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

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

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” :-(
3. Implementation details

Five categories:

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

a) Polygons (triangles)

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

b) Material: shading coeffs.

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

b) Fog

Various objects in various distances

c) Light sources

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

- Directional
- Spot
- Point

d) Textures

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

Future work

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

The End

Thank you for your attention

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