

The Java 3D™ API

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<https://java3d.dev.java.net>

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Agenda

- Java 3D Community Source Project
- Java 3D 1.4 API
- Demo
- Future Releases
- Q&A

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Java 3D Community Source Project

- Source code available at <https://java3d.dev.java.net>
- Three main sub-projects:
 - j3d-core – `javax.media.j3d` package
 - Includes native code for Linux, Solaris, Windows
 - j3d-core-utils – `com.sun.j3d.*` packages
 - vecmath – `javax.vecmath` package
- Other sub-projects include:
 - j3d-examples – sample programs
 - j3d-contrib-utils – user-contributed, optional utilities
 - j3d-incubator – place to develop experimental code
 - JOALMixer under development

Java 3D Community Source Project

- Community is growing:
 - 230 registered project members; 15 signed JCAs
- Java 3D 1.3.2 released
 - Bug reports & fixes submitted by community members
 - Java Webstart via JNLP – moving to new server
- Support for new platforms:
 - Linux/amd64, Solaris/amd64, Linux/ia64 (contributed by community developer), Linux/ppc prototype
- 1.4 under development (more on this later)
 - API developed with community involvement
 - API specification ratified by JCP

Java 3D Community Source Project

- Help us improve Java 3D:
 - Apple port
 - Download and test Java 3D 1.4
 - Report bugs
 - Participate on forum
 - Suggest features (better still, help implement them)

Java 3D Community Source Project

- Roadmap:
 - 1.3.2 final release—March 2005
 - 1.4 API definition is complete
 - 1.4.0 early access (build5) just released
 - Final javadoc definitions for all API methods
 - Many features implemented
 - 1.4.0 beta—September 2005
 - 1.4.0 final release—November 2005

Java 3D Community Source Project

- Developer Resources:
 - Java 3D Forum on javadesktop.org
 - Very active: about 60 posts/week
 - Java 3D team reads forum regularly
 - Cross-posted to [interest 'at' java3d.dev.java.net](mailto:interest@java3d.dev.java.net)
 - Issue tracker on main java3d.dev.java.net page
 - File new issues or query existing issues
 - Discuss issues on [issues 'at' java3d.dev.java.net](mailto:issues@java3d.dev.java.net) mailing list
 - Developer mailing list – [dev 'at' java3d.dev.java.net](mailto:dev@java3d.dev.java.net)
 - For discussing implementation details of changes

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Java 3D 1.4 API

- Programmable shaders
- Additional core picking methods
- Stencil buffer support
- New rendering attributes / modes
- Other miscellaneous features
- Latest list of features, status at:
https://j3d-core.dev.java.net/j3d1_4/proposed-changes.html

Programmable Shaders

- Primary new feature of Java 3D 1.4
- Apps can access modern programmable GPUs
- Two shading languages:
 - OpenGL GLSL shading language (default)
 - NVIDIA's Cg shading language
- Existing GLSL shaders can be used without modification

Shader Class Hierarchy

NodeComponent

Appearance

ShaderAppearance

NodeComponent

Shader

SourceCodeShader

NodeComponent

ShaderProgram

GLSLShaderProgram

CgShaderProgram

NodeComponent

ShaderAttribute

ShaderAttributeObject

ShaderAttributeValue

ShaderAttributeArray

ShaderAttributeBinding

NodeComponent

ShaderAttributeSet

Programmable Shaders

- App creates Shader object for each vertex and fragment shader
- App creates GLSLShaderProgram (or Cg...) object to contain vertex and fragment shaders
- App creates ShaderAttribute{Value,Array} objects and puts them into a ShaderAttributeSet
- App creates ShaderAppearance to bind a ShaderProgram and a ShaderAttributeSet
- Demo with example code will be shown

Additional Picking Methods

- New methods in Locale and BranchGroup:
 - `public PickInfo[] pickAll(mode, flags, pickShape)`
 - `public PickInfo[] pickAllSorted(mode, flags, pickShape)`
 - `public PickInfo pickClosest(mode, flags, pickShape)`
 - `public PickInfo pickAny(mode, flags, pickShape)`
- New PickInfo class
 - Contains computed information about pick intersection

Stencil Buffer Support

- New methods in GraphicsConfigTemplate3D to set/get stencil size
- New RenderingAttributes:
 - Enable/disable stencil
 - Set stencil operation, function, and mask
- No multi-pass support in 1.4
 - Apps must use OrderedGroup or preRender callback

New Rendering Attributes

- New depth test function attribute:
 - ALWAYS, NEVER, EQUAL, NOT_EQUAL, LESS, GREATER, LESS_OR_EQUAL (default), GREATER_OR_EQUAL
- Additional blending functions:
 - BLEND_SRC_COLOR, BLEND_ONE_MINUS_SRC_COLOR, BLEND_DST_COLOR, BLEND_ONE_MINUS_DST_COLOR

Other Miscellaneous Features

- Method to retrieve geometry data from tessellated Font3D glyph
- Scene graph structure change listeners
- Name string for all scene graph objects
- Capability to call getParent() on live/compiled scene graph
- Method to get the Locale to which a node is attached

DEMO

Java 3D 1.4 API In Action

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Future Releases

- 1.5 API
 - Render to texture
 - Shadow map support
 - Multi-pass rendering
 - Other features that app developers need to fully utilize shader and access other advanced GPU features
 - Other possible features:
 - Non-power-of-two textures
 - Additional texture formats (NIO support, compression, ...)
 - Alpha buffers
 - Roughly 9 months after 1.4
 - We need your help!

Possible Future Releases

Unplanned

- Next minor release (1.6)
 - May include features that don't make 1.5
- Major Java 3D release (2.0)
 - Could break compatibility
 - Opportunity for significant change (RenderBin rewrite ...)
 - Features could include:
 - Access to the native context (JOGL integration)
 - Extensibility
 - Plug-in capability
 - Some features may not need a major release (could be done in 1.6)

For More Information

- Pavilion
 - POD #1208 – Java 3D, JAI, and JOGL
 - POD #1106 – Project Looking Glass
- Other BOFs
 - BOF #9877 – JOGL, JSR-239 (Tue, 8:30 PM)
 - Community Event – Project Looking Glass (Wed, 6 PM, Argent Hotel)
- URLs
 - <https://java3d.dev.java.net>
 - <http://www.javadesktop.org/forums/forum.jspa?forumID=55>

For More Information

- Recent books, and articles:
 - O'Reilly - “Killer Game Programming”
<http://www.oreilly.com/catalog/killergame>
 - JDJ - “Star Trek Technology for Java 3D”
<http://java.sys-con.com/read/99792.htm>
 - IEEE Computer Graphics (Mar/Apr 2005) - “Jabiru : Harnessing Java 3D Behaviors for Device and Display Portability”
<http://doi.ieeecomputersociety.org/10.1109/MCG.2005.42>

Q&A

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