X3D Web Software Visualization in Action!

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Abstract

3D web software visualization has always been expensive, special purpose, and hard to program. Most of the technologies used require large amounts of scripting, are not reliable on all platforms, are binary formats, or no longer maintained. We can make 3D software visualization of object-oriented programs cheap, portable, and easy by using X3D, which is a new open standard for web 3D graphics. In this film we show our X3D web software visualizations in action.

Categories and Subject Descriptors D.2.6 [*Programming Environments*]: Graphical Environments

General Terms Design

Keywords Execution Traces, Software Visualization, X3D

1. Film Description

In this film we present a light-weight solution for web 3D software visualization using the new X3D open standard for web 3D graphics [1]. We show UML class and sequence diagrams, algorithm animations, and large execution trace visualizations, implemented in X3D.

Our UML diagrams show two class diagrams which replicate the example from McIntosh et. al [2]. The first diagram shows a small Java program with 700 classes and the second shows over 4000 classes from the Eclipse application. Classes are grouped in packages and displayed on the XY plane. Packages are displayed at increasing depth of the Z dimension. We also show a sequence diagram of the smaller Java program.

The algorithm animations replicate some examples from Najork and Brown [3]. We animate Dijkstra's shortest path algorithm, heap sort, and a three way sort of bubble, selection, and insertion sort, all in X3D.

The execution trace visualisations show the execution of the Eclipse application. We can display up to 100,000 events from an execution trace as 3D shapes and information visualisation metaphors. The creation of an object is represented as blue spheres, method calls green boxes, main methods red boxes, method returns and end of objects white cones, field access cyan cylinders, and finally field modifications as pink cylinders.

2. Bios

Craig Anslow is a MSc thesis student at Victoria University of Wellington, New Zealand. The title of his thesis is "Evaluating X3D For Use in Software Visualization". Craig intends to start a PhD thesis in 2008 at Victoria University of Wellington.

Stuart Marshall is a Lecturer in Computer Science at Victoria University of Wellington, New Zealand. Stuart's main research interests are in human-computer interaction, user interfaces, component re-use, and software visualization.

James Noble is a Professor of Computer Science at Victoria University of Wellington, New Zealand. James's research centers around software design. This includes the design of the users' interface, the parts of software that users have to deal with every day, and the programmers' interface, the internal structures and organisations of software that programmers see only when they are designing, building, or modifying software. His research in both of these areas is colored by his longstanding interest in object oriented approaches to design. Within software design, his interests are rather broad. His current projects include: aliasing in object-oriented systems, design patterns, usage-centered interface design, global component migration, and program visualization.

Robert Biddle is a Professor in the Human-Oriented Technology Laboratory at Carleton University, Canada. Robert's main research interests are in human-computer interaction and software design. In particular, he focuses on better understanding of the human perspective to inform and explore the design of computer software.

References

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