X3D Graphics for Adanced Modeling

# Teaching and Learning X3D

Web3D 2012 Tutorial

Don Brutzman, Naval Postgraduate School

Tell me and I'll forget; show me and I may remember;
involve me and I'll understand. *Chinese Proverb*


# Tutorial Resources Today

X3D for Web Authors book

- Chapter slidesets, example archives, videos

Getting Started with X3D:  overview

X3D-Edit: open source authoring tool

X3D Scene Graph tutorial

X3D Example Archives and Authoring Tools

X3D for Advanced Modeling book is underway

Project outline:  visualizing data using X3D

Discussion and next steps

# Slidesets are available online

http://x3dgraphics.com/slidesets/
X3dForAdvancedModeling/Web3D2012/

- TeachingAndLearningX3dGraphics.pdf
- Chapter00-GettingStarted.pdf
- TutorialX3dSceneGraph.pdf
- X3D-EditAuthoringTool.pdf

plus some bonus items:

- GeneralConversionProcessDataToX3dVisualization.pdf
- ChapterAndExampleNotes.pdf

# Course abstract 1

This course is taught at an intermediate level and is suitable for educators and learners (i.e. all attendees). Materials covered include X3D examples, authoring validation and conversion tools, books, course slidesets and videos, communities, and numerous other resources.

Educators will get everything needed to teach their own introductory or advanced X3D graphics courses, without student prerequisites for programming experience.

# Course abstract 2

Graphics authors learning on their own will be fully enabled to learn and try whichever parts of X3D interest them. Future work on e-books will be described. If time permits, educators will be given 1-2 minutes to describe their experiences teaching X3D.

# Assets Overview

# X3D for Web Authors

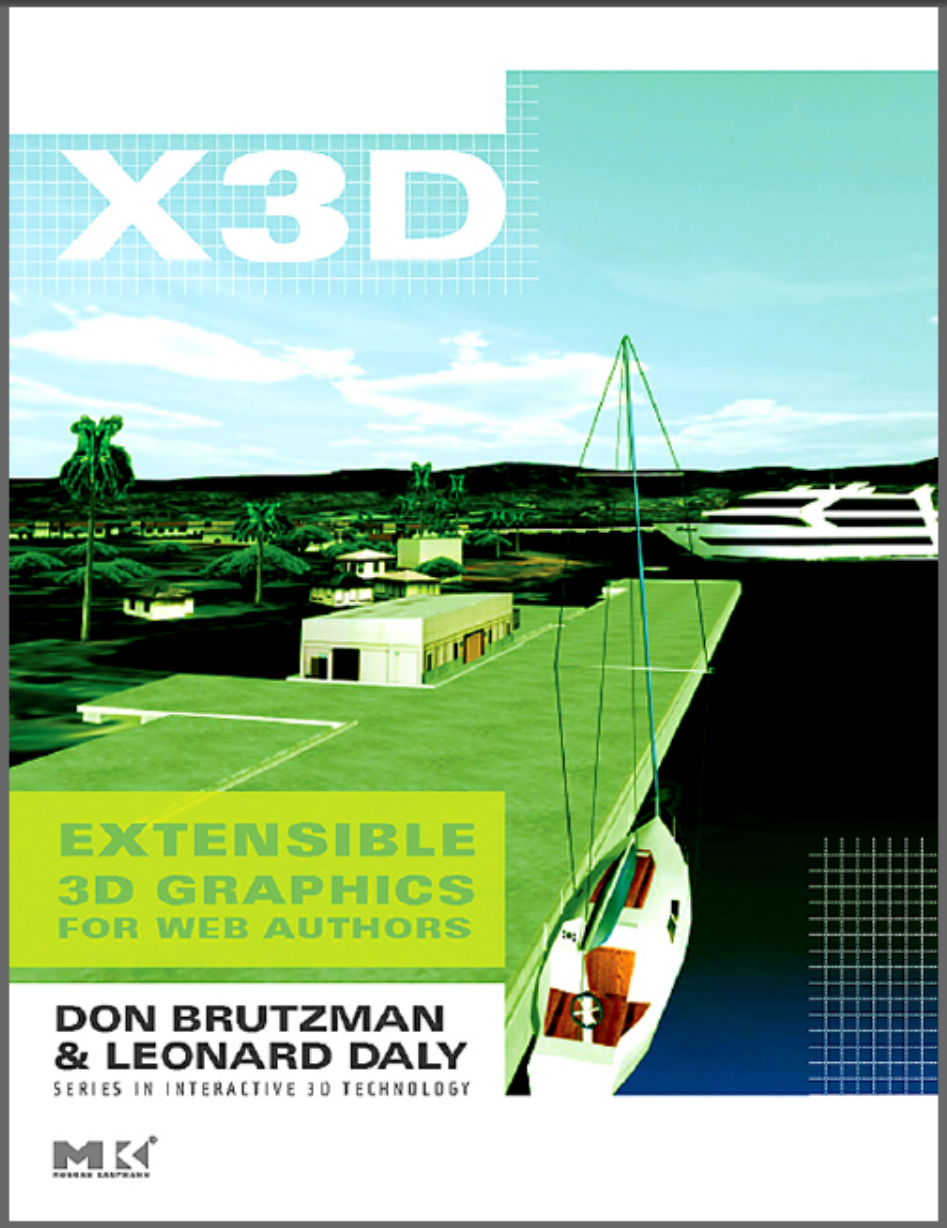
Textbook, slidesets, examples, videos

http://x3dGraphics.com

Bookmarks

Options





# Course Videos: X3D for Web Authors


These video lessons support the textbook X3D: Extensible 3D Graphics for Web Authors, which shows how to build and animate models using X3D.

Primary supporting materials for the book and these video lessons include the X3D-Edit authoring tool, example scenes, and chapter slidesets. Supplementary learning materials include X3D Resources, X3D Tooltips, and X3D Scene Authoring Hints.

These videos were produced as part of two Naval Postgraduate School (NPS) MOVES Institute courses: *Introduction to X3D Graphics* (MV3204) and *Advanced X3D Graphics* (MV4205). The course presenter is book coauthor Don Brutzman.

| Chapter Examples | Session | Description | .pdf |
|---|---|---|---|
| 0 | Getting Started | Goals and motivation, installing X3D-Edit authoring tool and example scenes, course introduction | slides |
| 1 | Technical Overview 1A | Introduction, historical background, Web3D Consortium, importance of standardization, X3D Specifications and International Organization of Standards (ISO), intellectual property rights (IPR) and open-source software, interoperability considerations | slides |
| | Technical Overview 1B | Browsers and players, models versus programming, scene graphs, behaviors and events, profiles and components, document metadata, fields | |
| | Technical Overview 1C | Importance of consistency, strong data typing, accessType, XML design patterns for X3D, compressed binary encoding, standards liaison organizations | |
| | Technical Overview 1D | X3D-Edit authoring tool development, functional testing, bug tracking, version control, Netbeans, help system | |
| 2 | Geometry Primitives 2A | Shape and geometry nodes, common geometry fields | slides |
| | Geometry Primitives 2B | Box and Cylinder nodes, X3D Tooltips | |
| | Geometry Primitives 2C | HelloWorld example, Cone Cylinder and Sphere nodes | |
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| | Geometry Primitives 2E | FontStyle node, open-source licenses | |
| 3 | Grouping 3A | Grouping node concepts, XML encoding | slides |
| | Grouping 3B | Inline node, url field | |
| | Grouping 3C | X3D resources and additional references, Inline node, url fields, level of detail (LOD) node | |
| | Grouping 3D | Switch node, review grouping node concepts, 3D grid resources | |
| 4 | Viewing Navigation 4A | Viewing, navigation, bindable nodes and binding operations example | slides |
| | Viewing Navigation 4B | Viewpoint node, viewing and navigation | |
| | Viewing Navigation 4C | NavigationInfo and Anchor nodes, uniform resource locator (url) | |
| 5 | Appearance 5A | Material and TwoSidedMaterial nodes, Universal Media materials library | slides |
| | Appearance 5B | Textures and ImageTexture node, texture coordinates, image copying and flipping to produce a continuously repeating texture, file formats | |
| | Appearance 5C | MovieTexture and PixelTexture nodes, LineProperties and FillProperties nodes | |
| | Appearance 5D | PixelTexture node, SFImage data type, PixelTexture image-import tool | |
| | Appearance 5E | More on PixelTexture node, MovieTexture node | |

# CGEMS

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- Archives for teaching and learning 3D
- http://cgems.inesc.pt


Jury award, best submission 2008

- Book, course notes, X3D-Edit tool, examples

Online learning resource:  course video podcasts!

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# Getting Started with X3D: overview slideset

X3D Graphics for Web Authors

Getting Started with X3D

*A journey of a thousand miles*
*begins with a single step.*
Chinese proverb

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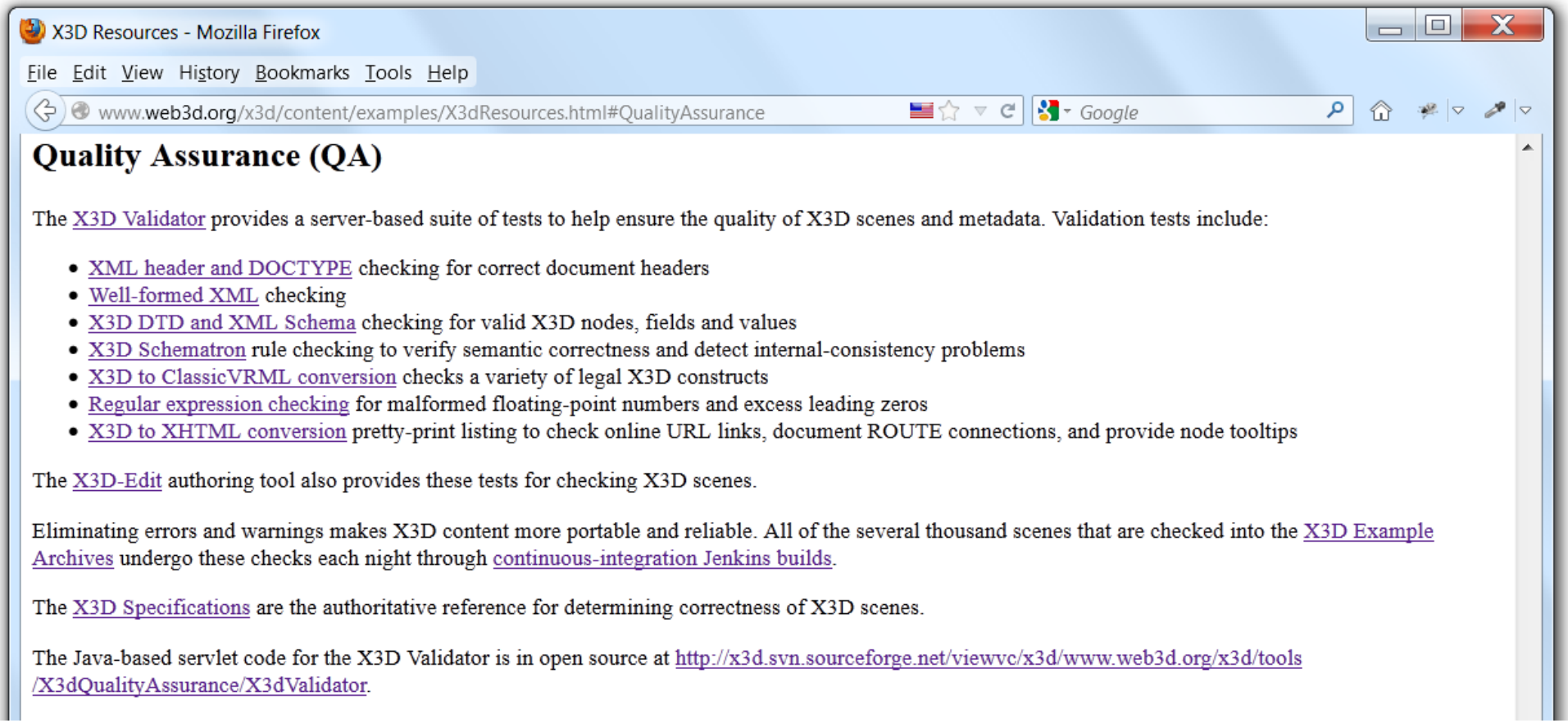
# Quality Assurance (QA)



# X3D Validator


## X3D Validator

This Web application checks X3D scene validity.


Choose a local .x3d scene:

Browse...

Enter an online .x3d url:

Hello World

Upload and Analyze

### X3D Validator Status

- The Quality Assurance (QA) section of the X3D Resources page provides further information about these tests.
- This codebase is published under an open-source license, available on SourceForge, and undergoing continued development.
- Security note: currently no scenes or errors are saved by the server. Future versions may support submitting error reports of general interest.

### Contact

- Questions, suggestions and comments about these resources are welcome. Please send them to Don Brutzman (*brutzman at nps.edu*)
- If you find this service useful, please consider providing a testimonial comment for our Web3D Consortium news announcement.
- The X3D Validator is available online at https://savage.nps.edu/X3dValidator
- Updated 29 July 2012 (revision log)

# X3D-Edit: open source authoring tool

X3D Graphics for Web Authors

## X3D-Edit Authoring Tool

3 August 2012

Don Brutzman
Naval Postgraduate School (NPS)
*brutzman@nps.edu*

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# X3D Scene Graph tutorial

## X3D Graphics for Web Authors

## X3D Scene Graph Tutorial

*Plus ça change, plus c'est la même chose.*

The more something changes, the more it's the same thing.

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# Applications, Players, Plugins for X3D

## X3D Resources


Extensible 3D (X3D) Graphics is the royalty-free open standard for viewing and archiving interactive 3D models on the Web.

This page lists numerous resources that support X3D.

Applications | Authoring Software | Authoring Support | Books | Conformance | Conversions | Examples | Export | License | Mobile | PowerPoint | Quality Assurance (QA) | References | Security | Showcase | Training | X3D-Edit | X3D Scene Authoring Hints | Contact

## Applications, Players and Plugins for X3D / VRML Viewing

Your web browser must be capable of viewing X3D/VRML scenes in order to browse these X3D examples. Please load one of these player plugins if necessary.

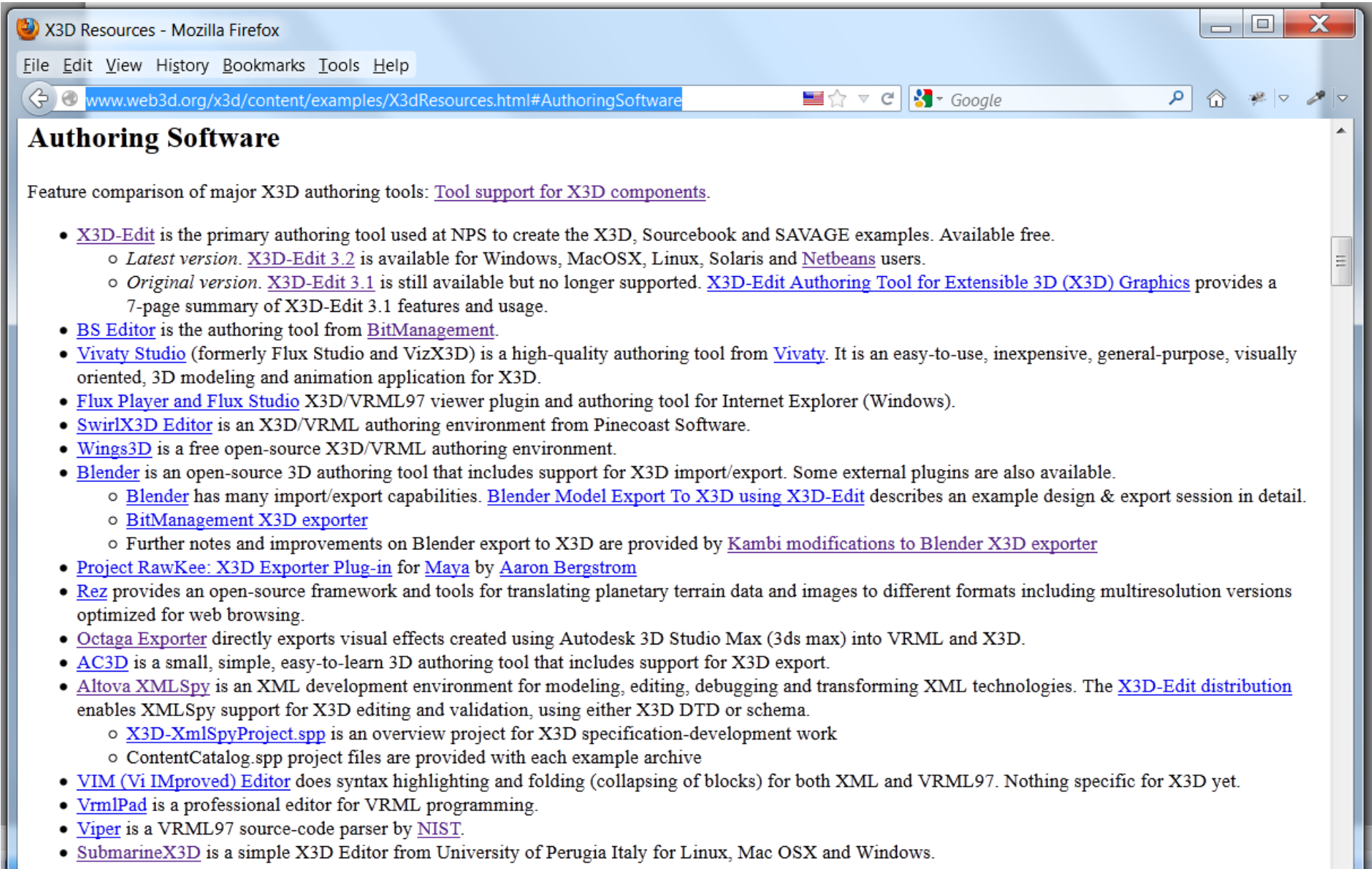
> Example test scene: HelloWorld (.x3d XML, .x3dv ClassicVRML, .wrl VRML97, .html listing, .xhtml X3DOM, .x3db compression, C14N canonicalization, and .png image)

Feature comparison of major X3D viewers: Player support for X3D components.

X3D players from Web3D Consortium members:

- BitManagement's BS Contact and BS Contact Geo X3D/VRML97 plugins for Internet Explorer (Windows MacOSX Linux).
- InstantReality is a high-performance Mixed Reality (MR) system (Windows MacOSX Linux).
- FreeWRL/FreeX3D X3D/VRML browser (open-source C). Also available via Apple website (Windows MacOSX Linux).
- Xj3D Open Source (latest release on developer page) for X3D/VRML97. Version 2.0 release using Java OpenGL (JOGL) rendering. (Windows MacOSX Linux Solaris, or Java standalone, or browser-launchable Java WebStart).
  - NPS source branch for Xj3D viewer nightly build is also available
- SwirlX3D Free Player by Pine Coast Software (Windows).
- Heilan X3D Browser open-source C++ browser for audio research (Mac Windows Linux).
- NuGraf 3D Rendering, Translation, Viewing & Data Optimization System by Okino (Windows and authoring-tool plugins).
- GeoVrml Run-Time is needed for VRML97 GeoVrml examples.
- Sensegraphics H3DAPI is an open-source C++ API for X3D that includes the haptics support, the Rigid Body Physics component, plus the proposed Volume Visualization component for the Medical Working Group.

# X3D Authoring Software




## Authoring Software

Feature comparison of major X3D authoring tools: Tool support for X3D components.

- X3D-Edit is the primary authoring tool used at NPS to create the X3D, Sourcebook and SAVAGE examples. Available free.
  - *Latest version*. X3D-Edit 3.2 is available for Windows, MacOSX, Linux, Solaris and Netbeans users.
  - *Original version*. X3D-Edit 3.1 is still available but no longer supported. X3D-Edit Authoring Tool for Extensible 3D (X3D) Graphics provides a 7-page summary of X3D-Edit 3.1 features and usage.
- BS Editor is the authoring tool from BitManagement.
- Vivaty Studio (formerly Flux Studio and VizX3D) is a high-quality authoring tool from Vivaty. It is an easy-to-use, inexpensive, general-purpose, visually oriented, 3D modeling and animation application for X3D.
- Flux Player and Flux Studio X3D/VRML97 viewer plugin and authoring tool for Internet Explorer (Windows).
- SwirlX3D Editor is an X3D/VRML authoring environment from Pinecoast Software.
- Wings3D is a free open-source X3D/VRML authoring environment.
- Blender is an open-source 3D authoring tool that includes support for X3D import/export. Some external plugins are also available.
  - Blender has many import/export capabilities. Blender Model Export To X3D using X3D-Edit describes an example design & export session in detail.
  - BitManagement X3D exporter
  - Further notes and improvements on Blender export to X3D are provided by Kambi modifications to Blender X3D exporter
- Project RawKee: X3D Exporter Plug-in for Maya by Aaron Bergstrom
- Rez provides an open-source framework and tools for translating planetary terrain data and images to different formats including multiresolution versions optimized for web browsing.
- Octaga Exporter directly exports visual effects created using Autodesk 3D Studio Max (3ds max) into VRML and X3D.
- AC3D is a small, simple, easy-to-learn 3D authoring tool that includes support for X3D export.
- Altova XMLSpy is an XML development environment for modeling, editing, debugging and transforming XML technologies. The X3D-Edit distribution enables XMLSpy support for X3D editing and validation, using either X3D DTD or schema.
  - X3D-XmlSpyProject.spp is an overview project for X3D specification-development work
  - ContentCatalog.spp project files are provided with each example archive
- VIM (Vi IMproved) Editor does syntax highlighting and folding (collapsing of blocks) for both XML and VRML97. Nothing specific for X3D yet.
- VrmlPad is a professional editor for VRML programming.
- Viper is a VRML97 source-code parser by NIST.
- SubmarineX3D is a simple X3D Editor from University of Perugia Italy for Linux, Mac OSX and Windows.

# X3D Example Archives

## Examples

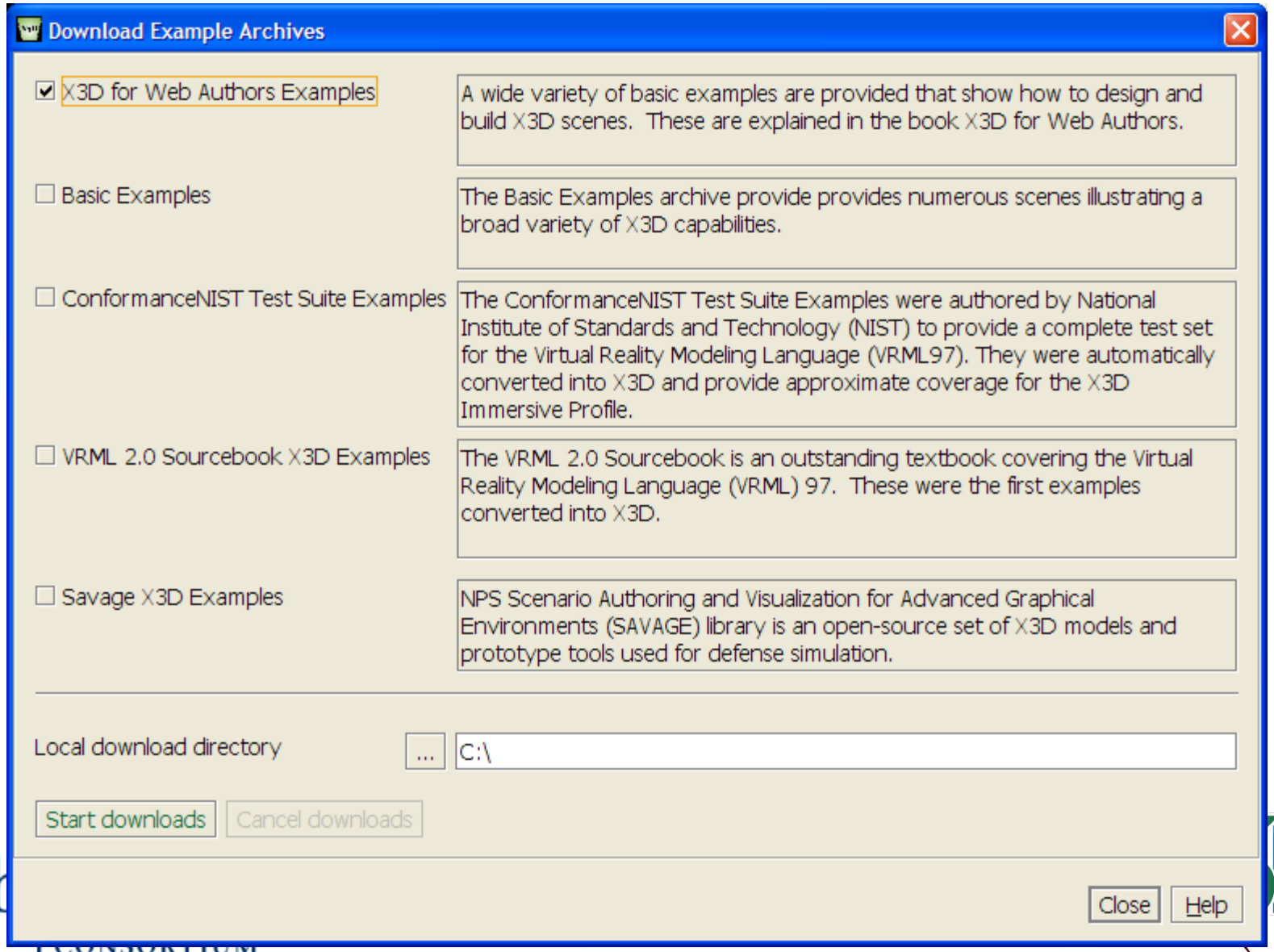
The X3D Examples Archive archives demonstrate how X3D nodes and scenes work. Over 3000 .x3d example scenes are provided, available individually online or collected together as fully complete, downloadable, and installable .zip archives. These examples are maintained by the Web3D Consortium and are all protected under an open source license, provided free for any use.

Currently each example is provided in multiple file encodings: XML (.x3d), ClassicVRML (.x3dv), VRML97 (.wrl) and pretty-print XHTML (.html) form. Compressed Binary Encoding (.x3db) and X3D Canonicalization (C14N) formats were added summer 2006.

Example archives start with the directory structure `www.web3d.org/x3d/content/examples` in order to match the online addresses for most examples, and also to keep local archives side-by-side for easier user access to scenes.

a. Example test scene: HelloWorld (.x3d XML .x3dv ClassicVRML, .wrl VRML97, .html listing, .xhtml X3DOM, .x3db compression, and C14N canonicalization, and .png image)
b. X3D for Web Authors Examples Archive
   - A wide variety of basic examples are provided for the corresponding textbook that show how to design and build X3D scenes. Bug reports are tracked online.
   - Online at http://x3dGraphics.com/examples/X3dForWebAuthors
   - Compressed archive (~42 MB) at X3dExamplesX3dForWebAuthors.zip
   - Subversion master source is retrievable via subversion check out:
     ```
     svn co https://x3d.svn.sourceforge.net/svnroot/x3d/www.web3d.org/x3d/content/examples/X3dForWebAuthors X3dForWebAuthors
     ```
   - Source is viewable at http://x3d.svn.sourceforge.net/viewvc/x3d/www.web3d.org/x3d/content/examples/X3dForWebAuthors, with model source changes reported via the x3d-commits mailing list.
   - X3D Examples for Web Authors Project continuous integration testing is performed by the Savage Jenkins server, with latest console error logs and nightly build products available online.
c. Basic X3D Examples Archive
   - The Basic Examples archive provide provides numerous scenes illustrating a broad variety of X3D capabilities. Bug reports are tracked online.
   - Online at http://www.web3d.org/x3d/content/examples/Basic
   - Compressed archive (~110 MB) at X3dExamplesBasic.zip
   - Subversion master source is retrievable via subversion check out:
     ```
     svn co https://x3d.svn.sourceforge.net/svnroot/x3d/www.web3d.org/x3d/content/examples/Basic Basic
     ```
   - Source is viewable at http://x3d.svn.sourceforge.net/viewvc/x3d/www.web3d.org/x3d/content/examples/Basic, with model source changes reported via the x3d-commits mailing list.
   - X3D Examples Archive Basic Project continuous integration testing is performed by the Savage Jenkins server, with latest console error logs and nightly build products available online.

# X3D Examples download panel, X3D-Edit



# Production pipeline

Open-source license

Version control using subversion

.x3d files are master versions, others derivative

Chapter outline builder collects scene metadata, produces HTML framework

Build scripts perform conversions, publication

SourceForge projects for X3D

Sharable + repeatable, contributors + students

# X3D for Advanced Modeling book is underway

List of chapter topics

Project outline:  visualizing data using X3D

# E-books: initial work

- Interest group has been formed
  - Dr. Kwan Hee Yoo
  - Website
- Goals
  - 1
  - 2
- More activity needed
  - Meeting
  - Future work

# Discussion and next steps

# Tutorial Summary

# Tutorial Summary

X3D scene graph has a tremendous amount of capability and flexibility

X3D playback is suitable for

- Real-time rendering of 3D models
- Efficient animation using ROUTE-based event passing for any scene-graph parameter
- Reacting to user behaviors, overt and implicit

X3D authoring is straightforward

- Tools help, XML interoperability helps more
- Web deployment opens up new horizons for 3D

# Exercise: deploy a 3D model

Deploy a 3D model using X3D, HTML on the Web

- Use existing model from another tool (e.g. Blender)
- Save as in XML as .x3d file (or #VRML 2.0, 3.0)
- Load (or import) into X3D-Edit, fix bugs (if any)
- Add meta tags in header documenting the scene
- Create parent scene that loads first via Inline
- Add further X3D content to parent scene
- Create HTML page containing the X3D scene that adds further information to user
- Deploy on a web site or as .zip archive to users

# Review topics

- Create a proper scene graph structure for a given scene
- List content and functionality that can be embedded in a scene graph
- State the contents of internal nodes and leaf nodes
- Visualize on paper the scene contained in a scene graph
- Explain the various scene-graph traversals, their order and purpose
- Translate between between scene graph and OpenGL with respect to modeling transformations, rendering attributes, geometry, animations
- Explain the connection between the matrix stack and a scene graph
- Name the advantages of using a scene graph over OpenGL
- Explain the relationship between scene graphs and raytracing
- Explain why and how bounding volumes are used in scene graphs
- Name performance optimizations that a scene graph affords
- Use X3D as a concrete scene graph architecture
- Use a graphical scene graph editor to create and modify graphs
- Use a text editor to modify graphs
- Conceptually explain the relationship between a scene graph data file, a scene graph viewer, a scene graph editor, a geometry data file and an OpenGL executable

# Contact

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# CGEMS, SIGGRAPH, Eurographics

The Computer Graphics Educational Materials Source(CGEMS) site is designed for educators

- to provide a source of refereed high-quality content
- as a service to the Computer Graphics community
- freely available, directly prepared for classroom use
- http://cgems.inesc.pt

*X3D for Web Authors* recognized by CGEMS! ☺

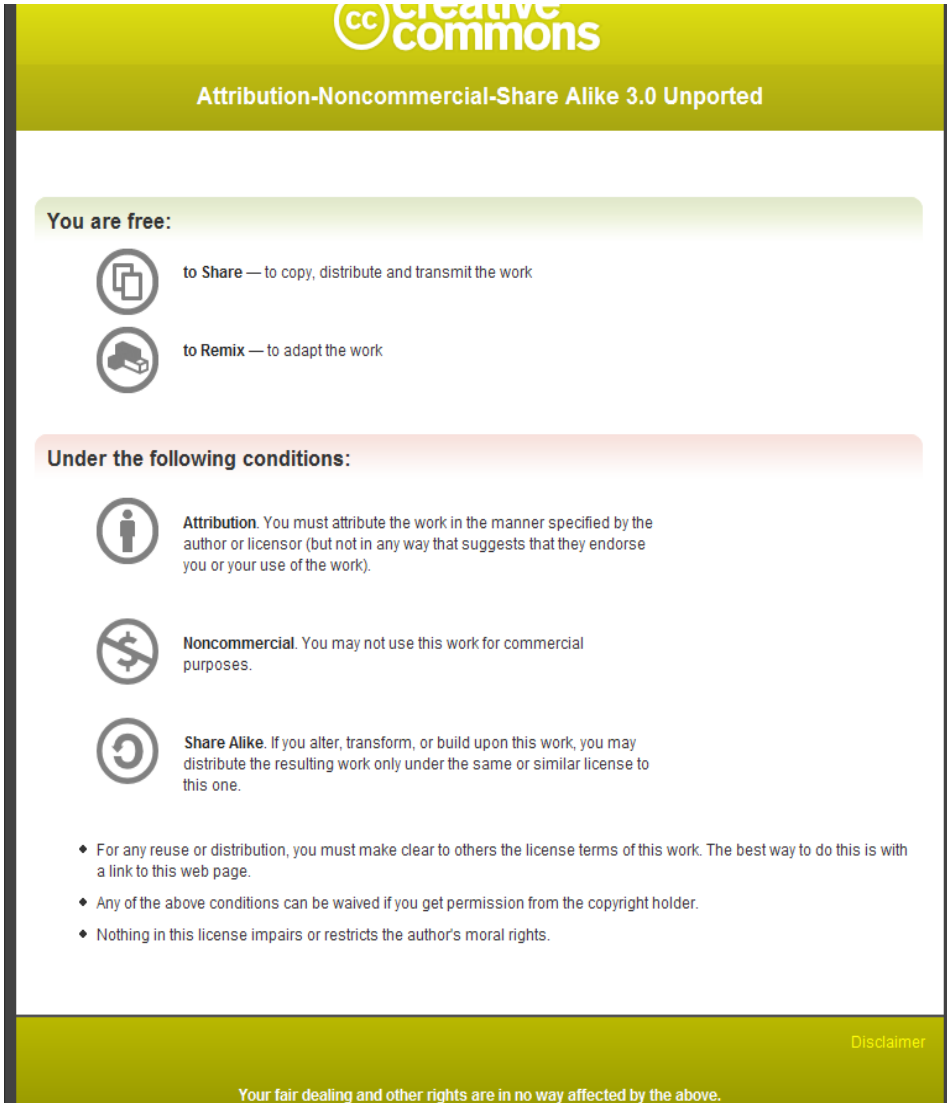
- Book materials: X3D-Edit tool, examples, slidesets
- Received jury award for Best Submission 2008

CGEMS supported by SIGGRAPH, Eurographics



# Creative Commons open-source license

http://creativecommons.org/licenses/by-nc-sa/3.0



# Open-source license
# for X3D-Edit software and X3D example scenes

http://www.web3d.org/x3d/content/examples/license.html

X3D Graphics for Adanced Modeling

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Textbook, slidesets, examples, videos

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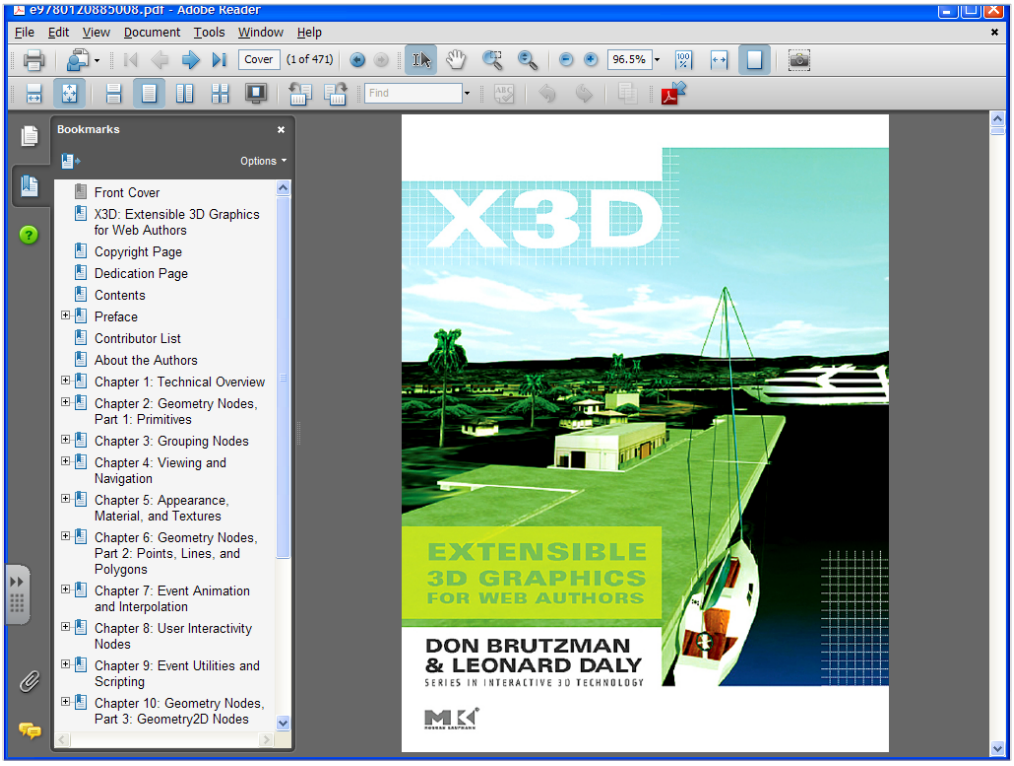
e9780120885008.pdf - Adobe Reader
File Edit View Document Tools Window Help
Cover (1 of 471)
96.5%
Find
Bookmarks
Options
Front Cover
X3D: Extensible 3D Graphics for Web Authors
Copyright Page
Dedication Page
Contents
Preface
Contributor List
About the Authors
Chapter 1: Technical Overview
Chapter 2: Geometry Nodes, Part 1: Primitives
Chapter 3: Grouping Nodes
Chapter 4: Viewing and Navigation
Chapter 5: Appearance, Material, and Textures
Chapter 6: Geometry Nodes, Part 2: Points, Lines, and Polygons
Chapter 7: Event Animation and Interpolation
Chapter 8: User Interactivity Nodes
Chapter 9: Event Utilities and Scripting
Chapter 10: Geometry Nodes, Part 3: Geometry2D Nodes
X3D
EXTENSIBLE
3D GRAPHICS
FOR WEB AUTHORS
DON BRUTZMAN
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SERIES IN INTERACTIVE 3D TECHNOLOGY

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Online learning resource: course video podcasts!

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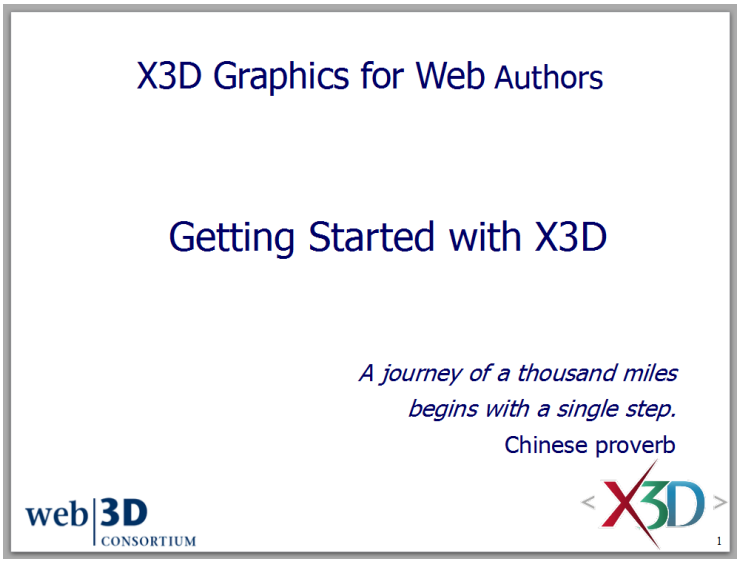
<X3D>

10

# Getting Started with X3D: overview slideset



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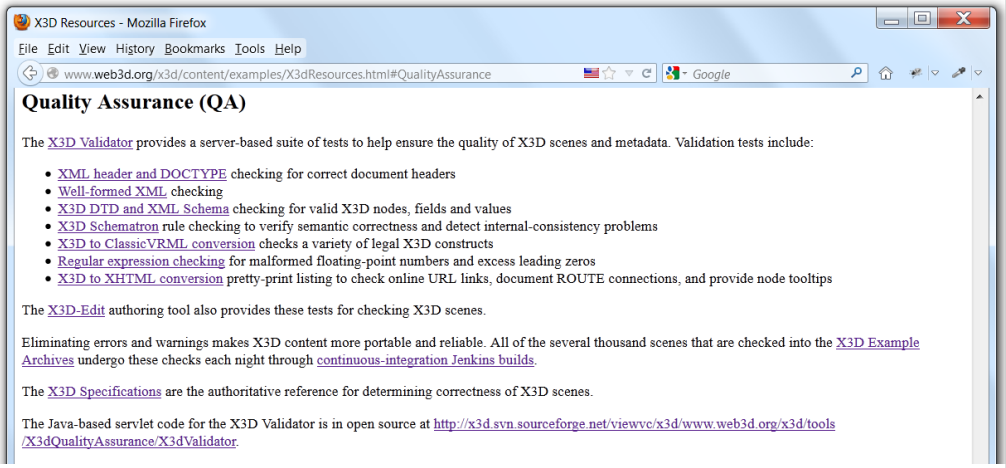

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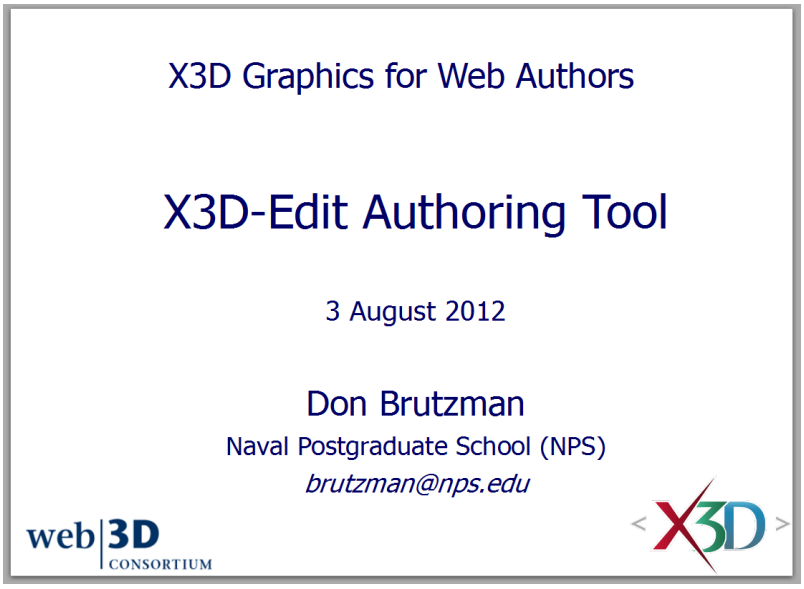
- This codebase is published under an open-source license, available on SourceForge, and undergoing continued development.
- Security note: currently no scenes or errors are saved by the server. Future versions may support submitting error reports of general interest.

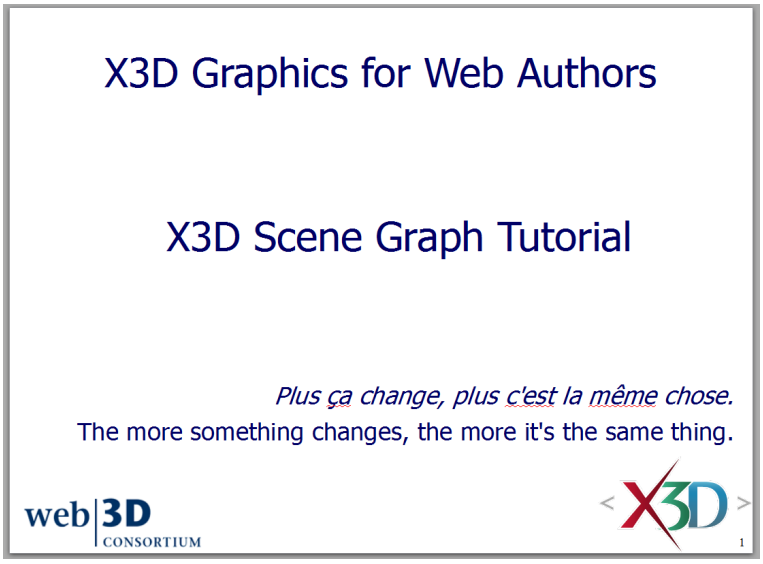
### Contact

- Questions, suggestions and comments about these resources are welcome. Please send them to Don Brutzman (*brutzman at nps.edu*)
- If you find this service useful, please consider providing a testimonial comment for our Web3D Consortium news announcement.
- The X3D Validator is available online at https://savage.nps.edu/X3dValidator
- Updated 29 July 2012 (revision log)

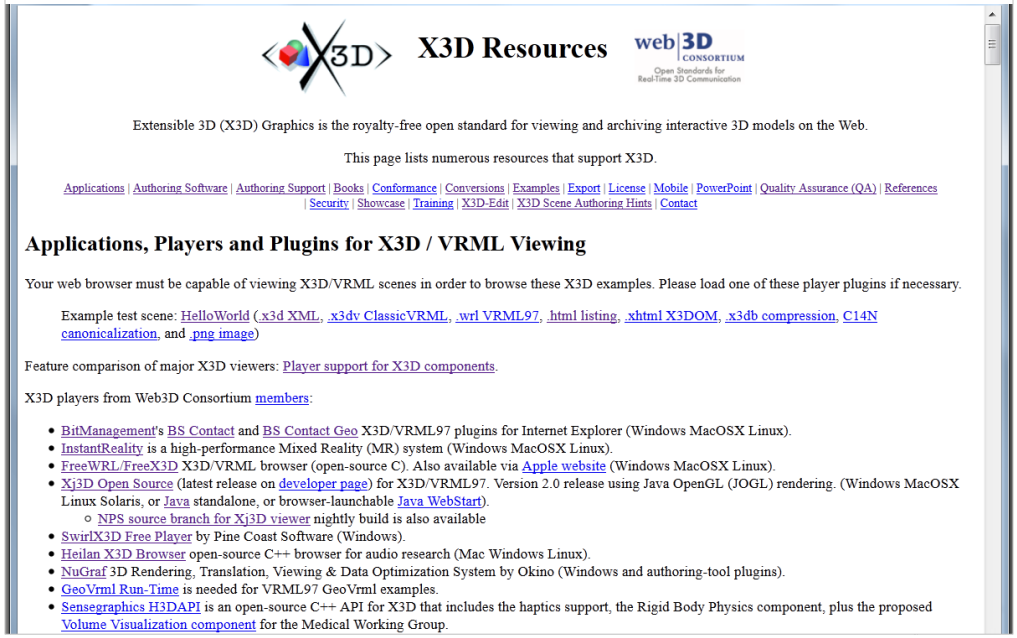
# X3D-Edit: open source authoring tool



# X3D Scene Graph tutorial



# Applications, Players, Plugins for X3D



## X3D Resources

Extensible 3D (X3D) Graphics is the royalty-free open standard for viewing and archiving interactive 3D models on the Web.

This page lists numerous resources that support X3D.

Applications | Authoring Software | Authoring Support | Books | Conformance | Conversions | Examples | Export | License | Mobile | PowerPoint | Quality Assurance (QA) | References | Security | Showcase | Training | X3D-Edit | X3D Scene Authoring Hints | Contact

### Applications, Players and Plugins for X3D / VRML Viewing

Your web browser must be capable of viewing X3D/VRML scenes in order to browse these X3D examples. Please load one of these player plugins if necessary.

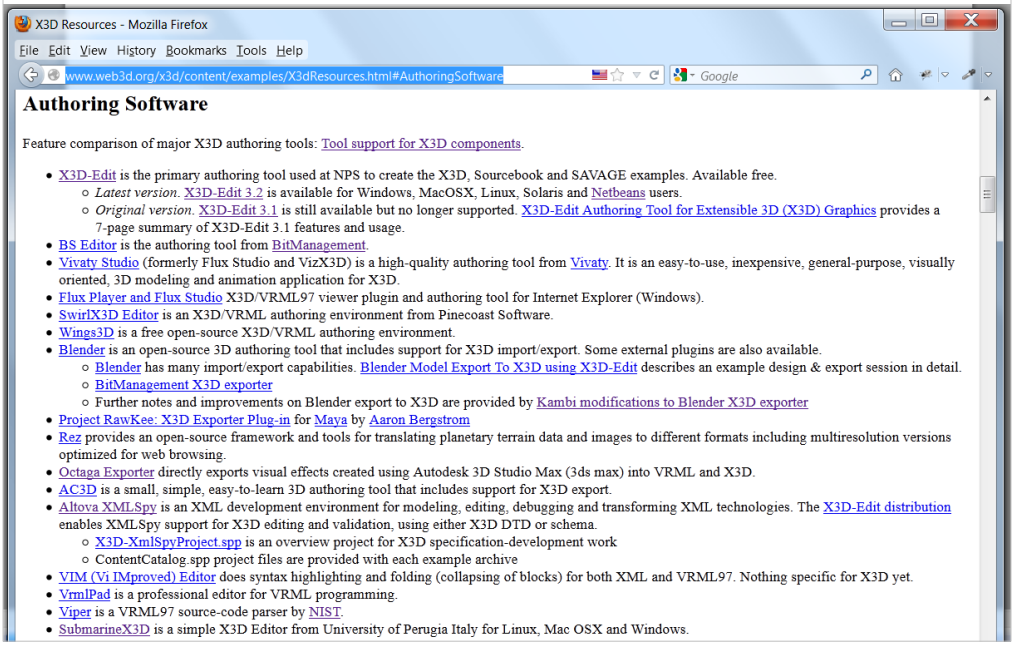
> Example test scene: HelloWorld (.x3d XML, .x3dv ClassicVRML, .wrl VRML97, .html listing, .xhtml X3DOM, .x3db compression, C14N canonicalization, and .png image)

Feature comparison of major X3D viewers: Player support for X3D components.

X3D players from Web3D Consortium members:

- BitManagement's BS Contact and BS Contact Geo X3D/VRML97 plugins for Internet Explorer (Windows MacOSX Linux).
- InstantReality is a high-performance Mixed Reality (MR) system (Windows MacOSX Linux).
- FreeWRL/FreeX3D X3D/VRML browser (open-source C). Also available via Apple website (Windows MacOSX Linux).
- Xj3D Open Source (latest release on developer page) for X3D/VRML97. Version 2.0 release using Java OpenGL (JOGL) rendering. (Windows MacOSX Linux Solaris, or Java standalone, or browser-launchable Java WebStart).
  - NPS source branch for Xj3D viewer nightly build is also available
- SwirlX3D Free Player by Pine Coast Software (Windows).
- Heilan X3D Browser open-source C++ browser for audio research (Mac Windows Linux).
- NuGraf 3D Rendering, Translation, Viewing & Data Optimization System by Okino (Windows and authoring-tool plugins).
- GeoVrml Run-Time is needed for VRML97 GeoVrml examples.
- Sensegraphics H3DAPI is an open-source C++ API for X3D that includes the haptics support, the Rigid Body Physics component, plus the proposed Volume Visualization component for the Medical Working Group.

# X3D Authoring Software




**Authoring Software**

Feature comparison of major X3D authoring tools: Tool support for X3D components.

- X3D-Edit is the primary authoring tool used at NPS to create the X3D, Sourcebook and SAVAGE examples. Available free.
  - *Latest version.* X3D-Edit 3.2 is available for Windows, MacOSX, Linux, Solaris and Netbeans users.
  - *Original version.* X3D-Edit 3.1 is still available but no longer supported. X3D-Edit Authoring Tool for Extensible 3D (X3D) Graphics provides a 7-page summary of X3D-Edit 3.1 features and usage.
- BS Editor is the authoring tool from BitManagement.
- Vivaty Studio (formerly Flux Studio and VizX3D) is a high-quality authoring tool from Vivaty. It is an easy-to-use, inexpensive, general-purpose, visually oriented, 3D modeling and animation application for X3D.
- Flux Player and Flux Studio X3D/VRML97 viewer plugin and authoring tool for Internet Explorer (Windows).
- SwirlX3D Editor is an X3D/VRML authoring environment from Pinecoast Software.
- Wings3D is a free open-source X3D/VRML authoring environment.
- Blender is an open-source 3D authoring tool that includes support for X3D import/export. Some external plugins are also available.
  - Blender has many import/export capabilities. Blender Model Export To X3D using X3D-Edit describes an example design & export session in detail.
  - BitManagement X3D exporter
  - Further notes and improvements on Blender export to X3D are provided by Kambi modifications to Blender X3D exporter
- Project RawKee: X3D Exporter Plug-in for Maya by Aaron Bergstrom
- Rez provides an open-source framework and tools for translating planetary terrain data and images to different formats including multiresolution versions optimized for web browsing.
- Octaga Exporter directly exports visual effects created using Autodesk 3D Studio Max (3ds max) into VRML and X3D.
- AC3D is a small, simple, easy-to-learn 3D authoring tool that includes support for X3D export.
- Altova XMLSpy is an XML development environment for modeling, editing, debugging and transforming XML technologies. The X3D-Edit distribution enables XMLSpy support for X3D editing and validation, using either X3D DTD or schema.
  - X3D-XmlSpyProject.spp is an overview project for X3D specification-development work
  - ContentCatalog.spp project files are provided with each example archive
- VIM (Vi IMproved) Editor does syntax highlighting and folding (collapsing of blocks) for both XML and VRML97. Nothing specific for X3D yet.
- VrmlPad is a professional editor for VRML programming.
- Viper is a VRML97 source-code parser by NIST.
- SubmarineX3D is a simple X3D Editor from University of Perugia Italy for Linux, Mac OSX and Windows.

# X3D Example Archives

## Examples

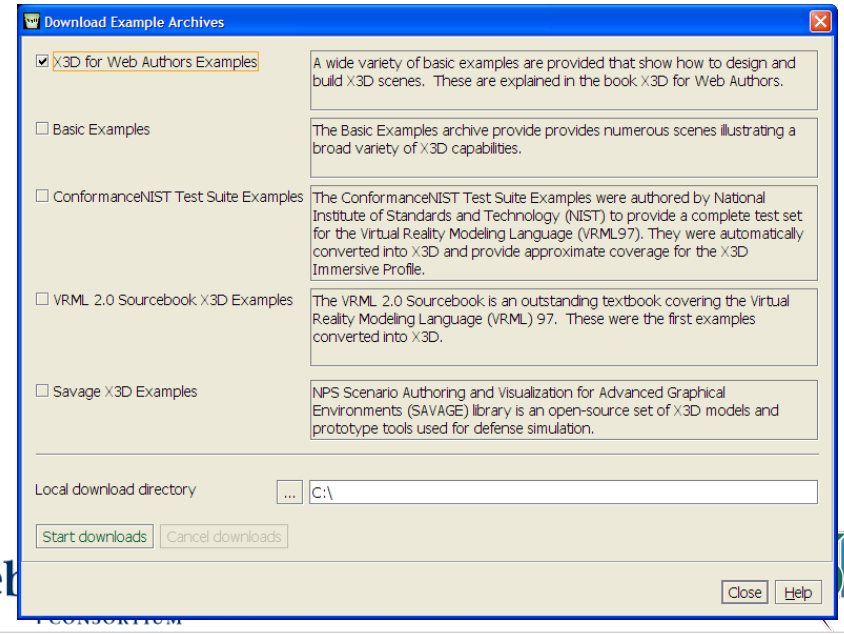
The X3D Examples Archive archives demonstrate how X3D nodes and scenes work. Over 3000 .x3d example scenes are provided, available individually online or collected together as fully complete, downloadable, and installable .zip archives. These examples are maintained by the Web3D Consortium and are all protected under an open source license, provided free for any use.

Currently each example is provided in multiple file encodings: XML (.x3d), ClassicVRML (.x3dv), VRML97 (.wrl) and pretty-print XHTML (.html) form. Compressed Binary Encoding (.x3db) and X3D Canonicalization (C14N) formats were added summer 2006.

Example archives start with the directory structure `www.web3d.org/x3d/content/examples` in order to match the online addresses for most examples, and also to keep local archives side-by-side for easier user access to scenes.

a. Example test scene: HelloWorld (.x3d XML, .x3dv ClassicVRML, .wrl VRML97, .html listing, .xhtml X3DOM, .x3db compression, and C14N canonicalization, and .png image)
b. X3D for Web Authors Examples Archive
   - A wide variety of basic examples are provided for the corresponding textbook that show how to design and build X3D scenes. Bug reports are tracked online.
   - Online at http://x3dGraphics.com/examples/X3dForWebAuthors
   - Compressed archive (~42 MB) at X3dExamplesX3dForWebAuthors.zip
   - Subversion master source is retrievable via subversion check out:
     ```
     svn co https://x3d.svn.sourceforge.net/svnroot/x3d/www.web3d.org/x3d/content/examples/X3dForWebAuthors X3dForWebAuthors
     ```
   - Source is viewable at http://x3d.svn.sourceforge.net/viewvc/x3d/www.web3d.org/x3d/content/examples/X3dForWebAuthors, with model source changes reported via the x3d-commits mailing list.
   - X3D Examples for Web Authors Project continuous integration testing is performed by the Savage Jenkins server, with latest console error logs and nightly build products available online.
c. Basic X3D Examples Archive
   - The Basic Examples archive provide provides numerous scenes illustrating a broad variety of X3D capabilities. Bug reports are tracked online.
   - Online at http://www.web3d.org/x3d/content/examples/Basic
   - Compressed archive (~110 MB) at X3dExamplesBasic.zip
   - Subversion master source is retrievable via subversion check out:
     ```
     svn co https://x3d.svn.sourceforge.net/svnroot/x3d/www.web3d.org/x3d/content/examples/Basic Basic
     ```
   - Source is viewable at http://x3d.svn.sourceforge.net/viewvc/x3d/www.web3d.org/x3d/content/examples/Basic, with model source changes reported via the x3d-commits mailing list.
   - X3D Examples Archive Basic Project continuous integration testing is performed by the Savage Jenkins server, with latest console error logs and nightly build products available online.

## X3D Examples download panel, X3D-Edit

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X3D-Edit includes this download panel. Select the top-level *Examples* menu, then *Download X3D Example Archives*.

# Production pipeline

- Open-source license
- Version control using subversion
- .x3d files are master versions, others derivative
- Chapter outline builder collects scene metadata, produces HTML framework
- Build scripts perform conversions, publication
- SourceForge projects for X3D
- Sharable + repeatable, contributors + students

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# X3D for Advanced Modeling book is underway

List of chapter topics

Project outline:  visualizing data using X3D

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# E-books: initial work

- Interest group has been formed
  - Dr. Kwan Hee Yoo
  - Website
- Goals
  - 1
  - 2
- More activity needed
  - Meeting
  - Future work

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# Discussion and next steps

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# Tutorial Summary


# Tutorial Summary

X3D scene graph has a tremendous amount of capability and flexibility

X3D playback is suitable for

- Real-time rendering of 3D models
- Efficient animation using ROUTE-based event passing for any scene-graph parameter
- Reacting to user behaviors, overt and implicit

X3D authoring is straightforward

- Tools help, XML interoperability helps more
- Web deployment opens up new horizons for 3D

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# Exercise: deploy a 3D model

Deploy a 3D model using X3D, HTML on the Web

- Use existing model from another tool (e.g. Blender)
- Save as in XML as .x3d file (or #VRML 2.0, 3.0)
- Load (or import) into X3D-Edit, fix bugs (if any)
- Add meta tags in header documenting the scene
- Create parent scene that loads first via Inline
- Add further X3D content to parent scene
- Create HTML page containing the X3D scene that adds further information to user
- Deploy on a web site or as .zip archive to users

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# Review topics

- Create a proper scene graph structure for a given scene
- List content and functionality that can be embedded in a scene graph
- State the contents of internal nodes and leaf nodes
- Visualize on paper the scene contained in a scene graph
- Explain the various scene-graph traversals, their order and purpose
- Translate between between scene graph and OpenGL with respect to modeling transformations, rendering attributes, geometry, animations
- Explain the connection between the matrix stack and a scene graph
- Name the advantages of using a scene graph over OpenGL
- Explain the relationship between scene graphs and raytracing
- Explain why and how bounding volumes are used in scene graphs
- Name performance optimizations that a scene graph affords
- Use X3D as a concrete scene graph architecture
- Use a graphical scene graph editor to create and modify graphs
- Use a text editor to modify graphs
- Conceptually explain the relationship between a scene graph data file, a scene graph viewer, a scene graph editor, a geometry data file and an OpenGL executable

With thanks to Dr. Mathias Kolsch NPS for these guiding questions to support a MV3202 course tutorial.

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## CGEMS, SIGGRAPH, Eurographics

The Computer Graphics Educational Materials Source(CGEMS) site is designed for educators

- to provide a source of refereed high-quality content
- as a service to the Computer Graphics community
- freely available, directly prepared for classroom use
- http://cgems.inesc.pt

*X3D for Web Authors* recognized by CGEMS! ☺

- Book materials: X3D-Edit tool, examples, slidesets
- Received jury award for Best Submission 2008

CGEMS supported by SIGGRAPH, Eurographics


From the CGEMS home page:

- http://cgems.inesc.pt

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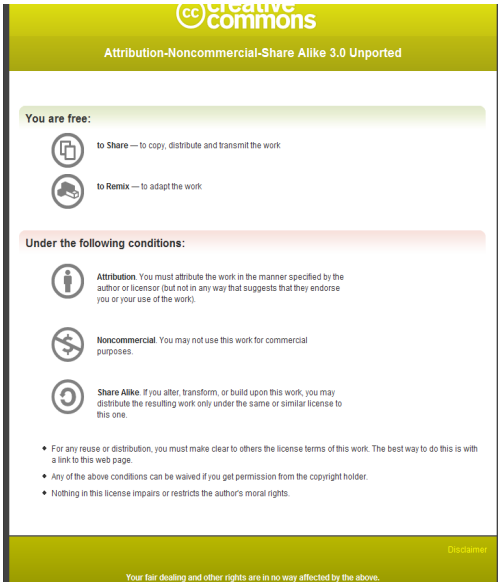


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# Open-source license
## for X3D-Edit software and X3D example scenes

http://www.web3d.org/x3d/content/examples/license.html

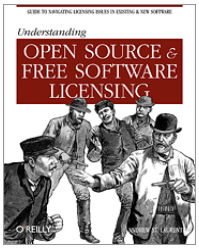


License available at

http://www.web3d.org/x3d/content/examples/license.txt

http://www.web3d.org/x3d/content/examples/license.html

Good references on open source:

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