

Optix 7 and Nau Projects

Defining raygen proc

Optix device functions

```
uint3 optixGetLaunchIndex();  
uint3 optixGetLaunchDimensions();
```

LaunchParams2.h

```
struct LaunchParams  
{  
    struct {  
        uint32_t *colorBuffer;  
    } frame;  
    OptixTraversableHandle traversable;  
};
```

Nau project file

```
<pass class="rt" name="pass1">  
    . . .  
    <rtEntryPoint>  
        <rayGen file="optix/testOptix0.ptx" proc="__raygen__renderFrame"/>  
    </rtEntryPoint>  
    . . .  
</pass>
```

required
prefix

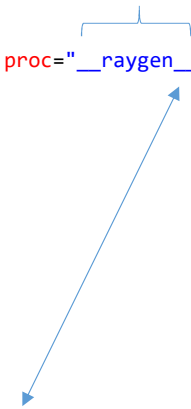
Optix cuda file

```
extern "C" {  
    __constant__ LaunchParams optixLaunchParams;  
}  
  
extern "C" __global__ void __raygen__renderFrame() {  
  
    const uint3 index = optixGetLaunchIndex();  
  
    const int r = 0;    const int g = 255;  
    const int b = 255;  const int a = 0;  
  
    // convert to 32-bit rgba value  
    const uint32_t rgba = a | (r<<0) | (g<<8) | (b<<16);  
  
    const unsigned int fbIndex =  
        index.x + (index.y * optixGetLaunchDimensions().x);  
  
    optixLaunchParams.frame.colorBuffer[fbIndex] = rgba;  
}
```

←

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Defining hit and miss procs

Nau project file

```
<pass class="rt" name="pass1">
  <scenes>
    <scene name="MainScene" />
  </scenes>
  <camera name="MainCamera" />
  <renderTarget name="test" fromLibrary="Optix Ray Tracer Render Target" />

  <rtRayTypes>
    <rayType name="Phong"/>
    <rayType name="Shadow"/>
  </rtRayTypes>

  <rtEntryPoint>
    <rayGen file="optix/testOptix1.ptx" proc="__raygen__renderFrame"/>
  </rtEntryPoint>
  <rtDefaultMaterial>
    <rayType name="Phong">
      <rtProgram type="ANY_HIT" file="optix/testOptix1.ptx" proc="__anyhit__phong"/>
      <rtProgram type="CLOSEST_HIT" file="optix/testOptix1.ptx" proc="__closesthit__phong"/>
      <rtProgram type="MISS" file="optix/testOptix1.ptx" proc="__miss__phong"/>
    </rayType>
    <rayType name="Shadow">
      <rtProgram type="ANY_HIT" file="optix/testOptix4.ptx" proc="__anyhit__shadow"/>
      <rtProgram type="CLOSEST_HIT" file="optix/testOptix4.ptx" proc="__closesthit__shadow"/>
      <rtProgram type="MISS" file="optix/testOptix4.ptx" proc="__miss__shadow"/>
    </rayType>
  </rtDefaultMaterial>
</pass>
```

Optix cuda file

```
extern "C" __global__ void __closesthit__phong() {
  . . .
}

// nothing to do in here
extern "C" __global__ void __anyhit__phong() {
  . . .
}

// miss sets the bacgground color
extern "C" __global__ void __miss__phong() {
  . . .
}

extern "C" __global__ void __closesthit__shadow() {
  . . .
}

// nothing to do in here
extern "C" __global__ void __anyhit__shadow() {
  . . .
}

// miss sets the bacgground color
extern "C" __global__ void __miss__shadow() {
  . . .
}
```

Ray Types

Nau Project file

```
<rtRayTypes>
  <rayType name="Phong"/>
  <rayType name="Shadow"/>
</rtRayTypes>
<rtDefaultMaterial>
  <rayType name="Phong">
    <rtProgram type="ANY_HIT" file="a.ptx" proc="__anyhit_phong"/>
    <rtProgram type="CLOSEST_HIT" file="a.ptx" proc="__closesthit_phong"/>
    <rtProgram type="MISS" file="a.ptx" proc="__miss_phong"/>
  </rayType>
  <rayType name="Shadow">
    <rtProgram type="ANY_HIT" file="a.ptx" proc="__anyhit_shadow"/>
    <rtProgram type="CLOSEST_HIT" file="a.ptx" proc="__closesthit_shadow"/>
    <rtProgram type="MISS" file="a.ptx" proc="__miss_shadow"/>
  </rayType>
</rtDefaultMaterial>
```

Optix cuda file

```
enum { PHONG=0, SHADOW, RAY_TYPE_COUNT };

extern "C" __global__ void __raygen__renderFrame() {

  ...
  // trace primary ray
  optixTrace(optixLaunchParams.traversable, ← Launch a phong ray
    camera.position,
    rayDir,
    0.f, // tmin
    1e20f, // tmax
    0.0f, // rayTime
    OptixVisibilityMask( 255 ),
    OPTIX_RAY_FLAG_DISABLE_ANYHIT,
    PHONG_RAY_TYPE, // SBT offset
    RAY_TYPE_COUNT, // SBT stride
    PHONG_RAY_TYPE, // missSBTIndex
    u0, u1 );

  ...
}

extern "C" __global__ void __closesthit__phong() {

  ...
  optixTrace(optixLaunchParams.traversable, ← Launch a shadow ray
    pos,
    lDir,
    0.1f, // tmin
    1e20f, // tmax
    0.0f, // rayTime
    OptixVisibilityMask( 255 ),
    OPTIX_RAY_FLAG_TERMINATE_ON_FIRST_HIT,
    SHADOW, // SBT offset
    RAY_TYPE_COUNT, // SBT stride
    SHADOW, // missSBTIndex
    u0, u1 );

  ...
}
```