Introduction to Computer Graphics with WebGL

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What's Next

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What we can do now

- Create basic 3D web applications
  - can integrate with other HTML5 packages
- Work with event-driven input
- Use a variety of texture-based methods
- Make use of off-screen rendering

What we haven't covered

- More OpenGL capabilities
- Modeling
- Alternate renderers
- Integration with Web
- Where are things going

What's in desktop OpenGL

- Much more control and many more options
  - Geometry,Tessellation and Compute Shaders
  - Level of Detail (LOD)
  - 1-4 Dimensional Textures
  - Many more texture options
- Vertex Array Buffers
- Occlusion Queries

What should we expect soon in APIs

- Movement of more desktop OpenGL features to ES and WebGL
- WebCL 1.0 released March 2014
- ES 3.0 and ES 3.1
- ECMA 6 Script draft (new version of JS)
- Many JS variants such as Coffee Script

The Players have Changed

- Originally hardware and software was dominated by the scientific and CAD communities
  - SGI key for both hardware and software
  - OpenGL developed by SGI
- With PCs and graphics cards leadership moved to Microsoft and game users
  - DirectX
  - Video Toaster

Players Have Changed

- Development of GPUs
  - Nvidia, AMD and Intel dominate
  - OpenGL makes a comeback
  - Cg (Nvidia) leads to GLSL
  - Interactive games control direction of hw and sw
- Web and smart phones
  - Google, Mozilla, Nokia and others dominate software
  - ARM dominates smart phone chips

Advanced Topics

- Level of Detail (LOD)
- Image based rendering
- Light field rendering
- Ray Tracing (CS 413)
- Volume Rendering
- Point Clouds
- Particle Systems
- Information Visualization

What about Games?

- Need more courses
  - Digital Storytelling
  - Game AI
  - HCI
  - Real-time graphics

Supercomputing

- Fastest supercomputers use GPUs for floating point operations
  - GPGPU
  - OpenCL/WebGL
  - Compute shaders
- Low power is a major issue
  - Exascale machine will require 20MW
  - Intel vs ARM?