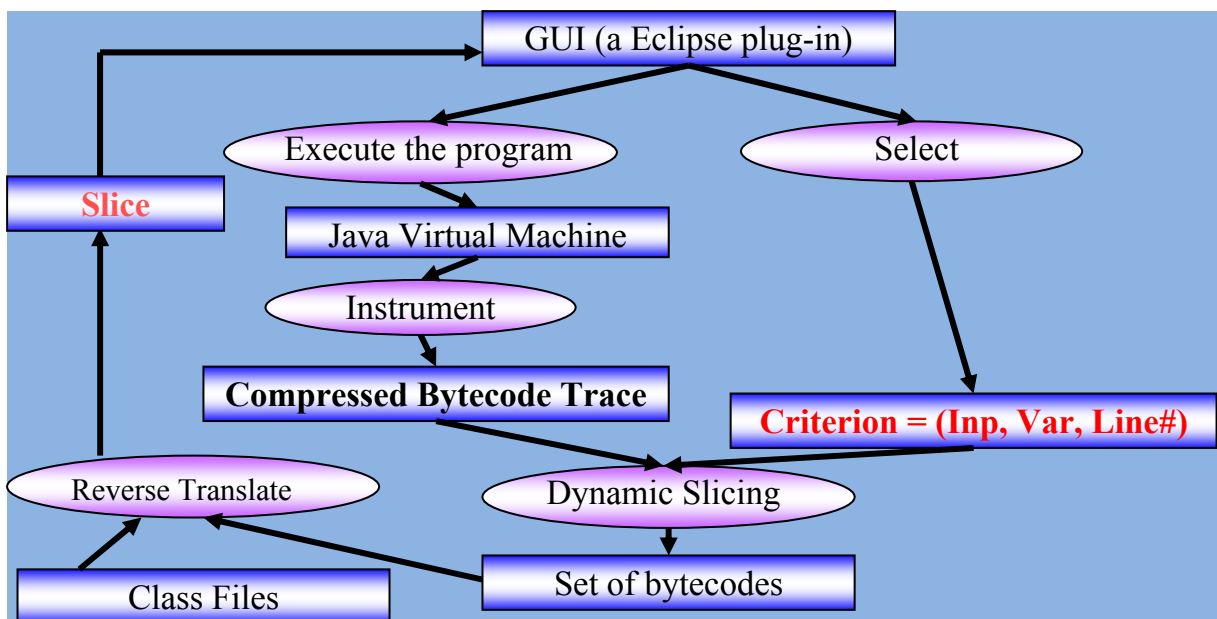
Reverse Translate

Dynamic Slicing

Class Files

Set of bytecodes

Figure 3: Architecture of the JSlice tool.