

Compute Shaders

CSCI 4239/5239

**Advanced Computer Graphics
Spring 2013**

Purpose of Compute Shaders

- Lightweight general purpose computing
 - Perform arbitrary computations outside of the vertex/fragment paradigm
 - Access to textures and buffers
 - Does not require additional drivers or run time
 - Easier initialization and invocation than OpenCL
- Requires OpenGL 4.3
 - No working examples :-)

Using the Compute Shader

- Compiles just like other shaders
 - CreateShader(prog, GL_COMPUTE_SHADER, file)
 - Link only one shader into program
- Bind buffers
 - glBindBuffer(GL_SHADER_STORAGE_BUFFER, x)
- Run the shader
 - glUseProgram(compute_shader);
 - glDispatchCompute(NumX, NumY, NumZ);
 - glMemoryBarrier(GL_SHADER_STORAGE_BARRIER_BIT);

Pre-set Variables in Shader

- `uvec3 gl_NumWorkGroups`
- `uvec3 gl_WorkGroupSize`
- `uvec3 gl_WorkGroupID`
- `uvec3 gl_LocalInvocationID`
- `uvec3 gl_GlobalInvocationID`
- `uvec3 gl_LocalInvocationIndex`
- `gl_GlobalInvocationID =`
`gl_WorkGroupID * gl_WorkGroupSize + gl_LocalInvocationID`
- `gl_LocalInvocationIndex =`
`gl_LocalInvocationID.z * gl_WorkGroupSize.y * gl_WorkGroupSize.x +`
`gl_LocalInvocationID.y * gl_WorkGroupSize.x +`
`gl_LocalInvocationID.x`