



**ZOOM 3**  
*a demo in 64k*

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*First presented on Assembly 2003 demoparty*

**In Development Process**

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## What is a demo...?

- **Code**
  - Engine, visual effects, ... programming
- **Sound**
  - Music, special sound effects
- **Graphics**
  - 2D textures and fonts
  - 3D scenes and objects
- **Looks like a video clip but works in real time**



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## Main features (1)

- Executable size just 65536 bytes
- Realtime per-pixel lighting with fullscene shadow casting
- Complex scenes with thousands of triangles crunched just in 10 kilobytes
- Fullscreen post processing
  - Motion blur (Smooth motion)
  - Several kind of layered effects
  - Unified color saturation and inversion



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## Main features (2)

- **All demo resources build in the executable file**
- **Great OS trick with Speech synthesis**
  - Windows 2000 and Windows XP have builtin interfaces to get the speech
- **Advanced Iso-surfaces effects**
  - Blobs in the tunnel
  - Liquid worm like in "Abyss" movie



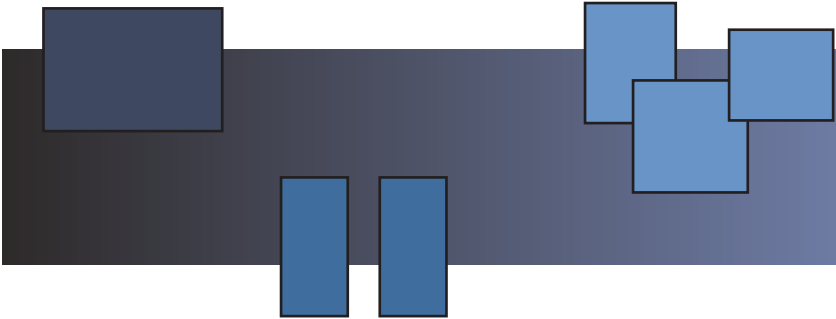


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## Compression

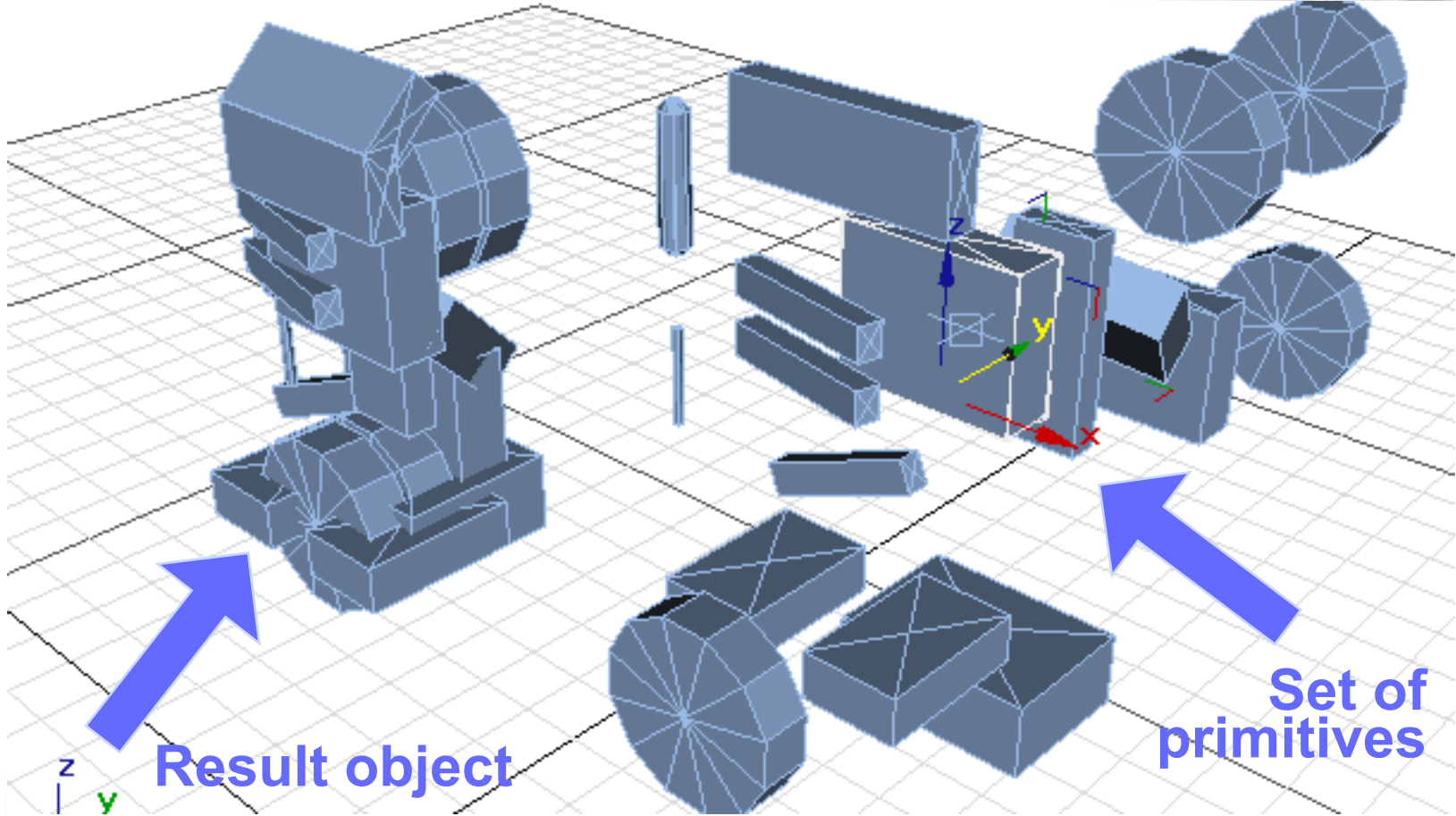
- **Non automatic compression**
  - Each specific case is unique
  - Analytical in most cases
- **Two main tricks**
  1. All data structures optimized for Huffman based algorithms
  2. Generalized properties of all objects in separated streams of a data
- **This process works only in one direction**



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## The power of primitives



**Result object**

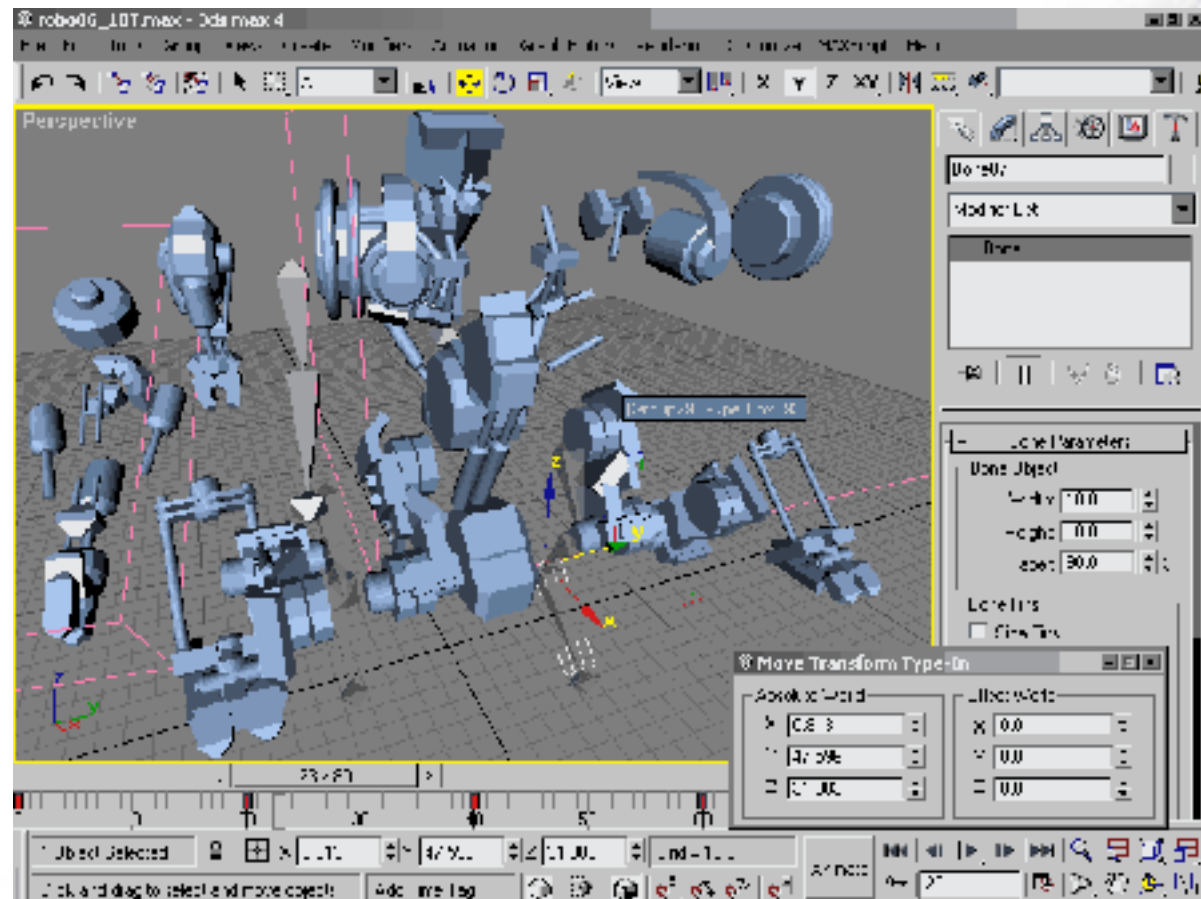
**Set of primitives**



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## A robot ...





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## The power of shaders

- **Advanced lighting models can be done per pixel in realtime**
  - More interactivity
  - More realistic or non realistic
- **Phong based lighting in Zoom3**
  - About 10 lights with shadows in a scene
  - One pass per light is still fillrate limited
- **Shader based shadow casting**
  - GPU + stencil = shadows, without CPU





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... was born





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## Soft synth

- **Realtime sound synthesis**
  - BUZZ based architecture
  - 32bit (float) synthesis and mixing
- **Unified synthesis machine**
  - Allow to get any instrument you want ( guitars, piano, acidlike, drums, etc )
  - Also a lot of special sound effects
- **A lot of DSP machines**
- **Zoom3 track takes 15% on 2Ghz CPU**







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## Crunching in action

- **4Mb of 3D data crunched into 10kb**
  - 80 000 vertices and 150 000 faces
- **5Mb of textures crunched into 1kb**
- **70Mb of sound data crunched into 5,5kb**
- **Average Zoom3 crunching ratio is 1:5000**
- **Common compression tool has about 1:2 - 1:10**





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## “Motion blur”

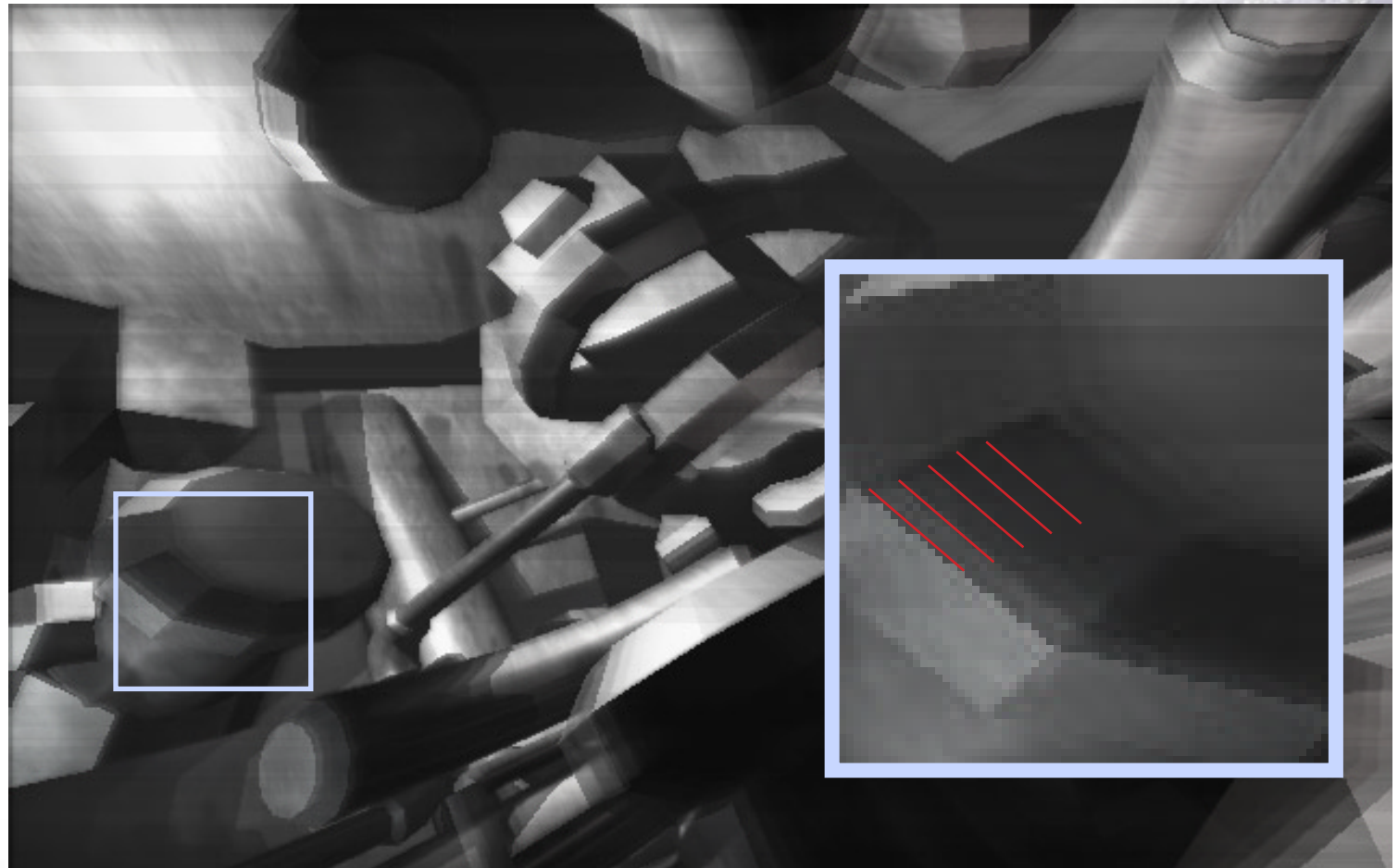
- **20-30 fps is enough for human eye**
  - Motion can be automatically reconstructed by the human brain
- **Faded previous frames can be used as additional information for the brain**
  - Very cheap for GPUs
  - Looks greate in motion
  - But static screenshot doesn't look so
  - Required around or more than 20 fps



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## Motion smooth





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## Useful...? Yep!

- **In Game Development**
  - Advanced special effects
  - All technologies can be tested and touched before they will be used in games
- **On handset devices**
  - Mobile phones, Communicators, Gaming consoles, etc...
- **Can be used in Internet**
  - Java applets, .NET



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## Questions, feedback

- <http://and.intercon.ru>
- [and@intercon.ru](mailto:and@intercon.ru)

Amazing continues  
to amaze