SyntaxTrain

Mordechai (Moti) Ben-Ari
Department of Science Teaching
Weizmann Institute of Science
http://stwww.weizmann.ac.il/g-cs/benari/

Rationale

Beginning students struggle with programming language syntax, especially in languages like Java that derive their syntax from C. The situation is not improved by cryptic error message from compilers. The intention of the project is to develop a dynamic visualization of the syntax of Java programs to aid students in diagnosing syntactical errors.

Syntax "railways"

Students of the Pascal language have relatively few problems with syntax because of the "railway" diagrams that appeared in the first book (Jensen & Wirth, *Pascal User Manual and Report*; see also, F.E.J. Kruseman Aretz, *Syntax diagrams for ISO Pascal standard*, ACM SIGPLAN Notices 17(10), 1982). For some reason, such diagrams are rarely used in other languages.

Visualization

It is proposed to build a software tool, SyntaxTrain, that will display two panes side-by-side: on the left a Java source file and on the right syntax diagrams. The student will be able to step through the source code and see the corresponding position in the syntax diagram highlighted. Alternatively, she can run a syntax check and have the place of an error highlighted both in the source file and in the diagram.

There should be an option for stepping and displaying at various degrees of detail: the full syntax including identifiers, expressions with identifiers skipped over, statements with expressions skipped over, etc.

Implementation

The individual elements of syntax diagrams for Java can be found at `http://tioswww.unige.ch/db-research/Enseignement/analyseinfo/JAVA/BNFindex.html`. Open source Java parsers are easy to find, for example, ANTLR. The tool should be written in Java using Swing for the user interface. If necessary, a graphics library can be used.