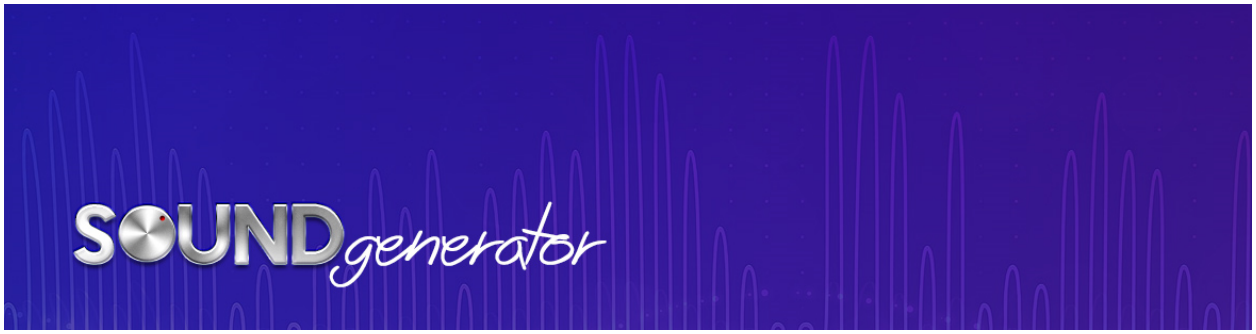


Sound Generator for Unity

Full support for Unity as well as Unity Pro on all platforms.

You can find Sound Generator in the Unity Asset Store here[1].

There is also a channel on YouTube.

For any queries you can Contact Support by email at:
sound-generator@darkarts.zendesk.com
Be sure to include your invoice number as proof of purchase.

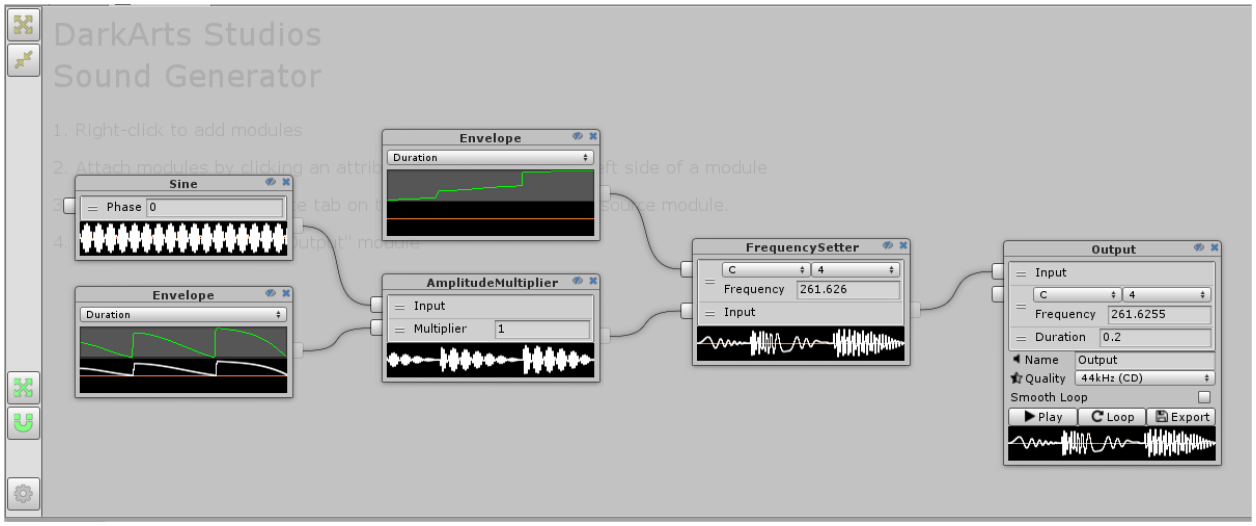
[1]Sound Generator in the Unity Asset Store: http://u3d.as/5AX

Table of contents

2.0.0

Introduction

Sound Generator by DarkArts Studios is a software audio synthesiser for Unity. Using Sound Generator you will be able to create your own sounds for your games or even manipulate existing sound files using the Sound Generator filters to create fresh and different sounds based on your originals.



You can view the demo scenes which ship with Sound Generator built for the Unity Web Player online at the following locations:

- Compositions, a simple demo of a few sound compositions shown in a menu. This scene also acts as an example on how to get the Sound Generator scene load progress feedback for display within your game at load time.
- Simple Platformer, a basic playable platform game prototype including a prefab which gets reused.
- Sci-Fi, a small view-only scene which shows several sounds including a looping siren.

Features

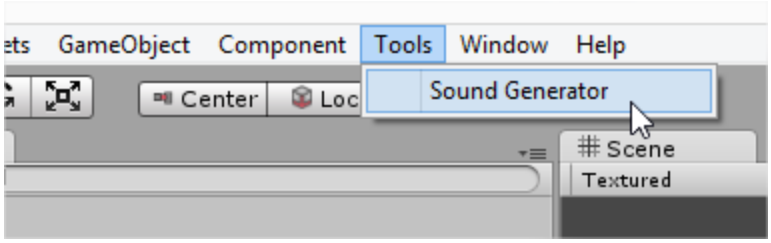
- Create your own sounds for your game within the Unity Editor.
- Easy and intuitive interface, you don't have to be a sound engineer to create sound.
- 100% procedurally generated audio:
    - Near zero size overhead for each sound effect, your games will be smaller.
    - No stored audio, no WAV files, no OGGs, no MP3s and **no MP3 licences fees**.
- Open Architecture:
    - Create your own modules.
    - Generate new sound effects even at runtime, in-game.
    - Supports C# and UnityScript(JavaScript).
- Zero runtime performance impact, sounds are pre-generated during scene load, from then onwards you're simply using Unity AudioClips.
- Easily export any generated sounds to WAV files for use anywhere else.
- Create sound prefabs for (re)use as template sounds or filters within other Sound Generator compositions.

Creating Compositions and basic intro to the user interface

There are three ways to create or add a Sound Generator Composition to your game.

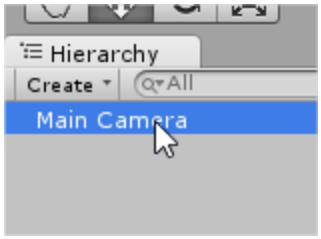
Adding a Composition to an existing GameObject

First, open the Composition window. This can be done from the main Unity menu by selecting *Tools* and then clicking on *Sound Generator*.



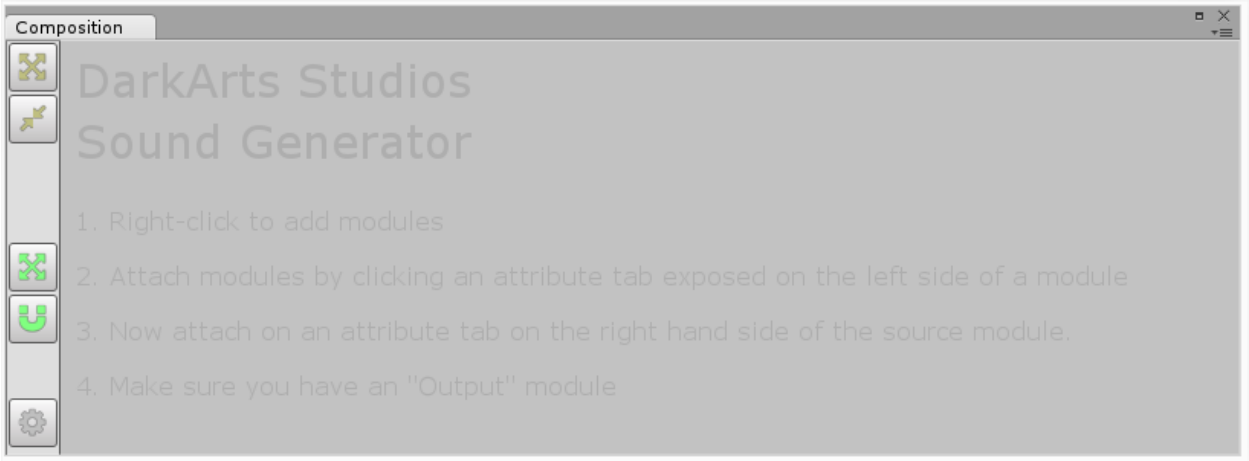
You will now be able to view any compositions. All your Sound Generator work will be done within this window which should look something like this:

Now select any GameObject within the Hierarchy view, for example:



Once a GameObject is selected is an option to add a Composition to that GameObject in the Sound Generator Composition window:

Click the *Add a Sound Generator Composition to this GameObject* button and a Composition Component[2] will be added to your GameObject allowing you to begin editing and creating a sound. The composition window will change and will now look like this:

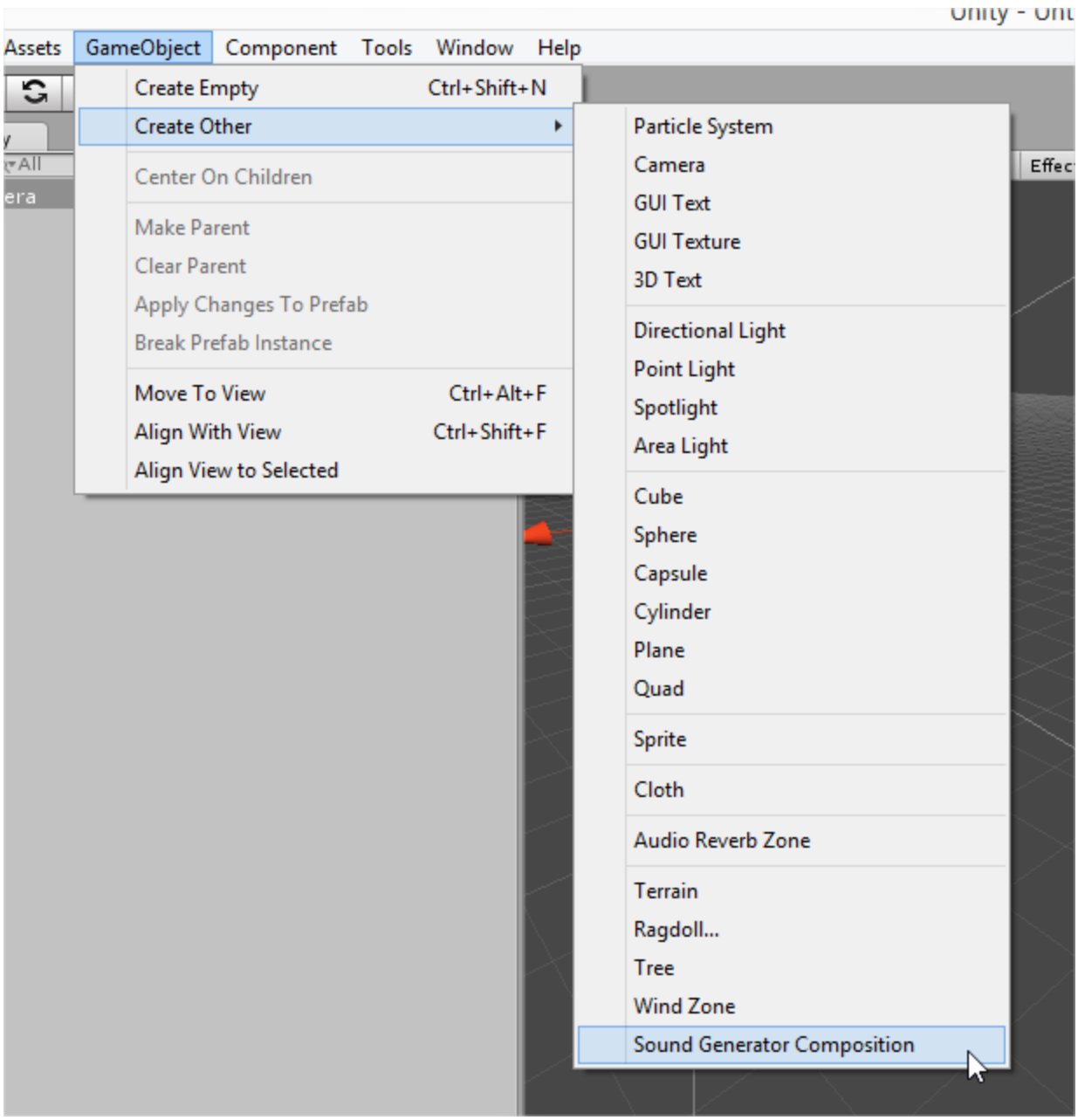


At this point you can simply follow the instructions in faded-out text in the background to create your first sound.

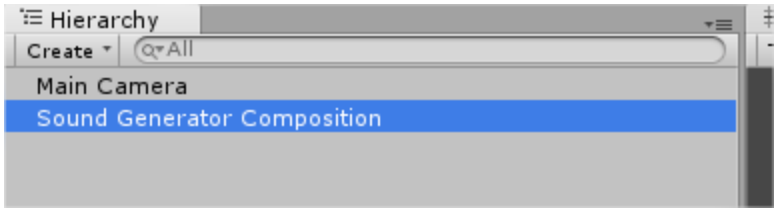
Creating a new, empty, in-scene composition

From the main Unity menu select *GameObject*, then within the presented submenu select *Create Other* and then within that submenu click *Sound Generator Composition*.

[2] This is an actual Unity GameObject Component, also accessible via the *Add Component* menu and viewable as a Component within your normal GameObject inspector.



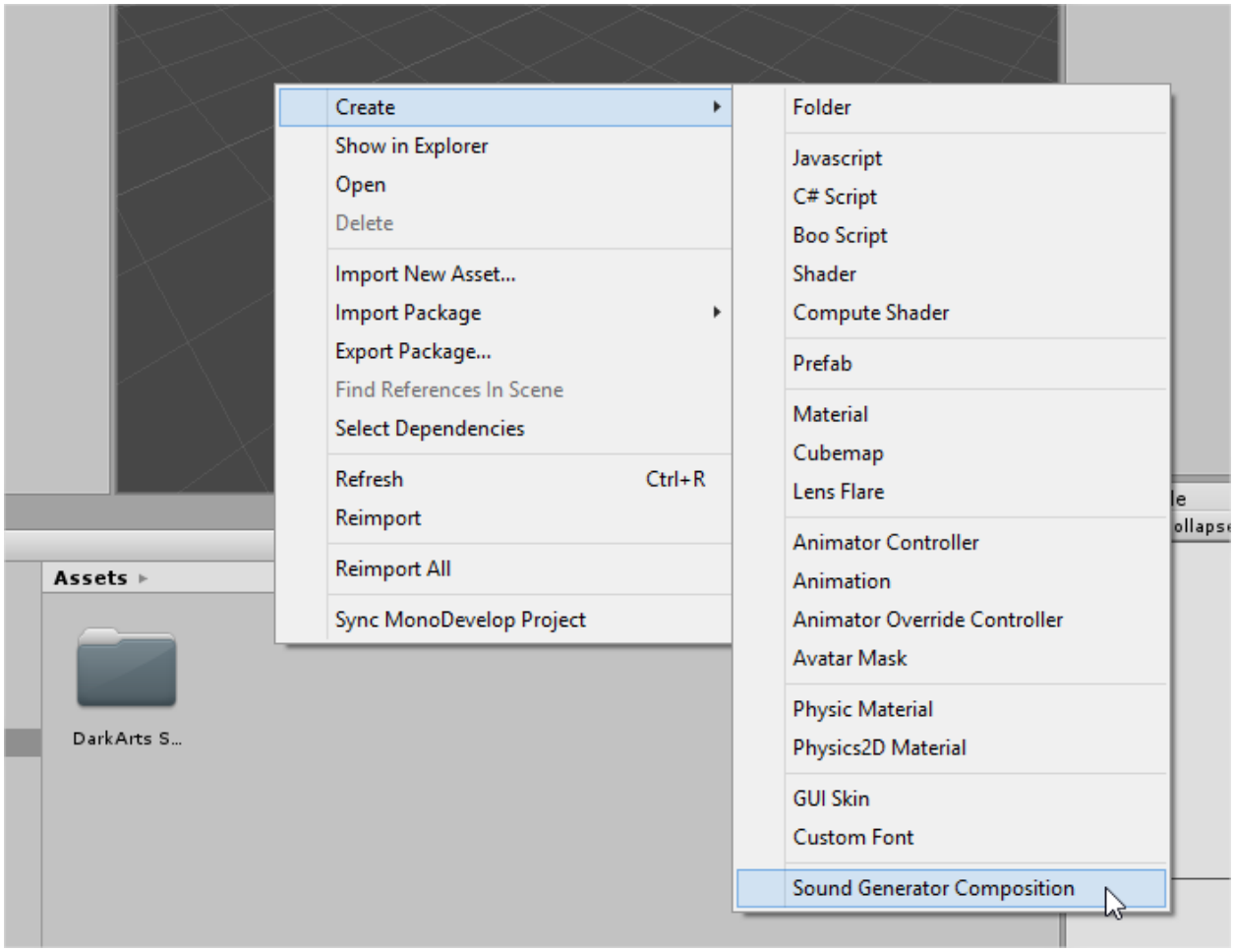
A new Sound Generator Composition GameObject will be added in your Hierarchy View as follows:



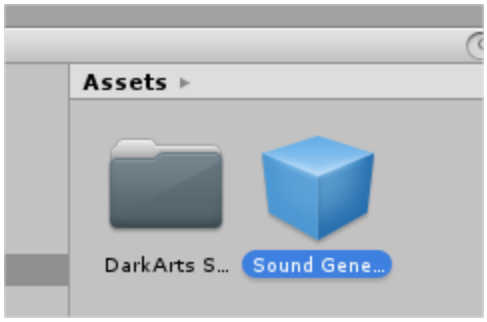
You can now rename this GameObject as you would any GameObject as well as edit it within the Sound Generator window.

Creating a new, empty, prefab composition

If you would like to create a reusable Sound Generator Composition you have two options. First, you can create it within the scene view as you would any other GameObject and then simply drag it into the asset folder as you would with creation of any other prefabs. Second, you can create it as a prefab to begin with and edit it from there by right clicking within your Project view, selecting *Create* and then clicking on *Sound Generator Composition* within the presented submenu.



A prefab will be created as follows:



You can now rename this as usual and edit it as you would any other Sound Generator Composition within the Sound Generator Composition window. This prefab can then be dragged into any scene for reuse or even dragged into a composition module within another composition as a small part of a larger audio composition.

The user interface

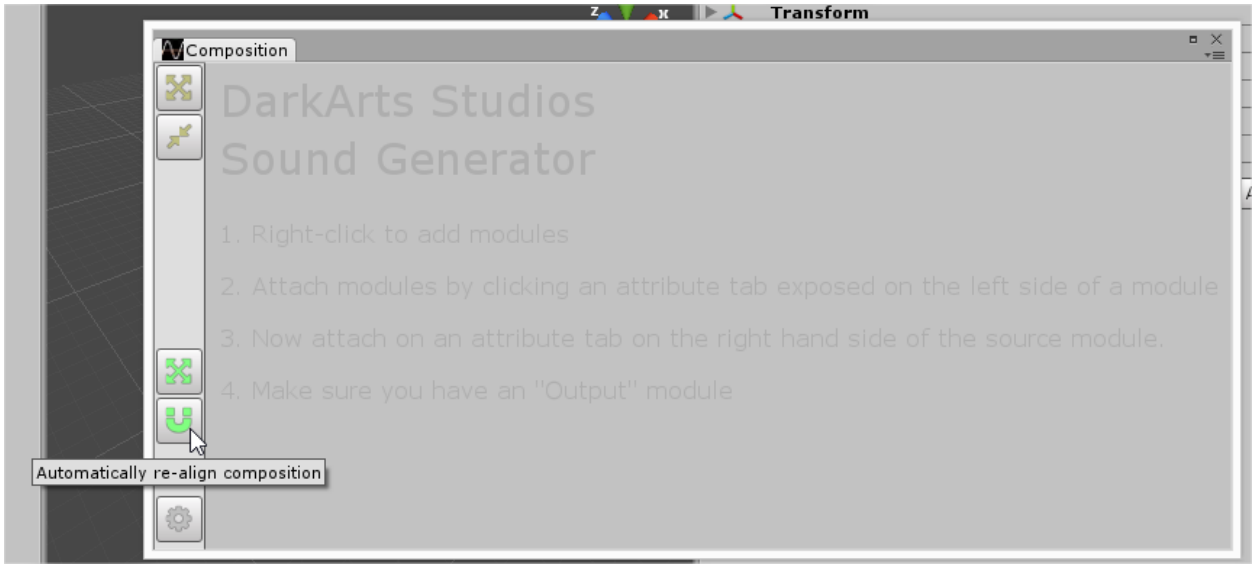
The Sound Generator user interface is limited to the Sound Generator Composition Window.

Mouse Controls

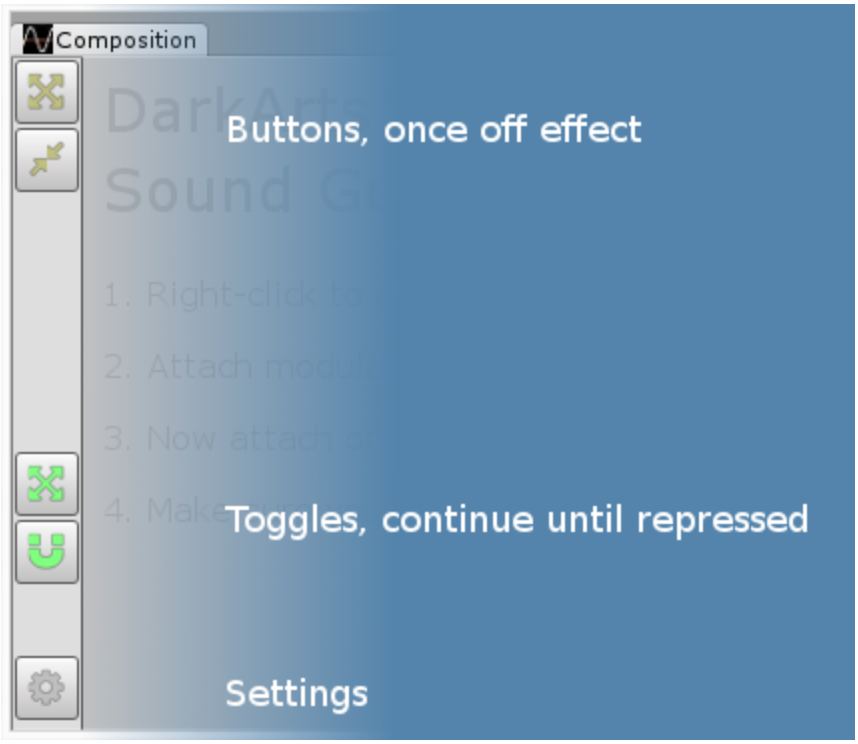
- Zooming: Use your mouse scroll wheel to zoom in and out of your composition.
- Moving the entire Composition: You can move your composition by middle, or left clicking, anywhere in the background and dragging your mouse around.
- Moving an individual Module: You can move any module by left clicking on it, and dragging it to its new position.

Composition Window Icons

There is a column of icons on the left which make viewing your Composition simpler. Most of them are about your view of the Composition and aligning the Composition better within the Composition window. Each of these icons give a description of their functionality if you hover your mouse cursor over them:

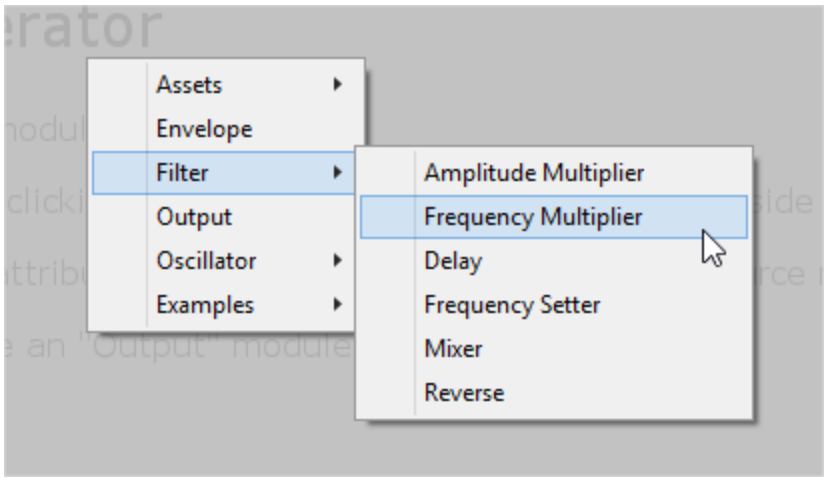


The Icons are split into three distinct sections and separated by colour as well as position:

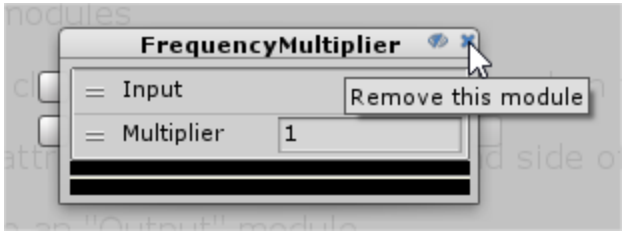


Adding, removing and viewing modules

Right clicking within the Sound Generator Composition window will allow you to add Modules:



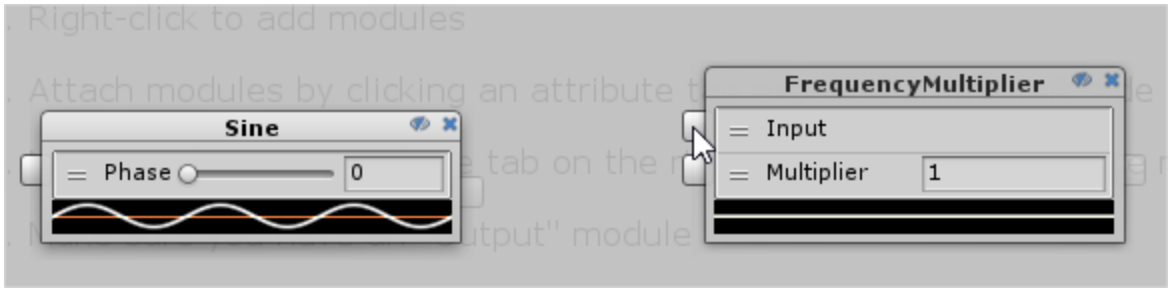
Once you have added a module, there are two small blue icons in the top right of the module. These allow you to either remove the module:



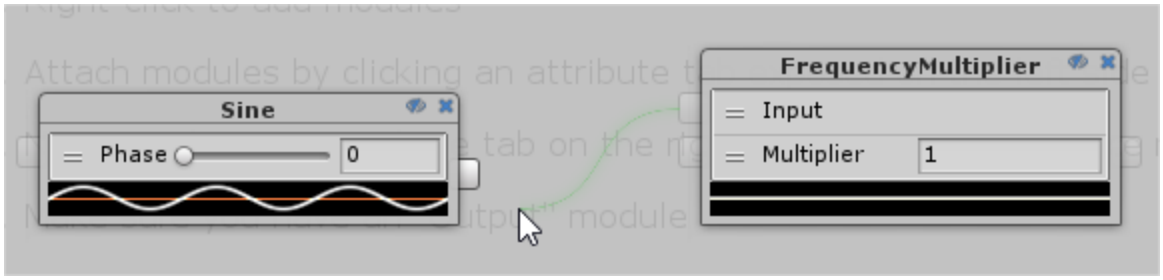
Or let you toggle the dark preview area at the bottom of the module:

Attaching two modules

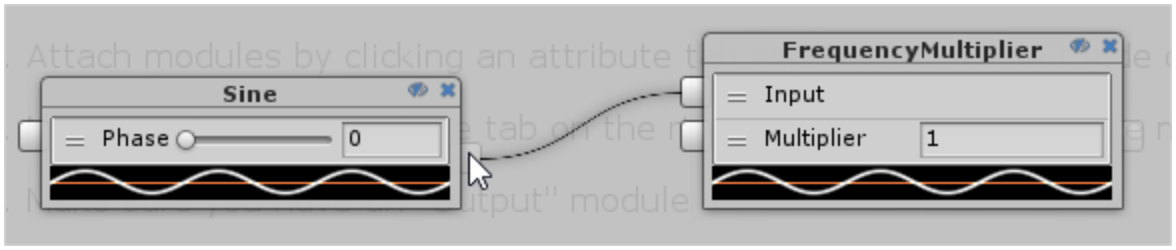
Attaching Modules is done by clicking on an exposed non-greyed-out tab on the side face of a module:



Once clicked, a visible connection curve will be displayed:



You will notice that some of the exposed tabs are now greyed out, and those that were previously greyed out are not greyed out anymore. You can then click on an exposed non-greyed-out tab to attach the two modules:

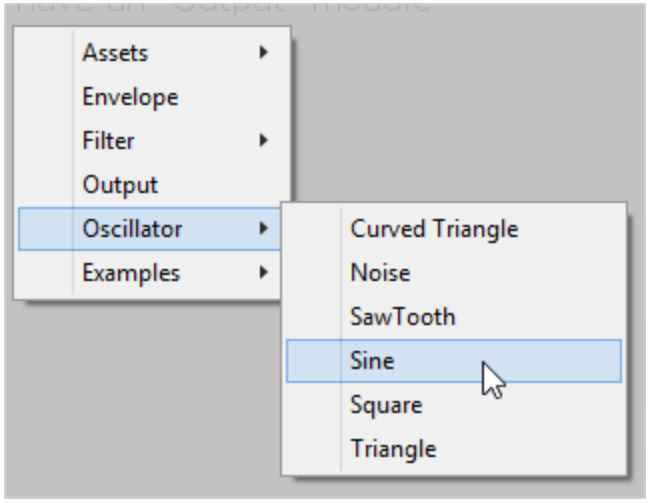


You can also cancel the above process at any time by simply clicking anywhere in the background rather than on the tab you wish to connect to. You can now move your modules around anywhere you'd like and the connection will remain intact.

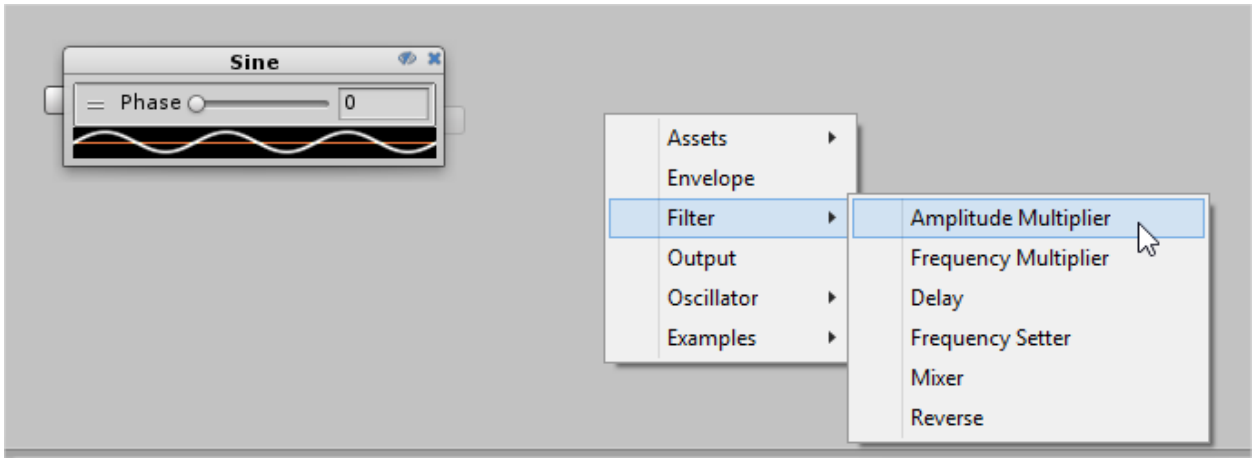
Creating your first Composition, an example

This section will give a lightning fast example on sound creation within Sound Generator by creating a Drum-like sound. Start off by creating an empty Sound Generator Composition as described above. Once you've created an empty Composition, select it and open the Sound Generator Composition window.

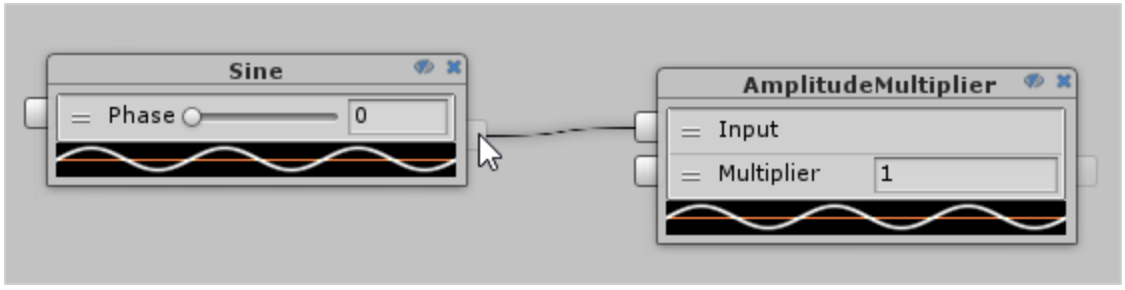
Within the Composition editing window right click and add an "Oscillator/Sine":



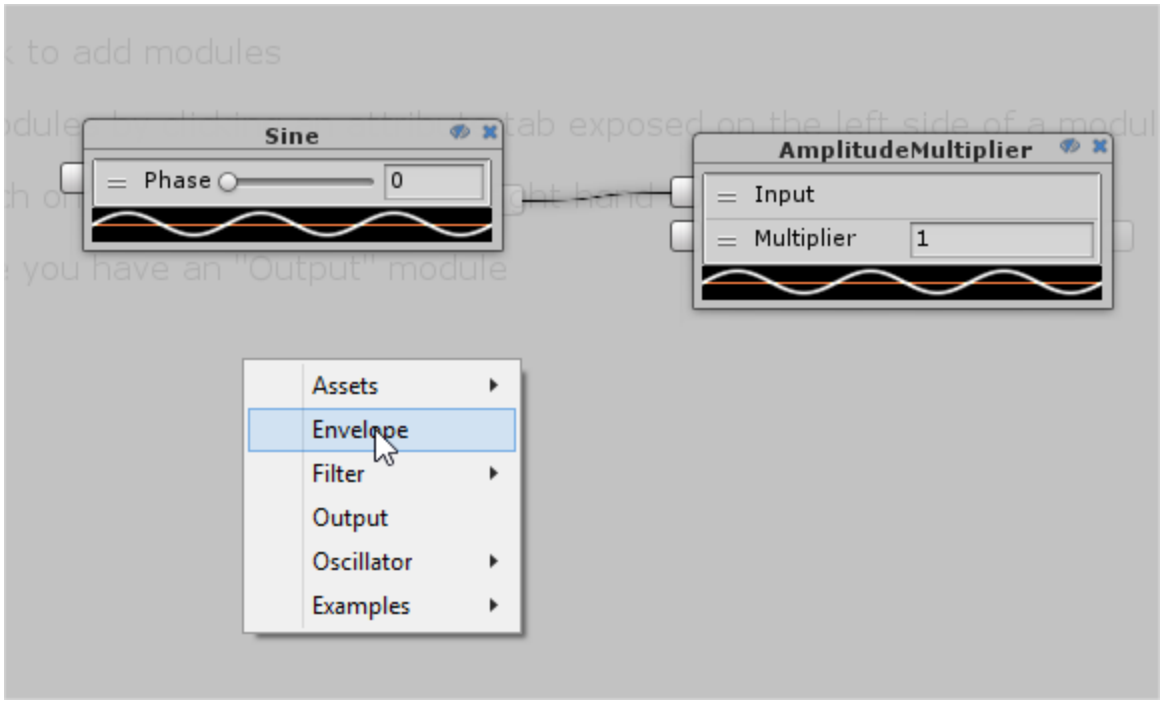
Now add a "Filter/Amplitude Multiplier":



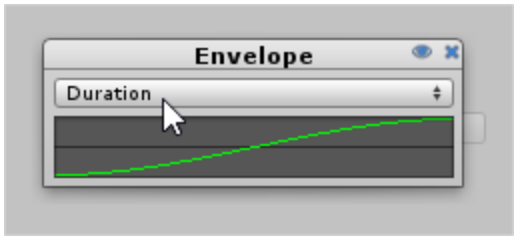
Connect the "Input" of the "Amplitude Multiplier" to the "Sine" as described in the introduction to the User Interface above:



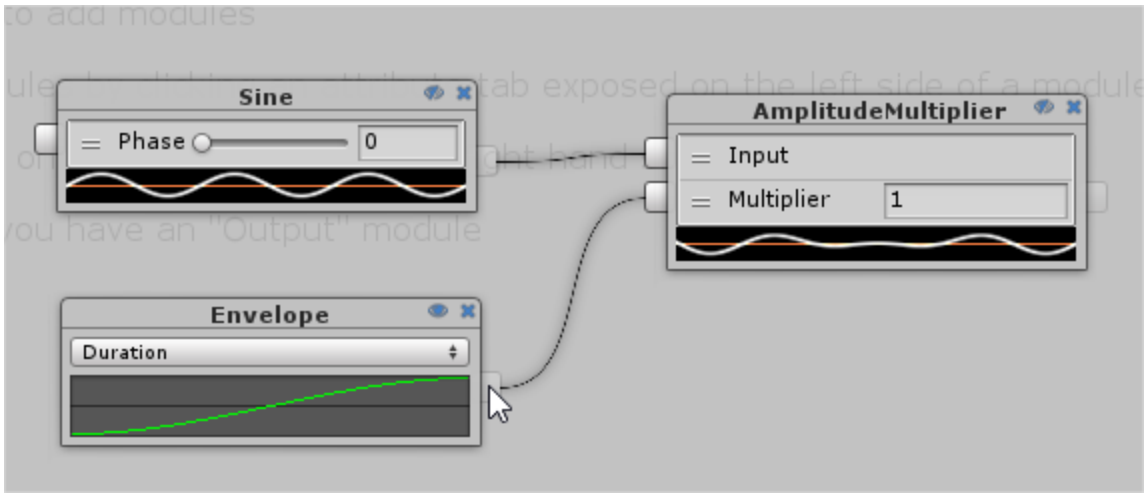
Now add an “Envelope”:



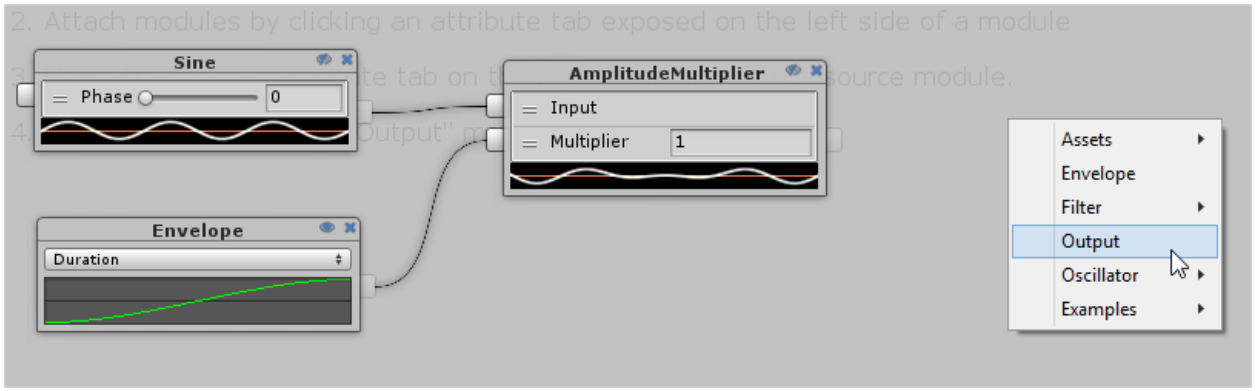
Make sure that the “Envelope” is set to “Duration”:



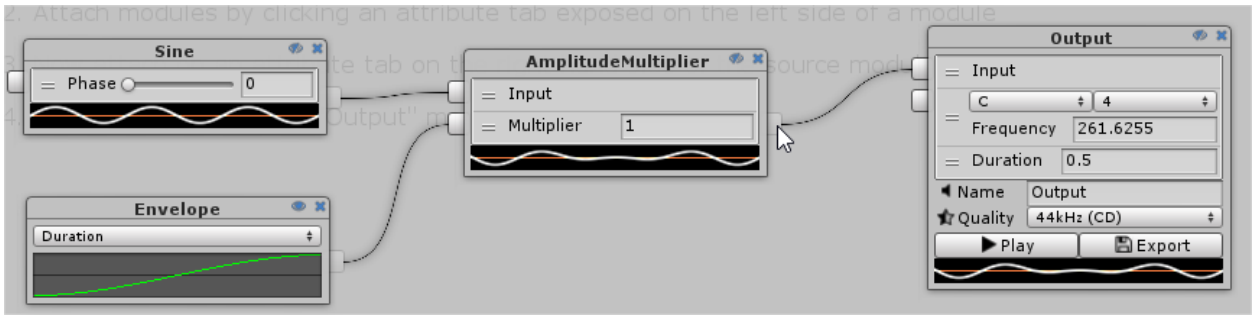
Now attach the “Multiplier” attribute of the “AmplitudeMultiplier” to the “Envelope”:



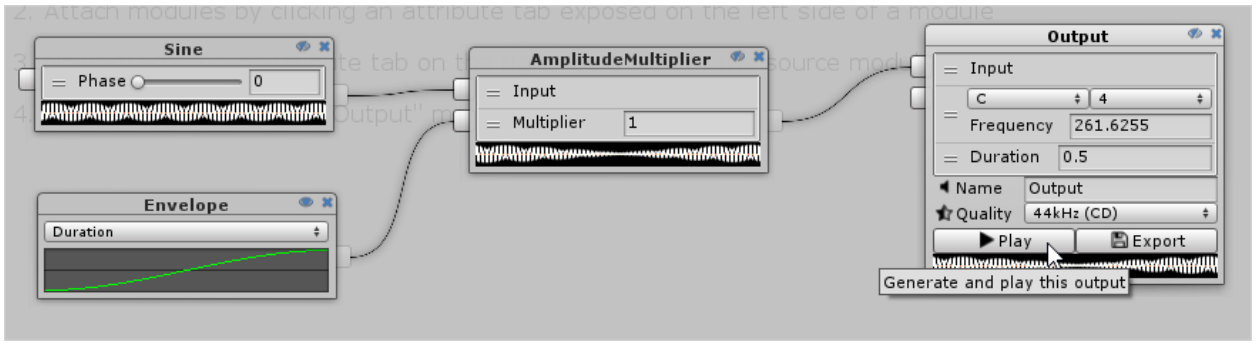
At this point we’ll add an “Output”, so that we can get a feel for what we’re creating:



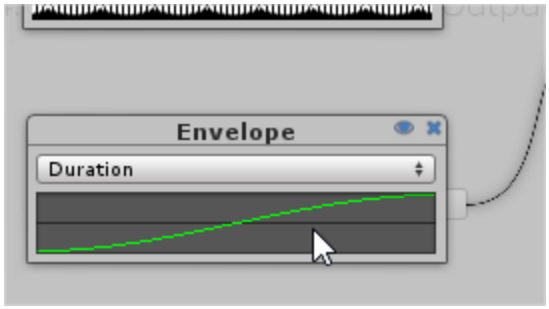
Now connect the “Output” module’s “Input” attribute to the “Amplitude Multiplier”:



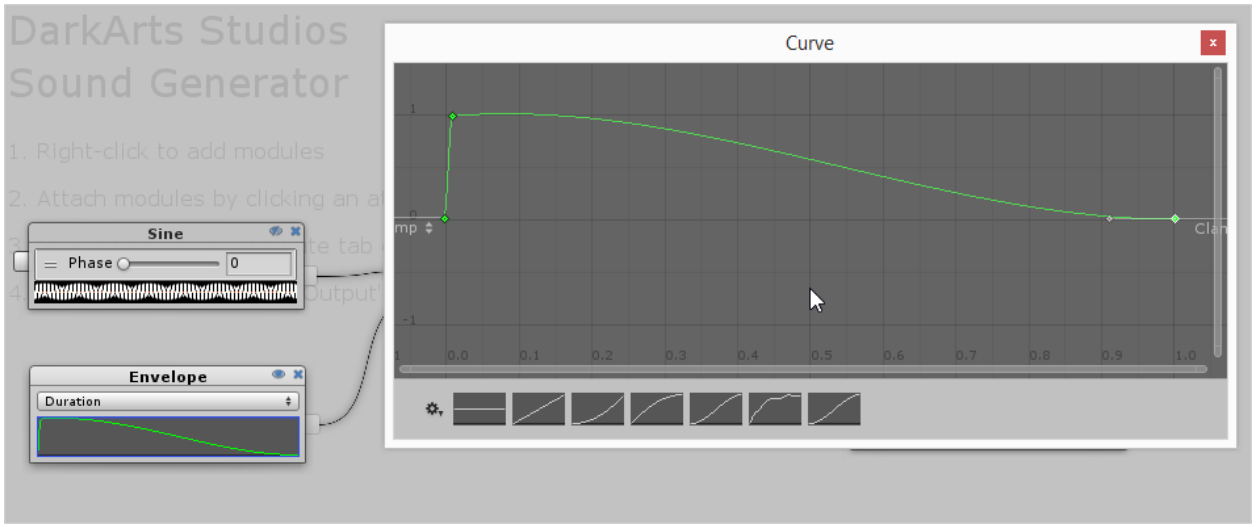
You can now press the “Play” button, it won’t sound anything like a Drum, but you are now able to, throughout the rest of this example, press “Play” whenever you like to see what it sounds like so far:



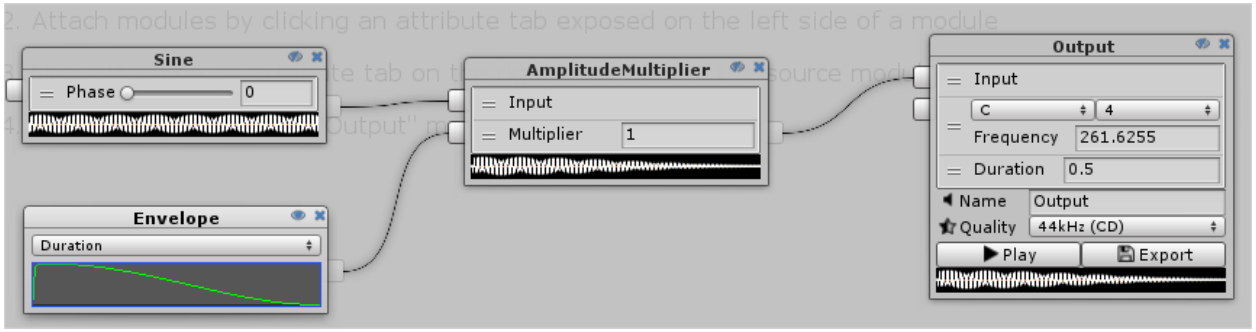
Drum sounds start loud and get softer. We have an Envelope describing the Amplitude (or volume) over time, so we can now click on the envelope graph and begin editing it to make it sound more like a drum. Left click on the envelope graph:



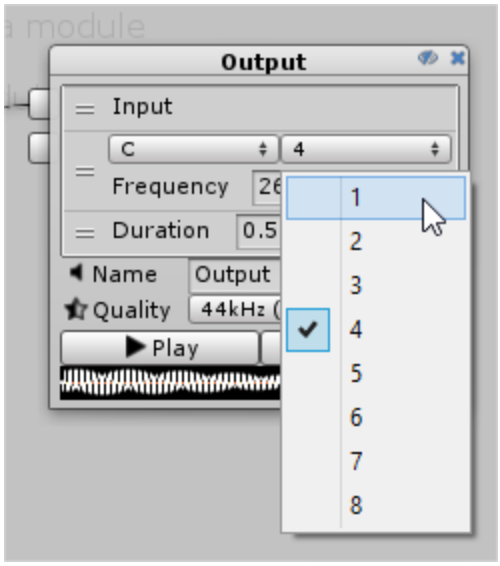
Now edit in the Curve Editor until you have something that looks similar (does not have to be perfect), to the curve below. Pay attention to the zero (0) and one (1) values in the vertical plane, that's most important. This graph below shows a very-fast rise in volume at the start and then a slow descent over time :



If you're done and you close the Curve window you will see that all the module preview areas have updated to reflect this new state:



Pressing "Play" (on the Output module) at this point makes a more pleasant sound. Still too high pitched though so the last thing we want to do is change the octave in the Frequency attribute of the Output module to one (1), this is the lowest octave, musically:



Congratulations :) If you press “Play” again now you will hear your “Drum”.

Module Reference

This section contains a basic breakdown of each of the officially shipped Sound Generator modules which can be used within your Compositions.

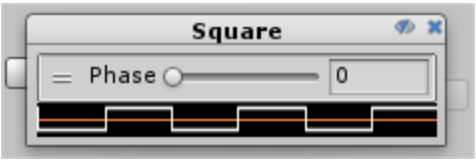
Oscillators

Oscillators produce sound waves. They don't have any modules attached to them for input and only act as feeders for other modules. All oscillators share a *phase* setting. This simply moves the wave start and end point in time and will have no impact at all on the resulting basic sound. You will seldom need to adjust this setting with basic compositions, however with complex overlapping oscillators being mixed together you may find that either some waveforms cancel each other out or amplify each other resulting in distortion due to their peaks and dips being aligned too closely. In cases like these it's useful to be able to shift the phase of one or more of your source oscillators to ensure they work together better.

Sine

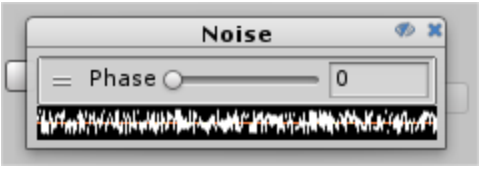
This is your basic Sine wave, a smooth oscillating curve.

Square



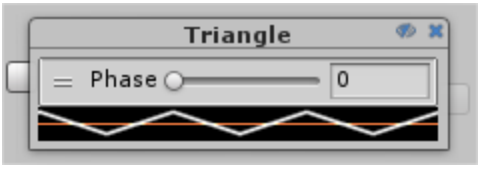
The Square wave is probably the oldest waveform used in computing. If you want to make very old-school game sound effects you'll probably be using this. The wave itself alternates between maximum and minimum without any smoothing.

Noise



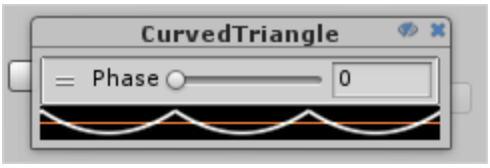
This is simply white noise, random values.

Triangle



This waveform has sharp edges in a triangular manner.

Curved Triangle



Very similar to Triangle, except the bottom extents are curved giving a slightly smoother sound than the standard Triangle oscillator.

Saw Tooth

Shaped like the teeth from a saw this waveform is a blend of the Triangle and Square waveforms.

Assets

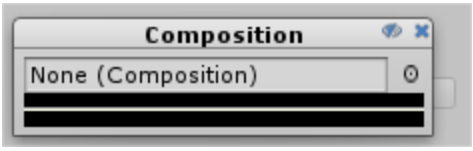
These modules reuse existing assets.

AudioClip

This module allows you to use any existing Asset (AudioClip) in your project within a Sound Generator Composition. Simply drag and drop your AudioClip, WAV, MP3[3], OGG or compatible sound file into this module and that sound will now be used inside your current composition at that point.

[3] Please be aware of licensing agreements regarding sound formats and even sounds themselves. Be sure that you're allowed to use imported sounds. Also be aware of what licensing fees you may be required to pay should you choose to import sound data.

Composition

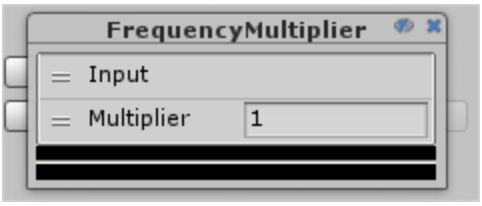


Very similar to the AudioClip module, except this module allows you to reuse previously created Sound Generator Compositions inline within the current Composition you are creating.

Note: At the moment you drag and drop your Composition template into this module it will create a copy (reflected with “(clone)” within the module). If you go back and edit the original prefab that you dragged inline, the current cloned prefab will not be altered. If you alter the original and want an updated clone you will need to replace the clone by dragging and dropping it once more.

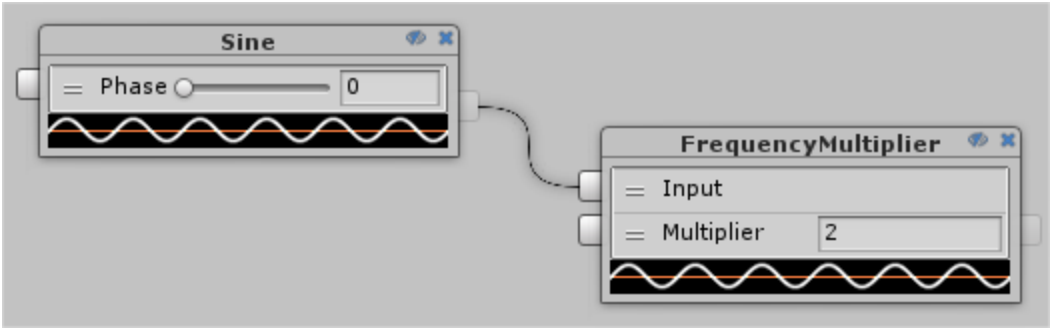
Filters

Frequency Multiplier

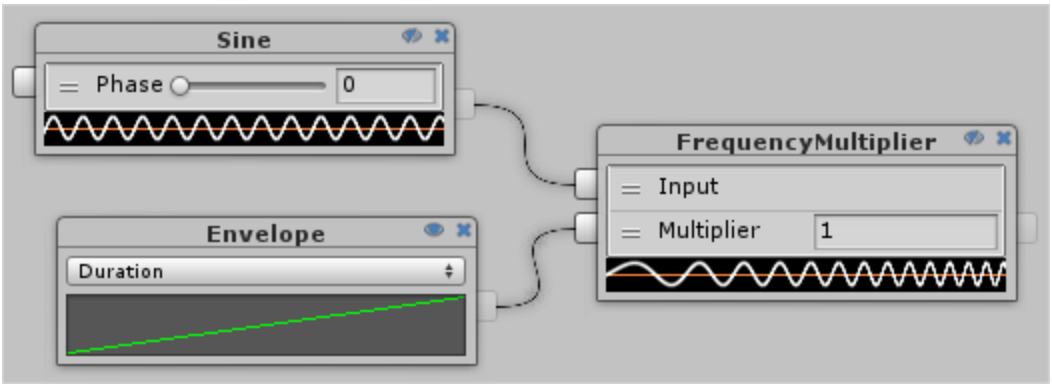


This module acts as a frequency modifier for any sound/frequency being fed through it and can be used in several ways:

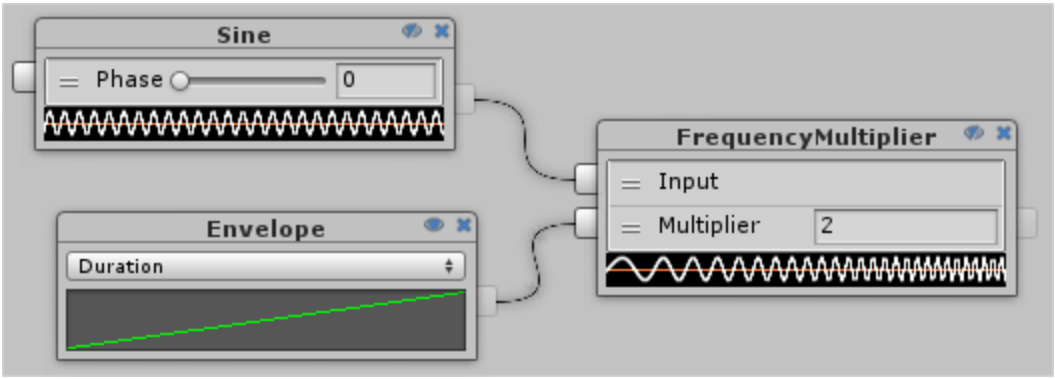
- Edit the “Multiplier” attribute in-line and directly alter the Frequency of the incoming sound wave for the final produced sound:



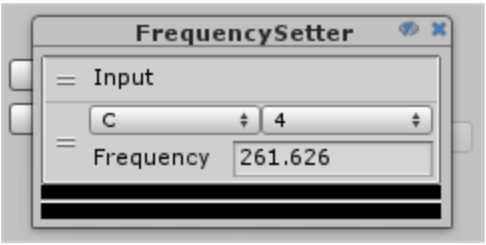
- You can attach another module, for example an Envelope, to influence the Frequency over time:



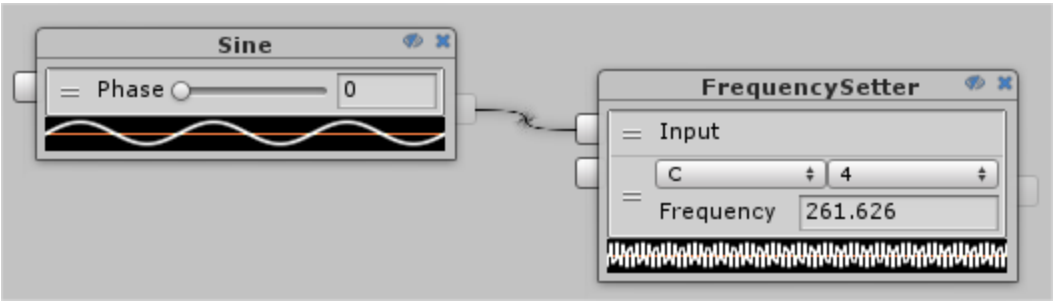
- You can use both an attached module as well as the “Multiplier” value, which act together, to result in a final sound Frequency:



Frequency Setter

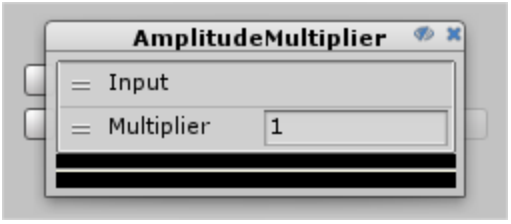


The Frequency Setter module sets the Frequency at any given point in the Composition and will affect any Modules given to it as input. This can be used when you want a portion of your composition to have a different frequency to that set by the final Output Module.



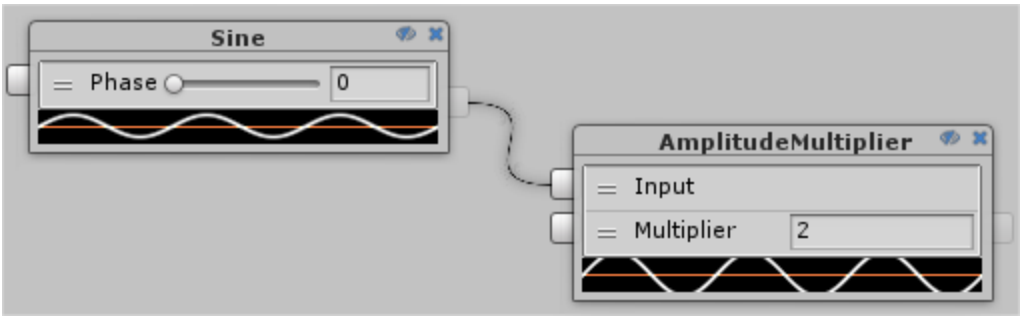
For more detailed information on how to use the Frequency attribute in this Module, see the Output module's documentation.

Amplitude Multiplier

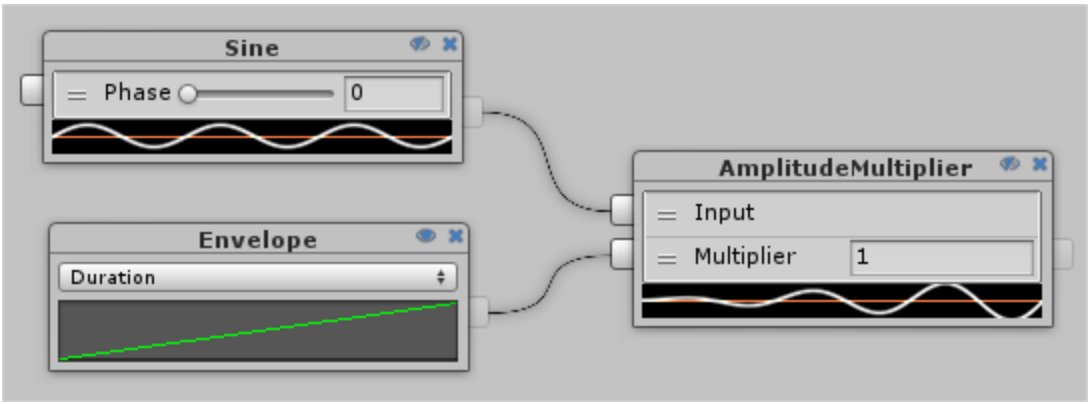


This module acts as an amplifier and can be used in several ways:

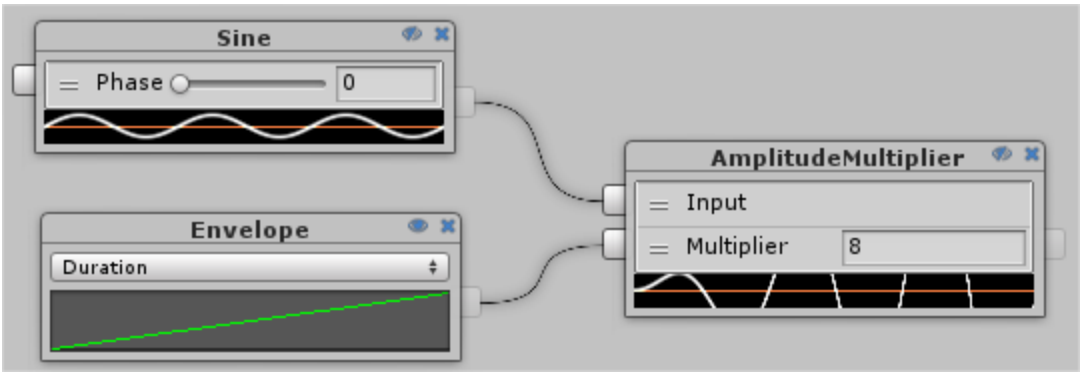
- Edit the "Multiplier" attribute in-line and directly alter the Amplitude (or Volume), of the produced sound:



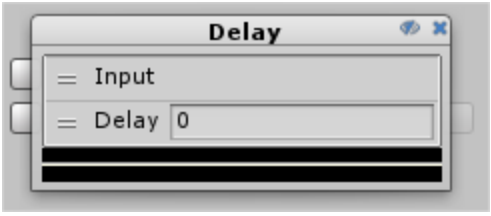
- You can attach another module, for example an Envelope, to influence the amplification over time:



- You can use both an attached module as well as the “Multiplier” value, which act together, to result in a final amplification:

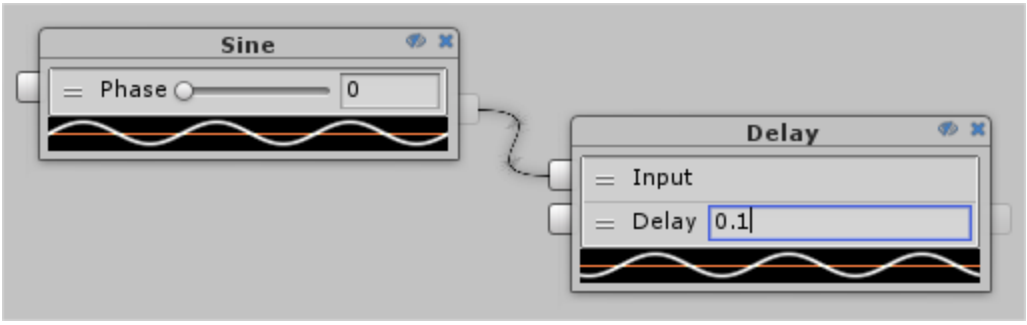


Delay

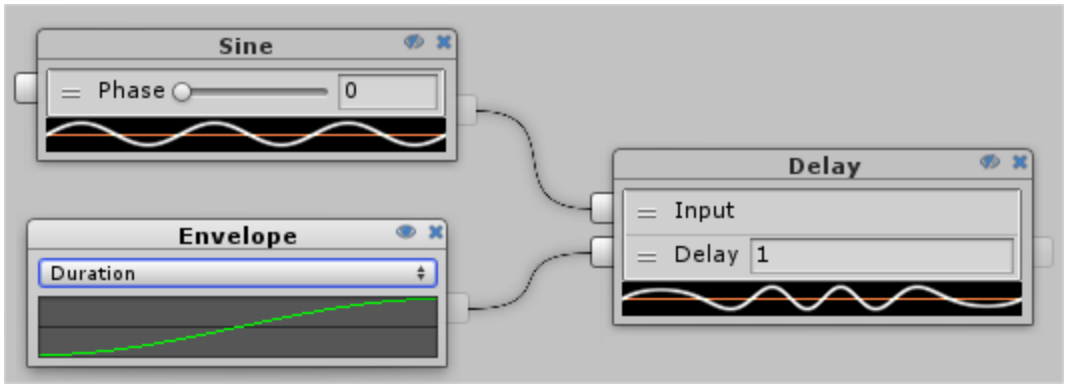


The Delay module allows you to insert a simple delay at that point within your composition. The value of the Delay attribute is in seconds, or portions of seconds. This module can be used in several ways:

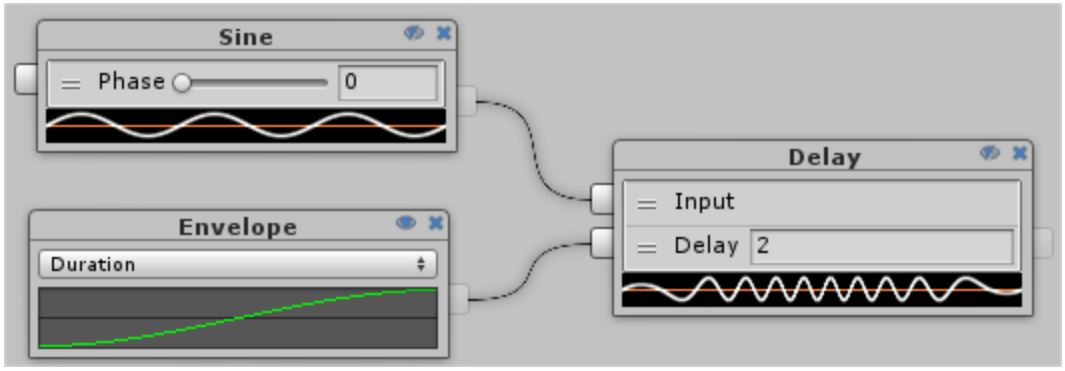
- Edit the Delay attribute value directly to delay your sound by a specific amount of time (in seconds), you can even enter negative values, which would result the sound fed into it starting at a point within the given sound rather than a delay before it begins:



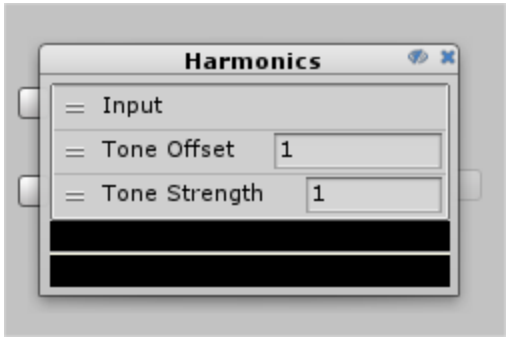
- Attach another module, for example an Envelope, to use a more dynamic delay for the duration of the sound:



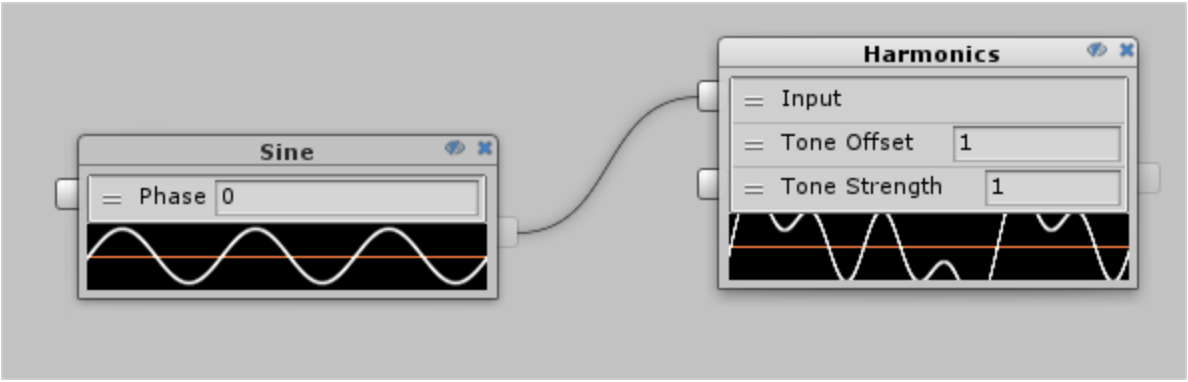
- You can also modify both values in which case the value fed in by the attached Module will be multiplied by the value captured:



Harmonics

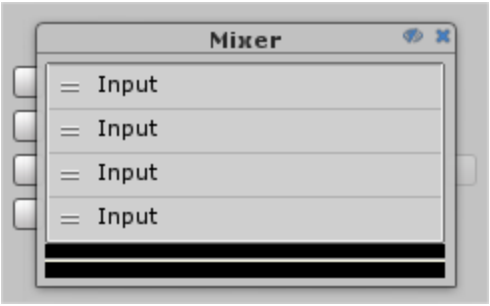


The Harmonics module lets you create simple 3-tone harmonics. Your original frequency as well as one harmonic above and one harmonic below your current frequency.

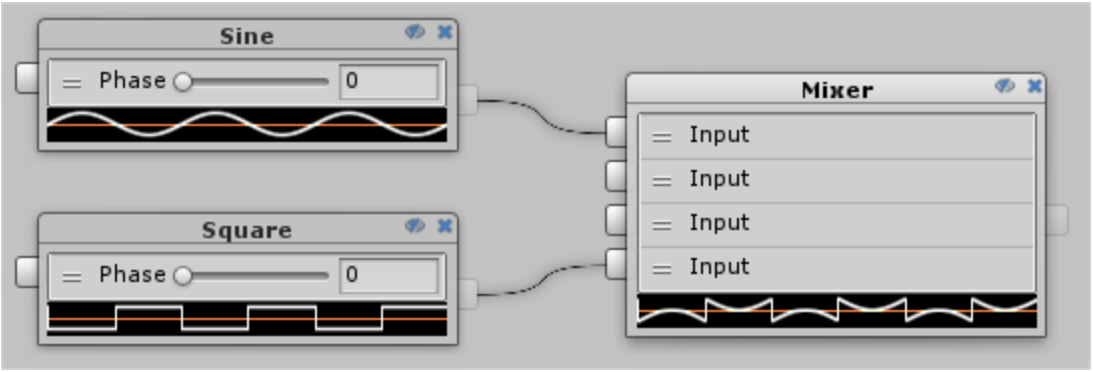


Generally it will create a sound wave that's overflowing, as above, and allows you to lessen the output levels using the amplitude multiplier (or another module of your choosing). Tone Offset increases the harmonic distance from the primary frequency. Tone Strength alters the power, or volume, of the harmonics (the primary frequency amplitude is left unaltered).

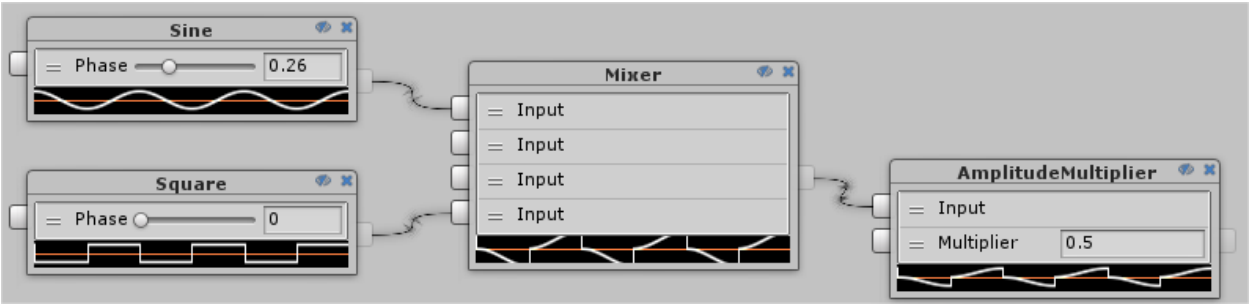
Mixer



The Mixer module allows you to mix, or blend, several incoming sounds together:



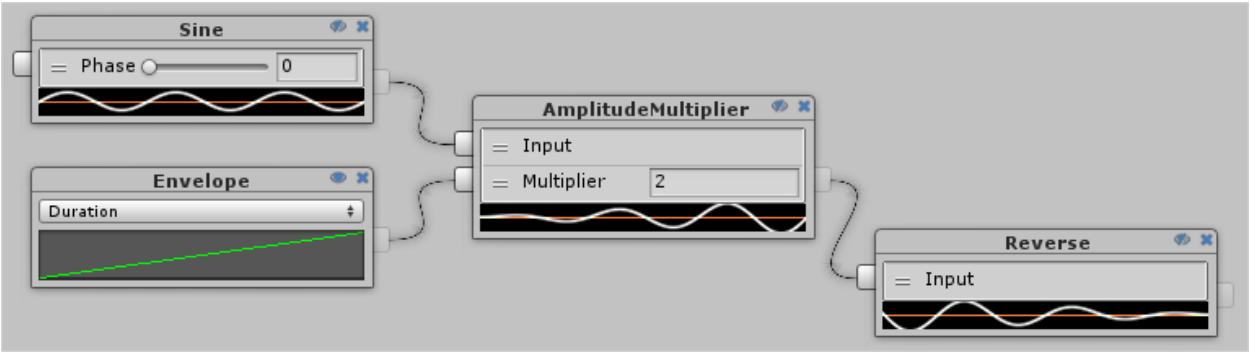
If you're mixing many loud sounds and you're finding the resulting final sound is distorting you may want to add an Amplitude Multiplier directly after the mixer to lower the resulting amplitude (or volume).



Sound Generator does not presume to do this for you automatically and always errs on the side of highest resultant quality without data loss[4].

Reverse

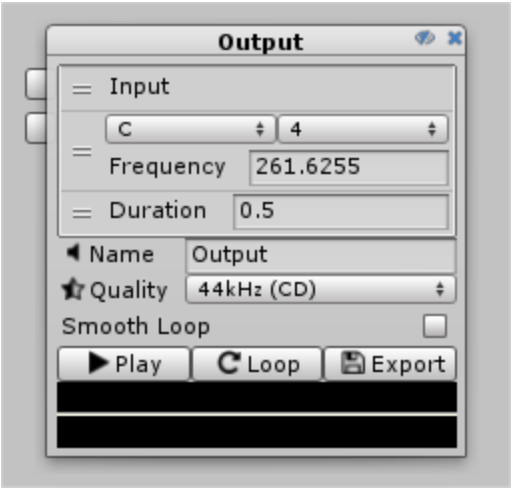
The Reverse module simply reverses, or mirrors, the sound fed into it:



[4] At this point in the composition even though the resulting values overflow (causing distortion in a final resultant sound) you may have, or be planning to add, other filters which could reduce this waveform to a final, undistorted form. If Sound Generator attempted to do this reduction prematurely and automatically it would result in losing sound quality at this point in your composition.

Other

Output

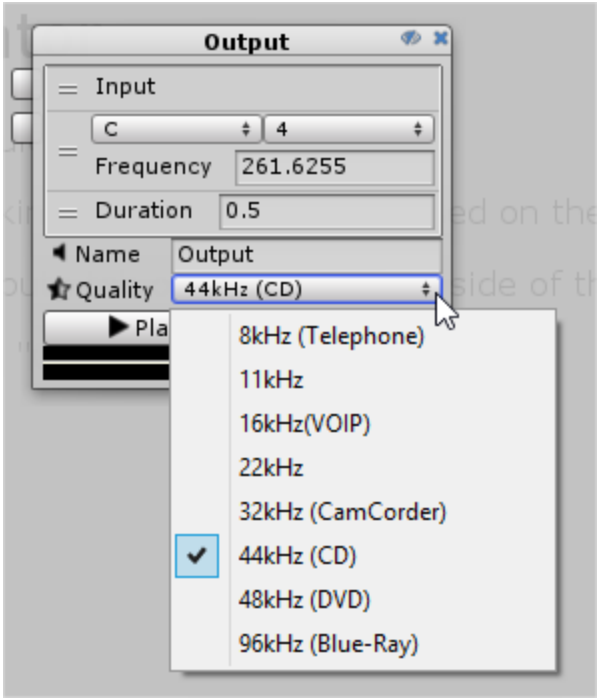


This is the most important module within your Composition. **Every Composition to be used directly from your game logic *must* have at least one Output Module!**[5] The Output module is the only module which does, itself, not output to other modules. It accepts an input attached module and produces the final sound you will use within your game. This module defines not only the pitch of the sound you're creating, but also its duration, quality and the name you will use from within your code to access the final created sound effect. In your game you will be interacting with Output modules to retrieve or even regenerate your created sounds.
Using the Output module you are able to press "Play" to hear your creation and hear what it will sound like in-game. "Loop" will play the same sound, but looped until you press "Loop" again. "Export" will export the generated sound to a WAVE (.wav) file which you are able to use elsewhere (you do not need to export the sound to use it within your game):

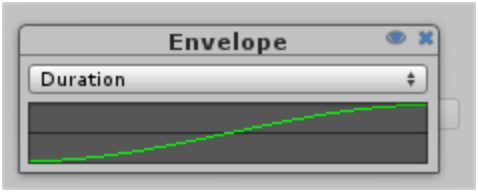
- Input: This field can be attached to incoming modules.
- Frequency: This allows you to enter an octave & note combination (in music form) for the final pitch or an actual sound wave frequency as a number.
- Duration: This is the full duration, or length, in seconds of the final output.
- Name: You can optionally set this to anything you like (Its default value is simply "Output"). Be careful if you have code accessing composition AudioClips already though since they will be accessing your Output using this name.

[5] The Output modules are how Sound Generator exposes and generates the Sounds for you. At game runtime you will be given access to all Composition outputs, by name, through the SoundGenerator.Composition component attached to your GameObject.

- Quality: The final sound quality of the generated sound. Higher quality sounds will take longer to generate[6] but sound a lot better. The default value of 44kHz (CD quality) should be ideal for most use cases:

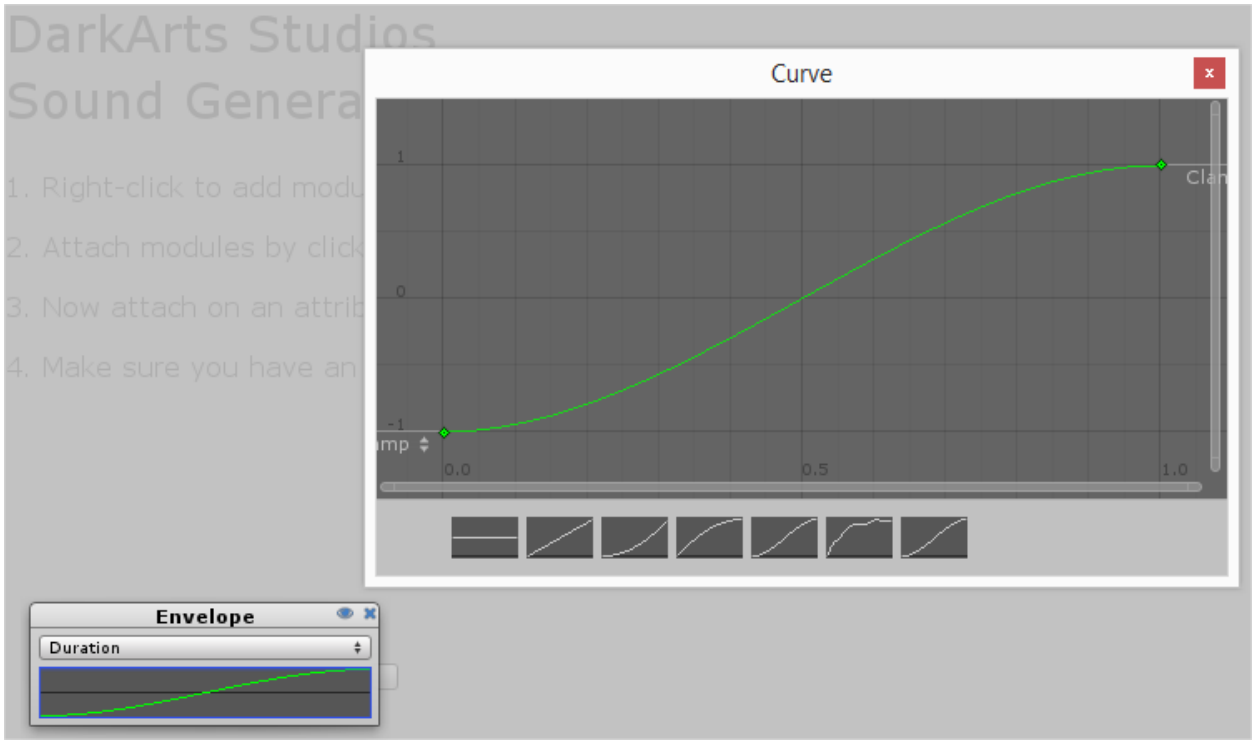


Envelope

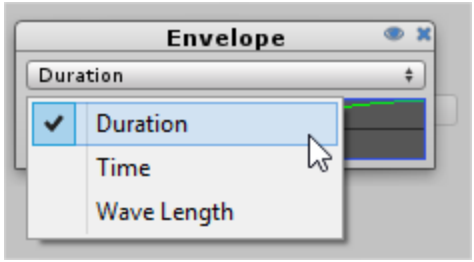


The Envelope is a multi-purpose module which can feed any values in other, attached modules. Clicking on the envelope graphic itself will open a standard Unity Curve editor:

[6] Only when you press Play or Export in the Editor. At runtime this will happen once only during Scene load after which all usage of this sound will be instant within your game.

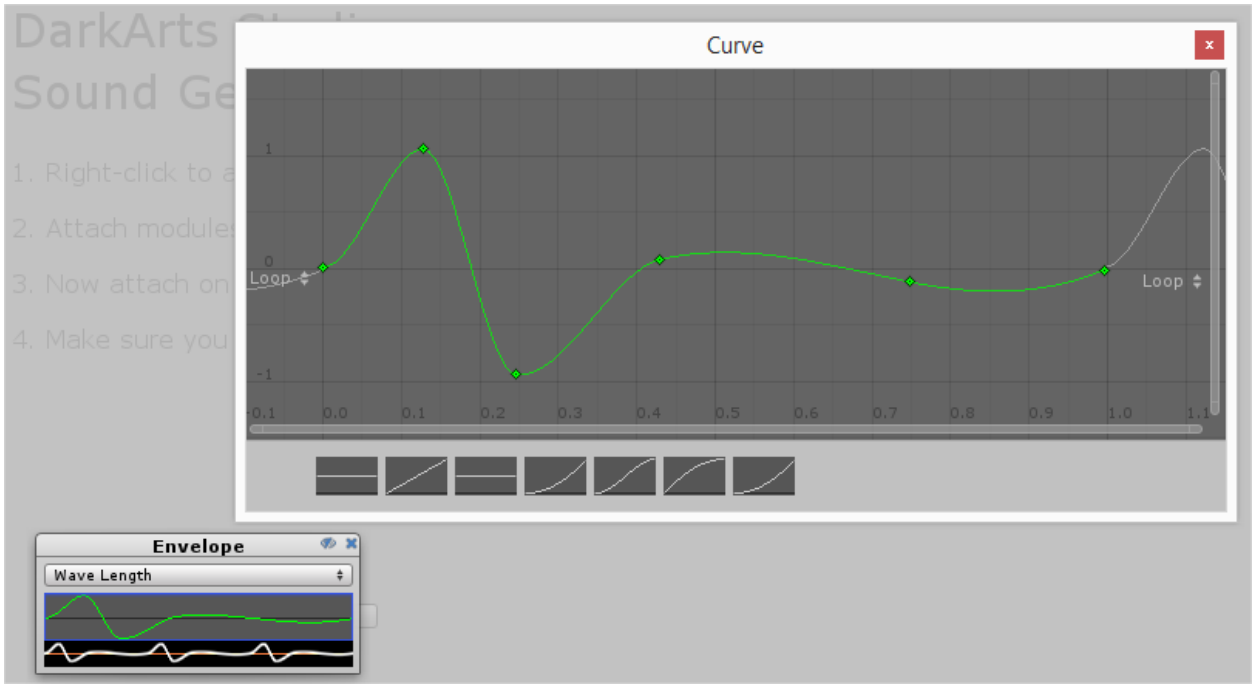


There are three possible Envelope types:



- Duration: The Envelope's extent will be the entire duration of the final sound produced.
- Time: The values as shown in the Curve Editor's horizontal plane represent exact time in seconds. If your curve ends, to the right, at "1.0" then the curve will be for exactly one second.
- Wave Length: This means that the length of the Envelope will be exactly the length of a single sound wave. This allows you to create custom sound waves within your

composition. For example:



Example Modules

There are four example modules that ship with Sound Generator:

- Oscillator/Sine (UnityScript)
- Oscillator/Cosine (C#)
- Filter/Sharpen (UnityScript)
- Filter/Softer (C#)

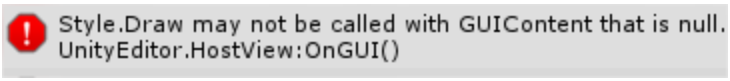
These are examples of how to implement your own custom modules and are not the best modules to actually use within your Compositions. Their purpose is to show developers how to access the open architecture of Sound Generator in order to extend it for themselves. You will find the source code to these modules within the following folder:

Assets/DarkArtsStudios/SoundGenerator/Examples/CustomModules/

Known Issues

Error messages in the Console when using Envelopes

When using Envelopes (Unity Curves) within your composition you may see the following error message at times:



This is, unfortunately, occurring within Unity's Curve Editor itself and although it has no impact on Sound Generator or it's function at all I have been unable to get rid of this error message. A work-around is to, after adding your envelope, switch to the inspector window and then back to the Sound Generator window again. This is a known issue and I will continue to look into getting this resolved. For more information you can see: http://answers.unity3d.com/questions/522378/clicking-an-editorguicurvefield-in-an-editorwindow.html

Changes

2.1

- Upgraded DarkArts Studios Core libraries syncing up with more stable & improved core shared by other DarkArts Studios Editor Extensions
- Sound Generator Composition Inspector now has a button to open Composition Editor
- Removed some legacy debug logging that should never have been released
- Fixed audio clip discarding console warning when using "Smooth Loop" within an Output Module
- Began upgrading entire UI with improved icons more accurately depicting functionality

2.0.1

This change was motivated by feedback after the Asset Store February Madness sale at the beginning of February 2014.

- Harmonics Module added
- Output Module now has a "Loop" playback button playing back the composition as a loop
- Output Module has a "Smooth Loop" option, smoothing out looping sounds if checked.
- Fixed an issue with very high resolution Mac platforms where modules became uneditable (Related to a Unity Bug in which control-ids of Slider controls have issues). Disabled all Slider controls within modules until Unity resolves this.

2.0.0

First public release of Sound Generator as a complete rewrite in modular form