Optix 7 and Nau Projects

Defining raygen proc

Optix device functions

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

Nau project file

required prefix

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

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;
}
```

LaunchParams2.h

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

    OptixTraversableHandle traversable;
};
```

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 bacground 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 bacground 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,
            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,
        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 );
    . . .
}
```

Launch a phong ray

Launch a shadow ray