

Harmonia: An extensible framework for interactive, language-aware programming tools





Language-based Tools for the Programmer

Benefits of Eclipse Platform for Harmonia Research

Text Editor Framework **Project and Resource Management Graphical User Interface 3rd Party Tool Integration** Existing Base of Potential Users

Future Work Enabled by Eclipse Integrate Eclipse's User Services with Harmonia's Analyses **Voice-Based Commenting Environment** Harmonia Language Module Development Perspective

in End-Programmer Tools

Supports C • C++ • Java • XML • Scheme • Common Lisp • Cobol • SRCL



- Java/JNI/C Plugin Development Perspective

Harmonia + Eclipse Enables New Research

OpenGL-based Control Flow Graph Visualization



Structurally-filtered Search

le Edit View Cmds Tools Options Buffers Harmonia s ValueTooSmall extends java.lang.Exception { erface Calculator & nt eval(int num) throws ValueTooSmal Factorial implements Calculator {
int fact(int n) throws ValueTooSmall if (n < 0) throw new ValueTooSmall()</pre> else if (n < 2) return 1; else return n * fact(n – 1); fact(int n, int answer) throws ValueTooSmall {
 if (n < 0) throw new ValueTooSmall();</pre> else if (n < 2) return answer; else return fact(n - 1, answer * n)

c int eval(int x) throws ValueTooSmall { return fact(x, 1); } -Emacs[dogwood.CS]: Sample.java [---] (Harmonia-Java CVS-1.3 Isear irch (Method or Constructor Name): fac

Interactive Transformations

Goal: Enable the programmer to express operations on program source code at a level above traditional text-based editing. **Programmers Say**

"Rename external variables to make their first six letters unique." [Knuth, The errors of TeX] "Change BI_* macros to BYTE_*; similarly for bi_* local variables." [Ben Wing, XEmacs ChangeLog]

Programmers Now Do sed s/\([^.]*\)\.take_one(&\([^)]*\)) $/\langle 2 = \langle 1.back(); \langle n \rangle | back()/g$

Programmers Should Do .take_one(x); <expr of type MyList as e>.take one(<expr as v> <v> = <e>.back(); <e>.pop back() type MyList

 p.take_one(x); 	BETC BETC BETC BETC BETC BETC BETC BETC
for each statement lik	character identifier variable expression expression o

Programming by Voice

Goal: Enable a programmer to compose, edit and navigate code in an editor using voice recognition.

Problems

Homoph

1. User Speaks in Spoken Java

if args dot length equals two then file two load gets args sub one end if

if (args.length == 2) filetoload = args[1];

Speech recognizers don't do Java Compilers can't deal with ambiguities of natural language

ones	Many Parses
4	foo bar
for	foo(bar)
ore	foo().bar

2. Computer Translates to Java