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Graphics Performance Benchmarking Based on VRML Browsers



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Talk outline

1. Motivation
2. Design of benchmarks
3. Implementation details
4. Results
5. Conclusion & Future work



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1. Motivation

To compare performance of VRML browsers

- speed
- memory requirements
- SW/HW rendering
- (VRML conformance)

To tune up hardware and software components

- driver for graphics card (GL, D3D)
- operating system
- WWW browser



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2. Design of benchmarks

- One complex test versus set of specialized benchmarks
- Automatic versus non-automatic processing of tests
- Standalone or web-based application



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Design of benchmarks (contd.)

- WWW application
 - One HTML page per one benchmark
 - VRML window 500x500 pixels
 - Measuring applet connected via EAI
 - Speed (fps) obtained from VRML browser (!)
- ←—————→
- Memory requirements "by hand" :- (

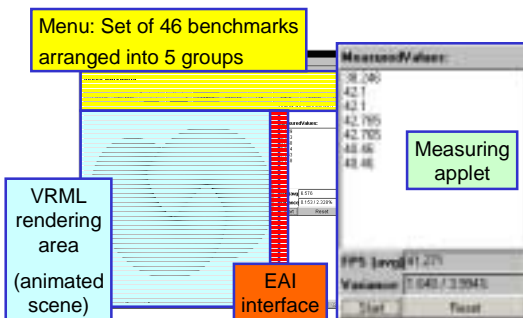


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Benchmark GUI



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3. Implementation details

Five categories:

- a) Polygons
- b) Materials (shading) & Fog
- c) Light sources
- d) Textures
- e) Event processing

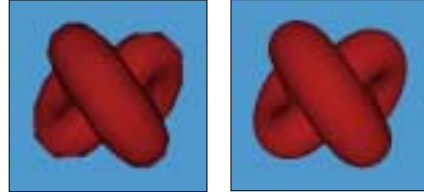


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a) Polygons (triangles)

- Simple Gouraud shading
 - 1 directional light (headlight)
 - diffuse component only
- From 1.000 up to 50.000 triangles

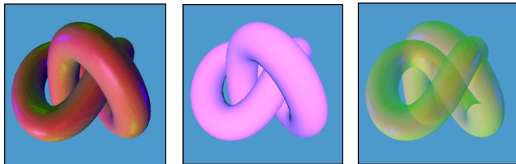


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b) Material: shading coeffs.

- Model with 10.000 triangles
- 1 or 8 directional (colored) lights
- ambient, diffuse, specular, emissive color
- Transparency

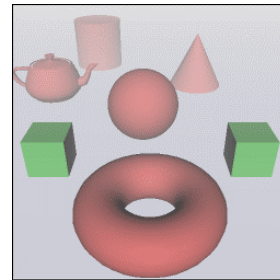


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b) Fog

Various objects in various distances

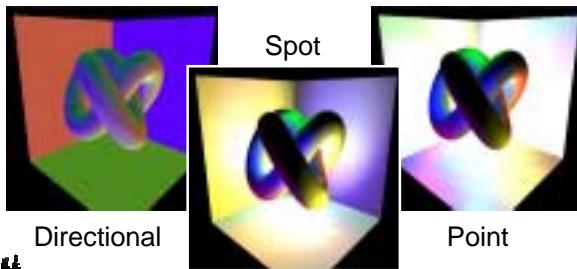


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c) Light sources

- Model with 10.000 triangles
- 4, 8, and 12 light sources (!)

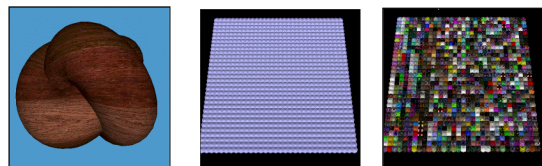


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d) Textures

- 1 model + 1 texture with varying size (from 1x1 up to 4096x4096 pixels)
- Many textures (1024) instances versus references (!)



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e) Event processing

- Not a rendering problem
- CPU or browser implementation issue
- 4000 events routed to a single node



4. Results

VRML browsers:

- Contact (Blaxxun)
- Cortona (Parallel Graphics)
- CosmoPlayer (Cosmo Software, Platinum)
- WorldView (Intervista)

Platform: Win NT, MSIE/Netscape

Graphics: various (Open GL / Direct 3D)

CPU: various



Results: Sample configuration

Computer:

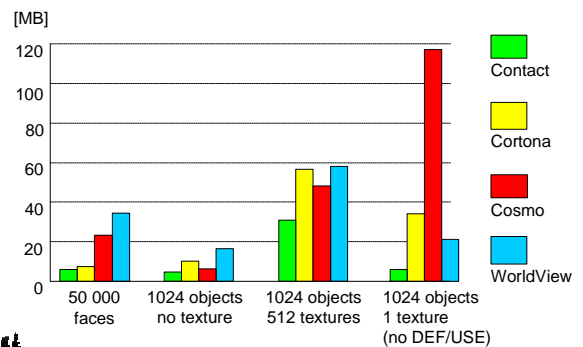
Athlon 900 MHz/256 MB (Open GL)

Riva GeForce 2 GTS 64

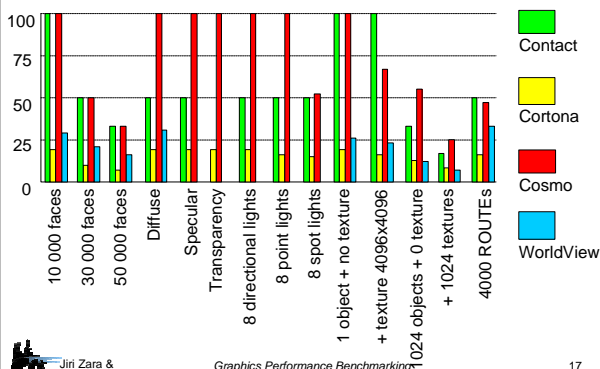
Win NT, MSIE 5.5



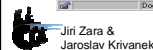
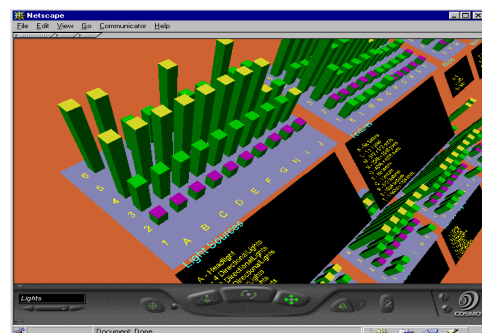
Results: Memory requirements



Results: Speed



Results: 3D visualization



5. Conclusion

- **Complex set** of benchmarks for graphics performance
- **VRML browsers** comparison
- **Tuning** of computer configuration
- **Web application** with **3D output**



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Future work

- Benchmarks for **Java** VRML browsers (Shout3D, blaxxun 3D, etc.)
- **Semi-automatic** processing & evaluation
- Benchmarks for new VRML **extensions** (GeoVRML, NurbsVRML)



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The End

[Thank you for your attention](#)

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<http://www.cgg.cvut.cz/VRML/Benchmarks/>



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