Spike: *21*

Title: Measuring Performance

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Goals / deliverables:

Write a short report on measuring the performance of the Unreal Engine. Then create another short report on the performance difference between 100 dynamic verses 100 baked lights. Compare and report the difference.

To create this spike, you require:

- Use Spike 16 as a reference
- Performance measuring

Technologies, Tools, and Resources used:

List of information needed by someone trying to reproduce this work

- Performance Measuring
  - https://docs.unrealengine.com/latest/INT/Engine/Performance/index.html

Tasks undertaken:

- Open Spike 16 and the extra dynamic and baked lights
- Play the game and type the console commands for performance
- Write the report on Performance measuring
- Write the report for comparing dynamic and baked lights
- Create the blueprints

What we found out:

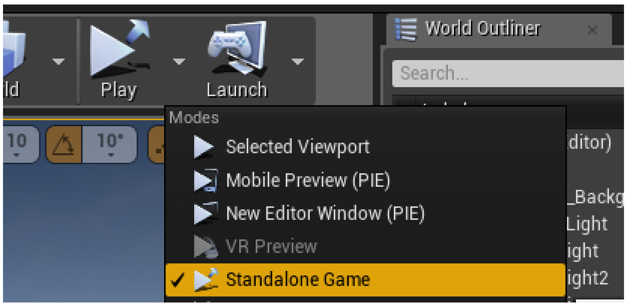
- You need to open the scene into a new window to type the commands in

Open issues/ risks:

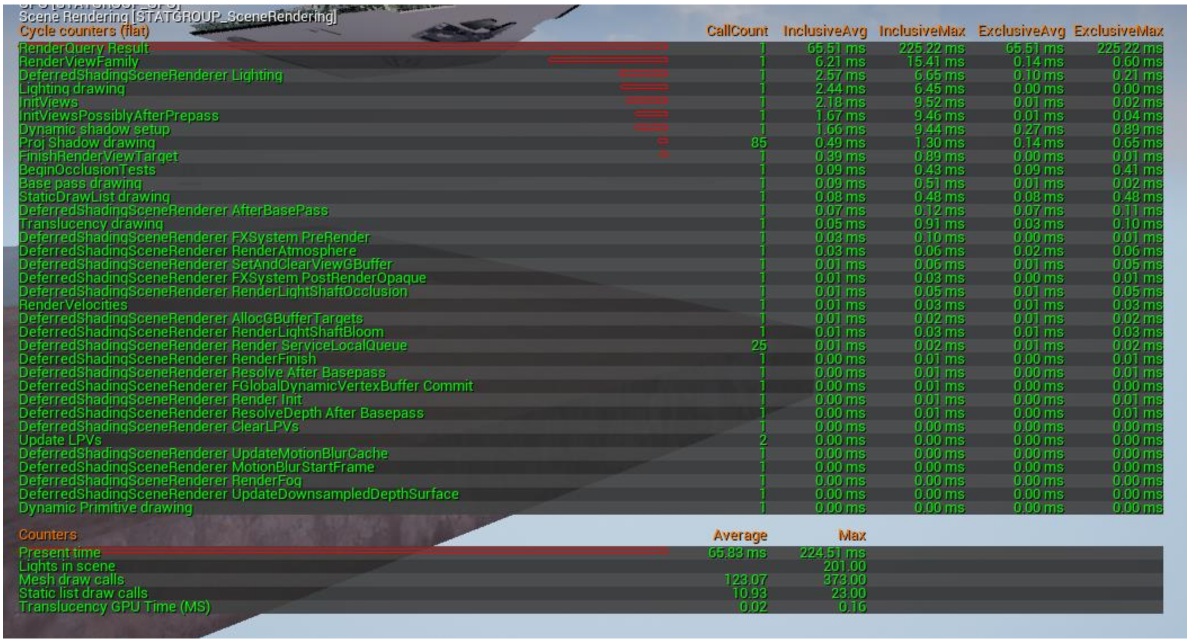
- Sometimes because of all the lighting when you exit the scene unreal crashes because it’s trying to render all the lights.

Performance Measuring

So you’re interested in measuring your performance of that great game you made? Well, firstly we need to open this epic scene. Now we need to open the scene in a new window by clicking the arrow next to launch and select a standalone game.



Now once the window is open you need to press the ~ key next to the 1 on the keyboard. Then the console will open and you can put all the commands in.

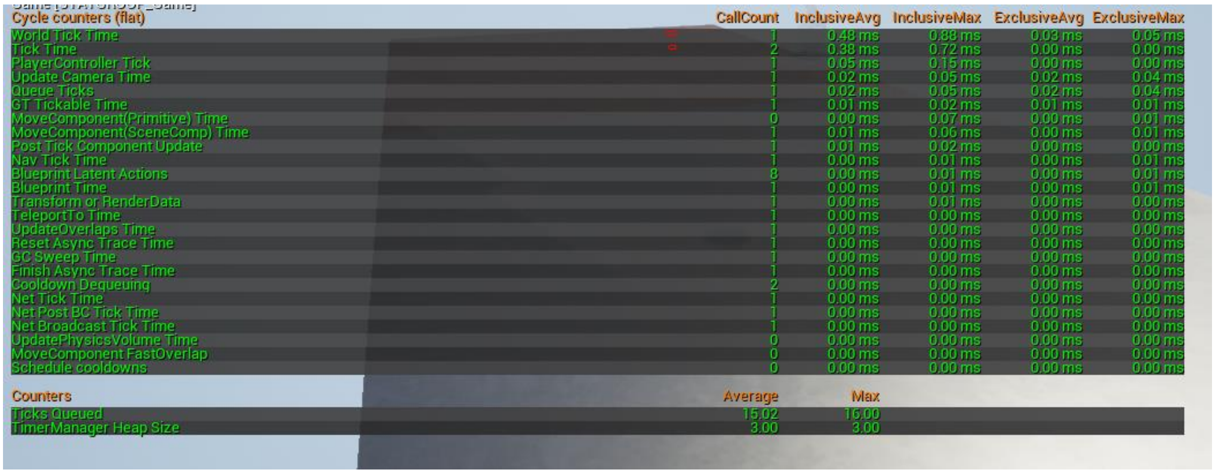


```
Scene Rendering [STATGROUP_SceneRendering]
Cycle counters (flat)                                          CallCount  InclusiveAvg  InclusiveMax  ExclusiveAvg  ExclusiveMax
RenderQuery Result                                                     1      65.51 ms     225.22 ms      65.51 ms     225.22 ms
RenderViewFamily                                                       1       6.21 ms      15.41 ms       0.14 ms       0.60 ms
DeferredShadingSceneRenderer Lighting                                  1       2.57 ms       6.65 ms       0.10 ms       0.21 ms
Lighting drawing                                                       1       2.44 ms       6.45 ms       0.00 ms       0.00 ms
InitViews                                                              1       2.18 ms       9.52 ms       0.01 ms       0.02 ms
InitViewsPossiblyAfterPrepass                                          1       1.67 ms       9.46 ms       0.01 ms       0.04 ms
Dynamic shadow setup                                                   1       1.66 ms       9.44 ms       0.27 ms       0.89 ms
Proj Shadow drawing                                                   85       0.49 ms       1.30 ms       0.14 ms       0.65 ms
FinishRenderViewTarget                                                 1       0.39 ms       0.89 ms       0.00 ms       0.01 ms
BeginOcclusionTests                                                    1       0.09 ms       0.43 ms       0.09 ms       0.41 ms
Base pass drawing                                                      1       0.09 ms       0.51 ms       0.01 ms       0.02 ms
StaticDrawList drawing                                                 1       0.08 ms       0.48 ms       0.08 ms       0.48 ms
DeferredShadingSceneRenderer AfterBasePass                             1       0.07 ms       0.12 ms       0.07 ms       0.11 ms
Translucency drawing                                                   1       0.05 ms       0.91 ms       0.03 ms       0.10 ms
DeferredShadingSceneRenderer FXSystem PreRender                        1       0.03 ms       0.10 ms       0.00 ms       0.01 ms
DeferredShadingSceneRenderer RenderAtmosphere                          1       0.03 ms       0.06 ms       0.02 ms       0.06 ms
DeferredShadingSceneRenderer SetAndClearViewGBuffer                    1       0.01 ms       0.06 ms       0.01 ms       0.05 ms
DeferredShadingSceneRenderer FXSystem PostRenderOpaque                 1       0.01 ms       0.03 ms       0.00 ms       0.01 ms
DeferredShadingSceneRenderer RenderLightShaftOcclusion                 1       0.01 ms       0.05 ms       0.01 ms       0.05 ms
RenderVelocities                                                       1       0.01 ms       0.03 ms       0.01 ms       0.03 ms
DeferredShadingSceneRenderer AllocGBufferTargets                       1       0.01 ms       0.02 ms       0.01 ms       0.02 ms
DeferredShadingSceneRenderer RenderLightShaftBloom                     1       0.01 ms       0.03 ms       0.01 ms       0.03 ms
DeferredShadingSceneRenderer Render ServiceLocalQueue                 25       0.01 ms       0.02 ms       0.01 ms       0.02 ms
DeferredShadingSceneRenderer RenderFinish                              1       0.00 ms       0.01 ms       0.00 ms       0.01 ms
DeferredShadingSceneRenderer Resolve After Basepass                    1       0.00 ms       0.01 ms       0.00 ms       0.01 ms
DeferredShadingSceneRenderer FGlobalDynamicVertexBuffer Commit         1       0.00 ms       0.01 ms       0.00 ms       0.00 ms
DeferredShadingSceneRenderer Render Init                               1       0.00 ms       0.01 ms       0.00 ms       0.01 ms
DeferredShadingSceneRenderer ResolveDepth After Basepass               1       0.00 ms       0.01 ms       0.00 ms       0.01 ms
DeferredShadingSceneRenderer ClearLPVs                                 1       0.00 ms       0.00 ms       0.00 ms       0.00 ms
Update LPVs                                                            2       0.00 ms       0.00 ms       0.00 ms       0.00 ms
DeferredShadingSceneRenderer UpdateMotionBlurCache                     1       0.00 ms       0.00 ms       0.00 ms       0.00 ms
DeferredShadingSceneRenderer MotionBlurStartFrame                      1       0.00 ms       0.00 ms       0.00 ms       0.00 ms
DeferredShadingSceneRenderer RenderFog                                 1       0.00 ms       0.00 ms       0.00 ms       0.00 ms
DeferredShadingSceneRenderer UpdateDownsampledDepthSurface             1       0.00 ms       0.00 ms       0.00 ms       0.00 ms
Dynamic Primitive drawing                                              1       0.00 ms       0.00 ms       0.00 ms       0.00 ms

Counters                                                         Average           Max
Present time                                                    65.83 ms     224.51 ms
Lights in scene                                                                 201.00
Mesh draw calls                                                   123.07        373.00
Static list draw calls                                             10.93         23.00
Translucency GPU Time (MS)                                          0.02          0.16
```

As you can see. By typing “stat ScenceRendering”, you can measure the rendering… judging by this. Your game is bad at rendering and you should feel bad…

Now you can all type “Stat Game” and it will display any attributes that apply to the running of the game



Game [STATGROUP_Game]

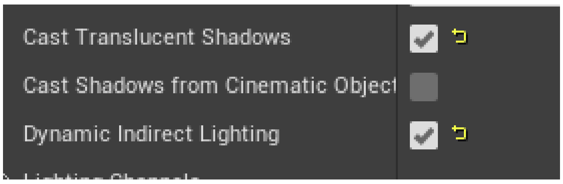
Cycle counters (flat)	CallCount	InclusiveAvg	InclusiveMax	ExclusiveAvg	ExclusiveMax
World Tick Time	1	0.48 ms	0.88 ms	0.03 ms	0.05 ms
Tick Time	2	0.38 ms	0.72 ms	0.00 ms	0.00 ms
PlayerController Tick	1	0.05 ms	0.15 ms	0.00 ms	0.00 ms
Update Camera Time	1	0.02 ms	0.05 ms	0.02 ms	0.04 ms
Queue Ticks	1	0.02 ms	0.05 ms	0.02 ms	0.04 ms
GT Tickable Time	1	0.01 ms	0.02 ms	0.01 ms	0.01 ms
MoveComponent(Primitive) Time	0	0.00 ms	0.07 ms	0.00 ms	0.01 ms
MoveComponent(SceneComp) Time	1	0.01 ms	0.06 ms	0.00 ms	0.01 ms
Post Tick Component Update	1	0.01 ms	0.02 ms	0.00 ms	0.00 ms
Nav Tick Time	1	0.00 ms	0.01 ms	0.00 ms	0.01 ms
Blueprint Latent Actions	8	0.00 ms	0.01 ms	0.00 ms	0.01 ms
Blueprint Time	1	0.00 ms	0.01 ms	0.00 ms	0.01 ms
Transform or RenderData	1	0.00 ms	0.01 ms	0.00 ms	0.00 ms
TeleportTo Time	1	0.00 ms	0.00 ms	0.00 ms	0.00 ms
UpdateOverlaps Time	1	0.00 ms	0.00 ms	0.00 ms	0.00 ms
Reset Async Trace Time	1	0.00 ms	0.00 ms	0.00 ms	0.00 ms
GC Sweep Time	1	0.00 ms	0.00 ms	0.00 ms	0.00 ms
Finish Async Trace Time	1	0.00 ms	0.00 ms	0.00 ms	0.00 ms
Cooldown Dequeuing	2	0.00 ms	0.00 ms	0.00 ms	0.00 ms
Net Tick Time	1	0.00 ms	0.00 ms	0.00 ms	0.00 ms
Net Post BC Tick Time	1	0.00 ms	0.00 ms	0.00 ms	0.00 ms
Net Broadcast Tick Time	1	0.00 ms	0.00 ms	0.00 ms	0.00 ms
UpdatePhysicsVolume Time	0	0.00 ms	0.00 ms	0.00 ms	0.00 ms
MoveComponent FastOverlap	0	0.00 ms	0.00 ms	0.00 ms	0.00 ms
Schedule cooldowns	0	0.00 ms	0.00 ms	0.00 ms	0.00 ms

Counters	Average	Max
Ticks Queued	15.02	16.00
TimerManager Heap Size	3.00	3.00

Now by looking at these you can see that in most stats your games is optimal. The only thing you need to work on is getting the time per tick (frame) lower. Now that you know you need to the rendering. You can update it before you showoff it to your friends.

Dynamic V Backed Lights

Now you’re an expert in performance measuring. You have discovered that the problem is with your lighting you want to test the performance between the baked and dynamic lights. Now we need to see what type of light you’re using and test both.



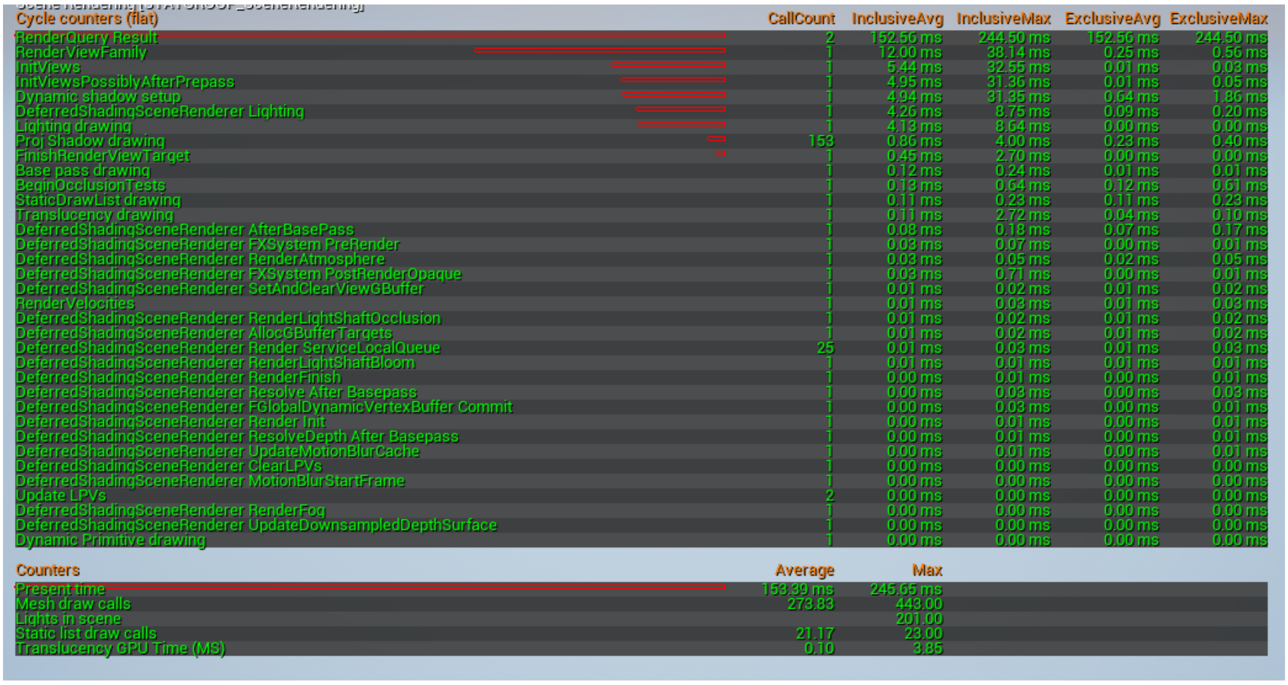
Cast Translucent Shadows ☑

Cast Shadows from Cinematic Object □

Dynamic Indirect Lighting ☑

Lighting Channels

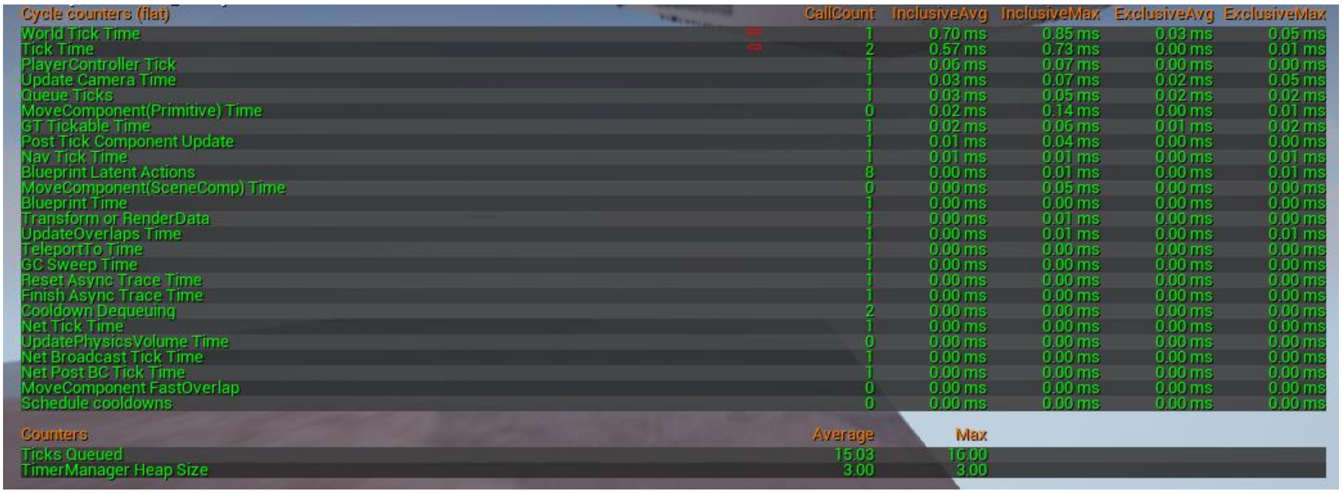
So, as we see, you’re using dynamic lights so let's test them.



```
Scene Rendering [STATGROUP_SceneRendering]
Cycle counters (flat)                                                  CallCount  InclusiveAvg  InclusiveMax  ExclusiveAvg  ExclusiveMax
RenderQuery Result                                                             2     152.56 ms     244.50 ms     152.56 ms     244.50 ms
RenderViewFamily                                                               1      12.00 ms      38.14 ms       0.25 ms       0.56 ms
InitViews                                                                      1       5.44 ms      32.55 ms       0.01 ms       0.03 ms
InitViewsPossiblyAfterPrepass                                                  1       4.95 ms      31.36 ms       0.01 ms       0.05 ms
Dynamic shadow setup                                                           1       4.94 ms      31.35 ms       0.64 ms       1.86 ms
DeferredShadingSceneRenderer Lighting                                          1       4.26 ms       8.75 ms       0.09 ms       0.20 ms
Lighting drawing                                                               1       4.13 ms       8.64 ms       0.00 ms       0.00 ms
Proj Shadow drawing                                                          153       0.86 ms       4.00 ms       0.23 ms       0.40 ms
FinishRenderViewTarget                                                         1       0.45 ms       2.70 ms       0.00 ms       0.00 ms
Base pass drawing                                                              1       0.12 ms       0.24 ms       0.01 ms       0.01 ms
BeginOcclusionTests                                                            1       0.13 ms       0.64 ms       0.12 ms       0.61 ms
StaticDrawList drawing                                                         1       0.11 ms       0.23 ms       0.11 ms       0.23 ms
Translucency drawing                                                           1       0.11 ms       2.72 ms       0.04 ms       0.10 ms
DeferredShadingSceneRenderer AfterBasePass                                     1       0.08 ms       0.18 ms       0.07 ms       0.17 ms
DeferredShadingSceneRenderer FXSystem PreRender                                1       0.03 ms       0.07 ms       0.00 ms       0.01 ms
DeferredShadingSceneRenderer RenderAtmosphere                                  1       0.03 ms       0.05 ms       0.02 ms       0.05 ms
DeferredShadingSceneRenderer FXSystem PostRenderOpaque                         1       0.03 ms       0.71 ms       0.00 ms       0.01 ms
DeferredShadingSceneRenderer SetAndClearViewGBuffer                            1       0.01 ms       0.02 ms       0.01 ms       0.02 ms
RenderVelocities                                                               1       0.01 ms       0.03 ms       0.01 ms       0.03 ms
DeferredShadingSceneRenderer RenderLightShaftOcclusion                         1       0.01 ms       0.02 ms       0.01 ms       0.02 ms
DeferredShadingSceneRenderer AllocGBufferTargets                               1       0.01 ms       0.02 ms       0.01 ms       0.02 ms
DeferredShadingSceneRenderer Render ServiceLocalQueue                         25       0.01 ms       0.03 ms       0.01 ms       0.03 ms
DeferredShadingSceneRenderer RenderLightShaftBloom                             1       0.01 ms       0.01 ms       0.01 ms       0.01 ms
DeferredShadingSceneRenderer RenderFinish                                      1       0.00 ms       0.01 ms       0.00 ms       0.01 ms
DeferredShadingSceneRenderer Resolve After Basepass                            1       0.00 ms       0.03 ms       0.00 ms       0.03 ms
DeferredShadingSceneRenderer FGlobalDynamicVertexBuffer Commit                 1       0.00 ms       0.03 ms       0.00 ms       0.01 ms
DeferredShadingSceneRenderer Render Init                                       1       0.00 ms       0.01 ms       0.00 ms       0.01 ms
DeferredShadingSceneRenderer ResolveDepth After Basepass                       1       0.00 ms       0.01 ms       0.00 ms       0.01 ms
DeferredShadingSceneRenderer UpdateMotionBlurCache                             1       0.00 ms       0.01 ms       0.00 ms       0.01 ms
DeferredShadingSceneRenderer ClearLPVs                                         1       0.00 ms       0.00 ms       0.00 ms       0.00 ms
DeferredShadingSceneRenderer MotionBlurStartFrame                              1       0.00 ms       0.00 ms       0.00 ms       0.00 ms
Update LPVs                                                                    2       0.00 ms       0.00 ms       0.00 ms       0.00 ms
DeferredShadingSceneRenderer RenderFog                                         1       0.00 ms       0.00 ms       0.00 ms       0.00 ms
DeferredShadingSceneRenderer UpdateDownsampledDepthSurface                     1       0.00 ms       0.00 ms       0.00 ms       0.00 ms
Dynamic Primitive drawing                                                      1       0.00 ms       0.00 ms       0.00 ms       0.00 ms

Counters                                                                 Average           Max
Present time                                                           153.39 ms     245.65 ms
Mesh draw calls                                                           273.83        443.00
Lights in scene                                                                         201.00
Static list draw calls                                                     21.17         23.00
Translucency GPU Time (MS)                                                  0.10          3.85
```

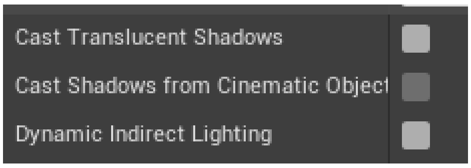
Oh, good there's your problem!!!!! It takes over 1.5 seconds to render your light per tick… So, let's see how long it takes per tick



Cycle counters (flat)	CallCount	InclusiveAvg	InclusiveMax	ExclusiveAvg	ExclusiveMax
World Tick Time	1	0.70 ms	0.85 ms	0.03 ms	0.05 ms
Tick Time	2	0.57 ms	0.73 ms	0.00 ms	0.01 ms
PlayerController Tick	1	0.06 ms	0.07 ms	0.00 ms	0.00 ms
Update Camera Time	1	0.03 ms	0.07 ms	0.02 ms	0.05 ms
Queue Ticks	1	0.03 ms	0.05 ms	0.02 ms	0.02 ms
MoveComponent(Primitive) Time	0	0.02 ms	0.14 ms	0.00 ms	0.01 ms
GT Tickable Time	1	0.02 ms	0.06 ms	0.01 ms	0.02 ms
Post Tick Component Update	1	0.01 ms	0.04 ms	0.00 ms	0.00 ms
Nav Tick Time	1	0.01 ms	0.01 ms	0.00 ms	0.01 ms
Blueprint Latent Actions	8	0.00 ms	0.01 ms	0.00 ms	0.01 ms
MoveComponent(SceneComp) Time	0	0.00 ms	0.05 ms	0.00 ms	0.00 ms
Blueprint Time	1	0.00 ms	0.00 ms	0.00 ms	0.00 ms
Transform or RenderData	1	0.00 ms	0.01 ms	0.00 ms	0.00 ms
UpdateOverlaps Time	1	0.00 ms	0.01 ms	0.00 ms	0.01 ms
TeleportTo Time	1	0.00 ms	0.00 ms	0.00 ms	0.00 ms
GC Sweep Time	1	0.00 ms	0.00 ms	0.00 ms	0.00 ms
Reset Async Trace Time	1	0.00 ms	0.00 ms	0.00 ms	0.00 ms
Finish Async Trace Time	1	0.00 ms	0.00 ms	0.00 ms	0.00 ms
Cooldown Dequeuing	2	0.00 ms	0.00 ms	0.00 ms	0.00 ms
Net Tick Time	1	0.00 ms	0.00 ms	0.00 ms	0.00 ms
UpdatePhysicsVolume Time	0	0.00 ms	0.00 ms	0.00 ms	0.00 ms
Net Broadcast Tick Time	1	0.00 ms	0.00 ms	0.00 ms	0.00 ms
Net Post BC Tick Time	1	0.00 ms	0.00 ms	0.00 ms	0.00 ms
MoveComponent FastOverlap	0	0.00 ms	0.00 ms	0.00 ms	0.00 ms
Schedule cooldowns	0	0.00 ms	0.00 ms	0.00 ms	0.00 ms

Counters	Average	Max
Ticks Queued	15.03	16.00
TimerManager Heap Size	3.00	3.00

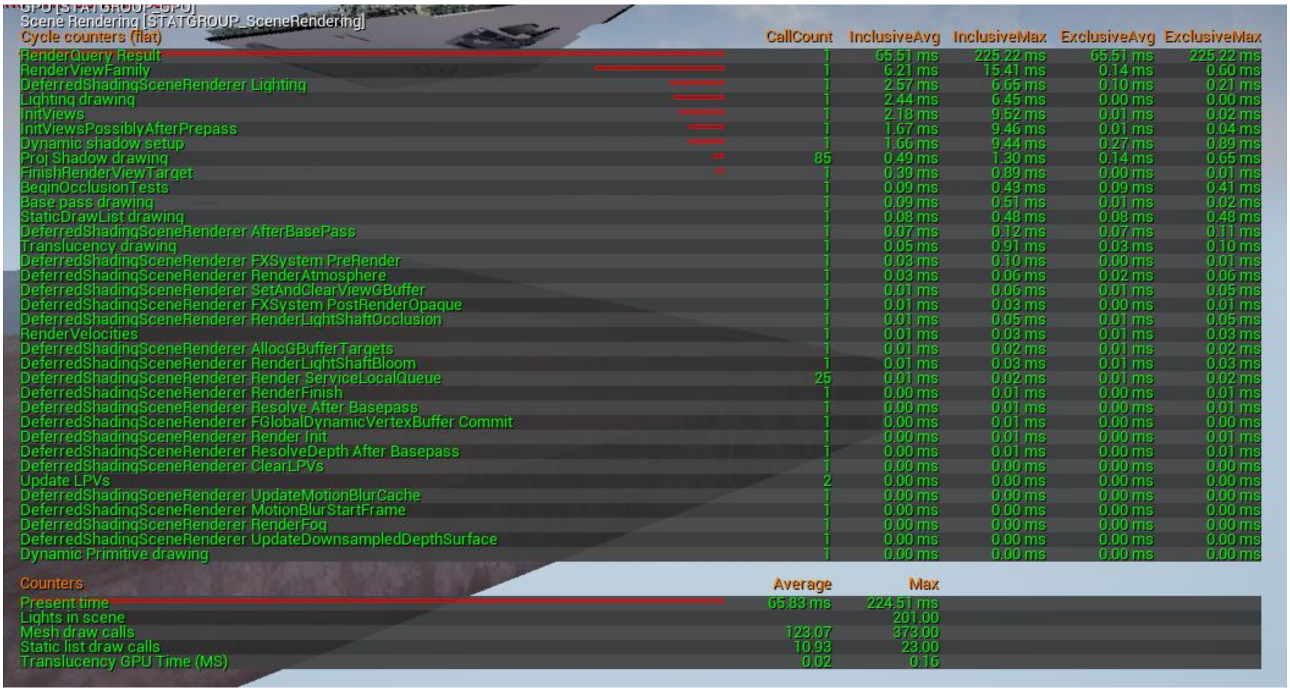
My god it’s horrible… So, it takes over 1.5 seconds to render the light per tick… but each it is 0.7 seconds... so, if you do the math it takes 1.55 ticks to render the light for one tick… so we have discovered that baked lights are horrible for this game. Let's try Baked



Cast Translucent Shadows ☐
Cast Shadows from Cinematic Object ☐
Dynamic Indirect Lighting ☐

Now we untick these options to create baked lights.

So, we are going to the same tests as the baked lights to compare the difference.

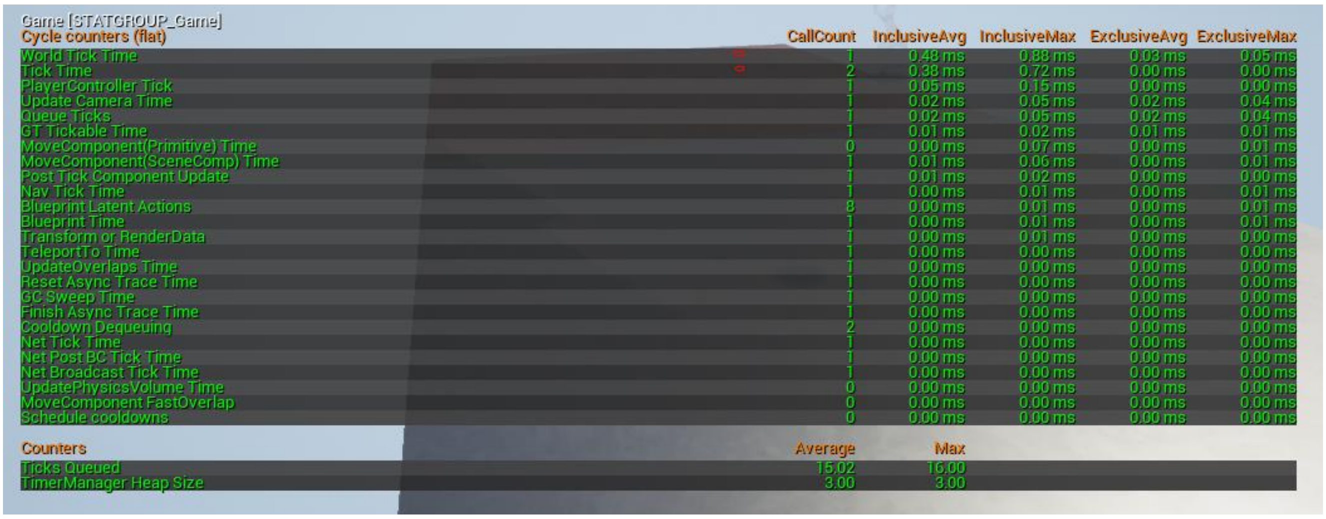


GPU [STATGROUP_GPU]
Scene Rendering [STATGROUP_SceneRendering]

Cycle counters (flat)	CallCount	InclusiveAvg	InclusiveMax	ExclusiveAvg	ExclusiveMax
RenderQuery Result	1	65.51 ms	225.22 ms	65.51 ms	225.22 ms
RenderViewFamily	1	6.21 ms	15.41 ms	0.14 ms	0.60 ms
DeferredShadingSceneRenderer Lighting	1	2.57 ms	6.65 ms	0.10 ms	0.21 ms
Lighting drawing	1	2.44 ms	6.45 ms	0.00 ms	0.00 ms
InitViews	1	2.18 ms	9.52 ms	0.01 ms	0.02 ms
InitViewsPossiblyAfterPrepass	1	1.67 ms	9.46 ms	0.01 ms	0.04 ms
Dynamic shadow setup	1	1.66 ms	9.44 ms	0.27 ms	0.89 ms
Proj Shadow drawing	85	0.49 ms	1.30 ms	0.14 ms	0.65 ms
FinishRenderViewTarget	1	0.39 ms	0.89 ms	0.00 ms	0.01 ms
BeginOcclusionTests	1	0.09 ms	0.43 ms	0.09 ms	0.41 ms
Base pass drawing	1	0.09 ms	0.51 ms	0.01 ms	0.02 ms
StaticDrawList drawing	1	0.08 ms	0.48 ms	0.08 ms	0.48 ms
DeferredShadingSceneRenderer AfterBasePass	1	0.07 ms	0.12 ms	0.07 ms	0.11 ms
Translucency drawing	1	0.05 ms	0.91 ms	0.03 ms	0.10 ms
DeferredShadingSceneRenderer FXSystem PreRender	1	0.03 ms	0.10 ms	0.00 ms	0.01 ms
DeferredShadingSceneRenderer RenderAtmosphere	1	0.03 ms	0.06 ms	0.02 ms	0.06 ms
DeferredShadingSceneRenderer SetAndClearViewGBuffer	1	0.01 ms	0.06 ms	0.01 ms	0.05 ms
DeferredShadingSceneRenderer FXSystem PostRenderOpaque	1	0.01 ms	0.03 ms	0.00 ms	0.01 ms
DeferredShadingSceneRenderer RenderLightShaftOcclusion	1	0.01 ms	0.05 ms	0.01 ms	0.05 ms
RenderVelocities	1	0.01 ms	0.03 ms	0.01 ms	0.03 ms
DeferredShadingSceneRenderer AllocGBufferTargets	1	0.01 ms	0.02 ms	0.01 ms	0.02 ms
DeferredShadingSceneRenderer RenderLightShaftBloom	1	0.01 ms	0.03 ms	0.01 ms	0.03 ms
DeferredShadingSceneRenderer Render ServiceLocalQueue	25	0.01 ms	0.02 ms	0.01 ms	0.02 ms
DeferredShadingSceneRenderer RenderFinish	1	0.00 ms	0.01 ms	0.00 ms	0.01 ms
DeferredShadingSceneRenderer Resolve After Basepass	1	0.00 ms	0.01 ms	0.00 ms	0.01 ms
DeferredShadingSceneRenderer FGlobalDynamicVertexBuffer Commit	1	0.00 ms	0.01 ms	0.00 ms	0.00 ms
DeferredShadingSceneRenderer Render Init	1	0.00 ms	0.01 ms	0.00 ms	0.01 ms
DeferredShadingSceneRenderer ResolveDepth After Basepass	1	0.00 ms	0.01 ms	0.00 ms	0.01 ms
DeferredShadingSceneRenderer ClearLPVs	1	0.00 ms	0.00 ms	0.00 ms	0.00 ms
Update LPVs	2	0.00 ms	0.00 ms	0.00 ms	0.00 ms
DeferredShadingSceneRenderer UpdateMotionBlurCache	1	0.00 ms	0.00 ms	0.00 ms	0.00 ms
DeferredShadingSceneRenderer MotionBlurStartFrame	1	0.00 ms	0.00 ms	0.00 ms	0.00 ms
DeferredShadingSceneRenderer RenderFog	1	0.00 ms	0.00 ms	0.00 ms	0.00 ms
DeferredShadingSceneRenderer UpdateDownsampledDepthSurface	1	0.00 ms	0.00 ms	0.00 ms	0.00 ms
Dynamic Primitive drawing	1	0.00 ms	0.00 ms	0.00 ms	0.00 ms

Counters	Average	Max
Present time	65.83 ms	224.51 ms
Lights in scene		201.00
Mesh draw calls	123.07	373.00
Static list draw calls	10.93	23.00
Translucency GPU Time (MS)	0.02	0.16

Oh, boy, this is much better but it’s still horrible. It’s a welcome improvement because it only takes. 0.65 seconds to render the lights instead of over 1.5 seconds.



```
Game [STATGROUP_Game]
Cycle counters (flat)                        CallCount  InclusiveAvg  InclusiveMax  ExclusiveAvg  ExclusiveMax
World Tick Time                                      1       0.48 ms       0.88 ms       0.03 ms       0.05 ms
Tick Time                                            2       0.38 ms       0.72 ms       0.00 ms       0.00 ms
PlayerController Tick                                1       0.05 ms       0.15 ms       0.00 ms       0.00 ms
Update Camera Time                                   1       0.02 ms       0.05 ms       0.02 ms       0.04 ms
Queue Ticks                                          1       0.02 ms       0.05 ms       0.02 ms       0.04 ms
GT Tickable Time                                     1       0.01 ms       0.02 ms       0.01 ms       0.01 ms
MoveComponent(Primitive) Time                        0       0.00 ms       0.07 ms       0.00 ms       0.01 ms
MoveComponent(SceneComp) Time                        1       0.01 ms       0.06 ms       0.00 ms       0.01 ms
Post Tick Component Update                           1       0.01 ms       0.02 ms       0.00 ms       0.00 ms
Nav Tick Time                                        1       0.00 ms       0.01 ms       0.00 ms       0.01 ms
Blueprint Latent Actions                             8       0.00 ms       0.01 ms       0.00 ms       0.01 ms
Blueprint Time                                       1       0.00 ms       0.01 ms       0.00 ms       0.01 ms
Transform or RenderData                              1       0.00 ms       0.01 ms       0.00 ms       0.00 ms
TeleportTo Time                                      1       0.00 ms       0.00 ms       0.00 ms       0.00 ms
UpdateOverlaps Time                                  1       0.00 ms       0.00 ms       0.00 ms       0.00 ms
Reset Async Trace Time                               1       0.00 ms       0.00 ms       0.00 ms       0.00 ms
GC Sweep Time                                        1       0.00 ms       0.00 ms       0.00 ms       0.00 ms
Finish Async Trace Time                              1       0.00 ms       0.00 ms       0.00 ms       0.00 ms
Cooldown Dequeuing                                   2       0.00 ms       0.00 ms       0.00 ms       0.00 ms
Net Tick Time                                        1       0.00 ms       0.00 ms       0.00 ms       0.00 ms
Net Post BC Tick Time                                1       0.00 ms       0.00 ms       0.00 ms       0.00 ms
Net Broadcast Tick Time                              1       0.00 ms       0.00 ms       0.00 ms       0.00 ms
UpdatePhysicsVolume Time                             0       0.00 ms       0.00 ms       0.00 ms       0.00 ms
MoveComponent FastOverlap                            0       0.00 ms       0.00 ms       0.00 ms       0.00 ms
Schedule cooldowns                                   0       0.00 ms       0.00 ms       0.00 ms       0.00 ms

Counters                                       Average           Max
Ticks Queued                                     15.02         16.00
TimerManager Heap Size                            3.00          3.00
```

Wow, now it only takes 0.48 seconds per tick. This is so much better but as you can see we need to improve the lighting still to match the tick.

Know we know that the dynamic lights are performing worst we need to learn why. Well, the main reason is that with the dynamic light, it adjusts to your position in the world. There will be a light direction which the source comes from. This source is like the sun so basically depending on your location and the surrounding. The game will cast shadow. So basically, this will increase the rendering time. But why doesn’t baked light do this? Well, they are basically the same as a dynamic light in which they reached to the light source, they are static. So, you could be running on the amount of light will be the same on all ticks. So naturally this will have a lower and stable rendering time. What is the best way to use dynamic and baked lighting? On your player’s camera, a dynamic light works well and baked lights around the world.