

Known Problems

David Eberly, [Geometric Tools](#)
Last Modified: November 12, 2021

Contents

1	Issues in Geometric Tools	2
1.1	Failure in ExtremalQueryBSP	2
1.2	Report of a Bug During a Linear Walk in Constrained Delaunay Triangulation	2
2	Issued with Packages that Geometric Tools Depends On	2
2.1	Applications Fail to Link using Intel C++ Classic 19.2	2
2.2	Random Failure to Destroy All ID3D11Device Objects	2
2.3	Debug Performance with MSVS 16.7 and Later	6
2.4	Reference Counting Bug in Inter Compiler 19.0	6
2.5	Compiler Failure in a Windows 10 SDK Header File	6
2.6	Incorrect Behavior of MassSprings3D with NVIDIA Graphics on Windows 11	7

The date shown before each issue is when the problem was posted in this document. As the GeometricTools-based issues are resolved, they will be removed from this document. For other packages, the issues will remain listed here because I have no control over whether or when they will be addressed by the owners of those packages. Even if they are fixed, developers using the buggy packages need to know that the problems do exist and, most likely, the developers should upgrade to newer packages where the bugs no longer exist.

1 Issues in Geometric Tools

1.1 Failure in ExtremalQueryBSP

October 25, 2020. During the rewrite of MinimumVolumeBox3, I tried to use ExtremalQuery3BSP for a fast search for extreme vertices of a convex polyhedron. The code produced incorrect results. This is surprising, given that the GeometricTools/Samples/Geometrics/ExtremalQuery sample (which demonstrates the use of the class) appears to produce correct results. This needs to be investigated.

1.2 Report of a Bug During a Linear Walk in Constrained Delaunay Triangulation

May 9, 2019. A user reported that there is a bug, but he provided only a link to a document about how linear walks in this situation might not be linear. I asked for a test dataset to reproduce the error but none was provided. He also mentioned that the pseudodistance function ComputePSD is incorrect, once again without a test dataset. This needs to be investigated, but is low priority until I receive a test dataset or another user reports a problem.

2 Issued with Packages that Geometric Tools Depends On

2.1 Applications Fail to Link using Intel C++ Classic 19.2

May 27, 2021. Selecting the Intel compiler from the Microsoft Visual Studio 2019 16.9.6 environment, a rebuild of all the GTE distribution leads to applications failing to link. The offending symbol is `_ceilf`. [Intel is aware of the problem](#).

2.2 Random Failure to Destroy All ID3D11Device Objects

October 25, 2020. On random occasions, an exception in `DX11Engine::DestroyDevice` is thrown on exit from an application. The code is

```
// Code in DX11Engine.
bool DX11Engine::DestroyDevice()
{
    return DX11::FinalRelease(mImmediate) == 0 && DX11::FinalRelease(mDevice) == 0;
}

// Code in DX11.h.
template <typename T>
```

```

static ULONG FinalRelease(T*& object)
{
    if (object)
    {
        ULONG refs = object->Release();
        object = nullptr;
        if (refs > 0)
        {
            LogError("Reference count is not zero after release.");
        }
    }
    return 0;
}

```

The DX11::FinalRelease(mDevice) call throws the exception because the mDevice reference count is positive.

I have seen this random problem for quite some time, investigating it as if my code had a reference-count bug. I am only now posting the issue because I was able to collect enough information to decide the problem is not in my code.

Recently I was working with a project where the exception was thrown each time the application exited. This gave me a chance to enable the DXGI Debug Layer using

```

#include "MyAppWindow2.h"
#include <Applications/LogReporter.h>

int main()
{
    #if defined(_DEBUG)
        LogReporter reporter(
            "LogReport.txt",
            Logger::Listener::LISTEN_FOR_ALL,
            Logger::Listener::LISTEN_FOR_ALL,
            Logger::Listener::LISTEN_FOR_ALL,
            Logger::Listener::LISTEN_FOR_ALL);
    #endif

    Window::Parameters parameters(L"MyAppWindow2", 0, 0, 1024, 1024);
    parameters.deviceCreationFlags = D3D11.CREATE_DEVICE_DEBUG;
    auto window = TheWindowSystem.Create<MyAppWindow2>(parameters);
    TheWindowSystem.MessagePump(window, TheWindowSystem.NO_IDLE_LOOP);
    TheWindowSystem.Destroy(window);
    return 0;
}

```

I also launched the DirectX Control Panel to add the executable to the list of programs to monitor. I selected the Force On option for the debug layer. In the Message Settings, I did not mute any message type. In the Break Settings, I checked the boxes for Enable break on functionality, Corruption, Error and Warning.

For an execution that throws the exception, the output messages are

```

D3D11 INFO: Create ID3D11Context: Name="unnamed", Addr=0x0000026178506F80, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097225: CREATE_CONTEXT]
D3D11 INFO: Create ID3D11DeviceContextState: Name="unnamed", Addr=0x00000261786640D0, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #3145735: CREATE_DEVICECONTEXTSTATE]
D3D11 INFO: Create ID3D11BlendState: Name="unnamed", Addr=0x00000261785ADF60, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097270: CREATE_BLENDSTATE]
D3D11 INFO: Create ID3D11DepthStencilState: Name="unnamed", Addr=0x00000261785AE470, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097273: CREATE_DEPTHSTENCILSTATE]
D3D11 INFO: Create ID3D11RasterizerState: Name="unnamed", Addr=0x00000261785AE660, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097276: CREATE_RASTERIZERSTATE]
D3D11 INFO: Create ID3D11Sampler: Name="unnamed", Addr=0x00000261785AE9A0, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097267: CREATE_SAMPLER]
D3D11 INFO: Create ID3D11Query: Name="unnamed", Addr=0x00000261785AEB90, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097279: CREATE_QUERY]
D3D11 INFO: Create ID3D11Fence: Name="unnamed", Addr=0x00000261785AEDC0, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #3146249: CREATE_FENCE]
D3D11 INFO: Destroy ID3D11Fence: Name="unnamed", Addr=0x00000261785AEDC0 [ STATE_CREATION INFO #3146251: DESTROY_FENCE]
DXGI WARNING: IDXGIFactory::CreateSwapChain: Blt-model swap effects (DXGI_SWAP_EFFECT_DISCARD and DXGI_SWAP_EFFECT_SEQUENTIAL) are legacy swap effects that are predominantly superceded by their flip-model counterparts (DXGI_SWAP_EFFECT_FLIP_SEQUENTIAL and DXGI_SWAP_EFFECT_FLIP_DISCARD). Please consider updating your application to leverage flip-model swap effects to benefit from modern presentation enhancements. More information is available at http://aka.ms/dxgiflipmodel. [ MISCELLANEOUS WARNING #294: ]
D3D11 INFO: Create ID3D11Texture2D: Name="unnamed", Addr=0x0000026178670320, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097234: CREATE_TEXTURE2D]
D3D11 INFO: Create ID3D11RenderTargetView: Name="unnamed", Addr=0x0000026178670FC0, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097243: CREATE_RENDERTARGETVIEW]
D3D11 INFO: Create ID3D11Texture2D: Name="unnamed", Addr=0x0000026178671200, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097234: CREATE_TEXTURE2D]
D3D11 INFO: Create ID3D11Texture2D: Name="unnamed", Addr=0x0000026178675E70, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097234: CREATE_TEXTURE2D]
D3D11 INFO: Create ID3D11DepthStencilView: Name="unnamed", Addr=0x0000026178674B20, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097246: CREATE_DEPTHSTENCILVIEW]
D3D11 INFO: Create ID3D11Buffer: Name="unnamed", Addr=0x0000026178691C00, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097228: CREATE_BUFFER]

```

```
D3D11 INFO: Create ID3D11Buffer: Name="unnamed", Addr=0x00000261786920A0, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097228: CREATE_BUFFER]
D3D11 INFO: Create ID3D11Buffer: Name="unnamed", Addr=0x0000026176564110, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097228: CREATE_BUFFER]
D3D11 INFO: Create ID3D11Buffer: Name="unnamed", Addr=0x0000026178698910, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097228: CREATE_BUFFER]
D3D11 INFO: Create ID3D11VertexShader: Name="unnamed", Addr=0x0000026178699580, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097249: CREATE_VERTEXSHADER]
D3D11 INFO: Create ID3D11PixelShader: Name="unnamed", Addr=0x00000261786A6760, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097261: CREATE_PIXELSHADER]
D3D11 INFO: Create ID3D11DepthStencilState: Name="unnamed", Addr=0x00000261786A7AE0, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097273: CREATE_DEPTHSTENCILSTATE]
D3D11 INFO: Create ID3D11RasterizerState: Name="unnamed", Addr=0x00000261786EAC50, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097276: CREATE_RASTERIZERSTATE]
D3D11 INFO: Create ID3D11DepthStencilState: Name="unnamed", Addr=0x00000261786EAC50, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097273: CREATE_DEPTHSTENCILSTATE]
D3D11 INFO: Create ID3D11Texture2D: Name="unnamed", Addr=0x00000261786F3160, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097234: CREATE_TEXTURE2D]
D3D11 INFO: Create ID3D11ShaderResourceView: Name="unnamed", Addr=0x00000261786F1900, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097240: CREATE_SHADERRESOURCEVIEW]
D3D11 INFO: Create ID3D11VertexShader: Name="unnamed", Addr=0x00000261786FAFF0, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097249: CREATE_VERTEXSHADER]
D3D11 INFO: Create ID3D11PixelShader: Name="unnamed", Addr=0x00000261786FB990, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097261: CREATE_PIXELSHADER]
D3D11 INFO: Create ID3D11Buffer: Name="unnamed", Addr=0x00000261786FC730, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097228: CREATE_BUFFER]
D3D11 INFO: Create ID3D11Sampler: Name="unnamed", Addr=0x00000261786FAD70, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097267: CREATE_SAMPLER]
D3D11 INFO: Create ID3D11Texture2D: Name="unnamed", Addr=0x00000261786FAC10, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097234: CREATE_TEXTURE2D]
D3D11 INFO: Create ID3D11InputLayout: Name="unnamed", Addr=0x000002617862A870, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097264: CREATE_INPUTLAYOUT]
D3D11 INFO: Create ID3D11Buffer: Name="unnamed", Addr=0x00000261786FBF70, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097228: CREATE_BUFFER]
D3D11 INFO: Create ID3D11Context: Name="unnamed", Addr=0x00000261787355D0, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097225: CREATE_CONTEXT]
D3D11 INFO: Create ID3D11RenderTargetView: Name="unnamed", Addr=0x00000261786F3550, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097243: CREATE_RENDERTARGETVIEW]
D3D11 INFO: Create ID3D11BlendState: Name="unnamed", Addr=0x000002617871F2A0, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097270: CREATE_BLENDSTATE]
D3D11 INFO: Create ID3D11ClassLinkage: Name="unnamed", Addr=0x0000026178758CE0, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097293: CREATE_CLASSLINKAGE]
D3D11 INFO: Create ID3D11Sampler: Name="unnamed", Addr=0x000002617875F6C0, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097267: CREATE_SAMPLER]
D3D11 INFO: Create ID3D11VertexShader: Name="unnamed", Addr=0x00000261786FBF30, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097249: CREATE_VERTEXSHADER]
D3D11 INFO: Create ID3D11PixelShader: Name="unnamed", Addr=0x00000261786FBF70, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097261: CREATE_PIXELSHADER]
D3D11 INFO: Create ID3D11InputLayout: Name="unnamed", Addr=0x00000261787548D0, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097264: CREATE_INPUTLAYOUT]
D3D11 INFO: Create ID3D11Buffer: Name="unnamed", Addr=0x00000261786FC350, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097228: CREATE_BUFFER]
D3D11 INFO: Create ID3D11Buffer: Name="unnamed", Addr=0x0000026178690CA0, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097228: CREATE_BUFFER]
D3D11 INFO: Create ID3D11Texture2D: Name="unnamed", Addr=0x00000261787AC010, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097234: CREATE_TEXTURE2D]
D3D11 INFO: Create ID3D11Query: Name="unnamed", Addr=0x000002617875A190 [ STATE_CREATION INFO #2097281: DESTROY_QUERY]
D3D11 INFO: Destroy ID3D11Buffer: Name="unnamed", Addr=0x0000026178698910 [ STATE_CREATION INFO #2097230: DESTROY_BUFFER]
D3D11 INFO: Destroy ID3D11PixelShader: Name="unnamed", Addr=0x00000261786A6760 [ STATE_CREATION INFO #2097263: DESTROY_PIXELSHADER]
D3D11 INFO: Destroy ID3D11Buffer: Name="unnamed", Addr=0x0000026176564110 [ STATE_CREATION INFO #2097230: DESTROY_BUFFER]
D3D11 INFO: Destroy ID3D11VertexShader: Name="unnamed", Addr=0x0000026178699580 [ STATE_CREATION INFO #2097251: DESTROY_VERTEXSHADER]
D3D11 INFO: Destroy ID3D11Buffer: Name="unnamed", Addr=0x00000261786920A0 [ STATE_CREATION INFO #2097230: DESTROY_BUFFER]
D3D11 INFO: Destroy ID3D11Buffer: Name="unnamed", Addr=0x0000026178691CC0 [ STATE_CREATION INFO #2097230: DESTROY_BUFFER]
D3D11 INFO: Destroy ID3D11Texture2D: Name="unnamed", Addr=0x0000026178671200 [ STATE_CREATION INFO #2097236: DESTROY_TEXTURE2D]
```

```
GTE ERROR:
File: my_path/GeometricTools/GTE/Graphics/DX11/DX11.h
Func: gte::DX11::FinalRelease
Line: 64
Reference count is not zero after release.
```

Debug Error!

Program: my_executable

abort() has been called

(Press Retry to debug the application)

```
Exception thrown at 0x00007FFDA248E49 in my_executable: Microsoft C++ exception: std::runtime_error at memory location 0x0000007300DFE9F8.
D3D11 WARNING: Process is terminating. Using simple reporting. Please call ReportLiveObjects() at runtime for standard reporting. [ STATE_CREATION WARNING #0: UNKNOWN]
D3D11: **BREAK** enabled for the previous message, which was: [ WARNING STATE_CREATION #0: UNKNOWN ]
Exception thrown at 0x00007FFDA248E49 (KernelBase.dll) in my_executable: 0x00000087A (parameters: 0x0000000000000002, 0x0000007300DFA0B0, 0x0000007300DFAE10).
DXGI WARNING: Process is terminating. Using simple reporting. Please call ReportLiveObjects() at runtime for standard reporting. [ STATE_CREATION WARNING #0: ]
DXGI WARNING: Live Producer at 0x00000261764EC258, Refcount: 4. [ STATE_CREATION WARNING #0: ]
DXGI WARNING: Live Object at 0x00000261764EC6C0, Refcount: 2. [ STATE_CREATION WARNING #0: ]
DXGI WARNING: Live Object : 1 [ STATE_CREATION WARNING #0: ]
```

For an execution that terminates normally, the output messages are

```
D3D11 INFO: Create ID3D11Context: Name="unnamed", Addr=0x0000026DF5D76F80, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097225: CREATE_CONTEXT]
D3D11 INFO: Create ID3D11DeviceContextState: Name="unnamed", Addr=0x0000026DF7FC8020, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #3145735: CREATE_DEVICECONTEXTSTATE]
D3D11 INFO: Create ID3D11BlendState: Name="unnamed", Addr=0x0000026DF5DEEDD0, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097270: CREATE_BLENDSTATE]
D3D11 INFO: Create ID3D11DepthStencilState: Name="unnamed", Addr=0x0000026DF7F0C230, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097273: CREATE_DEPTHSTENCILSTATE]
D3D11 INFO: Create ID3D11RasterizerState: Name="unnamed", Addr=0x0000026DF7F0C420, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097276: CREATE_RASTERIZERSTATE]
D3D11 INFO: Create ID3D11Sampler: Name="unnamed", Addr=0x0000026DF7F0C760, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097267: CREATE_SAMPLER]
D3D11 INFO: Create ID3D11Query: Name="unnamed", Addr=0x0000026DF7F0C950, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097279: CREATE_QUERY]
D3D11 INFO: Create ID3D11Fence: Name="unnamed", Addr=0x0000026DF7F0CB80, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #3146249: CREATE_FENCE]
D3D11 INFO: Destroy ID3D11Fence: Name="unnamed", Addr=0x0000026DF7F0CB80 [ STATE_CREATION INFO #3146251: DESTROY_FENCE]
DXGI WARNING: IDXGIFactory::CreateSwapChain: Blt-model swap effects (DXGI_SWAP_EFFECT_DISCARD and DXGI_SWAP_EFFECT_SEQUENTIAL) are legacy swap effects that are predominantly superseded by their flip-model counterparts (DXGI_SWAP_EFFECT_FLIP_SEQUENTIAL and DXGI_SWAP_EFFECT_FLIP_DISCARD). Please consider updating your application to leverage flip-model swap effects to benefit from modern presentation enhancements. More information is available at http://aka.ms/dxgiflipmodel. [ MISCELLANEOUS WARNING #294: ]
D3D11 INFO: Create ID3D11Texture2D: Name="unnamed", Addr=0x0000026DF7F0DA70, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097234: CREATE_TEXTURE2D]
D3D11 INFO: Create ID3D11RenderTargetView: Name="unnamed", Addr=0x0000026DF7F0E880, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097243: CREATE_RENDERTARGETVIEW]
D3D11 INFO: Create ID3D11Texture2D: Name="unnamed", Addr=0x0000026DF7F0EAC0, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097234: CREATE_TEXTURE2D]
D3D11 INFO: Create ID3D11Texture2D: Name="unnamed", Addr=0x0000026DF7F0F7C00, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097234: CREATE_TEXTURE2D]
D3D11 INFO: Create ID3D11DepthStencilView: Name="unnamed", Addr=0x0000026DF7F0C8B0, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097246: CREATE_DEPTHSTENCILVIEW]
D3D11 INFO: Create ID3D11Buffer: Name="unnamed", Addr=0x0000026DF7FF3910, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097228: CREATE_BUFFER]
D3D11 INFO: Create ID3D11Buffer: Name="unnamed", Addr=0x0000026DF7FF3C30, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097228: CREATE_BUFFER]
D3D11 INFO: Create ID3D11Buffer: Name="unnamed", Addr=0x0000026DF5DD40C0, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097228: CREATE_BUFFER]
D3D11 INFO: Create ID3D11Buffer: Name="unnamed", Addr=0x0000026DF7FFA560, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097228: CREATE_BUFFER]
D3D11 INFO: Create ID3D11VertexShader: Name="unnamed", Addr=0x0000026DF7FFB1D0, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097249: CREATE_VERTEXSHADER]
D3D11 INFO: Create ID3D11PixelShader: Name="unnamed", Addr=0x0000026DF8006730, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097261: CREATE_PIXELSHADER]
D3D11 INFO: Create ID3D11DepthStencilState: Name="unnamed", Addr=0x0000026DF808EE0, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097273: CREATE_DEPTHSTENCILSTATE]
D3D11 INFO: Create ID3D11RasterizerState: Name="unnamed", Addr=0x0000026DF8007C90, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097276: CREATE_RASTERIZERSTATE]
D3D11 INFO: Create ID3D11DepthStencilState: Name="unnamed", Addr=0x0000026DF802C1B0, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097273: CREATE_DEPTHSTENCILSTATE]
D3D11 INFO: Create ID3D11Texture2D: Name="unnamed", Addr=0x0000026DF802C540, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097234: CREATE_TEXTURE2D]
D3D11 INFO: Create ID3D11ShaderResourceView: Name="unnamed", Addr=0x0000026DF8033750, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097240: CREATE_SHADERRESOURCEVIEW]
D3D11 INFO: Create ID3D11VertexShader: Name="unnamed", Addr=0x0000026DF7F65F10, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097249: CREATE_VERTEXSHADER]
```

```

D3D11 INFO: Create ID3D11PixelShader: Name="unnamed", Addr=0x0000026DF8041EB0, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097261: CREATE_PIXELSHADER]
D3D11 INFO: Create ID3D11Buffer: Name="unnamed", Addr=0x0000026DF5DE6620, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097228: CREATE_BUFFER]
D3D11 INFO: Create ID3D11Sampler: Name="unnamed", Addr=0x0000026DF80397F0, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097267: CREATE_SAMPLER]
D3D11 INFO: Create ID3D11Buffer: Name="unnamed", Addr=0x0000026DF8037990, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097228: CREATE_BUFFER]
D3D11 INFO: Create ID3D11InputLayout: Name="unnamed", Addr=0x0000026DF7F890C0, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097264: CREATE_INPUTLAYOUT]
D3D11 INFO: Create ID3D11Buffer: Name="unnamed", Addr=0x0000026DF803E180, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097228: CREATE_BUFFER]
D3D11 INFO: Create ID3D11Texture2D: Name="unnamed", Addr=0x0000026DF80651C0, ExtRef=1, IntRef=0 [ STATE_CREATION INFO #2097234: CREATE_TEXTURE2D]
D3D11 INFO: Destroy ID3D11Buffer: Name="unnamed", Addr=0x0000026DF7FFA560 [ STATE_CREATION INFO #2097230: DESTROY_BUFFER]
D3D11 INFO: Destroy ID3D11PixelShader: Name="unnamed", Addr=0x0000026DF8006730 [ STATE_CREATION INFO #2097263: DESTROY_PIXELSHADER]
D3D11 INFO: Destroy ID3D11Buffer: Name="unnamed", Addr=0x0000026DF5DD40C0 [ STATE_CREATION INFO #2097230: DESTROY_BUFFER]
D3D11 INFO: Destroy ID3D11VertexShader: Name="unnamed", Addr=0x0000026DF7FFB1D0 [ STATE_CREATION INFO #2097251: DESTROY_VERTEXSHADER]
D3D11 INFO: Destroy ID3D11Buffer: Name="unnamed", Addr=0x0000026DF7FF3CF0 [ STATE_CREATION INFO #2097230: DESTROY_BUFFER]
D3D11 INFO: Destroy ID3D11Buffer: Name="unnamed", Addr=0x0000026DF7FF3910 [ STATE_CREATION INFO #2097230: DESTROY_BUFFER]
D3D11 INFO: Destroy ID3D11Texture2D: Name="unnamed", Addr=0x0000026DF7F0EAC0 [ STATE_CREATION INFO #2097236: DESTROY_TEXTURE2D]
D3D11 INFO: Destroy ID3D11Query: Name="unnamed", Addr=0x0000026DF7F0C950 [ STATE_CREATION INFO #2097281: DESTROY_QUERY]
D3D11 INFO: Destroy ID3D11RasterizerState: Name="unnamed", Addr=0x0000026DF7F0C420 [ STATE_CREATION INFO #2097278: DESTROY_RASTERIZERSTATE]
D3D11 INFO: Destroy ID3D11DepthStencilState: Name="unnamed", Addr=0x0000026DF7F0C230 [ STATE_CREATION INFO #2097275: DESTROY_DEPTHSTENCILSTATE]
D3D11 INFO: Destroy ID3D11BlendState: Name="unnamed", Addr=0x0000026DF5DEEDD0 [ STATE_CREATION INFO #2097272: DESTROY_BLENDSTATE]
D3D11 INFO: Destroy ID3D11DepthStencilView: Name="unnamed", Addr=0x0000026DF7FDC8B0 [ STATE_CREATION INFO #2097248: DESTROY_DEPTHSTENCILVIEW]
D3D11 INFO: Destroy ID3D11Texture2D: Name="unnamed", Addr=0x0000026DF7FD7C00 [ STATE_CREATION INFO #2097236: DESTROY_TEXTURE2D]
D3D11 INFO: Destroy ID3D11RenderTargetView: Name="unnamed", Addr=0x0000026DF7F0E880 [ STATE_CREATION INFO #2097245: DESTROY_RENDERTARGETVIEW]
D3D11 INFO: Destroy ID3D11Texture2D: Name="unnamed", Addr=0x0000026DF80651C0 [ STATE_CREATION INFO #2097236: DESTROY_TEXTURE2D]
D3D11 INFO: Destroy ID3D11Texture2D: Name="unnamed", Addr=0x0000026DF7F0DA70 [ STATE_CREATION INFO #2097236: DESTROY_TEXTURE2D]
D3D11 INFO: Destroy ID3D11DepthStencilState: Name="unnamed", Addr=0x0000026DF802C1B0 [ STATE_CREATION INFO #2097275: DESTROY_DEPTHSTENCILSTATE]
D3D11 INFO: Destroy ID3D11RasterizerState: Name="unnamed", Addr=0x0000026DF8007C90 [ STATE_CREATION INFO #2097278: DESTROY_RASTERIZERSTATE]
D3D11 INFO: Destroy ID3D11DepthStencilState: Name="unnamed", Addr=0x0000026DF808E6E0 [ STATE_CREATION INFO #2097275: DESTROY_DEPTHSTENCILSTATE]
D3D11 INFO: Destroy ID3D11Buffer: Name="unnamed", Addr=0x0000026DF8037990 [ STATE_CREATION INFO #2097230: DESTROY_BUFFER]
D3D11 INFO: Destroy ID3D11Buffer: Name="unnamed", Addr=0x0000026DF803E180 [ STATE_CREATION INFO #2097230: DESTROY_BUFFER]
D3D11 INFO: Destroy ID3D11VertexShader: Name="unnamed", Addr=0x0000026DF7F65F10 [ STATE_CREATION INFO #2097251: DESTROY_VERTEXSHADER]
D3D11 INFO: Destroy ID3D11InputLayout: Name="unnamed", Addr=0x0000026DF7F890C0 [ STATE_CREATION INFO #2097266: DESTROY_INPUTLAYOUT]
D3D11 INFO: Destroy ID3D11Buffer: Name="unnamed", Addr=0x0000026DF5DE6620 [ STATE_CREATION INFO #2097230: DESTROY_BUFFER]
D3D11 INFO: Destroy ID3D11PixelShader: Name="unnamed", Addr=0x0000026DF8041EB0 [ STATE_CREATION INFO #2097263: DESTROY_PIXELSHADER]
D3D11 INFO: Destroy ID3D11ShaderResourceView: Name="unnamed", Addr=0x0000026DF8033750 [ STATE_CREATION INFO #2097242: DESTROY_SHADERRESOURCEVIEW]
D3D11 INFO: Destroy ID3D11Texture2D: Name="unnamed", Addr=0x0000026DF802C540 [ STATE_CREATION INFO #2097236: DESTROY_TEXTURE2D]
D3D11 INFO: Destroy ID3D11Sampler: Name="unnamed", Addr=0x0000026DF80397F0 [ STATE_CREATION INFO #2097269: DESTROY_SAMPLER]
D3D11 INFO: Destroy ID3D11Sampler: Name="unnamed", Addr=0x0000026DF7F0C760 [ STATE_CREATION INFO #2097269: DESTROY_SAMPLER]
D3D11 INFO: Destroy ID3D11Context: Name="unnamed", Addr=0x0000026DF576F80 [ STATE_CREATION INFO #2097227: DESTROY_CONTEXT]
D3D11 INFO: Destroy ID3D11DeviceContextState: Name="unnamed", Addr=0x0000026DF7F8C020 [ STATE_CREATION INFO #3145749: DESTROY_DEVICECONTEXTSTATE]
The program my_executable has exited with code 0 (0x0).

```

The difference is that the execution when the exception is thrown contains the creating of a **second** ID3D11Context object. My sample application contains only the default creation of graphics objects for a Window2-based application; that is, my code does not contain anything that would create a second context. The second context is not being destroyed by whomever created it, so when the application terminates, the ID3D11Device object mDevice still has references to it.

I had hoped to continue investigating by stepping through the code line-by-line with the DXGI debugging layer enabled. The idea would be to try to determine who is creating the second context. I returned to the investigation the next day, and the exception has not occurred. For the exception to occur every run on one day to not occurring the next day on any run is, perhaps, a mystery.

As it turns out, I was finally able to have the DXGI debugging layer break when an ID3D11Context is created, and I hit the break on one of the executions of the program. The context is created inside the Present call from the swap chain,

```

// The second context is created in the \Code{mSwapChain$>Present} call.
void DX11Engine::DisplayColorBuffer(unsigned int syncInterval)
{
    // The swap must occur on the thread in which the device was created.
    mSwapChain->Present(syncInterval, 0);
}

```

This might be related to the IDXGIFactory::CreateSwapChain warning. I tried to use the new “flip” flags when creating the swap chain and followed the advice in the [Stack Overflow post](#), but I get warnings about the back buffer being unbound, among other warnings regarding render target handling. Apparently I need to dig into the DX11 documentation to figure out the Magic Dance.

2.3 Debug Performance with MSVS 16.7 and Later

August 14, 2020. Microsoft Visual Studio 16.7.* uses a new C++ Standard Library implementation. Dinkumware was the implementation of choice for a long time, now the `<array>` header file has a comment *SPDX-License-Identifier: Apache-2.0 WITH LLVM-exception*. The Debug performance for some of my code has decreased significantly. In particular, the `ETManifoldMesh` class uses `std::map` with a key-type of `EdgeKey`. The latter class derives from `FeatureKey`, which stores the vertex indices in a `std::array` object. `FeatureKey` also implements comparison operators that directly call the `std::array` comparisons. These in turn lead to calls to `lexicographical_compare` that show up as the main bottleneck when using `ETManifoldMesh`. By bottleneck, I mean significant bottleneck. I am going to eliminate the `std::array` comparisons in my code, but I do not yet know what other performance problems might occur. If you encounter performance problems related to the new C++ Standard Library, send me email so I can investigate it and fix it.

2.4 Reference Counting Bug in Inter Compiler 19.0

February 19, 2020. The Intel Compiler 19.0, in conjunction with changes made to `<memory>` in Microsoft Visual Studio's C++ Standard Library starting with version 16.4.4, has a serious bug. When enabled as the compiler in the MSVS IDE, the Intel compiler incorrectly compiles constructor code for `std::shared_ptr` objects. This leads to memory leaks and to random crashes that are caused by premature deletion of objects. The Intel compiler is incorrectly generating code for

```
constexpr _Ref_count_base() noexcept = default;
```

where it sets `_Weaks` to 0 rather than to 1. A quick fix is to modify the Microsoft header file, changing the constructor to

```
_Ref_count_base(): _Uses(1), _Weaks(1){}
```

For more information see [Intel Compiler Forum post](#). The Intel Compiler 19.1 has the fix to this problem and correctly compiles the code.

2.5 Compiler Failure in a Windows 10 SDK Header File

January 13, 2020. When compiling with Microsoft Visual Studio on a Microsoft Windows 10 machine, the projects are set up to use the latest installed version of the Windows 10 SDK. If your machine's latest version is 10.0.17763.0, the file `GeometricTools/GTE/Applications/MSW/WICFileIO.cpp` will compile in Debug configuration but will not compile in Release configuration. The error messages are for `module.h` in the SDK, claiming that the function `Details::CheckForDuplicateEntries` does not exist in the `Details` namespace. This is a bug in `module.h`. The declaration of `CheckForDuplicateEntries` occurs in the namespace `Details` and is contained in a conditionally compiled block when `_DEBUG` is defined. However, the definitions for `CheckForDuplicateEntries` are not contained in a conditionally compiled block when they should be. This has been fixed in Windows SDK version 10.0.18362.0. You can install the newer Windows SDK version by using the Visual Studio Installer, selecting the `Modify` option, selecting the item `Individual Components`, checking the box for the Windows SDK version 10.0.18362.0 and then pressing the `Modify` button in the lower right of the installer window.

2.6 Incorrect Behavior of MassSprings3D with NVIDIA Graphics on Windows 11

November 12, 2021. I just noticed that the DX11 version of the physics sample MassSprings3D is not working correctly; the rendering is wrong. This is on a Windows 11 machine with an NVIDIA GeForce RTX 2080 Super, driver version 496.49. The OpenGL version runs correctly on this machine.