CS5820: GPU-HW-SW Assessment

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Hardware section

To create a shadow map, in the first pass, we need to render into a texture. The texture contains 1 point

- [x] Depth values from each light source's point of view
- [ ] Depth values from eye's point of view
- [ ] Material properties of each object
- [ ] Final color value of each object

Which of the following primitive topologies require the least number of vertices to be shaded by vertex shader 1 point

- [ ] Triangle list of 8 triangles
- [x] Triangle strip of 10 triangles
- [ ] Line list of 10 lines
- [ ] Trifan of 12 triangles
- [ ] Pointlist of 16 points

A blend function does blend_func(a*b, c*d) where a and c are source and destination colors. B and d and source and destination blend factors. Pixels that are overlapping always retire in order form Execution Units, so that the blend result is correct. Which of the following is NOT an order independent blend function, where answer will be correct regardless of the order in which pixels retire from execution units . Pick one or more options. 1 point

- [ ] MAX with c = 2, d = 1
- [ ] ADD, with c = 1, d= 1
- [ ] SUBTRACT, with c = 2, d= 1
- [ ] MIN with c = 3, d= 4

Which of the following is the correct sequence ? 1 point

- [ ] Command Streamer, vertex shader, clipper, depth test, texture sampler, pixel shader dispatch, color output
- [ ] Vertex Shader, command streamer, clipper, depth test, pixel shader dispatch, texture sampler, color output
- [ ] Command Streamer, vertex shader, clipper, pixel shader dispatch, depth test, texture sampler, color output
- [x] Command streamer, vertex shader, clipper, depth test, pixel shader dispatch, texture sampler, color output

Which one of the following statements is NOT true 1 point

- [ ] CPU has more instruction level parallelism than GPU
- [x] GPU always completes work faster than CPU
- [ ] GPU is more suitable for multi-threaded applications than CPU

- [ ] GPU and CPU can share the same virtual memory space

To make the edges of objects in a screen, appear smooth , we do anti-aliasing. which of the following techniques cannot be applied to do anti-aliasing in screen space 1 point

- [ ] Alpha blending at the edges
- [ ] increasing the resolution
- [x] Increase number of triangles
- [ ] increase the number of samples per pixel

Which of the following statements is false, about compute shader threads 1 point

- [x] A compute thread workgroup has to completely retire from execution units, before another workgroup can be dispatched into the execution units
- [ ] Number of Threads within a threadgroup depends on the number of work items in a thread group
- [ ] Threads within a threadgroup share a common local memory
- [ ] All threads within a compute thread workgroup need to be dispatched before threads from another thread group are dispatched into Execution units

The following equation is used to compute barycentric co-ordinates for a point P , for any attribute “a”, given V0, V1, V2 are vertices of a triangle. $P.a=\lambda 0*V0.a+\lambda 1*V1.a+\lambda 2*V2.a$ For which of the following attribute types, will the above formula not yield the correct result 1 point

- [ ] When the attribute “a” is color values (RGBA)
- [x] When the attribute “a” is Depth (Z) in camera space
- [ ] When the attribute “a” is depth in screen space with perspective projection

- [ ] When the attribute “a” is texture co-ordinates in screen space

Which of the following functions do only reads to memory and no writes 1 point

- [ ] Geometry shader producing new vertices
- [x] Texture filtering (sampler) from Pixel shader
- [ ] Blending of Pixel colors
- [ ] Atomic operations

A compute workgroup has 128 work elements. They are dispatched to Execution Units as SIMD16 compute shader threads. How many threads will be launched ? 1 point

- [ ] 2
- [ ] 16
- [x] 8
- [ ] 4

If the maximum frame rate offered by the GPU, is different than the display monitor refresh rate (example 144 fps and 60 hz) , we see artifacts such as tearing and ghosting while playing video games. Which of the following ways is guaranteed to get rid of these artifacts 1 point

- [x] Display refresh rate same as Frames/sec
- [ ] Display refresh rate less than frames/sec
- [ ] Display refresh rate greater than Frames/sec
- [x] Turning on Display Vsync

A GPU has 128 execution units. An Execution Unit can execute 8 threads simultaneously. Each thread runs a kernel which has 64 instructions followed by a read from memory, which takes 384 cycles, followed by another 64 instructions. Assume 0 latency in dispatching the threads. What is the utilization of the Execution unit ? (idle time/active time in %) 1 point

- [ ] 90%
- [ ] 80%
- [ ] 70%
- [ ] 100%

If a complex shader kernel uses more than the number of general registers provided by the execution unit hardware, what will the kernel do 1 point

- [ ] Kernel will simply hang
- [ ] Spill over to memory and continue executing.
- [ ] Start reusing the registers and corrupting the data
- [ ] Send interrupt to the CPU

‘Shearing” is an effect caused by which of the following transformations on an object 1 point

- [ ] Scaling in X followed by translation in Y
- [x] Scaling in X and Y directions
- [ ] Scaling in X direction followed by rotation in Y
- [ ] Translation in X direction followed by Rotation in Y

Vertices on the surface of a rigid object undergoes the following transformations in a fixed co-ordinate system – uniform Scaling around X axis, Translation along Z axis, Rotation around Y axis, uniform Scaling around an arbitrary axis E, rotation around a arbitrary vector V, ending with a translation along the X axis. How many transformations does the unit normal at any point on the surface of the object go through ?

1 point

- [ ] six
- [x] Two
- [ ] five
- [ ] Three

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