ITICSE 2002 Tutorial Proposal ... Revised Feb 1, 2002

Tutorial Title: Java Laboratories Using Java Power Tools

Organizers:

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Tutorial Category: Full Day or Half Day ... We can be flexible and do either format. We certainly have more than enough material to do a full day tutorial but we leave the duration to the discretion of the tutorial committee.

Tutorial Description:

The overall objective of this tutorial is to disseminate the collection of Java student laboratories developed at Northeastern University for freshman computer science and to teach faculty about the Java Power Tools so that they will be able to easily build additional laboratories on their own. The lab materials emphasize high quality graphical user interfaces that provide excellent student interactivity and feedback. The tools are the software technology that enables these labs to be built quite rapidly so that faculty need not spend inordinate amounts of time in the creation of lab materials. The workshop will also demonstrate the *Automatic Problem Set Framework* that enables faculty and students to define (in a matter of minutes) methods to solve small problems or test class definitions and then to execute these methods in an automatically created GUI framework. Time will be allocated in the workshop for open discussion of freshman pedagogy, especially, objects first and the use of GUIs.

We plan to include as many of the following labs as possible: Simple Picture; Scaled Picture; Turtle Explorer; Ticket Seller; Mars Images; Dot Patterns; 3D Box Viewer; Sorting Algorithms; Big-O Function Plots; Soda Machine; Warehouse Simulation; Data Manipulation Viewer; Race Simulation; Recursive Fractals; and Maze. We will highlight the framework for automatic array algorithm animation and the *Automatic Problem Set Framework* for the creation of "instant exercises" that have both a console window and a graphics output pane automatically available.

After the tutorial participants have seen a number of examples, we will present the central ideas of the Java Power Tools that allow GUIs to be created with an order of magnitude less work than when using only pure Java. We will discuss the conceptual framework of the JPT (Stringable, Displayable, and TypedView) and the most important JPT GUI builders (TextFieldView, OptionsView, ActionsPanel, TablePanel, ArrayPanel, and Zoo). We will also show how JPT supports automatic error checking in I/O whether from a console or from a GUI.

Although the Java Power Tools can be used with any Java compiler, we will also show how the JPT may be combined synergistically with BlueJ so that faculty may leverage the advantages of both tools if they so desire.

Abstract for Publication:

This workshop will present a complete suite of Java laboratories for freshman computer science. Each laboratory is developed with a complete graphical user interface that stimulates student interaction and observation. The workshop will also present the Java Power Tools that provide the object-oriented infrastructure for rapid GUI development and may be used as examples to illustrate many object-oriented design concepts. Finally, the workshop will demonstrate the *Automatic Problem Set Framework* that enables faculty and students to define (in a matter of minutes) methods to solve small problems or test class definitions and then to execute these methods in an automatically created GUI framework.

Background of the Presenters:

The senior presenters (Rasala and Proulx) have been active participants in SIGCSE and ITiCSE for many years and have been speakers and workshop presenters numerous times. The junior presenter (Raab) has been similarly active since he joined the Java Power Tools project two years ago. All presenters have received NSF support for curriculum development and the Java Power Tools and its laboratories are the results of the most recent NSF grant DUE-9950829.

Audio/Visual/Computer Requirements:

Computer projection is absolutely essential. There is no need for a computing laboratory as the tutorial will not be hands-on.