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Introduction to Programming in Java 3D

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course notes

Introduction to Programming with Java3D

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Introduction to Programming with Java 3D
Abstract

Java 3D is a new cross-platform API for developing 3D graphics applications in Java. Java 3D's feature set has been designed to enable quick development of complex 3D applications, and at the same time enable fast and efficient implementations on a variety of platforms, from PCs to workstations. Using Java 3D, software developers can build cross-platform applications that build 3D scenes programmatically, or via loading 3D content from VRML, OBJ, and/or other external files. The Java 3D API includes a rich feature set for building shapes, composing behaviors, interacting with the user, and controlling rendering details.

Participants in this tutorial will learn the concepts behind Java 3D, the Java 3D class hierarchy, typical usage patterns, ways of avoiding common mistakes, animation and scene design techniques, and tricks for increasing performance and realism.

Preface

Welcome to the *Introduction to Programming with Java 3D* tutorial notes! These tutorial notes have been written to give you a quick, practical, example-driven overview of *Java 3D*, the cross-platform 3D graphics API for Java. To do this, we've included almost 500 pages of tutorial material with nearly 100 images and over 50 Java 3D examples.

To use these tutorial notes you will need:

- An HTML Web browser
- Java Development Kit (JDK) 1.2 or later
- Java 3D 1.2 or later

Information on Java JDKs and Java 3D is available at:

http://www.javasoft.com

What's included in these notes

These tutorial notes primarily contain two types of information:

1. General information, such as this preface
2. Tutorial slides and examples

The tutorial slides are arranged as a sequence of 400+ hyper-linked pages containing Java 3D syntax notes, Java 3D usage comments, or images of sample Java 3D applications. Clicking on the file name underneath an image brings up a window showing the Java source file that generated the image. The Java source files contain extensive comments providing information about the techniques the file illustrates.

Compiling and executing the Java example file from the command-line brings up a Java application illustrating a Java 3D feature. Most such applications include menus and other interaction options with which you can explore Java 3D features.

The tutorial notes provide a necessarily terse overview of Java 3D. We recommend that you invest in a Java 3D book to get thorough coverage of the language. Two of the course lecturers are authors of the Java 3D specification, available from Addison-Wesley: *The Java 3D API Specification*, ISBN 0-201-32576-4, 1997.

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Henry Sowizral is a Senior Staff Engineer at Sun Microsystems where he is the chief architect of the Java 3D API. His areas of interest include virtual reality, large model visualization, and distributed and concurrent simulation. He has taught numerous tutorials on topics including expert systems and virtual reality at conferences including COMPCON, Supercomputing, VRAIS, and SIGGRAPH. Henry has taught Java 3D at SIGGRAPH 96, JavaOne, and other conferences.

Henry is a co-author of the book *The Java 3D API Specification*, published by Addison-Wesley. He holds a B.S. in Information and Computer Science from the University of California, Irvine, and an M.Phil. and Ph.D. in Computer Science from Yale University.

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Dave Nadeau is a principal scientist at the San Diego Supercomputer Center (SDSC), a national research center specializing in computational science and engineering, located on the campus of the University of California, San Diego (UCSD). Specializing in scientific visualization and virtual reality, he is the author of technical papers and articles on 3D graphics and VRML and is a co-author of two books on VRML (*The VRML Sourcebook* and *The VRML 2.0 Sourcebook*, published by John Wiley & Sons). He is the founder and lead librarian for *The VRML Repository* and *The Java 3D Repository*, principal Web sites for information on VRML, Java 3D, and related software.

Dave has taught VRML at multiple conferences including SIGGRAPH 96-97, WebNet 96-97, VRML 97-98, WMC/SCS 98, Eurographics 97, and Visualization 97. He has taught Java 3D at Visualization 97. He was a co-chair for the *VRML Behavior Workshop* in October 1995, the first workshop on VRML behavior technology, and a co-chair for the *VRML 95* conference in December 1995, the first conference on VRML. He was on the program committees for VRML 97 and VRML 98 and is SDSC's representative to the VRML Consortium.

Dave holds a B.S. in Aerospace Engineering from the University of Colorado, Boulder, an M.S. in Mechanical Engineering from Purdue University, and is in the Ph.D. program in Electrical and Computer Engineering at the University of California, San Diego.

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Mike Bailey is a senior principal scientist at the San Diego Supercomputer Center (SDSC) and an associate professor in both the Applied Mechanics and Engineering Sciences and the Computer Science departments at the University of California at San Diego (UCSD). His areas of interest include scientific visualization, high performance computer graphics, geometric modeling, and solid freeform fabrication (see the TeleManufacturing Facility).

Mike has served as chair of the Graphics Performance Characterization Committee since 1993. He served on the SIGGRAPH Executive Committee from 1986-1990, and as chair of the courses program at the SIGGRAPH conferences in 1984, 1985, 1987, 1988, and 1994. He also served as co-chair for the 1991 SIGGRAPH conference. He was the program chair for the VRML 95 conference in December 1995. He organized and presented at the SIGGRAPH 95, 96, and 97 *Introduction to Computer Graphics* courses, the SIGGRAPH 96 *The Use of Touch as an I/O Device* course, and presented at the SIGGRAPH 97 *Introduction to Java 3D* course.

Mike has a B.S. in Mechanical Engineering, and an M.S. and Ph.D. in Computer Graphics and Computer Aided Design from Purdue University.

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Michael Deering is a Distinguished Engineer at Sun Microsystems where he is chief hardware graphics architect and a co-architect of the Java 3D API. He has published on computer graphics architectures, virtual reality systems, and 3D interface technologies. He is the inventor of geometry compression and co-inventor of 3D-RAM.

Michael is a co-author of the book *The Java 3D API Specification*, published by Addison-Wesley. He holds an A.B and Ph.D. in Computer Science from the University of California, Berkeley.