Sky Studio

Developer Manual

jason@funly.io
https://funly.io

Most current copy of this document is online here.

Tutorials

Tutorial Video Series

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Other videos

- Sky Cubemap Background

You can find all Sky Studio videos, trailers, and clips on YouTube here.

Setup

Sky Studio has a simple 1-click setup wizard. Follow the below steps to setup Sky Studio in your current open scene.

Setup Steps

1. Open the scene you want to setup Sky Studio for.
2. Open Windows > Funly Sky Studio > Setup Sky.You should see a setup window like the one above.
3. Select a preset that will be used as the starting point for you sky system. We've included a number of great presets to help you get started more quickly. You can also create a new sky system based on a previous "sky profile" if you've already created one by looking under the "Your Project" section in the presets. If your unsure of which preset to pick, try out "3D/Full Day - Sunrise to Sunset" since it uses most of Sky Studios features.
4. Click "Create Sky System" button.
5. That's it, your all done! You'll see a new object in your scene called "SkySystemController" and it's configured with your new sky profile.

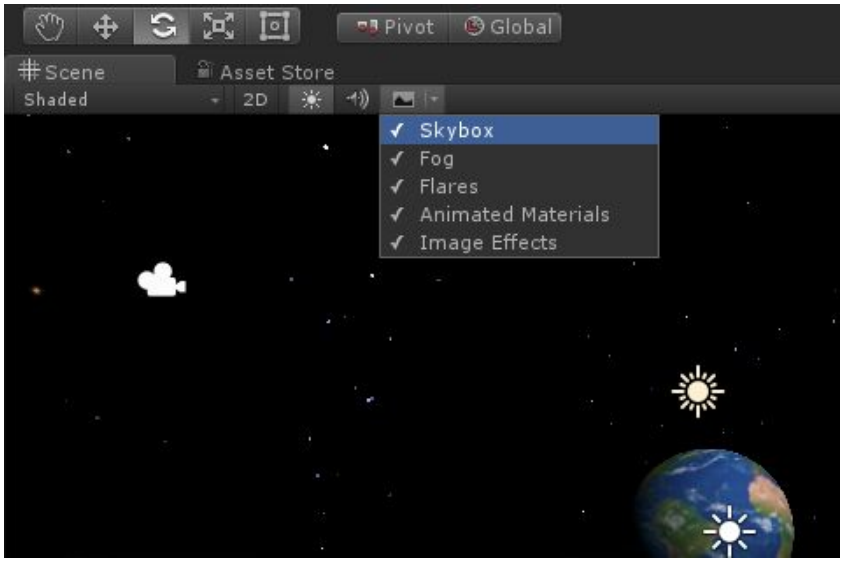
Files Generated

The setup wizard creates the necessary files for your sky system and connects them in the scene to the SkySystemController instance in your scene hierarchy. You can feel free to move these files wherever you like and rename them.

- <SceneName>SkyProfile
    - This is the sky profile for your sky system. This holds all the configuration and animation data for the sky.
- <SceneName>SkyboxMaterial
    - This material is setup with a Sky Studio supported shader. This material was assigned to the Unity skybox property in Windows > Lighting > Settings.

View Skybox in Scene

If you want to view your Skybox from inside the scene editor, make sure you've enabled this feature from the Scene window's toolbar.

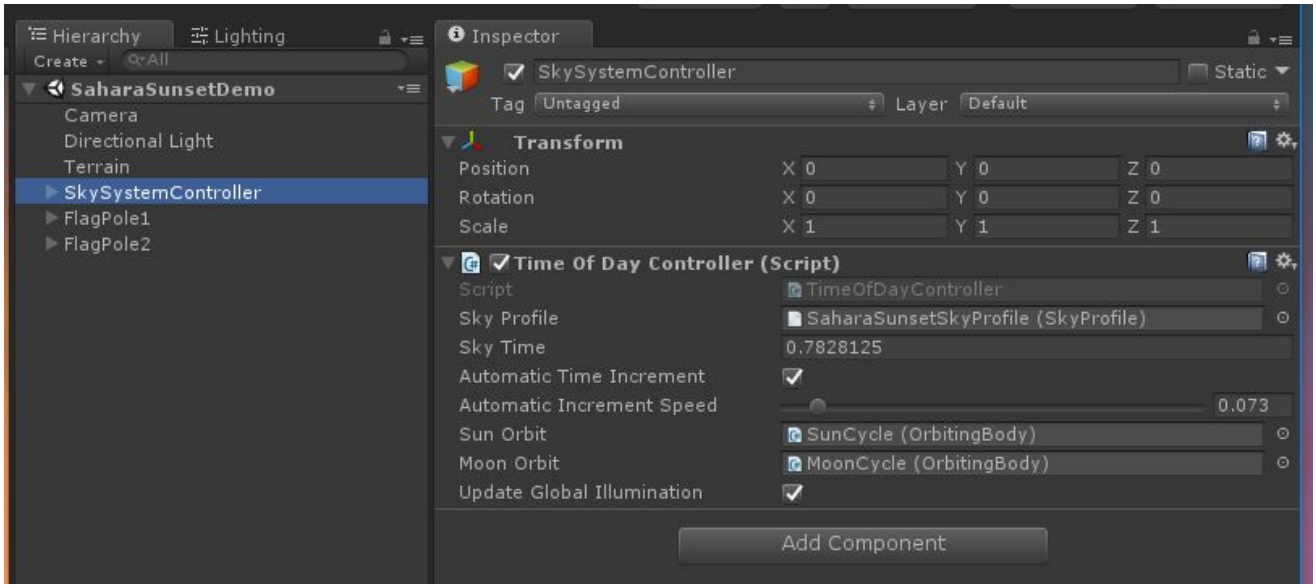

Pivot
Global
Scene
Asset Store
Shaded
2D
Skybox
Fog
Flares
Animated Materials
Image Effects

Sky System Controller

In your active scene you'll see a game object called "SkySystemController", this is the top level object that controls and manages your sky system. If you want to remove Sky Studio from your scene, all you have to do is delete this object from your hierarchy.

Time Of Day Controller - Component

This script is attached to the top level of your "SkySystemController" game object, and this is how you configure your sky system. All sky systems require a profile, or "sky profile" as we sometimes call it. The profile is what holds all your sky systems information and animation data.



Sky Profile

This is a reference to the Sky Profile that is currently being used to render the sky system.

You can change the Sky Profile at any point in time by assigning into this property. Changing the sky profile's at runtime is a powerful feature, that lets you adjust the sky based on your game play scenario. For example, you might want to change to a different sky when the player goes from inside a building to outside, or load a more ominous sky when game intensity is high.

Sky Time

Sky time shows your position in your sky full day cycles. Sky time is a floating point number that indicates both days and seconds elapsed. Think of the time as more of a percentage into your day/night cycle on the Sky Timeline. Remember, sky time has it's own concept of speed, so sky time does not relate to wall clock time. This is so you can manage the passing of time however it feels best for your game.

Here are some examples:
Sky Time: .5 - This means 50% of the first day has completed.
Sky Time 1.25 - This means 1 day has passed, and 25% through the second day.

When you build sky profiles you only create a timeline that manages 1 full day. After that day has passed, time will loop back to the beginning.

Automatic Time Increment

If enabled, the sky system will try to continuously advance the “Sky Time”. If you have any keyframes on the “Sky Timeline”, you’ll most likely want to enable automatic time incrementing so that your day smoothly continues and loops.

If disabled, the sky time will stop advancing and effectively pause. Pausing the sky time prevents the TimeOfDayController from advancing any interpolations between keyframes, but it’s important to note that many animations will still continue since what you’d expect (like clouds will keep moving, stars will keep twinkling, etc.).

Automatic Increment Speed

This determines how fast the sky profile’s timeline will advance. A lower value will make for a long day, and a higher value will make for a short day.

Sun Orbit

Reference to the controller that’s managing the sun’s position in the sky.

Moon Orbit

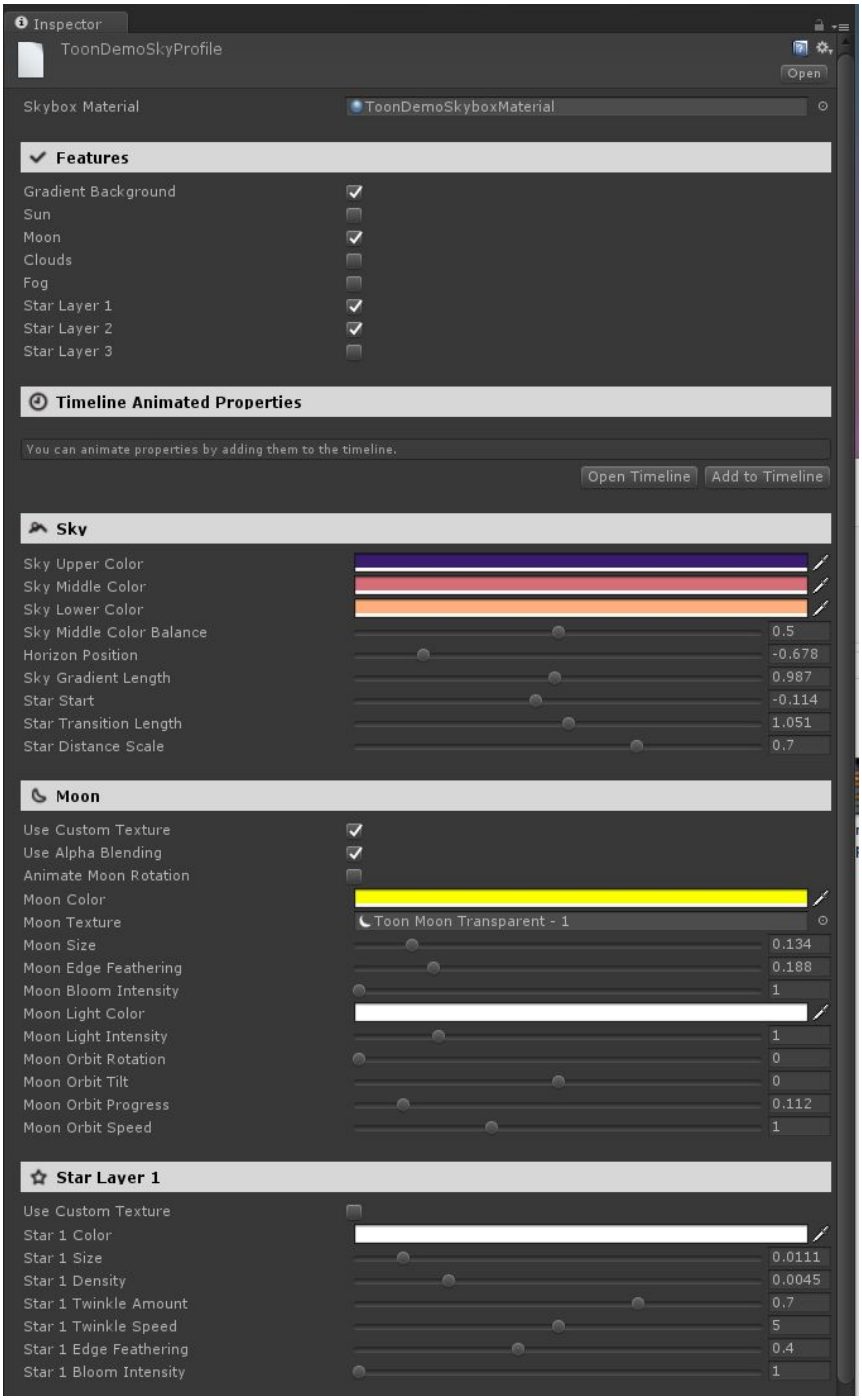
Reference to the controller that’s managing the moon’s position in the sky.

Update Global Illumination

If enabled, the TimeOfDayController will ask Unity to update the dynamic global illumination every time the sky changes. This feature can be very expensive and isn’t recommended for mobile or low end devices.

Sky Profile

The sky profile is in charge of holding all your sky system configuration data. This file is what you customize for your game, and connect to the the TimeOfDayController located on the SkySystemController in your current scene. Below is an example of what part of Sky Profile looks like.



Sky Properties

Below is a breakdown of all the properties that exist in the Sky Profile. They are organized by the sections just like you see them above in the Unity Editor.

Features Section

This is where you enabled the features you'll want to use in your sky system. The less features you enable, the faster the sky system will render. Our shader is a fast single pass shader, and these checkboxes help us compile in/out code for features you want to use. Always disable checkboxes for features your not using.

- Gradient Background
    - If enabled, skybox shows a 3-way gradient with upper, middle, and lower sky colors from Sky section.
    - If disabled, skybox shows a custom cubemap background you must supply in the Sky section.
- Sun
    - If enabled, the skybox renders a sun, and a Sun section will appear.
- Moon
    - If enabled, the skybox renders a moon, and a Moon section will appear.
- Clouds
    - If enabled, the skybox renders clouds, and a Cloud section will appear.
- Fog
    - If enabled, the skybox renders fog, and a Fog section will appear.
- Star Layer 1, 2, and 3
    - If enabled, a star layer will be rendered, and a Star Layer section will be created.

Timeline Animated Properties Section

This shows a list of properties that cannot be edited directly from the sky profile, because the value is managed on the Sky Timeline. The Sky Timeline allows you to create unlimited keyframe animation transitions and Sky Studio will interpolate between those values. This is how you create things like day/night cycles or background color gradients that change colors. Any properties added to the Sky TImeline will also show a message in place of their value control to help you understand where to edit things. See example below:

Sky Section

Sky section lets you control the general properties about the sky, like the colors and horizon position.

- Sky Upper Color
    - Top color of the 3-way gradient when gradient is enabled.
- Sky Middle Color
    - Middle color of the 3-way gradient when gradient is enabled.
- Sky Lower Color
    - Lower color of the 3-way gradient when gradient is enabled.
- Sky Middle Color Balance
    - This allows you adjust the position of the middle color in the 3-way gradient. Moving the value lower, makes the middle color closer to the lower color. Moving the value higher, makes the middle color closer to the upper color. Having this value at .5, means the middle color is exactly in between the upper and middle colors.
- Horizon Position
    - This moves the location of the horizon in the skybox upwards or downwards. This is useful for aligning the sky with your custom terrains.
- Sky Gradient Length
    - This makes the 3-way gradient larger or smaller. A short transition means that the gradient is compressed, and a larger transition extends the gradient higher into the skybox.
- Star Start
    - This controls the point in the skybox where stars will begin to fade in at. This allows you to keep stars above a certain height in the skybox.
- Star Transition Length
    - This controls an alpha fade-in for stars that begins at the Star Start point.

- Star Distance Scale
    - This applies a scale factor to shrink stars that are closer to the horizon. Typically you want stars to look a bit smaller towards to horizon to appear farther away or more faint. A value of .7 usually looks best.

Clouds

The clouds section controls the appearance of clouds.

- Cloud Noise Texture
    - Clouds are rendered based on animating a noise textures RGB channels. We supply a few example noise textures inside the "FunlySkyStudio/Textures/Clouds" directory. You can also create your own in photoshop if you there's a certain texture or pattern your trying to achieve. Our recommended cloud texture is "CloudNoiseBasic".
- Cloud Density
    - Controls how thick the cloud coverage is. Increase this value will start blocking out the background sky. Lowering this value will decrease cloud visibility and can be use to hide clouds.
- Cloud Speed
    - Speed at which the clouds appear to be blowing around.
- Cloud Direction
    - This value is determines the direction of the wind that's blowing the clouds around. The value is between 0 and 2PI in radians.
- Cloud Height
    - Adjusts the height, or altitude, of the clouds.
- Color 1
    - Primary color of the clouds. Typically white.
- Color 2
    - Secondary color of the clouds. Typically light gray.
- Cloud Fade-Out DIstance
    - Control the distance from the center of skybox that clouds will begin fading out at. The amount of fade out is determined by the Cloud Fade-Out Amount.
- Cloud Fade-Out Amount
    - Controls how much the clouds will fade out to towards the horizon. Having a value of 0, means that the clouds shouldn't fade out at all (this typically doesn't look good and causes warping at the horizon). A value of 1, means the clouds should completely fade out and disappear when they reach the horizon. A high value (>.8) typically looks best.

Fog

Sky Studio has its own version of fog that's blended into the skybox at the horizon position. This value is not the same as the fog used in Unity Lighting settings. We have our own fog so we can control the appearance, performance, and how it blends with our layers.

- Fog Color
    - Color of the fog.
- Fog Density
    - This control how visible the fog is. A lower value will make the fog partly transparent, and a high value will hide the sky background.
- Fog Height
    - This controls how high the fog reaches upwards into the skybox.

Sun Section

Sun section controls the appearance of the sun if enabled in the feature section.

- Use Custom Texture
    - If enabled, you can specify your own custom texture to use for the sun. By default, Sky Studio assumes this is an additive image (meaning that the transparent areas should be black). If you want to use a transparent image, make sure to enable “Use Alpha Blending” option.
- Custom Texture Is Sprite Sheet Animation
    - If enabled, your indicating to Sky Studio that the texture you’ve supplied should be treated as an animation flip book of images. When this is enabled more options will appear to allow you to specify the layout of your sprite sheet and the animation speed in frames per second to advanced between images. More information on sprite sheet animations can be found here.
- Sun Sprite Rows
    - If custom sprite sheet is enabled, this is the number of rows in your sprite sheet image.
- Sun Sprite Columns
    - If custom sprite sheet is enabled, this is the number of columns in your sprite sheet image.
- Sprite Sheet Item Count
    - If custom sprite sheet is enabled, this is the number of sub-image tiles in your sprite sheet. If your using all the space on your sprite sheet this would be “rows * columns”.
- Use Alpha Blending
    - By default, Sky Studio assumes custom images are in additive format (meaning that the transparent areas are black). If you have a traditional alpha transparent image, enable this checkbox to turn on alpha blending instead.
- Animate Sun Rotation
    - If enabled, this turns on some features to rotate the sun texture as a rotation. This looks great for cartoon style suns that should rotate.
- Sun Color
    - Tint color of the sun. If you’re using a custom texture, this color will be multiplied against the texture color.

- Sun Texture
    - If your using a custom texture, this is where you assign your custom image. Make sure your image is in additive format, unless you have enabled alpha blending.
- Sun Rotation Speed
    - If Animate Sun Rotation is enabled, this will control the speed at which the sun will rotate at.
- Sun Size
    - The size of the sun in the skybox.
- Sun Edge Feathering
    - The length of the alpha fade-in from the edges of the star towards the center point. You can use this to soften the edges of your textures (only looks good on circular textures for sun/moon/etc.). You can also use this without a texture to create a soft edge blurred sun in the sky.
- Sun Bloom Intensity
    - This value will be multiplied against the final sun color to intensify it, allowing you to create brighter colors to help bloom filters glow more easily.
- Sun Light Color
    - The color of the directional light that is shining from the direction of the sun.
- Sun Light Intensity
    - The intensity for the directional light that's shining from the direction of the sun.
- Sun Orbit Position
    - Position of the sun in horizontal and vertical equatorial coordinates. To make positioning easy, you can point-click in the scene editor to position the sun visually.

Moon Section

Moon section controls the appearance of the moon if enabled in the feature section.

- Use Custom Texture
    - If enabled, you can specify your own custom texture to use for the moon. By default, Sky Studio assumes this is an additive image (meaning that the transparent areas should be black). If you want to use a transparent image, make sure to enable "Use Alpha Blending" option.
- Custom Texture Is Sprite Sheet Animation
    - If enabled, your indicating to Sky Studio that the texture you've supplied should be treated as an animation flip book of images. When this is enabled more options will appear to allow you to specify the layout of your sprite sheet and the animation speed in frames per second to advanced between images. More information on sprite sheet animations can be found here.
- Moon Sprite Rows
    - If custom sprite sheet is enabled, this is the number of rows in your sprite sheet image.

- Moon Sprite Columns
    - If custom sprite sheet is enabled, this is the number of columns in your sprite sheet image.
- Sprite Sheet Item Count
    - If custom sprite sheet is enabled, this is the number of sub-image tiles in your sprite sheet. If your using all the space on your sprite sheet this would be “rows * columns”.
- Use Alpha Blending
    - By default, Sky Studio assumes custom images are in additive format (meaning that the transparent areas are black). If you have a traditional alpha transparent image, enable this checkbox to turn on alpha blending instead.
- Animate Moon Rotation
    - If enabled, this turns on some features to rotate the moon texture as a rotation. This looks great for cartoon style moons that should rotate.
- Moon Color
    - Tint color of the moon. If you’re using a custom texture, this color will be multiplied against the texture color.
- Moon Texture
    - If your using a custom texture, this is where you assign your custom image. Make sure your image is in additive format, unless you have enabled alpha blending.
- Moon Rotation Speed
    - If Animate Moon Rotation is enabled, this will control the speed at which the moon will rotate at.
- Moon Size
    - The size of the moon in the skybox.
- Moon Edge Feathering
    - The length of the alpha fade-in from the edges of the star towards the center point. You can use this to soften the edges of your textures (only looks good on circular textures for moon/moon/etc.). You can also use this without a texture to create a soft edge blurred moon in the sky.
- Moon Bloom Intensity
    - This value will be multiplied against the final moon color to intensify it, allowing you to create brighter colors to help bloom filters glow more easily.
- Moon Light Color
    - The color of the directional light that is shining from the direction of the moon.
- Moon Light Intensity
    - The intensity for the directional light that’s shining from the direction of the moon.
- Moon Orbit Rotation
    - Rotates the moon around the skybox. This rotates the entire orbit path of the moon.
- Moon Orbit Position

    - Position of the moon in horizontal and vertical equatorial coordinates. To make positioning easy, you can point-click in the scene editor to position the moon visually.

Star Layer 1, 2, and 3

The star layer controlls 1 layer of stars and how they look. You can have up to 3 different layers of stars with different configurations. Stars will not overlap other stars in their own layer, however they may additively blend and overlap with stars from other star layers.

- Use Custom Texture
    - If enabled, it reveals an property to let you assign a custom image. Currently we only support additive images for star textures. An additive texture should be black where you want transparent, and white where you want the visible portions.
- Custom Texture Is Sprite Sheet Animation
    - If enabled, your indicating to Sky Studio that the texture you've supplied should be treated as an animation flip book of images. When this is enabled more options will appear to allow you to specify the layout of your sprite sheet and the animation speed in frames per second to advanced between images. More information on sprite sheet animations can be found here.
- Star Sprite Rows
    - If custom sprite sheet is enabled, this is the number of rows in your sprite sheet image.
- Star Sprite Columns
    - If custom sprite sheet is enabled, this is the number of columns in your sprite sheet image.
- Sprite Sheet Item Count
    - If custom sprite sheet is enabled, this is the number of sub-image tiles in your sprite sheet. If your using all the space on your sprite sheet this would be "rows * columns".
- Star Color
    - Tint color for the star. If your using a custom image, this color will be multiplied against the texture color.
- Star Size
    - Size of the stars. Typically you'll want your stars to be pretty small to look realistic. If your doing a cartoon sky with big stars, make sure the star density is low to help reduce overlapping of stars.
- Star Density
    - Density controls the number of stars in the sky. Currently density is the only property you can't animate on the Sky Timeline (or adjust at runtime) due to the computational complexity that it takes when the value is modified. Since Sky Studio precomputes star positions you can't modify density at runtime, but the up side is that sky studio is significantly faster as a result of this pre-computation (even on mobile!). However, fear not, you can achieve a similar effect by

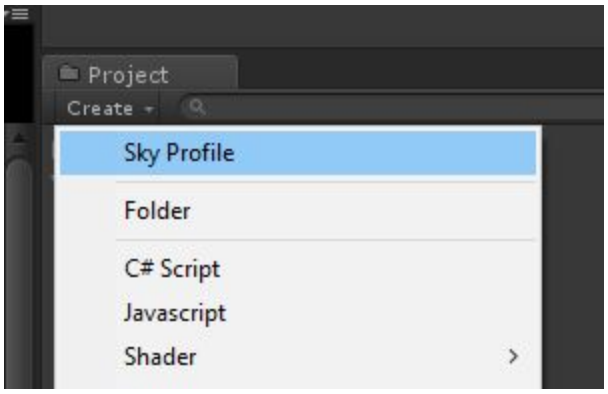
animating the Sky Size to create the appearance of stars fade-ing in/out for sunrise and sunsets.

- Star Twinkle Amount
    - The percentage amount a stars alpha will be faded to create a twinkle appearace (fading in-and-out). A value of 0, means the star will not twinkle, meaning it will stay completely visible with an alpha value of 1. A value of 1, or full twinkle, means the star will animate between being completely transparent, to completely visible.
- Star Twinkle Speed
    - The speed at which a star twinkles at.
- Star Edge Feathering
    - The amount of alpha fade-in from the edges towards the center of the star. You can use this to smooth the edges of the star and reduce hard lines creating softer stars.
- Star Bloom Intensity
    - This value will be multiplied against the final star color to help intensify color values. This is useful when your using bloom filters to help stars glow.

How to Manually Create Sky Profiles

When you use the setup wizard, a sky profile will automatically be created for you and placed into your project folder as <SceneName>SkyProfile.

However, you can also manually create your own sky profiles if you'd like to start from scratch.



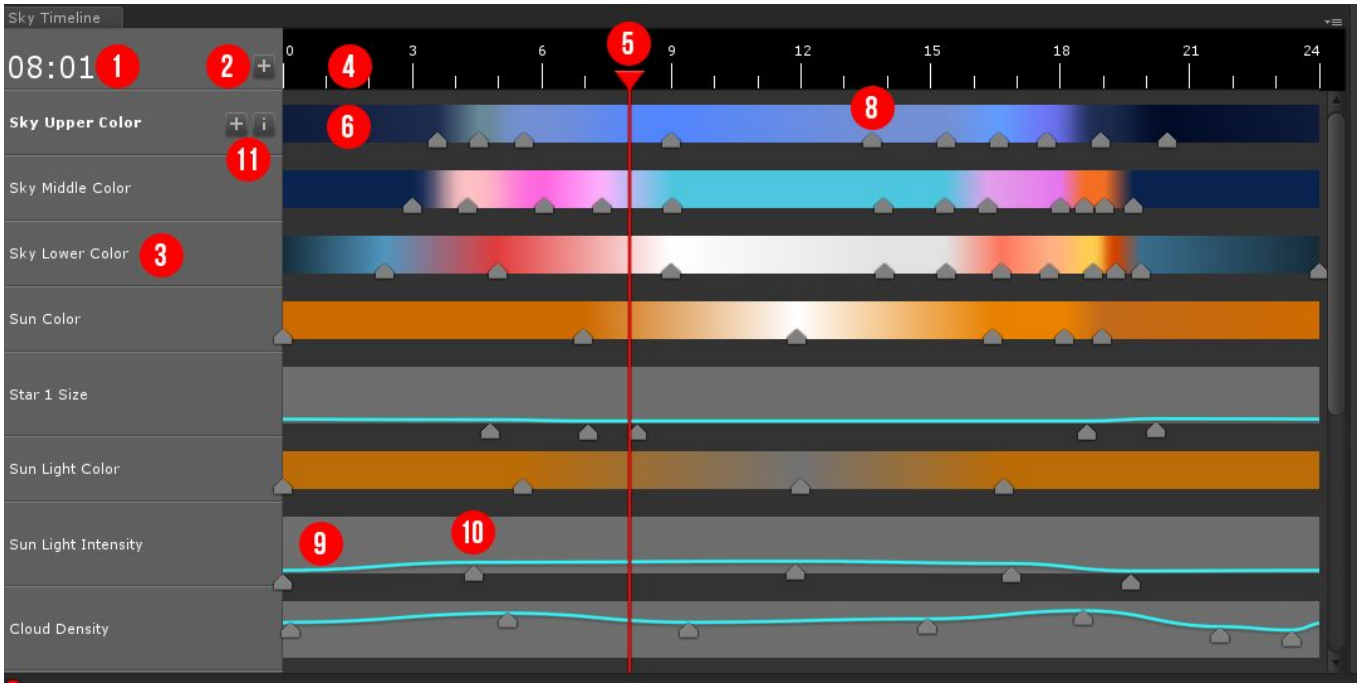
1. In your project window click "Create > Sky Profile".
2. Create a new material for the skybox shader, "Create > Material"
3. Set the shader on your new material to "Funly/Sky Studio/Skybox/3D Standard"
4. On your new sky profile, connect the material reference to the skybox you just created.
5. Assign your new sky profile to the TimeOfDayController in the scene.

Sky Timeline Window

The Sky Timeline is where you create animations and day/night cycles. You can control the value for 60+ properties that exist in the Sky Profile and change their values for different times of the day. For example, you might want to set the size of stars to 0 during the day, then animate their size up during nightfall. Similarly, you might want to set the sky to blue during the day, but then animate between a a few different colors during sunset.

User Interface Overview

Here's a screenshot of an example Sky Timeline that we've annotated below.



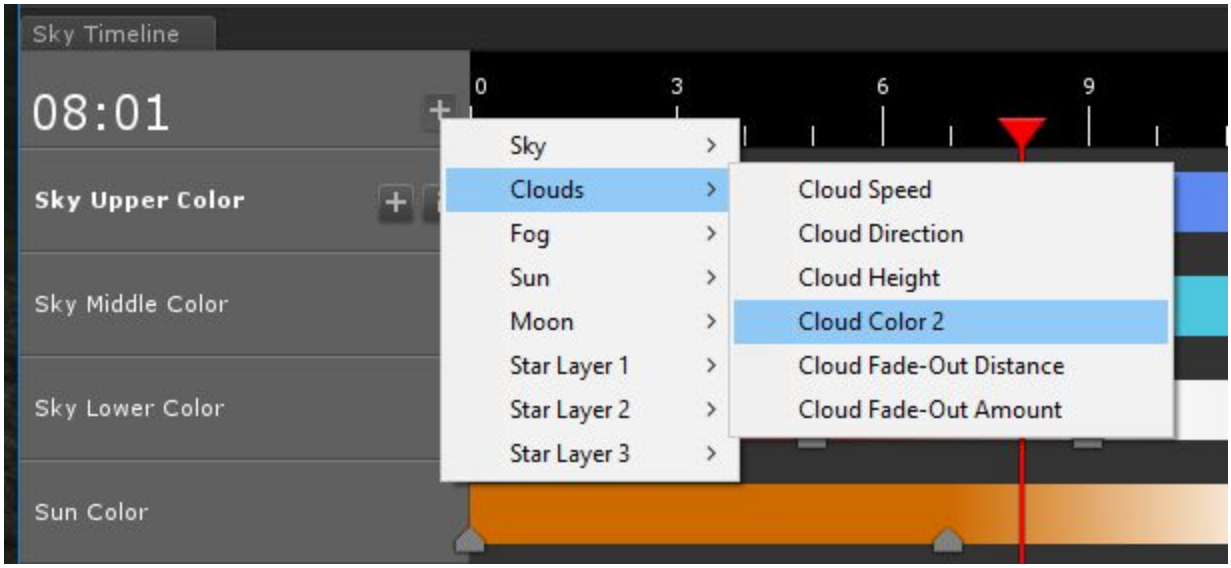
1. Time of day that the red time cursor (5) is positioned at. The time is in a 24 hour format. The current example image shows it's 8:01am.
2. Button to add a property onto the Sky Timeline. When you click this, you'll see a menu that shows you all the available properties that can be added. If a property is already on the Sky TImeline, it will not be shown in this menu. When a property is added the the timeline, you can no longer edit the value from the Sky Profile, and there will be a message "*Managed On Timeline*" in place of it's value.
3. Name of the property row. This example shows the row dedicated to managing the sky's lower color.

4. Time ruler. This shows a notch for every hour of the day to make it easier to see where your day/night values are positioned. In this example the the red time cursor(5) is positioned at roughly 8am, or the eighth hour notch.
5. Time cursor. This shows the current position of the sky system. When you click and drag on the time ruler, or empty areas of the timeline, this will update the sky system to render the values for that point in time. This cursor indicates the current sky time.
6. Color gradient bar. The gradient color bar is shown for all sky properties that have a color value. You can can visualize how the color changes throughout the day, and add/remove/reorder keyframe positions to control the colors.
7. Oops, looks like I skipped 7 when numbering! Just ignore this please.
8. Color Keyframe. This symbol indicates there is a color value set at this point, also referred to as a keyframe. You can click-and-drag the keyframe left or right to reposition it, or single click it to view the keyframe inspector and change its color. You can insert new keyframes by clicking the “+” button over the property group name in the left column (11), and it inserts a keyframe at the current time cursor position (5). If the keyframe inspector is open, the keyframe that’s actively being edited will appear as a lighter color than the rest.
9. Number line bar. A number line is shown for any property that has a numeric value. This graph let’s you position keyframe values anywhere between the minimum and maximum value range throughout the day. The bottom of the row indicates the minimum value, and the highest position indicates the maximum value.
10. Numeric Keyframe. Numeric keyframes indicate that a value position is set at a certain point in time. Moving the keyframe left/right adjust the time position for the value, and moving the keyframe up/down adjusts it’s value between the minimum and maximum value allowed for that property.
11. Property Actions
    a. “+” Button. This button allows you insert a new keyframe at the current time cursor position (5). This is how you create new keyframe values.
    b. “I” Button. This opens up the information window to tell you more about a group if your unsure what it’s value controls. You can also mouse over the title of a property to see this information as a tooltip.

Adding Properties to the Timeline

You can add properties to the timeline either from the Sky Timeline window, or from the Sky Profile inspector.

To add properties from the Sky Timeline, click the “+” button at the top left hand corner. This will reveal a menu and you can select the property to add to the timeline. See image below.



Removing Properties from the Timeline

You can remove a property from the timeline from the Sky Profile section “Timeline Managed Properties”. In the list of properties managed, click the “-” (minus) button to remove it. This will delete any keyframes that might have been created, and you can manage the single value in the Sky Profile.

Adding New Keyframes

You insert new keyframes from the Sky Timeline window.

1. Select the group you want to add a keyframe into. The active group will be bolded.
2. Move the time cursor to the position you want the new keyframe to be inserted at.
3. Click the “+” button next to the group property name.
4. Done, the new keyframe will be inserted and you can single click it to edit it’s values.

Deleting Keyframes

To delete a keyframe single click the keyframe to open the Keyframe Inspector window. Inside that window, click the “Delete Keyframe” button.

Performance Tips

To hit 60 FPS on lower end hardware, like mobile phones, you should disable any real-time lights in the scene and using all baked lighting. You can easily disable realtime lighting in “Windows > Lighting > Settings” and unchecking “Realtime Global Illumination”.

If your on low-end hardware, like mobile, you should also uncheck “Update Global Illumination” on your SkySystemController if it’s enabled.