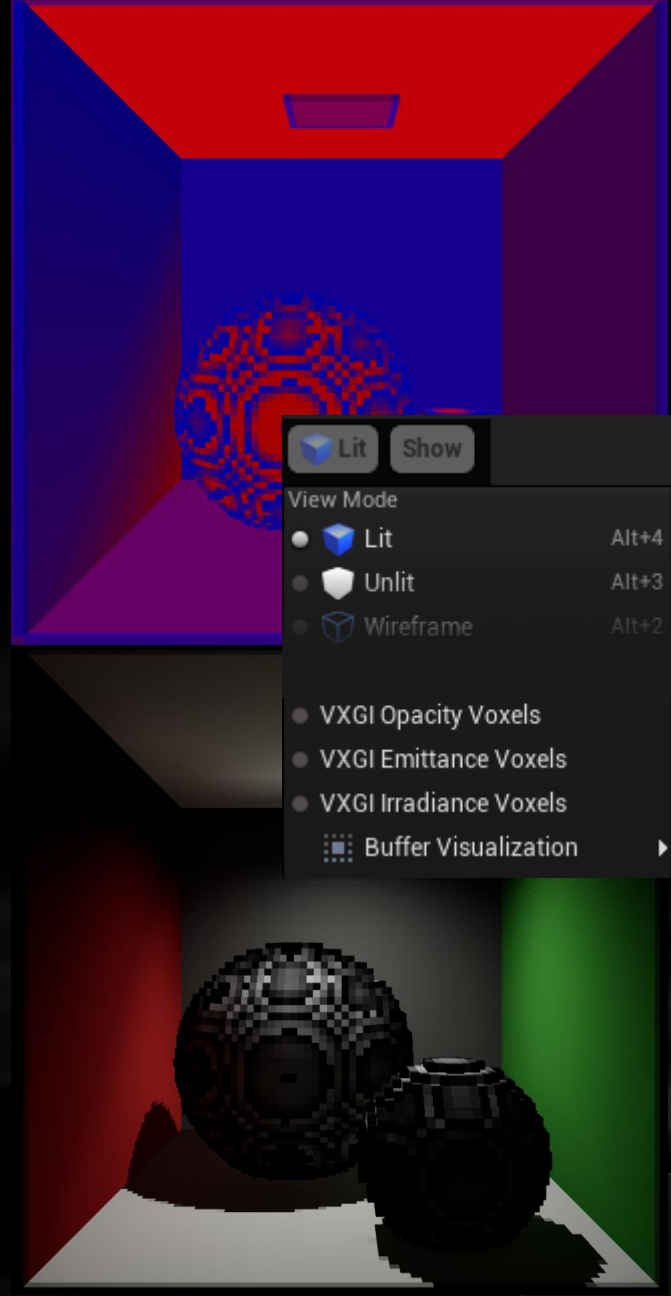
VXGI IN UE4

- Revoxelizes the whole scene on every frame (for simplicity)
- Can compute multi-bounce GI from emissive materials & multiple lights
- Can compute high-quality illumination from planar area lights
- Should work and look the same on all DX11 GPUs
- Example scenes (Cornell Box and SciFiHallway) are provided

VXGI BRING UP

- How to enable it
  - Check "VXGI Diffuse / Enable Diffuse Tracing" in the PostProcessVolume
  - Check "VXGI Indirect Lighting" on real lights and make them Movable
  - Set console variable "r.VXGI.DiffuseTracingEnable 1" (default)
  - Check "Used With VXGI Voxelization" on materials (default)
- Use the debug view modes often
  - VXGI Opacity Voxels should show all occluders as voxels
  - VXGI Emittance Voxels should show all reflected and emitted light
- Place a VXGI Anchor actor to lock the high-detail voxel region



VXGI PARAMETERS

Main Console Variables

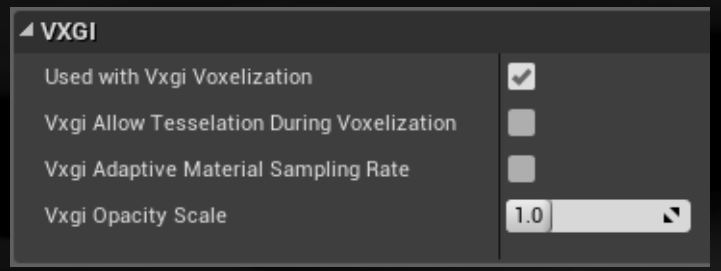
r.VXGI.MapSizeX,Y,Z
r.VXGI.VoxelSize
r.VXGI.AmbientOcclusionMode

r.VXGI.DiffuseTracingEnable
r.VXGI.SpecularTracingEnable
r.VXGI.EmissiveMaterialsEnable
r.VXGI.MultiBounceEnable

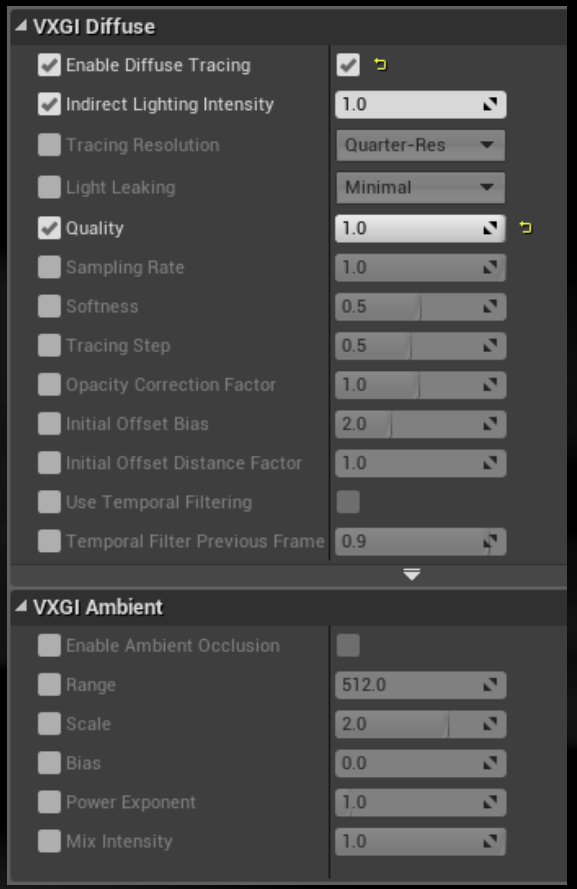
r.VXGI.EmittanceStorageScale
r.VXGI.HighQualityEmittanceDownsamplingEnable

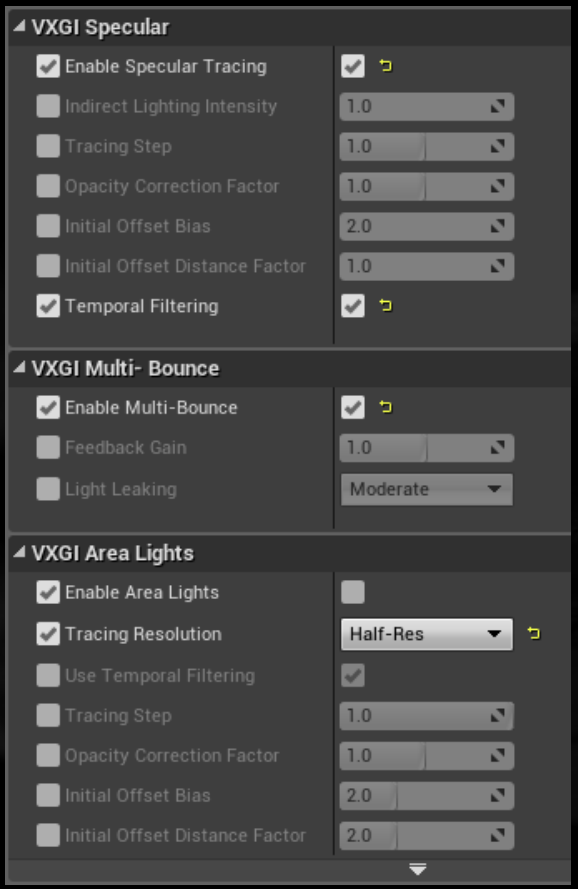
r.VXGI.DebugClipmapLevel

Material Parameters



Tracing Parameters





VXGI REFLECTIONS

- How to enable VXGI Reflections
  - Set console variable “r.VXGI.SpecularTracingEnable 1” (default)
  - Check “VXGI Specular / Enable Specular Tracing” in the PostProcessVolume
- When enabled, VXGI Specular Tracing
  - Disables SSR
  - Replaces SSR & light probes with the VXGI Specular Tracing result
  - Can be combined with SSR if “r.VXGI.CombineSpecularWithSSR 1” is set
- Limitation
  - VXGI reflections are meant to render glossy reflections (roughness >= 0.2 or so)
  - VXGI cannot render non-glossy reflections well (e.g. perfect mirrors)

PERFORMANCE KNOBS

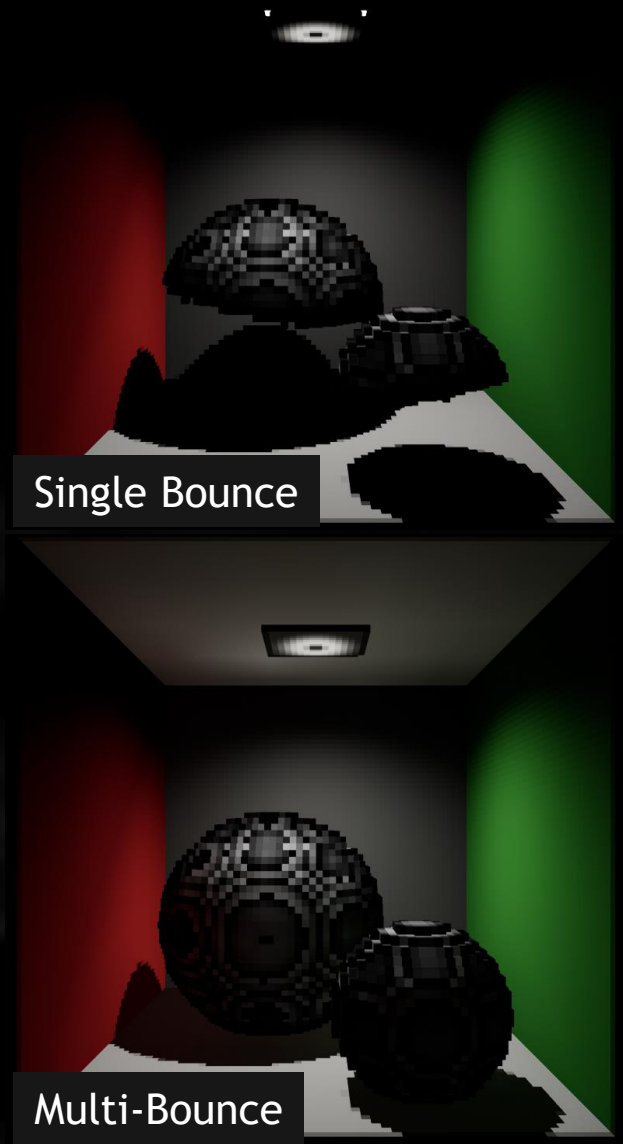
- You can type the "ProfileGPU" command to get a breakdown of the GPU time
  - Output of "stat unit" command also includes VXGI WS (World-Space) and VXGI SS (Screen-Space) GPU times
- To improve cone tracing performance, edit the PostProcessVolume settings:
  - Disable specular tracing
  - Set "VXGI Diffuse / Quality" to 0.1 – 0.3
  - Set "VXGI Diffuse / Tracing Resolution" to Quarter-Res
  - Enable "VXGI Diffuse / Use Temporal Filtering" (to remove flickering artifacts)
- To improve voxelization performance, set these console variables:
  - Set "r.VXGI.MapSizeX,Y,Z 64" (to improve both voxelization and tracing performance)
  - Set "r.VXGI.MultiBounceEnable 0" (to improve voxelization performance)
  - Set "r.VXGI.HighQualityEmittanceDownsamplingEnable 0" (to improve voxelization performance)

MULTI-BOUNCE GI

- When multi-bounce support is enabled, VXGI computes a 3D indirect irradiance map after voxelization
- Uses the irradiance map during voxelization on the next frame
  - Adds one more bounce on every frame
  - Makes the whole scene appear in specular reflections

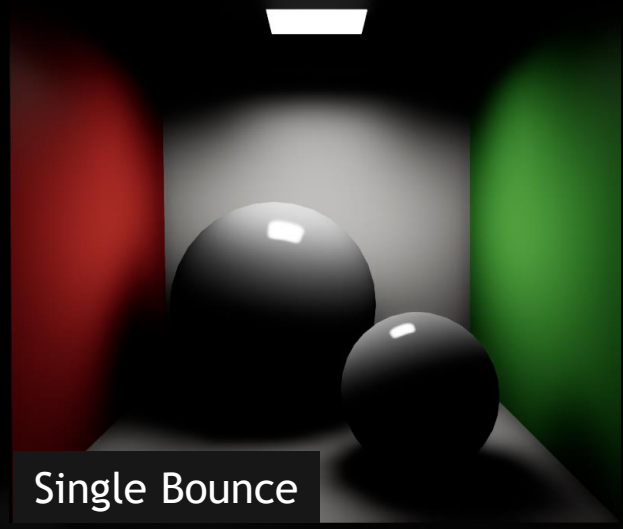
- How to enable it:
  - Check "VXGI Multi-Bounce / Enable Multi-Bounce"
  - Set console variable "r.VXGI.MultiBounceEnable 1" (default)
  - Tune "VXGI Multi-Bounce / Feedback Gain" until it looks right
    - Irradiance may blow up if this value is too high
  - Use "VXGI Irradiance Voxels" view mode to see the indirect irradiance map

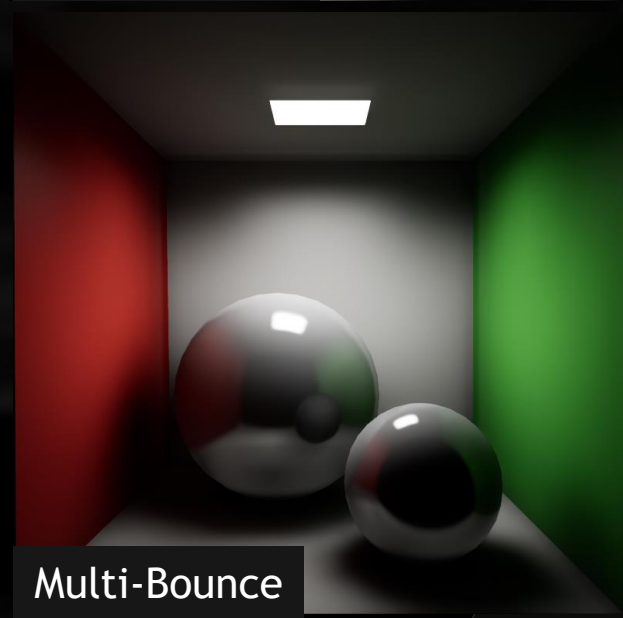
- Pictures on the right: visualization of emittance voxels



AREA LIGHTS

- VXGI is good at computing lighting (including soft shadows) from an arbitrary number of area lights of arbitrary shapes.
- Using actual emissive surfaces is often better than faking them with traditional local lights.
- For both performance and quality reasons, we recommend to not use any fill lights when lighting scenes with VXGI.
- With multi-bounce support, the entire scene can be lit by area lights only.
- Pictures on the right: Cornell Box lit by one emissive object





VXAL AREA LIGHTS

- VXGI 2.0 introduces support for higher-quality area lights

- Place the “Area Light” actor into the scene
- Adjust its material to render as emissive
- Check “VXGI Area Lights / Enable Area Lights”

- No multi-bounce support for VXAL so far

- Can use textured area lights
  - Set the Texture in AL parameters
  - Texture must have mip-maps!
  - Set the texture in AL material as well