

U3D and Javaview's PDF Export

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New Standard

- In 2004 a technical committee formed by the 3D Industry Forum (3DIF) started working on U3D
- Purpose: to develop a *unified extensible* file format for *communicating* and *visualizing* 3D scenes.
- In August 2005, the U3D file specification "ecma 363" was published.

<http://www.ecma-international.org/>

Tradeoffs of Universality

To work with any software, you have to keep it simple.

This means for geometry:

- no quadrilaterals, just triangles
- no splines or spline surfaces
- no vector fields
- ...

Advantages of U3D

- U3D is extensible, i.e. add your own specific data without affecting the readability in other software packages.
- Close to the runtime architecture of a typical 3D software.
- Supported by Adobe Acrobat 7.0 and Adobe Reader 7.0!

Building Blocks of a 3D Scene

- geometry
- materials and textures
- shading information
- light sources
- animation / motion information
- relative positions
- groups of objects ...

What is stored in U3D?

- scene graph connectivity
- geometry: CLOD mesh, line set, point set with colors, textures, normals ...
- animations (skeleton)
- lights
- shaders
- camera positions
- viewer settings

Structure of an U3D file

A binary file format.

Data blocks for all parts of a 3D scene.

Each block consists of

- a 32 bit ID, indicating the type of data
- two 32 bit integers for the size of the "Data" and "Meta Data" sections
- "Data" section, specified by ecma 363
- "Meta Data" section - for your own data.

Declaration and Resource blocks

First part:

Declaration blocks, containing enough information to allocate memory.

Second part:

Resource blocks, containing all the data.

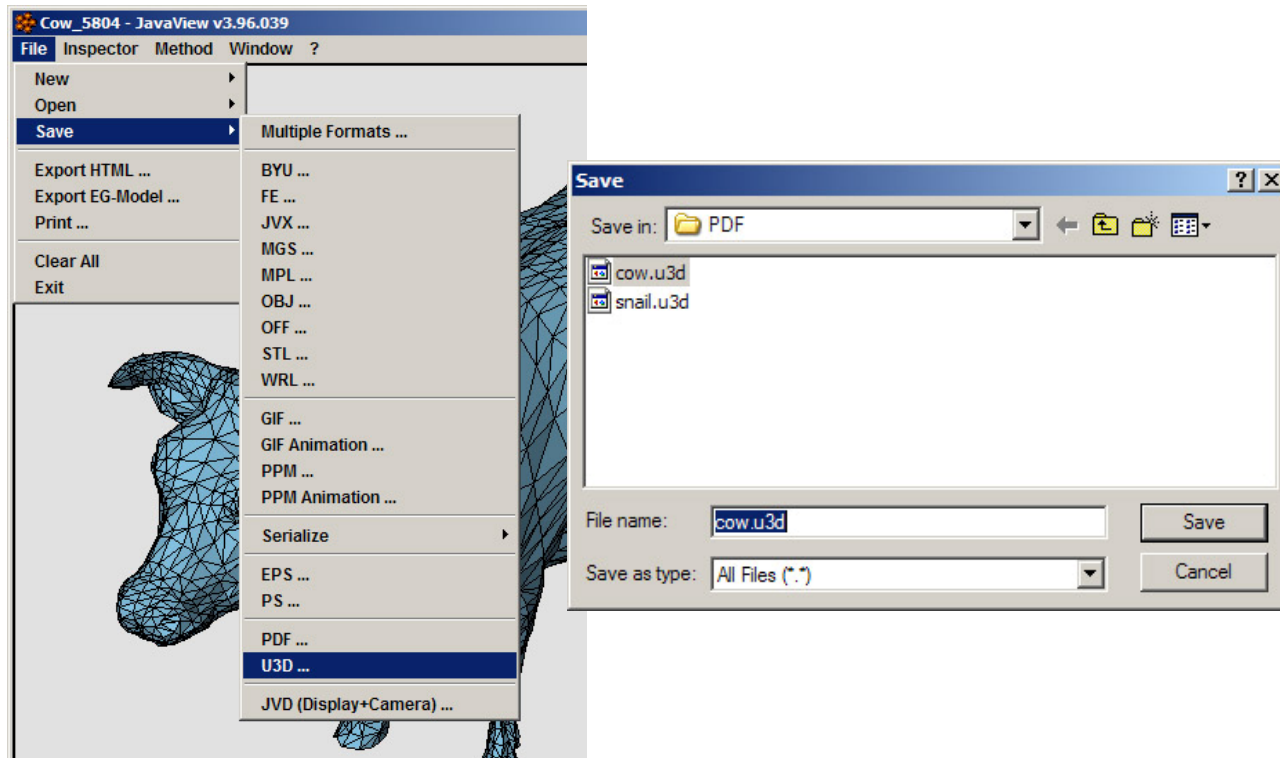
How do you get your geometry to U3D?

- either use Adobe Acrobat3D (from CAD applications) or
 - use a third-party software with U3D export
 - read ecma 363 specification and write your own U3D export
-
- use Javaview and export to U3D (future versions > 3.95)

<http://www.javaview.de>

How to export U3D with Javaview

- Load your geometry in Javaview
- Set up material and camera settings.
- Some information will get lost, since it is not supported by U3D or because the Adobe U3D viewer does not support it

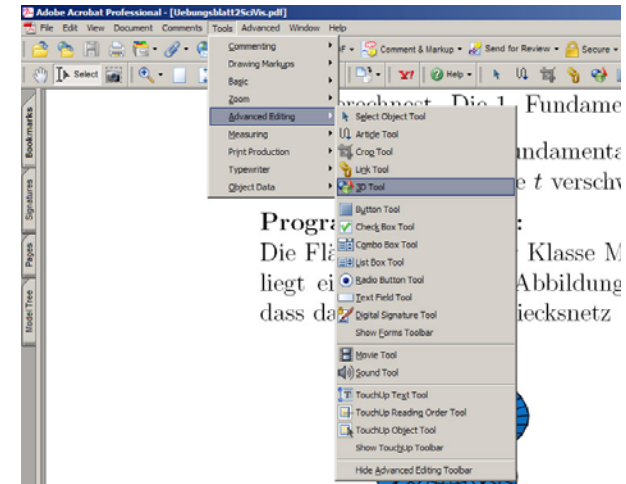


How do you get U3D into a PDF file?

- include the U3D file in a Tex file
- use Adobe Professional 7.0 with the 3D Tool to insert a U3D object into an existing PDF document
- or use Javaview to export to PDF directly!

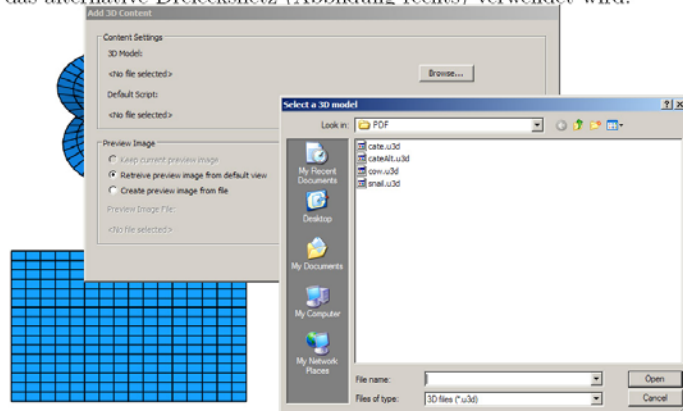
Use Adobe Professional

- Open an existing PDF document
- Select the 3D Tool
- Drag a rectangle for the 3D viewer
- Specify the U3D file to insert



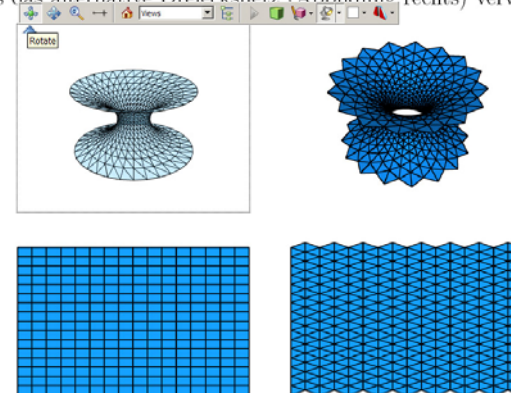
Programmieraufgabe:

Fläche wird von der Klasse MySurface.java berechnet. Der Berechnung ein Quadratnetz (Abbildung links) zugrunde. Ändere die Klasse, so dass alternative Dreiecksnetz (Abbildung rechts) verwendet wird.



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Use LaTeX

- Get the movie15.sty package for LaTeX from:
<http://www.ctan.org>
- In your document, load the package with `\usepackage[3D]{movie15}`
- Use the command
`\includemovie[options]{width}{height}{file.u3d}`
to include your U3D file
- Use pdfLaTeX version 1.20 or higher to generate the PDF document

Example:

```
\documentclass[a4paper]{article}
\usepackage[3D]{movie15}
\begin{document}
\includemovie[3Droo=28]{\linewidth}{\linewidth}{bunny.u3d}
\end{document}
```

Use Javaview to export to PDF directly

- Open and setup your geometry
- File -> Save -> PDF...
- Use the file browser to name the PDF document and click Save
- A configuration dialog opens, where you can setup the page size and relative coordinates of the viewer within the page
- Click OK to save the PDF document

