Aurasoft UK

Skyline Game Engine

Gen 2 - Alpha 1

Thank you for participating in the Skyline Game Engine Gen2 Alpha.

By using this version, you accept that there is still missing functionality and there may be more bugs / crashes in other areas than normal Gen1.

We hope you enjoy using Gen2 and that it ticks all your boxes for a modern game engine.

If you need support, then go to http://forum.aurasoft-skyline.co.uk.
If you have a bug or crash, then please create a topic here: http://www.forum.aurasoft-skyline.co.uk/viewforum.php?f=59.

Support email address: support@aurasoft-skyline.co.uk

Please read this document before proceeding and using the Alpha

OVERVIEW

A lot of things have changed in Gen2 compared to Gen1 whether it is editing in the scene or controlling how the lighting and materials look in the scene.

What are the major new features?

- **Industry Standard PBR** material workflow for both specular and metallic ways of working.
- Full **HDR** lighting solution including bloom and glows
- **HBAO** for ambient occlusion. This is high quality as seen in many top games. Can be a slow down on smaller cards though.
- **3x** to **16x** performance over Gen1 by auto instancing all meshes and materials to reduce draw calls.
- Better quality shadows with no camera flicker when looking ahead
- **Fudge loads of lights** and **Light Debugging** with gizmo editing.
- Great looking lighting worthy of AAA without Global Illumination techniques such as IBL, light mapping or Dynamic Global Illumination.
- Ability to omit entities from the update loop using **Static** or **Dynamic.** This can get you those few extra frames on large scenes as Statics will not update their positions, rotations or scales in the engine. Couple that with disabling Constant Update on the entity properties will omit it from updating in the game engine. This means any actions, scripts or modules will not run though so it is recommended for entities that do not move or are just environment placements.
- **DX11** and **OpenGL.** DX11 is prone to more errors and is slow as hell to generate shaders which we have a plan for, but DX11 can offer even more framerate than OpenGL3+. But we recommend you to use OpenGL3+ for now until we fix the main issues in DX11.
- **Multi Selection** and **Editing** in the scene.
- **Quicker selection** and **deselection** on large amounts of objects.
- Skyline can swap screen on any editor and main editor without a hickup or lock up.
- **Automatic Level of detail setup.**

Due to a huge performance improvement and modern rendering techniques used now; has made certain parts of the workflow more complex which we have tried to simplify the best we can at this stage, ***but this also prevents backwards compatibility to Gen1 on certain features.***

For instance, certain texture formats and files may slow the engine down more than it did in Gen1 and this can impact your games performance drastically, but get the right texture settings and you are good to go at rocket speed lol.

Couple of quick warnings:

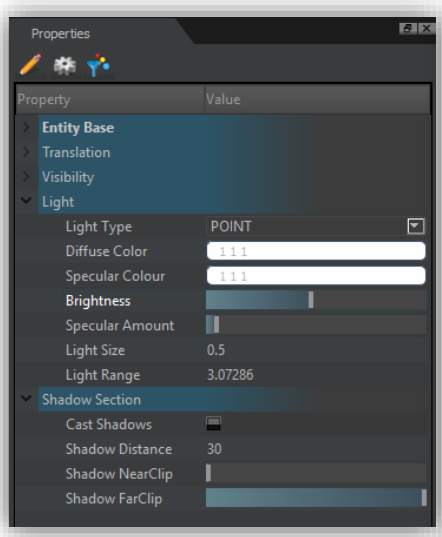
- Lock to 60 to stop burning your card out if you disable HDR and HBAO. You will hear the card screaming. Be kind to your card.
- Make sure to backup any games, scene files, presets & meshes you are working with on Gen1 and continue to use in Gen1 as all entities have got new properties and force an upgrade on scene files and presets. Mesh files are newer and later versions if converted using the FBX converter in Gen2 and ***will NOT load back into Gen1.***

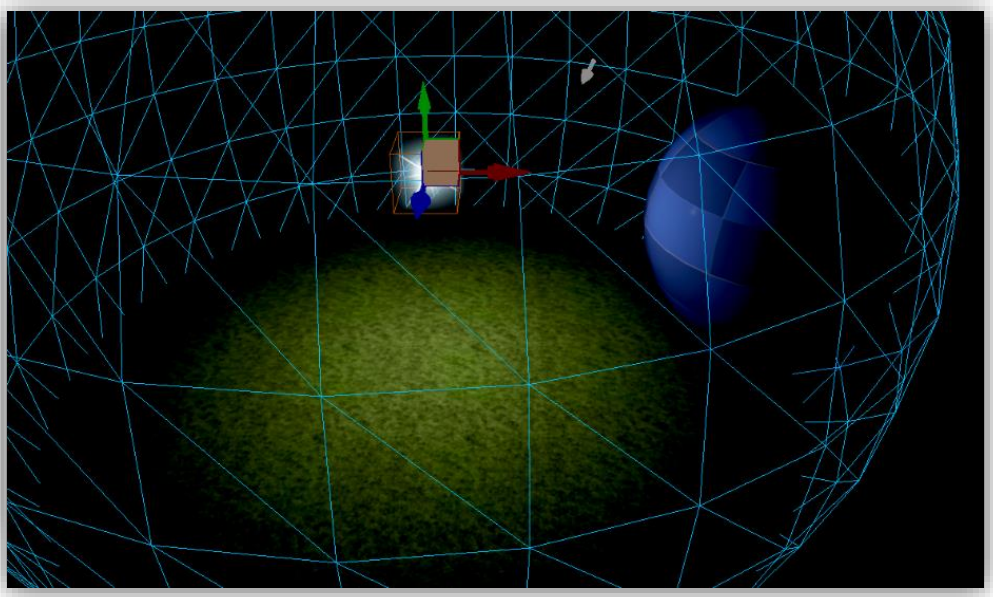
LIGHTS AND LIGHTING

Lighting has had a complete overhaul on Gen2 and is faster to work with and looks way better, and not to mention being able to run 50 + point lights at acceptable frames…. What!!!! I hear you scream….

It does however mean that your older levels if you were using a point or spot light will need to have their ranges and light sizes set. Light Sizes? What's the light size?

Well, since we have a PBR workflow now, that means that lights naturally need to adapt to this workflow and that's why lights are only controlled by Light Range and Light Size. Here is a picture of the settings and the light in the scene with the normal sphere for scale:





Note: The Sphere is the new Debug tools for point lights and a cone for spot lights, both can be adjusted by the Uniform scale. For spot lights, the z(blue, range) and x(red, cone angle) are usable. For point lights, you can use the x(red, Range).

Changing Light Size will affect how far the light will go even with a large range and small Light size, the light will not reach the range. The larger the value, the further the light will affect.

Light Range is in meters, and represents how far the light will extend.

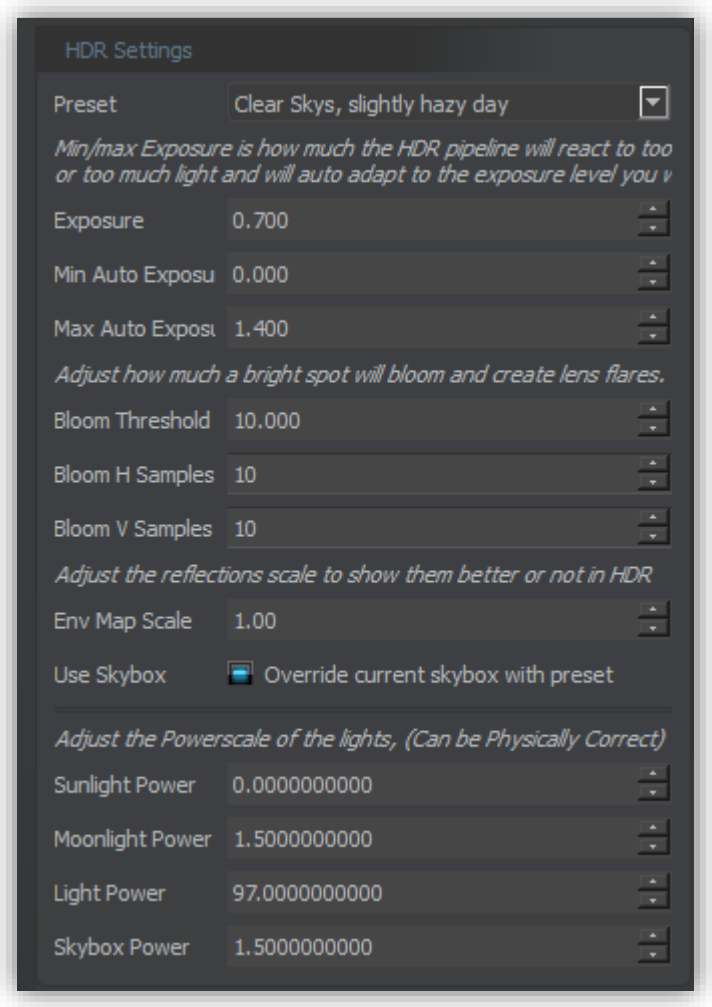
Here are a couple of things to bear in mind when working with lights:

- If possible use point lights over spot lights as they are more performance effective. Spot lights take more processing because of the angle cutoffs.
- Keep light range and size as small as possible to increase and keep performance. Larger lights will slow the engine down as they need to effect more entities.
- Keep in your mind, 1 big light = many smaller lights.

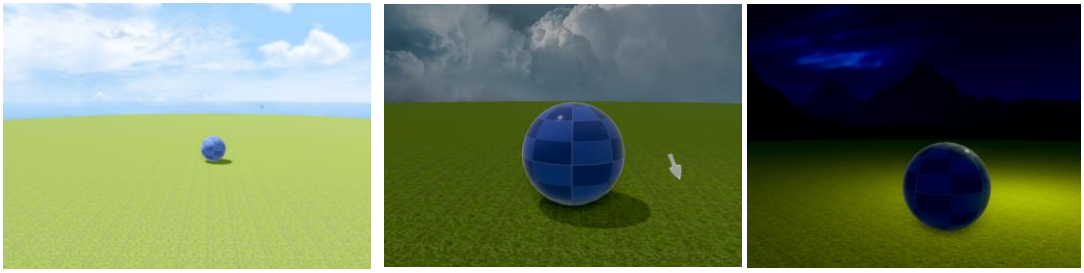
HDR Settings

Whether you have HDR on or off, you can still balance the lighting to suit your scenes need.

In the render panel we now have a new section for controlling HDR. It may seem advanced at first, but once you get used to it, makes it very fast to change the scenes feel whether it is a nightime, overcast or bright sunny day scene. Check out the properties:

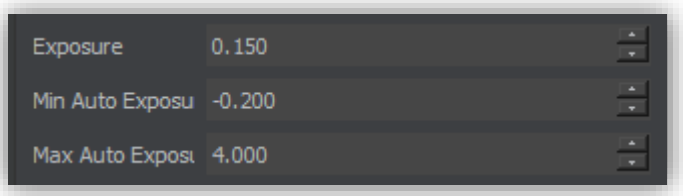


For simple use of the HDR system, changing the preset at the top and checking the “Override current skybox with preset” will be the easiest and fastest method of getting a feel you want, whether it has bloom and glows or just simple / bright lighting, there is a preset to suit your needs.

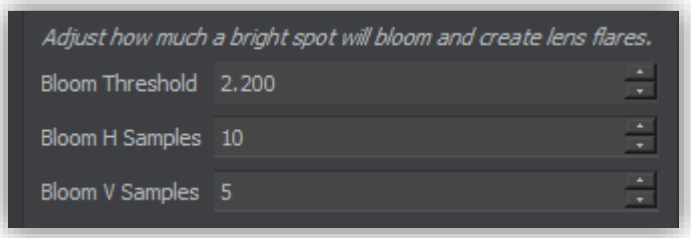


Caption: *HDR Example Presets:* ***Left****: “Bright Sunny Day”,* ***Middle****: “Cloudy Day”,* ***Right:*** *“Bloomin Dark night”*

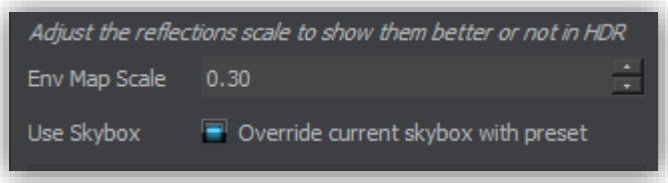
- The HDR is mainly controlled by the 3 exposure params, although editing exposure and min exposure do the same thing and the “min” property may be removed.



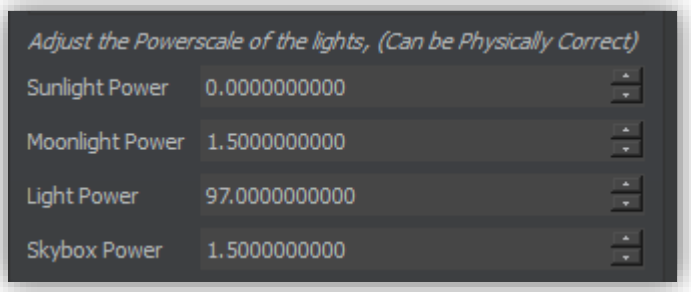
- Bloom Threshold closer to 0 will make the scene bloom more until the whole screen blurs at 0. Larger values reduce the amount of bloom until it disappears. Control the width and height of the bloom to create those Abrams Lens flares or keep uniform for gentle and soft glows.



- “Environment map Scale” will adjust how bright the reflections are in the scene and needs to be balanced off against the ambience slider at the top of the render panel.
- If you check the “Override skybox”, it will change the skybox to the skybox chosen and set by the preset. Disable this checkbox if you are wanting to use your own custom skybox.



- The lighting power scale is like a global mixer and will control all lights of that type for example:



  - Setting the Sunlight Power to 0 will stop the directional light from showing and only ambience will show. The property for the light is still set at 1. This means you can control what that 1 value on the light property slider means. A bright sunny day will have a sunlight power of 97. This is calculated from the lux of the sun. Without HDR a good Sunlight power is 3.14(PI).
  - Moonlight power is not yet used.

- Light Power will affect all point lights and spot lights in the scene. A power scale of 0 will mean no point or spot lights will show even if they have the brightness slider on their entity property set to 1. This is for the same reasons as Directional lights.
- Skybox power will allow you to adjust the exposure of the skybox to help make that blend on a dark night or extremely bright day. It is editing the exposure param of the skybox.

That is basically all there is to HDR lighting. Try the presets and make some cool looking lit levels :)

Light Balancing

At times, you might think that the scene is too dark or too bright. This is why we have the power scales to level everything out. Don't be afraid to adjust the "Light size" of a point or spot light to fit what your light needs afterall what ever you think looks good.. looks good!

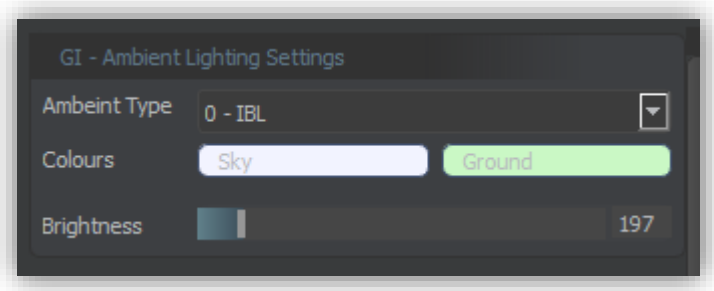
Blending the properties with the HDR power levels and ambience slider will give you what you need regardless of lighting.

Note: *Remember, this is a game engine and not real life. Use the values you think suit your game the best.*

Note: *If you add a point or spot light and are wondering where the light is, check your Light Power property on the render panel in the HDR Settings.*

Ambience

Ambience in Gen2 is currently Hemispherical only and no IBL has yet been added. You can change all the colours for sky and ground in the top of the render panel. There is no more fixed ambient colour, so in the event you want a single ambient colour, set the sky and ground colours to the same.



Shadows – point vs spot vs directional

Shadows in Gen2 are far superior than they were in Gen1, however we have not yet got around to point light shadows, and so only Spot and Directional lights can cast shadows properly.

Note: *Switching shadow settings is not possible from the editor yet, but can be done from editing the base workspace in the Data folder.*

- Directional lights use PSSM with 3 splits in High/medium Quality or 4 splits in Ultra Quality mode. When you set the shadows to low quality though, it will use a single focused shadow like old skyline for better

performance. This singular shadow does not flicker with camera movement though and increases performance drastically.

- Spot lights only use a singular focused shadow and currently only 6 spot lights can cast shadows. This will be edited in the end. More shadows means more performance loss.
  As you move through the level; the closest spot lights will be the ones casting shadows. This means 6 shadow casting spot lights will create a shadowed world without too much noticing of pops.
- Point lights are pointless to cast shadows with, not much different to Gen1. Except you can use lots of them to light your scenes. Indoor levels will be extremely fun lol :P

Note: *You will experience a pop as you add a shadow casting spotlight as the shaders need to be regenerated in both OpenGL3+ and DX11. We have a plan of using a microcode cache so the shaders are always pregenerated. This is planned for the full release of Gen2 and may appear in next few updates.*

MATERIALS

Wow, have materials changed and we have added more textures like emissive and soon to add displacement and AO mapping (***disp and ao are not in the engine yet!).***

We have a similar editor to what you were used to for editing but as said before with extra functionality.

New material format *.skymat instead of *.material

Gen2 materials are stored as JSON file document and are suffixed with the extension of *.skymat
There is a reason we did it this way. Gen1 materials used *.material which are still accepted in Gen2 as you can write new PBR and unlit materials inside them, but we didn't want to damage any materials for consistent use in Gen1. This is why we have the new format; it is also faster to load and read which has sped up the generation of material screenshots in the asset manager.

Now that Gen2 uses a PBR workflow, this means that textures you previously used may not work as expected.

What we call Diffuse maps are now Albedo maps which contain just the colour information of the surface. These textures can be quite small as the Roughness adds the micro-detail to the surface which then affects where the surface is smoother or rough to have more or less reflection.
Roughness maps are monochrome textures but you can still feed most types into the system**. White means Rough and Black means glossy.**

---- >>>> More to be filled in here: <<< -----

Note: *It is good practice to use just off black colour to retain the specular streak on the surface otherwise there will be no specular dot just reflection.*

Normal Maps – Lack of display on images / BC5_SNORM conversion – Performance optimization

One awkward feature of Gen2 is the normal maps which require a special pixel format for the texture. It is known as BC5_SNORM and by using it, we gain performance over older types of normal mapping. However because of its special format, it is very difficult to use which is why we include a tool from Microsoft called **"texconv.exe"** found on the Root of the "Win32_Release" or "Win64_Release" folder.

WORKSPACE, POST FX & SSAO

Post effects are currently un-editable and we only have HDR and HBAO so far. We do have plans to add most of the effects we had before to skyline Gen2.

Workspace & Post Effects

Part of the upgrade to the latest Ogre version is that everything runs through a workspace and compositor systems. This is an editable file located in the "Data/System/Workspace" folder. From there you can change how things render and what gets rendered like post fx, render queue. We can even change our shadow qualities from here. There is no reason why you as a user cannot make and add in your own post fx into the render system. Experiment and have a play, but beware:

***Note:** We consider editing this an advanced feature and creating an error will result in the software to crash on boot.*

HBAO

As we have mentioned before, we are running a high powered HBAO which runs extremely well but can be slow of smaller systems. It does have a couple of properties to edit but they are currently not exposed. When we are finished, HBAO will be controllable to adjust how wide the line is and how dark it is.

SKY SYSTEMS

Currently the Skybox system is one of the biggest PITA parts of Skyline as for no reason, when either adding a model, creating a thumbnail for a mesh or material or setting a reflection texture; the skybox may change to a different texture or go black. We don't feel that this is an error inside the Game Engine but more an error in core rendering tech and we are finding a way to resolve this issue.

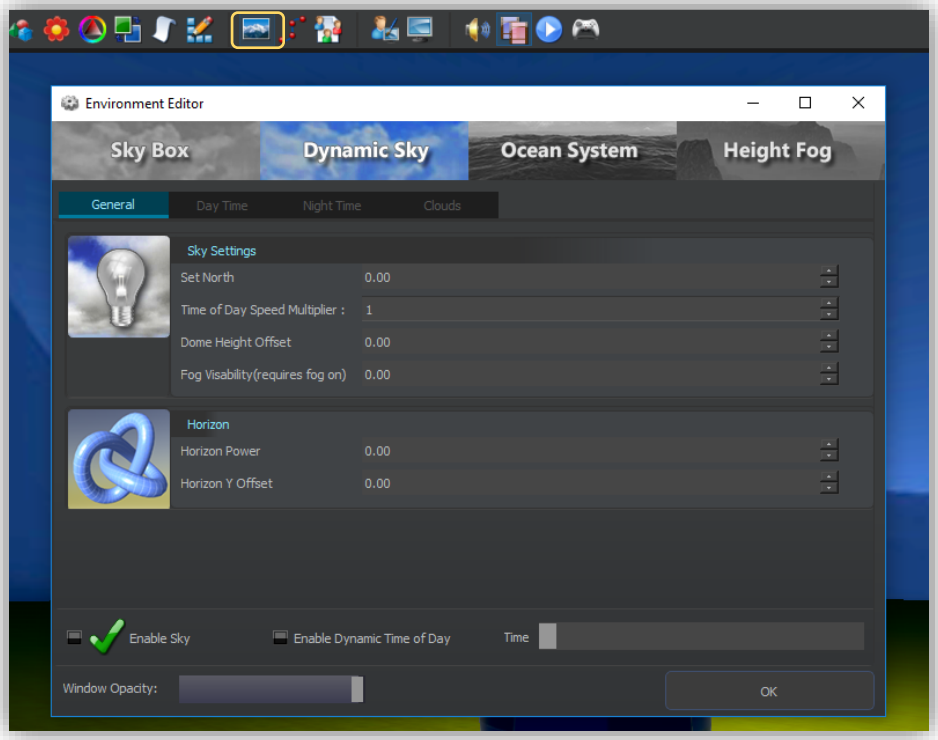
***Note:** In DX11, changing the skybox can lead to a crash.*

- Skyboxes cannot be turned off either atm, unless you edit the System Workspace by hand.

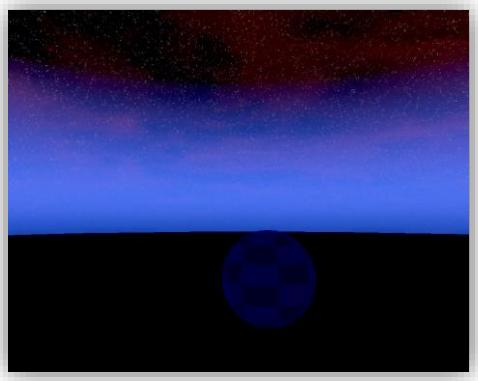
New TOD system – fast

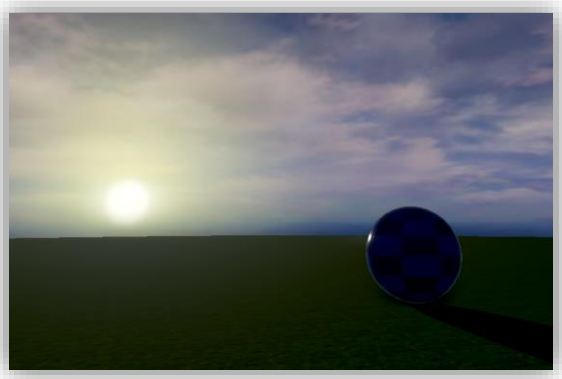
Because we moved onto a newer platform of the Ogre3D SDK, certain plugins like SkyX and Hydrax are no longer available and we cannot say when or if they will be added again. However we are creating bespoke systems to cover these bases and have already done the Time of day skybox.

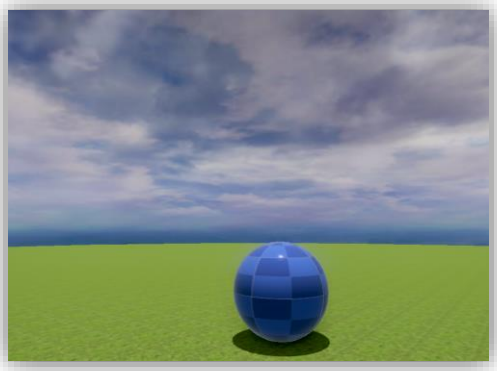
This can be activated through the "Environment editor".

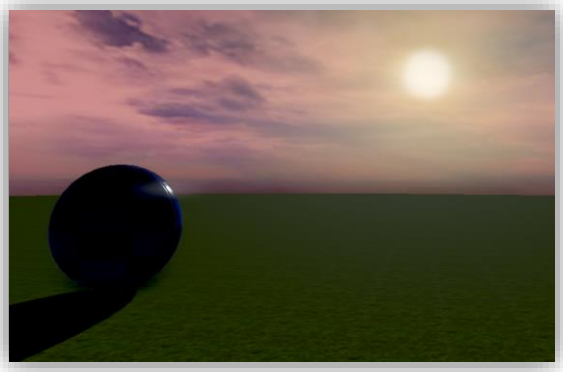


Activating the time of day should give you something like this and adjusting the slider in the editor will change the time of day:









There are plenty of properties to play with, but that will be for another tutorial.

SCENE FILE AND PRESET VERSIONS

This is a really important section and will be the difference between breaking everything you have or it working fine like normal.

Skyline Game Engine – Gen2 has new properties and we have removed other properties from the main entity system causing a system wide force upgrade of scene file and presets. Gen1 had this feature and was often used to upgrade actions from scene file to scene file as the engine was developed and increased in features.

This is just a **warning** to say that **if you do not backup your Gen1 scene files and presets** and you load them in **Gen2**, they will be **upgraded** to the latest version for working with inside Gen2.

What we recommend, is either while in alpha; create yourself a temp folder to work in. Copy all scene files and presets that you will need to use into this directory and load them from there.

If you are never going to Gen1 again, then go ahead and overwrite **but still make a backup!**

Note: *No backwards compatibility to Gen1 scene files.*

ASSET PREPARATION

Ok, here we go for the information on asset preparation compared to Gen1.

- Like scene files, if you convert a *.FBX file inside Gen2, then the mesh files exported will be Gen2 mesh files and **will NOT load inside Gen1**. We advise that if you still need to use Gen1 and those meshes, then export them inside Gen1 and use them inside Gen2.

Gen2 will auto-convert older meshes to the new format when loading without affecting the mesh file leaving Gen1 meshes to still work in that version.

Because of the new format and the PBR workflow, there may be a couple meshes that crash the engine upon loading:

- Meshes that have submeshes with no texture coordinates.
- Some mesh skeleton files.

Note: We would ask that upon receiving a crash after loading a mesh, please open the Skyline.log and copy the exception. Email us the exception and a link to the file that crashed and we will see what we can do.

The mesh editor is fully operational apart from adjusting LODS. This will be available soon though.

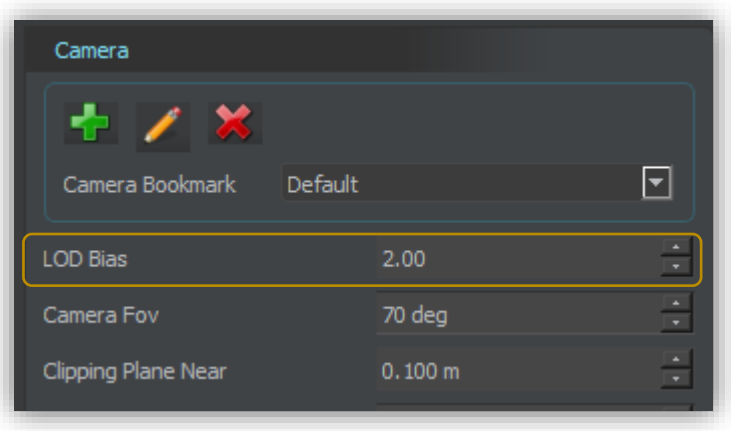
Note: *After you have saved in the mesh editor and you imported the mesh from a scene entity, reloading a skeletal mesh will crash the engine either by saving in the mesh editor or main toolbar.* ***So please SAVE your work before doing so.***

LODS (Level Of Detail)

As mentioned before that the lods are not adjustable from the mesh editor at the moment like Gen1.
But we do have a new exciting feature which is automatic level of detail. This is on by default and every mesh will generate 5 stages of lod and switch between without any work needed boosting performance in a scene by as much as 2-3x.

However, it doesn't work for every object without being able to adjust and does make some horrible lod stages so this is something that will be worked on soon. For example, a simple cube or large low poly ground may look strange at a distance.

You can adjust where the lods pop in at the level by changing the **"Camera LOD Bias"** property on the **"Scene Entity Panel".**



WHATS MISSING

Ok, onto the not so cool part. What features are still missing from skyline…..

- Terrain Editor
- Vegetation System
- Road system
- Ribbon trails and Chain Billboard meshes for the path editor and car skid marks.
- Water System
- River Editor
- Post Effects – Height fog, lightrays, dof, motion blur
- Editable Render Panel settings for SSAO and Shadows.
- Ability to turn HDR & HBAO off easily.
- Brightness, contrast, Hue etcc…
- Skeletal reloading in mesh editor
- Player & End Game

WHATS BUGS ARE KNOWN

These are some of the bugs and crashes that can happen that we are already aware of and are trying to fix in between tasks.

- Skybox error with texture changing or going black. Reload skybox to set right.
- Reload Skeletal meshes from main toolbar or mesh editor.
- Large lockups as shaders are being generated that can happen when adding extra lights that cast shadows or turning on or changing settings for. It can also happen when engaging certain textures on materials that haven't been in the scene before.
- Asset manager may crash when loading certain meshes either with or without skeletons as explained in this document elsewhere.
- Don't Load a scene file that has a terrain as it will crash at the moment.
- Tech Demos are not tested and may or may not work.
- Changing render_queue on a particle or entity may crash if it is put into the wrong mode as we haven't made it easy yet.
- Some particle universe materials may not be textured or alpha'd correctly.
- Make sure to load Default Weapons if using the older FPS System.
- Changing the property Scale on a point or spot light will not work from the property panel, please use "Gizmo axis" or "Light Range" and "Light Size"
- No "Black Knightress" model for the third person character. Preset will not load also.