Quick Start Manual

First steps in building game audio with

Contents

Introduction

About this manual

This manual will guide you through the first steps of creating a game audio project with ADX2 from CRI Middleware. It will give you a quick tour of the possibilities of AtomCraft, the authoring tool of ADX2.

Through this Quick Start manual the following pictograms will be used to indicate sections of interest:

Key Term
A “key term” section will describe an important word from the ADX2 terminology.

Note
A “note” section will add some extra information about an ADX2 feature.

Tip
A “Tip” section will give an idea about how to use an ADX2 feature.

About ADX2

ADX2 is the leading game audio middleware in Japan, used in as many as 2600 games in all genres and on all platforms.

ADX2 offers a user-friendly, DAW-like, authoring tool and a full-featured audio engine including a high-performance proprietary codec.

ADX2 is available for PlayStation®4 , Xbox One®, Wii, Wii UTM ,PSP, PlayStation® Vita, Nintendo 3DS™ , PlayStation®3 , Xbox 360®, Windows®, iOS and Android.

About CRI

CRI Middleware is a Japanese company headquartered in Tokyo, with offices in San Francisco. Founded in 1983, it specializes in audio and video software solutions for the digital entertainment industry.

Popular products include CRI Movie, a high-quality, multi-platform, movie playback system and CRI ADX2, an all-in-one audio solution.

What are game audio middleware?

Game audio middleware are composed of an authoring tool and a run-time component (game audio engine), in this case AtomCraft and the ADX2 API.

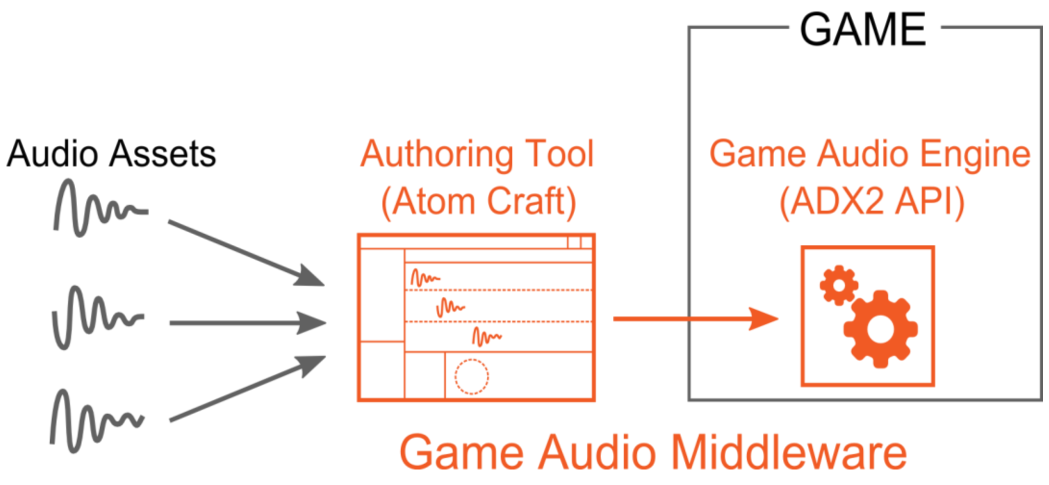
The authoring tool allows the sound designer to import audio assets (wave files), transform them into dynamic events that can be triggered and controlled, organize them into sound banks and export them to the game.

Game audio middleware provide specific features for sound effects (e.g. randomization and 3D positioning), interactive music (e.g. beat synchronization) and dialog (e.g. support for multiple languages).

Game audio middleware also offer mechanisms for the game and the audio engine to communicate (e.g. through game audio variables), so that the audio can truly be dynamic and react to what is happening in the game.

Last but not least, game audio middleware usually provide game audio previewing from within the authoring tool, lowering the time required to debug and iterate on the sound design.

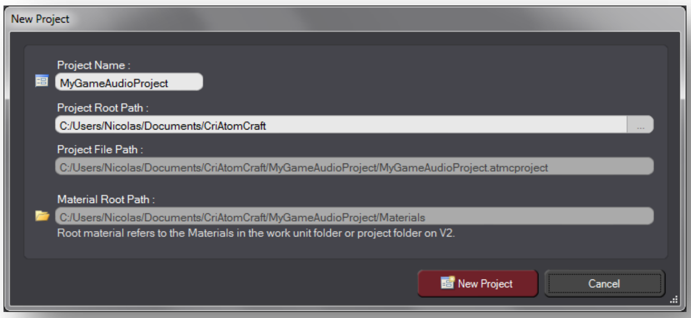
As we will see, all this - and much more – can be done with AtomCraft and the ADX2 API, in a very easy and intuitive way. ADX2 truly empowers sound designers while offering rock-solid run-time performance.



Starting a new project

Creating the project

Creating a new AtomCraft project is as easy as specifying the name of the project and its location on your hard drive.



New Project

Project Name : MyGameAudioProject

Project Root Path : C:/Users/Nicolas/Documents/CriAtomCraft

Project File Path : C:/Users/Nicolas/Documents/CriAtomCraft/MyGameAudioProject/MyGameAudioProject.atmcproject

Material Root Path : C:/Users/Nicolas/Documents/CriAtomCraft/MyGameAudioProject/Materials

Root material refers to the Materials in the work unit folder or project folder on V2.

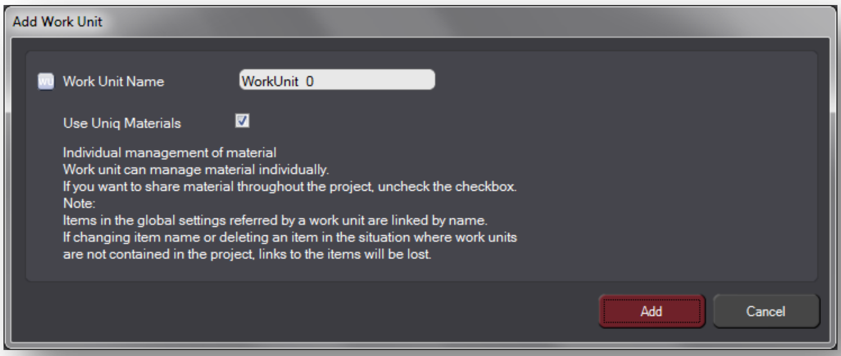
From that information, AtomCraft will derive the project file path as well as the material root path.

Key Term

Materials are audio assets - i.e. sound files - that your project will use. The *Material Root Path* is the parent folder in which all of these audio assets will be contained.

Work Units

At this point AtomCraft will create the first Work Unit for you, and will ask if you want the management of its materials to depend on the work unit itself or on the global material folder.



Add Work Unit

Work Unit Name WorkUnit_0

Use Uniq Materials ☑

Individual management of material
Work unit can manage material individually.
If you want to share material throughout the project, uncheck the checkbox.
Note:
Items in the global settings referred by a work unit are linked by name.
If changing item name or deleting an item in the situation where work units are not contained in the project, links to the items will be lost.

Key Term

Work Units are components of your project that can be checked out / checked-in independently. This is a very convenient system that allows several sound designers to work on the same project simultaneously. For example a sound designer could be in charge of the weapon sound effects, another one of the dialogue etc…

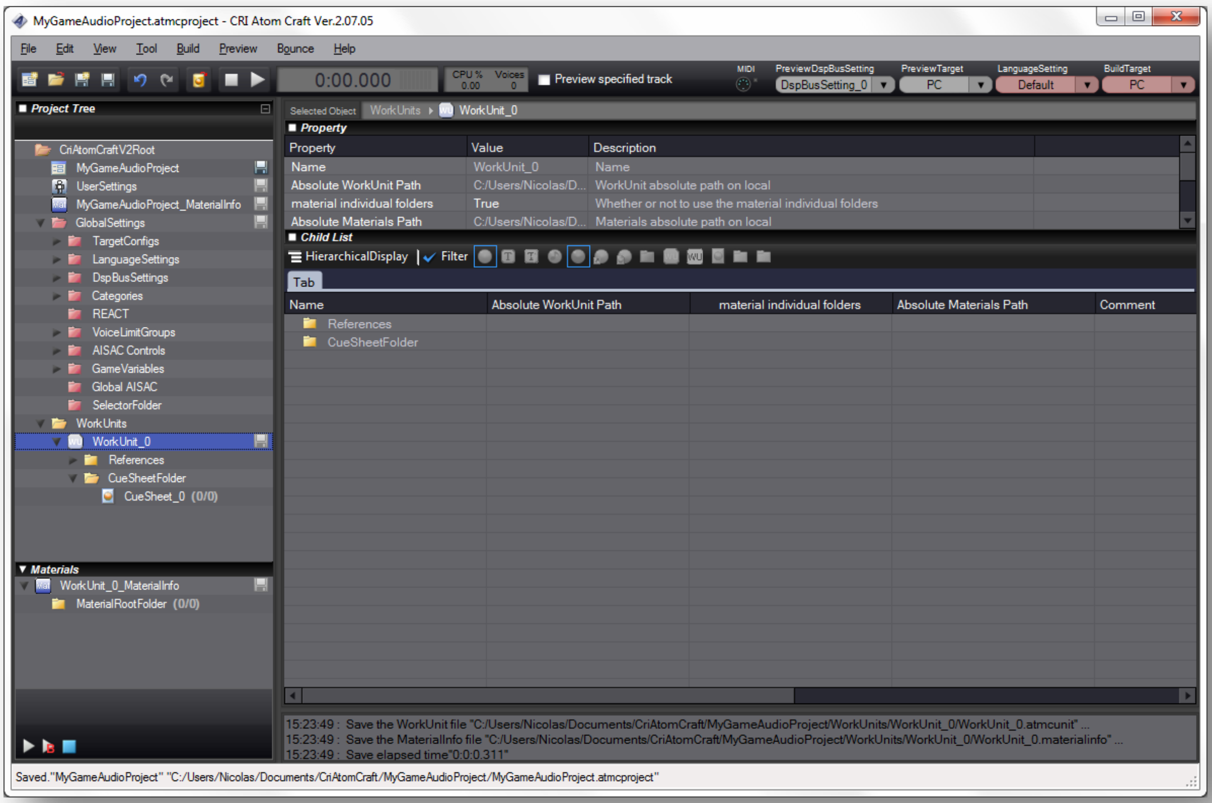
To check out a work unit, a sound designer simply uses the context menu and selects *Include work unit in the edit*. Once he is done, he can check the work unit back in by selecting *Exclude work unit from editing*.

Main window

The main window opens! On the left side, the project tree displays the different objects in the project. Many types of audio objects can be found here: we will discover more of them later in this manual.

Just under the project tree is the *Materials* folder. The materials folder contains the sample data (waveforms) that are referenced by the objects in the project.

As you can see, all the objects that can be saved have a small disk icon on their right. By checking the state of these icons it is possible to see in one glance what objects have been modified and need to be saved or checked in, which is very convenient.



Property	Value	Description
Name	WorkUnit_0	Name
Absolute WorkUnit Path	C:/Users/Nicolas/D...	WorkUnit absolute path on local
material individual folders	True	Whether or not to use the material individual folders
Absolute Materials Path	C:/Users/Nicolas/D...	Materials absolute path on local

Name	Absolute WorkUnit Path	material individual folders	Absolute Materials Path	Comment
References				
CueSheetFolder				

```
15:23:49 :  Save the WorkUnit file "C:/Users/Nicolas/Documents/CriAtomCraft/MyGameAudioProject/WorkUnits/WorkUnit_0/WorkUnit_0.atmcunit" ...
15:23:49 :  Save the MaterialInfo file "C:/Users/Nicolas/Documents/CriAtomCraft/MyGameAudioProject/WorkUnits/WorkUnit_0/WorkUnit_0.materialinfo" ...
15:23:49 :  Save elapsed time"0:0:0.311"
Saved."MyGameAudioProject" "C:/Users/Nicolas/Documents/CriAtomCraft/MyGameAudioProject/MyGameAudioProject.atmcproject"
```

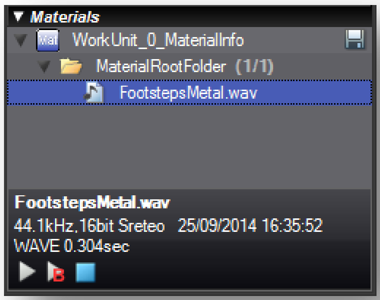
The main part of the window is dedicated to the display and editing of the audio objects. This area often looks like a typical DAW interface and in turn will display multiple audio tracks, a mixer, effects parameters etc… Several panes can be visible at the same time, including one with all the properties of the object currently edited, usually located on the right side.

Adding sound files

The materials folder will contain the audio data referenced by your project. To add a sound file to the materials folder, you can use the context menu but also drag and drop sound files directly from Windows Explorer.

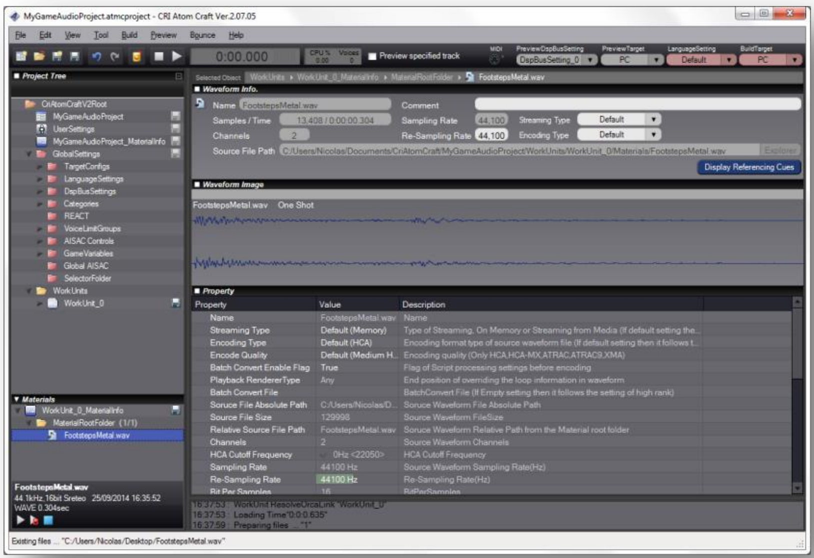
Please note that it is possible and recommended to create subfolders in the root material folder to organize the sample data per level, per type etc…

Let's add our first sound file!



FootstepsMetal.wav
44.1kHz,16bit Sreteo 25/09/2014 16:35:52
WAVE 0.304sec

As you can see, we just added a footstep sound. Some basic information about the file is available and it is possible to listen to it. When you click on the file name, the central pane of the window will display a lot more information, including its waveform, as well as looping and encoding options.



Name: FootstepsMetal.wav
Samples / Time: 13,408 / 0:00:00.304
Channels: 2
Source File Path: C:/Users/Nicolas/Documents/CriAtomCraft/MyGameAudioProject/WorkUnits/WorkUnit_0/Materials/FootstepsMetal.wav
Sampling Rate: 44,100
Re-Sampling Rate: 44,100
Streaming Type: Default
Encoding Type: Default

FootstepsMetal.wav One Shot

Property	Value	Description
Name	FootstepsMetal.wav	Name
Streaming Type	Default (Memory)	Type of Streaming. On Memory or Streaming from Media (If default setting the...
Encoding Type	Default (HCA)	Encoding format type of source waveform file (If default setting then it follows t...
Encode Quality	Default (Medium H...	Encoding quality (Only HCA,HCA-MX,ATRAC,ATRAC9,XMA)
Batch Convert Enable Flag	True	Flag of Script processing settings before encoding
Playback RendererType	Any	End position of overriding the loop information in waveform
Batch Convert File		BatchConvert File (If Empty setting then it follows the setting of high rank)
Soruce File Absolute Path	C:/Users/Nicolas/D...	Soruce Waveform File Absolute Path
Source File Size	129998	Source Waveform FileSize
Relative Source File Path	FootstepsMetal.wav	Soruce Waveform Relative Path from the Material root folder
Channels	2	Source Waveform Channels
HCA Cutoff Frequency	0Hz <22050>	HCA Cutoff Frequency
Sampling Rate	44100 Hz	Source Waveform Sampling Rate(Hz)
Re-Sampling Rate	44100 Hz	Re-Sampling Rate(Hz)
Bit Per Samples	16	BitPerSamples

```
16:37:53 WorkUnit ResolveOrcaLink "WorkUnit_0"
16:37:53 Loading Time"0:0:0.635"
16:37:59 Preparing files ... "1"
```

Existing files ... "C:/Users/Nicolas/Desktop/FootstepsMetal.wav"

> **Note**
> In addition to Wave files, you can also add AIFF files to the material folders.

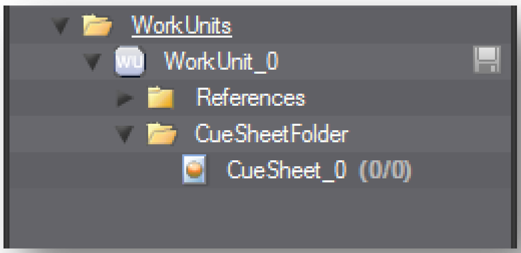
Files can be synchronized and material information files (i.e. list of files) can be imported and exported, speeding up the process in some cases.

Creating sound cues

Cue sheets, cues and tracks

Now that we have added a waveform, how can we turn it into a sound effect that a game can play?

Looking back at the project tree, we can see that at the same time it created a work unit, AtomCraft also generated a cue sheet folder and a cue sheet.

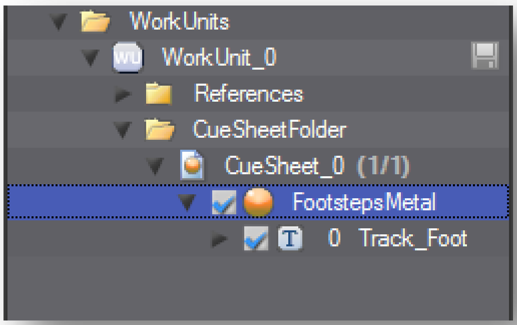


The only thing left for us to do is to add a cue.

Key Term

A *Cue* is a sound object that the game can trigger. A set of cues is called a *Cue Sheet*. It is possible to organize cues and cue sheets even more with folders.

Let's drag our footstep waveform from the material folder and drop it on the cue sheet. A cue with the same name is created and a track is automatically added to it, which references our footstep waveform.

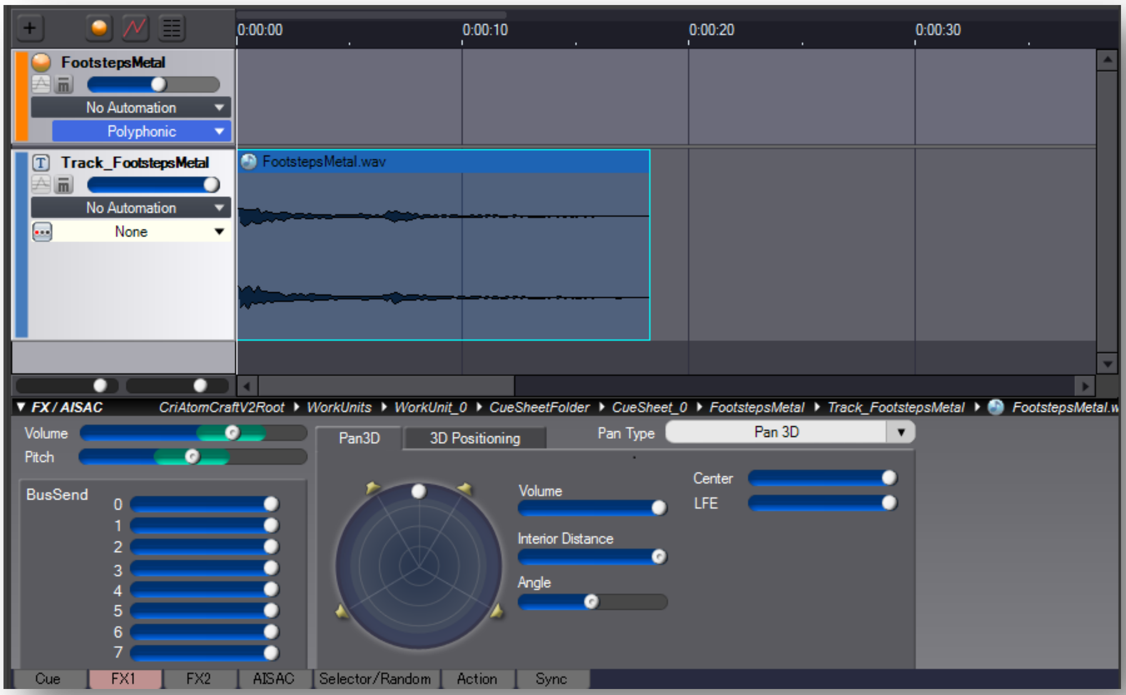


Tip

There is an even faster way to create a cue: by dragging wave files directly from Windows Explorer and dropping them on a cue sheet. AtomCraft will add the audio files to the material folder, then create a cue and reference the samples!

Key Term

A *Track* in AtomCraft is similar to a track in your DAW. It is a timeline on which you can place one or more waveforms.

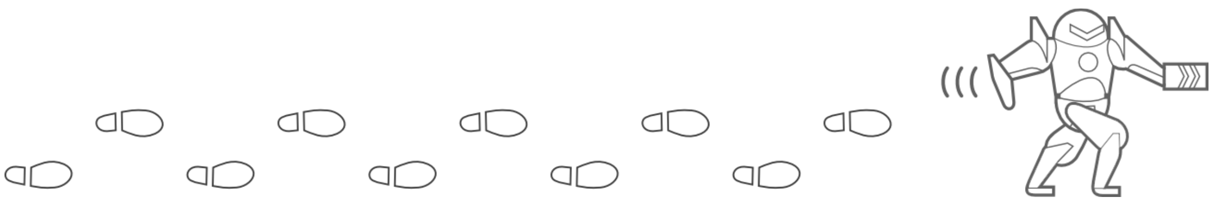


The picture above shows the newly created cue (at the top, in orange) and its child track, which includes the waveform.

Note

The cue editor in AtomCraft resembles very much to a DAW. You can see the timeline at the top, and there can be many tracks. Each of the tracks can have several waveforms, and it is easy to move them along the timeline just by drag and drop.

Let's press on the play button at the top of the window (or press "space" on your keyboard) to listen to the result. When we do that, AtomCraft runs the Atom Previewer application which simulates the way it would sound in a game. It's a success, our first cue is playing!

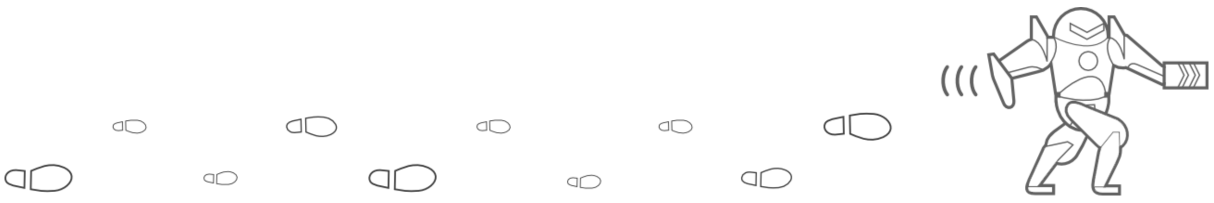


Randomizing parameters

Now that the cue is playing, it is possible to adjust its parameters in the tabs located at the bottom of the track view. Pitch, volume, pan, filter and more can be modified there.

To make a sound effect seem less repetitive in a game, it is sometimes a good idea to add a random variation to some of its parameters. This is done very easily in AtomCraft: just as you are setting a parameter value by moving a slider horizontally, you can set a random range around this value by moving the mouse vertically. At the bottom of the previous picture, you can see some of the track's parameters. A zone around the volume and pitch slider values has been highlighted: this is their random range.

If we play the footstep cue again, now it will sound slightly different each time, because its volume and its pitch will be different, while still staying in the range we set.

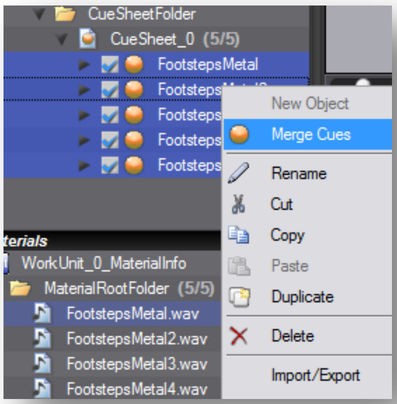


Different types of cues

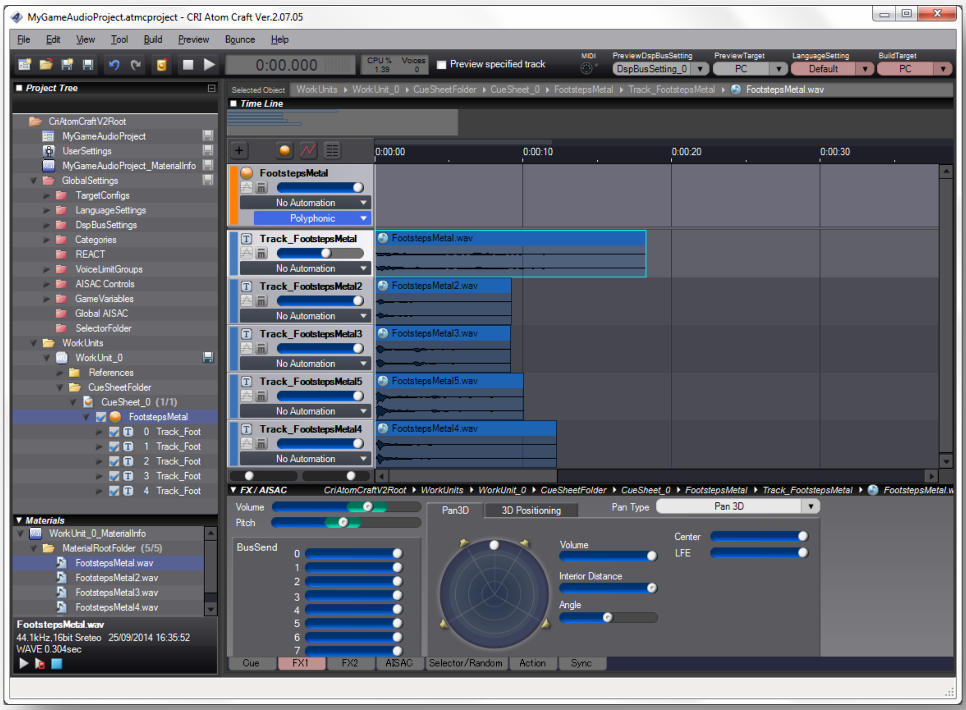
Although it is possible to get a slightly different sound effect each time a cue is triggered by randomizing some of its parameters, there are some cases where what is really needed is a different waveform. That is especially true for footsteps!

Fortunately, there are many more things you can do with a cue, and complex behaviors can be defined in very simple ways in AtomCraft. For example, in order to get more realistic footsteps, let's just introduce new waveforms! Instead of always playing the same sound effect over and over again, we would like to play a sound selected randomly among five. First, let's add the four new footsteps waveforms to the materials folder. Then, we can drag them on the cue sheet.

Four new cues have been created. However we want the new variations to be part of the same sound effect, i.e. the same cue. We can use the context menu and merge the cues as depicted below.

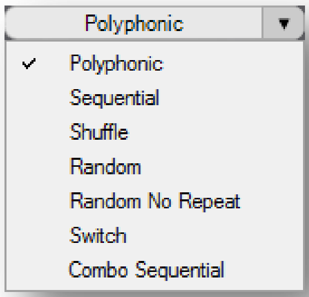


Tip
Alternatively it is also possible to drop wave files directly on the timeline of the cue editor: they will automatically be added as materials and new tracks will be created for each of them.



As depicted above, we now have our five tracks with five different waveforms in one cue. Let’s play this. All the footsteps are playing simultaneously!

This is because cues can be of various types: polyphonic, sequential, shuffle, random, random no repeat, switch and combo sequential. The default type is polyphonic, which is why all the tracks are played at the same time.



The most appropriate type for us in this case is “Random with no repeat”. This means that the tracks will be randomly selected, while making sure that the same track is never played twice in a row, which would break the realism.

Let’s try this again: this time, every time we trigger the cue, a different waveform is played, and it has a slightly different volume and pitch. It is now much more realistic!

The various AtomCraft’s cue types are very useful. They allow for specific behaviors when the cue is triggered. For example, choosing the sequential cue type would have played a different waveform each time, but always in the same order, while the shuffle type would have played them in random order, but making sure that all waveforms were played once before playing a waveform again. The switch type allows ADX2 to select the track to be played based on a game variable, and finally the combo sequential type adds options to the sequential type, such as a return to the first track after a given time.

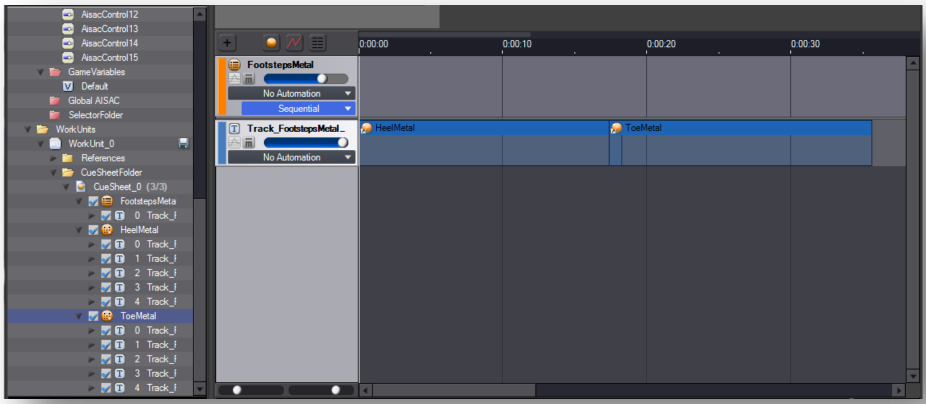
Nesting cues and complex behaviors

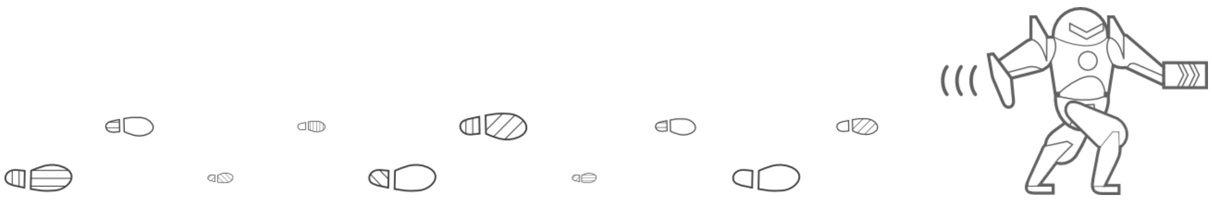
It is possible for cues to reference other cues instead of tracks. This opens the door to many complex behaviors.

Actually, to add even more variations to game footsteps, sound designers often divide them into two parts: toe and heel, using a different set of waveforms for each of them. Dividing our 5 footsteps waveforms gives us 10 samples, for a total of 25 possible combinations!

To achieve this, we simply create two footstep cues, one for the toe and on for the heel. Each of them is similar to the cue (of random type) we built previously. The toe cue randomly plays one of the 5 toe waveforms, and the heel cue randomly plays on of the 5 heel waveforms. Then we create a parent cue and we simply drop both cues on a track next to each other so that they will be played sequentially but that their content will be chosen randomly.

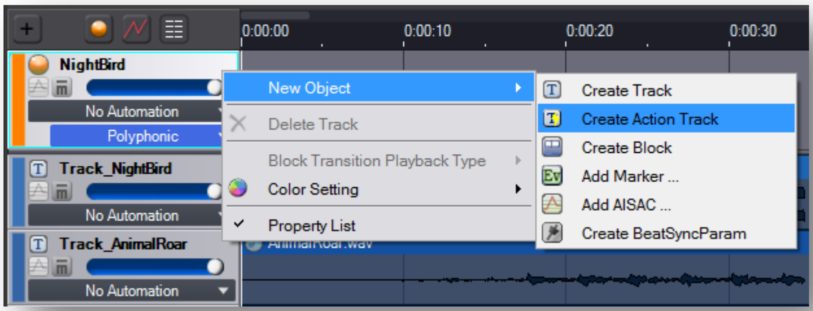
Press play and listen to even more realistic footsteps!



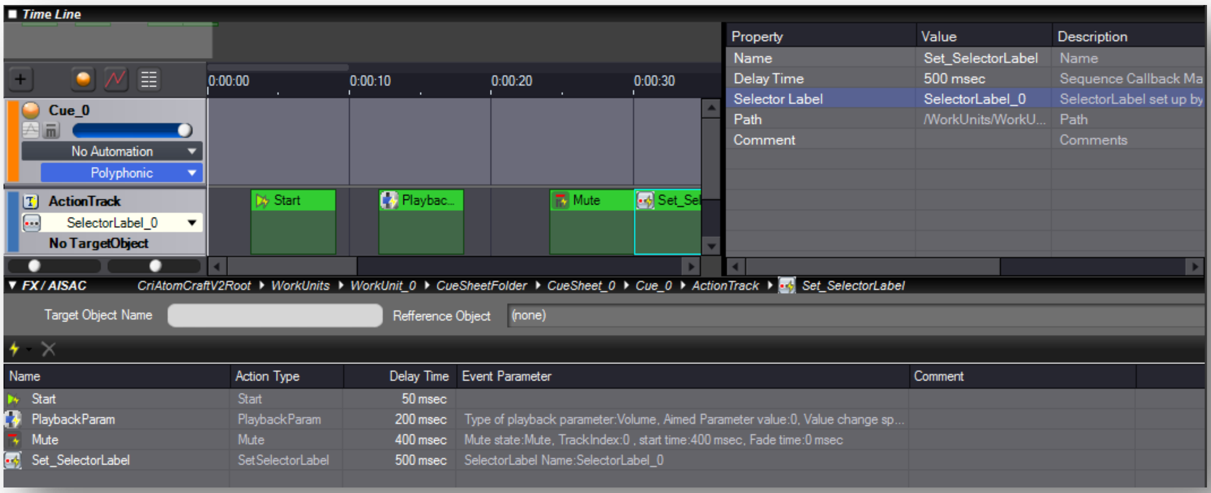


💡 Tip
Dividing samples in shorter waveforms and recombining them in different ways not only allows us to create more variations but also saves memory and storage space!

Another way to create complex behaviors is to use Actions. Actions can be added to a cue by creating a special *Action Track*.



By putting actions on the timeline of that special track we are actually performing some basic scripting as shown on the picture below. Actions include Start / Stop / Mute / Set Parameter and Set a Selector (project-wide switch).



Property	Value	Description
Name	Set_SelectorLabel	Name
Delay Time	500 msec	Sequence Callback Ma
Selector Label	SelectorLabel_0	SelectorLabel set up by
Path	/WorkUnits/WorkU...	Path
Comment		Comments

Target Object Name:
Refference Object: (none)

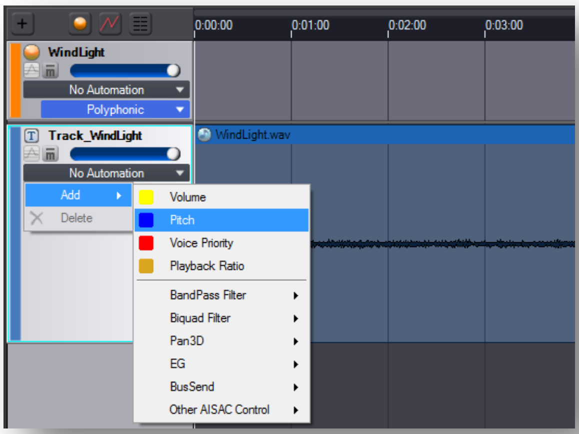
Name	Action Type	Delay Time	Event Parameter	Comment
Start	Start	50 msec		
PlaybackParam	PlaybackParam	200 msec	Type of playback parameter:Volume, Aimed Parameter value:0, Value change sp...	
Mute	Mute	400 msec	Mute state:Mute, TrackIndex:0 , start time:400 msec, Fade time:0 msec	
Set_SelectorLabel	SetSelectorLabel	500 msec	SelectorLabel Name:SelectorLabel_0	

Adding automation

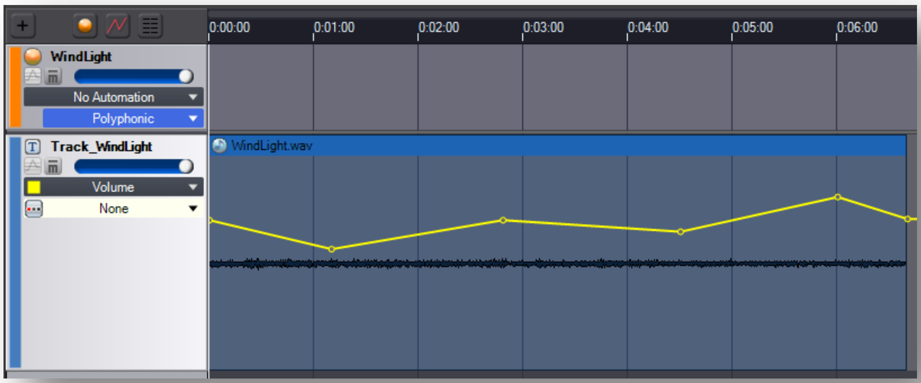
Another way to create variations without using more memory is to use automation curves. These are multi-segments envelopes that can affect the value of many parameters of the cue over time.

This time, let's try with a wind sample. Drop an appropriate sample file in the material folder and create a cue. Click on the cue to show the newly created track and then click on the combo box displaying *No Automation*.

One can add automation to a large number of parameters, such as volume, pitch but also filter cutoff frequency and resonance, panning etc…



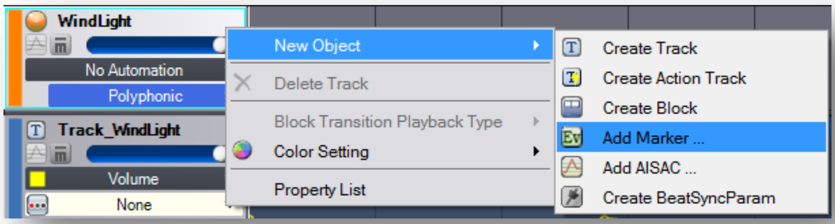
We will be adding a volume automation curve. A colored line appears. Simply click on it to add points and drag them to shape the curve as you want.



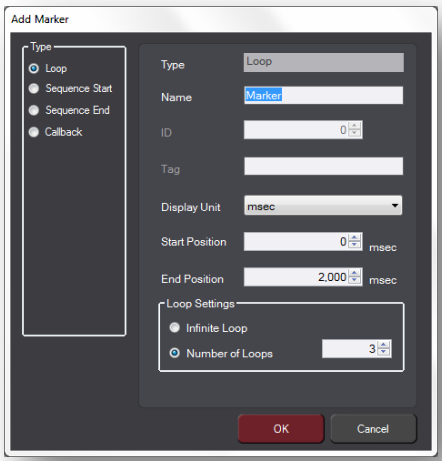
Note
We could add many automation curves (one per parameter) on the same track.

Let’s listen to it! Indeed, the volume of our wind sample now changes over time. We could drag the same wind waveform to create another cue, and add different automation curves. Because we would only be changing the automation curves and not the waveform itself, we could have several versions of the wind, all sounding slightly different, without needing any more memory to store additional waveforms.

We have a last thing to do. Because it is a wind sound effect, we want it to loop. However, the automation curve should also loop with the waveform, so the looping has to be done at the cue level. To do that, let’s bring the context menu of the cue, select *New Object* and then *Add Marker*.



This will open the window below. It is possible to specify different markers and loop settings such as the range of the loop and how many times it should repeat itself. Let’s choose a marker of type *Loop* and make sure it is looping indefinitely.



Add Marker

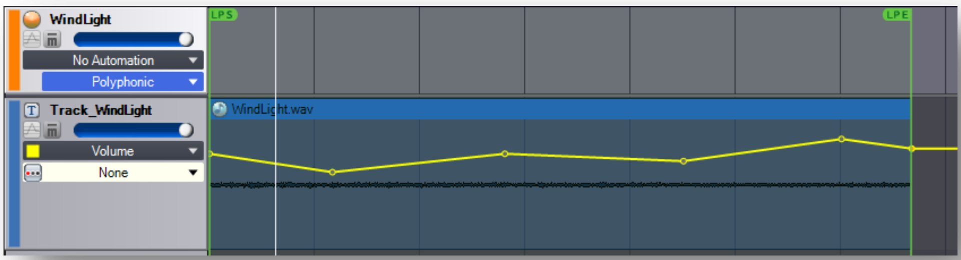
Type
[✓ Loop] Sequence Start Sequence End Callback

Type	Loop
Name	Marker
ID	0
Tag	
Display Unit	msec
Start Position	0 msec
End Position	2,000 msec

Loop Settings
Infinite Loop [✓ Number of Loops] 3

OK Cancel

Two green markers appear on the timeline of the cue. You can drag them to adjust the starting and ending points of the loop if you didn't enter precise values in the previous window.



We now have a variation of the wind sound effect which is looping correctly!

Tip
Because the automation curve is looping too, we have to make sure that the beginning and the end of the curve are at the same level or relatively close to avoid audible clicks.

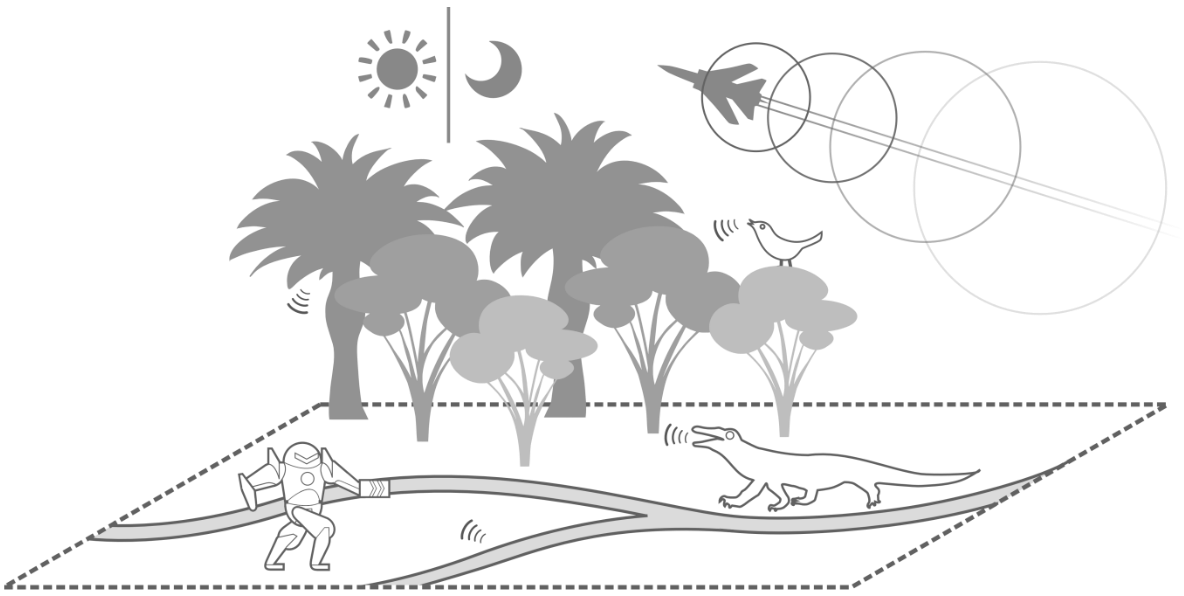
Building a sound scene

<u>What's in a sound scene?</u>

ADX2 and its authoring tool AtomCraft have everything needed to create immersive sound worlds. Now that we have seen the basics of cue creation, let's get a bit more ambitious and check what would be involved in implementing the sound design of a whole game scene.

On the sound design side - we will talk about music and dialog a bit later - a sound scene will usually consist of one or more ambience layers, as well as several fixed or moving 3D sound emitters (for example for enemies, the player and other scene objects). [There may also be some 2D interface sounds as well (and of course if the game is totally in 2D then most sounds will be too)].

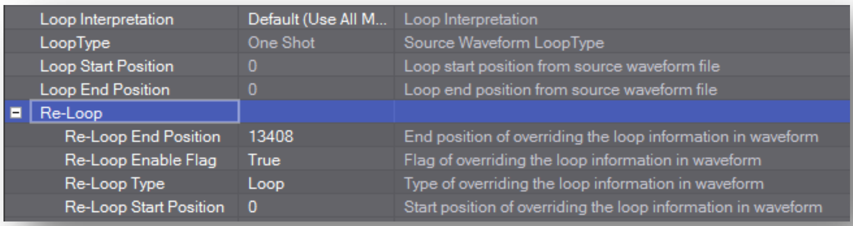
Let's try to recreate the following sound scene:



We will have 5 layers of ambiances: a generic jungle ambience, exotic birds in the distance, some kind of sporadic monkey sounds in the back too, the constant gurgling of the river in the front, and a weather layer (the sound of a light breeze and the rustling of the leaves). In addition we will add a couple of 3D sound emitters for animals in the front. Finally, a spaceship will sometimes quickly fly over the planet.

<u>Looping waveforms</u>

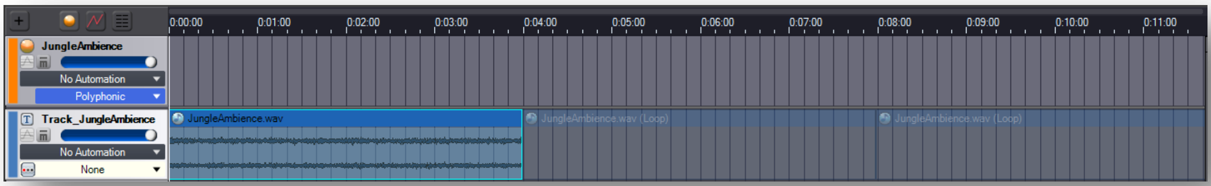
Let's start by adding our five ambiance samples to the materials folder. An ambiance is a sound that plays constantly in the background. In AtomCraft, there are several ways to make a sample loop. We saw one with the cue markers in the previous section. This time we will simply do it at the waveforms level. It is possible to use the loop points set in the original sample file or to override these points in the tool. Click on a waveform from the material folder and edit it:



Loop Interpretation	Default (Use All M...	Loop Interpretation
LoopType	One Shot	Source Waveform LoopType
Loop Start Position	0	Loop start position from source waveform file
Loop End Position	0	Loop end position from source waveform file
⊟ Re-Loop		
Re-Loop End Position	13408	End position of overriding the loop information in waveform
Re-Loop Enable Flag	True	Flag of overriding the loop information in waveform
Re-Loop Type	Loop	Type of overriding the loop information in waveform
Re-Loop Start Position	0	Start position of overriding the loop information in waveform

The *Loop* parameters are the ones coming directly from the wave file. The *Re-Loop* parameters are used to override them.

Once a track is using a looping waveform, it will look like depicted below (notice the ghosted repetitions after the initial waveform to indicate that it is looping):

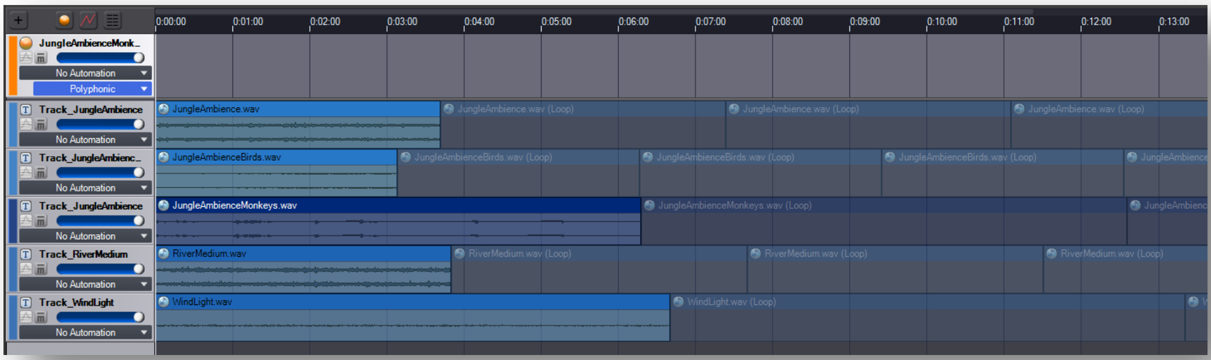


Once the five waveforms have been set up to loop, we create a cue containing five tracks, each one with a looping sound. We will keep the type of the cue as polyphonic, so that our five tracks will play simultaneously.

Tip

Adding layers with samples of different durations automatically creates evolving ambiences, as the loops don't repeat themselves at the same frequency. If we wanted that amount of variation from one single sample, we would need a much longer one, which would be costly in memory or disk space.

We should now have something like this:



Tip

When working with many cues and tracks, it is easy to get overwhelmed. AtomCraft offers the possibility to color the various audio objects, which is very convenient and efficient to organize your work. Use the *Color Settings* command from the context menu when available.

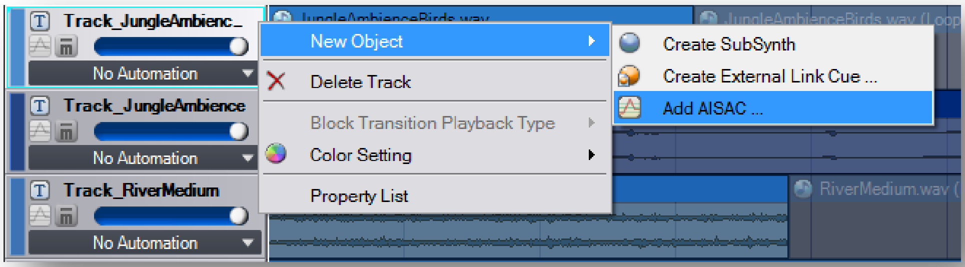
AISAC control

We now have an evolving ambience built from five looping sounds of different durations. The next step is to make this ambience dynamic, i.e. responsive to the events in the game. For example, the sound of the jungle will normally be different depending on the time of the day. It would be great if there was a way to notify the cue to change its parameters if it's day-time or night-time. Luckily for us, that's what AISAC is all about.

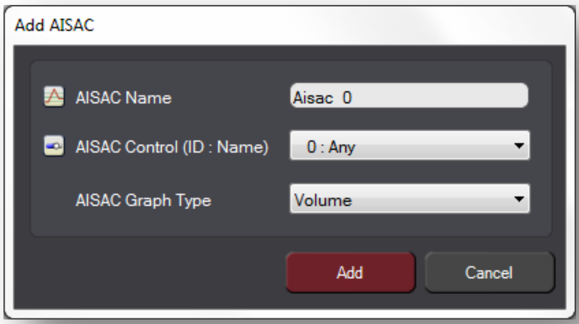
Key Term

AISAC is a system allowing the control of audio parameters by values coming from the game.

Right click on the track corresponding to the ambient birds. In the context menu, select *New Object* and then *Add AISAC*.



The following window appears, allowing you to associate a parameter with the new AISAC control. Like with automation curves, many parameters can be controlled by AISAC, such as volume, pitch, pan, filter and so on. The idea is to make the birds quiet at night, so let's choose the volume parameter.

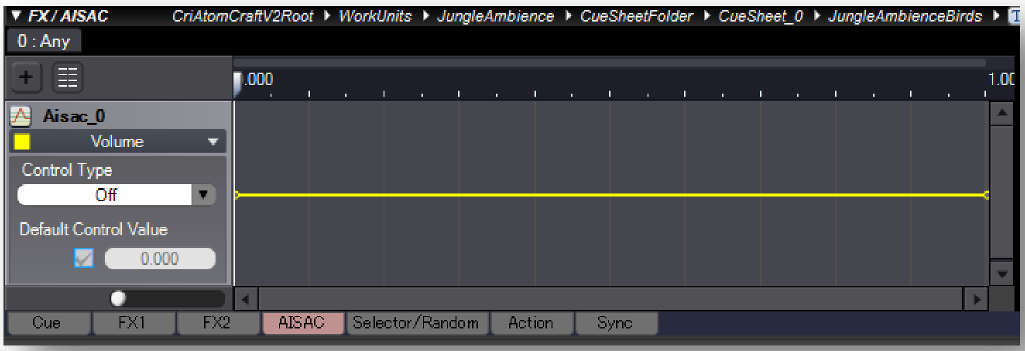

Add AISAC

AISAC Name: Aisac_0

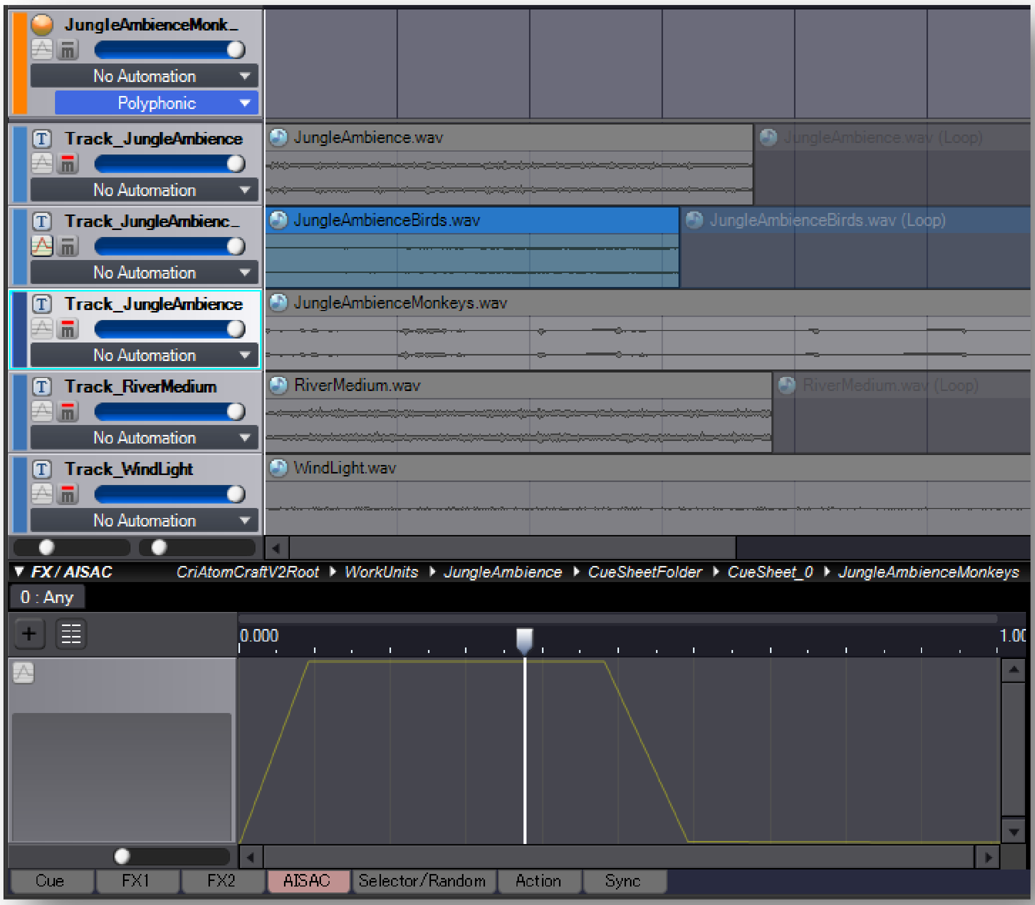
AISAC Control (ID : Name): 0 : Any

AISAC Graph Type: Volume

Once the window closed, the AISAC tab is selected in the FX / AISAC panel at the bottom of the main window and a default line is drawn. Similarly to the automation curves, simply click on the line to add points and drag them to shape the curve as you wish (you can also type in the values directly in a pane on the right).

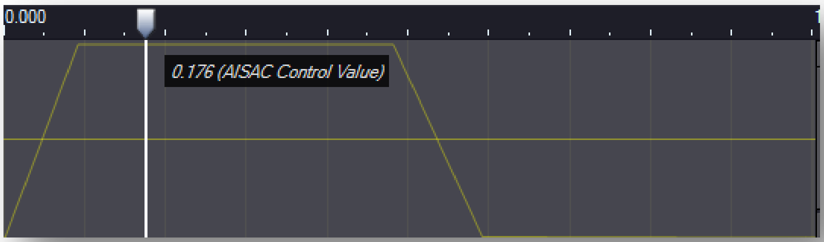


AISAC maps input values coming from the game (in the range from 0 to 1) to the values in the range of the parameter we have chosen. The curve we draw is therefore a mapping curve. When we move the points on the curve, AtomCraft displays the equivalent values in the parameter's units.

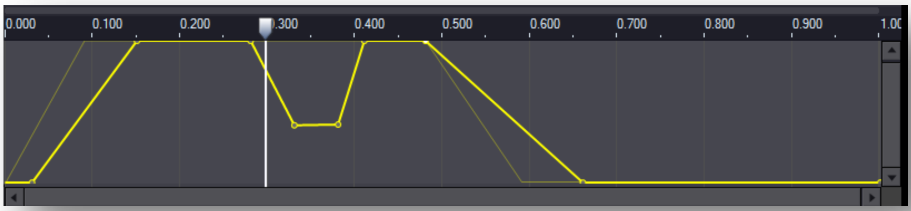


Because we want to simulate the day / night cycle, we first draw a volume fade-in for the morning, then a stable part at full volume for the day, a fade out part for the evening, and finally a silent part for the night. The ambient jungle birds will chirp during the day but not at night.

Let's try it! But first, to hear exactly what is happening, let's mute the other tracks. This can be easily done by pressing on the small M-shaped buttons on all tracks except for the jungle birds' ambience. The muted tracks will appear in gray. Press the preview button. While the sound is looping drag the AISAC cursor to change the time of the day: the birds are now waking up, chirping during the day, stopping progressively and sleeping at night!



We now do the same for the ambient layer with the monkey screams. Select the right track and add another AISAC control for the volume. We draw a slightly different curve this time to take into account their different lifestyle and we even add a midday nap during which they will be quieter!



Finally, we can unmute all the tracks and listen to the result of our 5-layer evolving ambience with day / night control from the game. It was really easy!

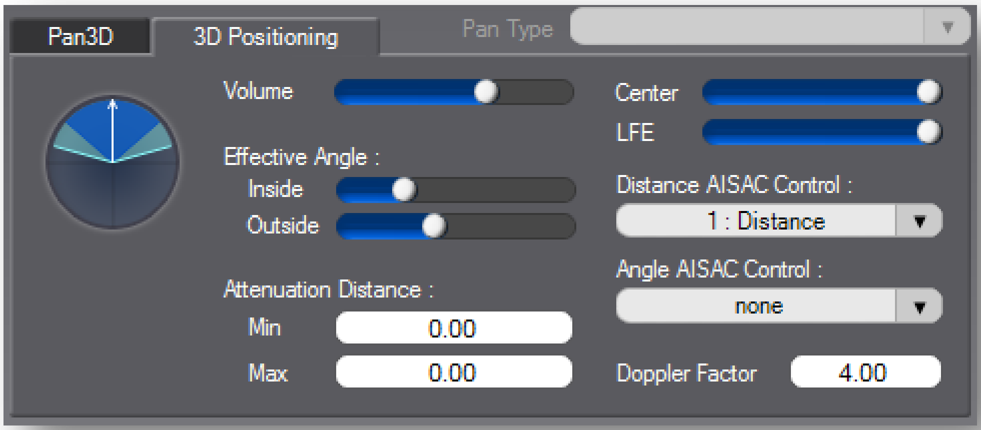
Note

The AISAC mapping curve can also have a random range and be retriggered periodically, which opens the door to a lot of other possibilities!

Sound Emitters

Until now all the cues from our sound scenes were background ambiences but some objects or characters (moving or immobile) can make sounds too. These sound sources are more local and directional. This is for example the case of the bird and the reptile in the front of the scene as well as the spaceship which flies by from time to time.

The 3D positioning tab from the *Cue* parameters lets you set the actual directionality of the sound emitter by specifying the inner and outer angles of its emission cone, as well as its distance attenuation by providing minimum and maximum values.



Distance AISAC Control : 1 : Distance
Angle AISAC Control : none
Attenuation Distance :
Min 0.00
Max 0.00
Doppler Factor 4.00

You will notice that there is no choice of attenuation curve, but because the distance can be controlled by AISAC, it is possible to map the parameter to any curve we design. Actually, even the angle can be controlled by AISAC.

Note
Do not confuse Pan 3D which describes the location of the sound relatively to the speakers and 3D positioning, which indicates how a sound should be emitted in a 3D world (distance attenuation, directionality etc…).

For the creatures in the front of our sound scene, we can select a rather narrow emission cone and fast attenuation curve, as you can't hear a bird very fast away. The case of the spaceship is a bit different: because we can hear it at a distance and because it will fly by at a high speed, which makes it a perfect candidate for a Doppler effect.

As you can see in the window above, there is a *Doppler Factor* parameter. Because if we applied the real Doppler formula, the resulting effect would be too subtle and not similar to what we have come to expect from movies and video games, many games use a Doppler effect which is many times bigger than normal. It is totally unrealistic but much more convincing and dramatic in the context of a video game!

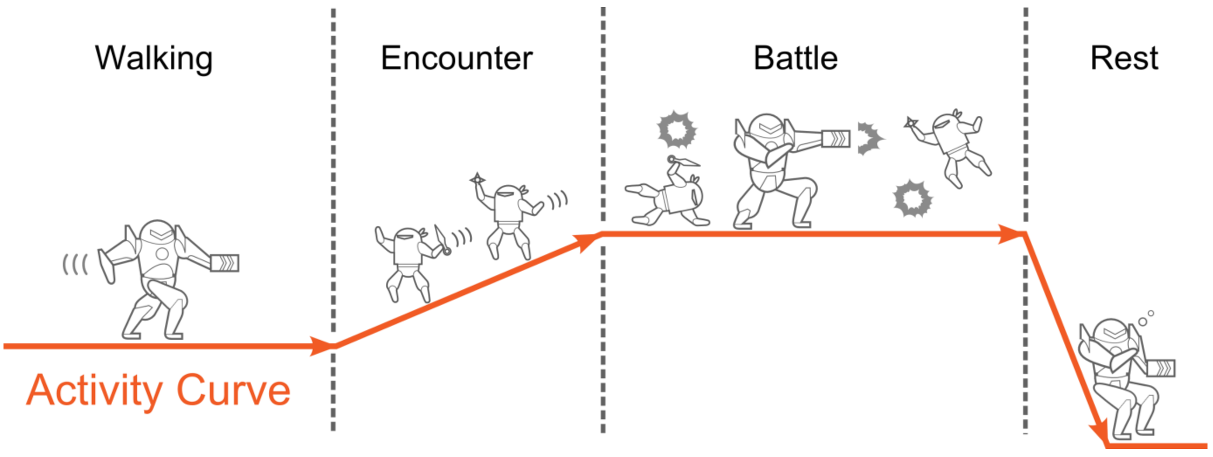
Implementing interactive music

Introduction

Interactive music in a video game can be implemented in different ways, from simple crossfades between musical stems to very complex reactive systems. ADX2 can do it all and we will see below two ways to implement interactive music in AtomCraft.

To be reactive, the music must know what is happening in the game. Usually, a variable will be defined and its value (level or a state) will be sent by the game to the audio engine. For example, the game could define an “activity” variable based on how active the player’s character is and send its value to the game audio engine. The audio engine would then interpret this value and play the appropriate music.

The following picture describes a game scenario where the player would be walking in an open world, and in that case, the level of activity is normal. But he soon sees enemies approaching and the activity level is increasing. They reach him and attack him! At this point the level of activity is maximal as they are fighting. Finally, the player is victorious. He picks up the loot the enemies left behind and rests. The activity level reaches its lowest point. Instead of passing the activity level as a value, the game could also communicate a state: walking, encounter, battle or rest.



Using AISAC

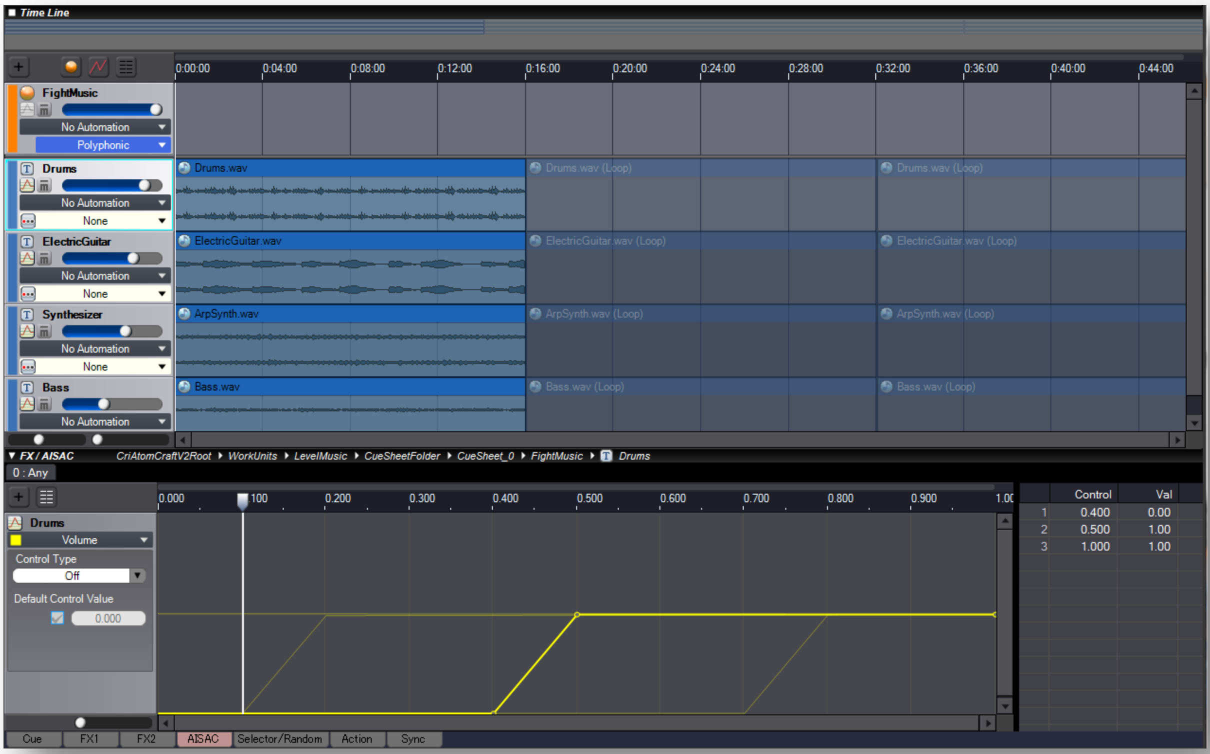
Modifying sounds based on a curve (like the activity curve described above) seems the prefect job for AISAC. Indeed, we could use the same technique than for our jungle ambience, and make musical tracks appear and disappear depending on the game context.

In this simple example, we will use four tracks for the various states of the game:

Walking	Encounter	Battle	Rest
Synth	Synth	Synth	Synth
Bass	Bass	Bass	
	Drums	Drums	
		Electric Guitar	

The higher the level of activity will be, the more tracks we will play. We will keep it very soft for the resting and walking states, but we will progressively add drums for the encounter to build up excitement and then an electric guitar for the fight.

Let's add the four waveforms to the materials folder and make sure they are all flagged as loops. Then, we create a cue with a track for each waveform. For each track, we add AISAC control over the volume parameter. It is more convenient to reorder the states from the quietest to the more active: rest, walking, encounter and fight. Finally, we edit the volume curves as below to make each track progressively appear as the activity level increases.



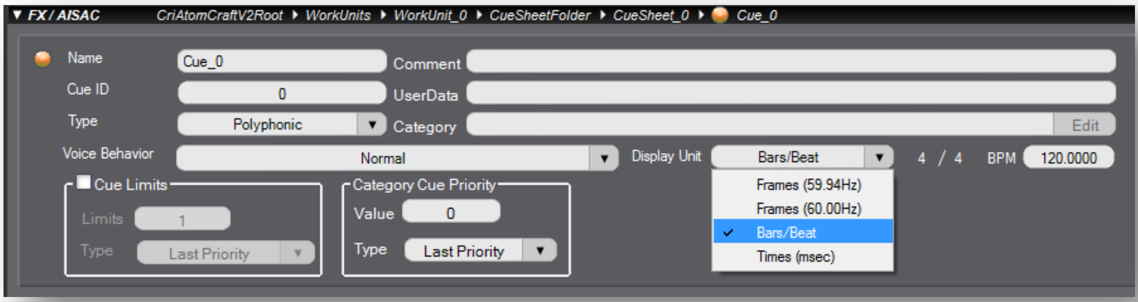
Drums
Volume
Control Type: Off
Default Control Value: 0.000

	Control	Val
1	0.400	0.00
2	0.500	1.00
3	1.000	1.00

While previewing, moving the AISAC cursor from left to right will indeed increase the activity level and make the music become more and more dynamic.

<u>Using blocks</u>

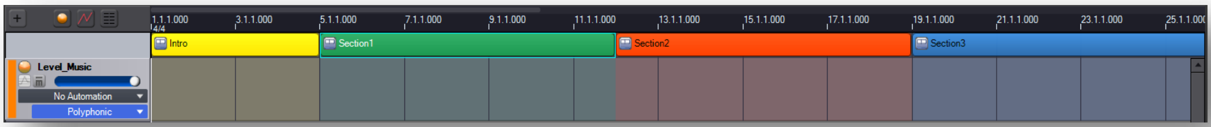
Another way to implement interactive music in AtomCraft is to use the blocks in the cues. To do that, create a new cue and change the display units for the timeline to bars / beat. You can do this in the first tab of the FX / AISAC panel. Next to it, you can also set the tempo (the default is 120 BPM).


▼ FX / AISAC   CriAtomCraftV2Root ▸ WorkUnits ▸ WorkUnit_0 ▸ CueSheetFolder ▸ CueSheet_0 ▸ Cue_0

Name: Cue_0   Comment:
Cue ID: 0   UserData:
Type: Polyphonic   Category: Edit
Voice Behavior: Normal   Display Unit: Bars/Beat   4 / 4   BPM 120.0000

Cue Limits: Limits 1, Type Last Priority
Category Cue Priority: Value 0, Type Last Priority

From the cue context menu, we will now create several blocks (*New Object* -> *Create Block*) to organize our composition.

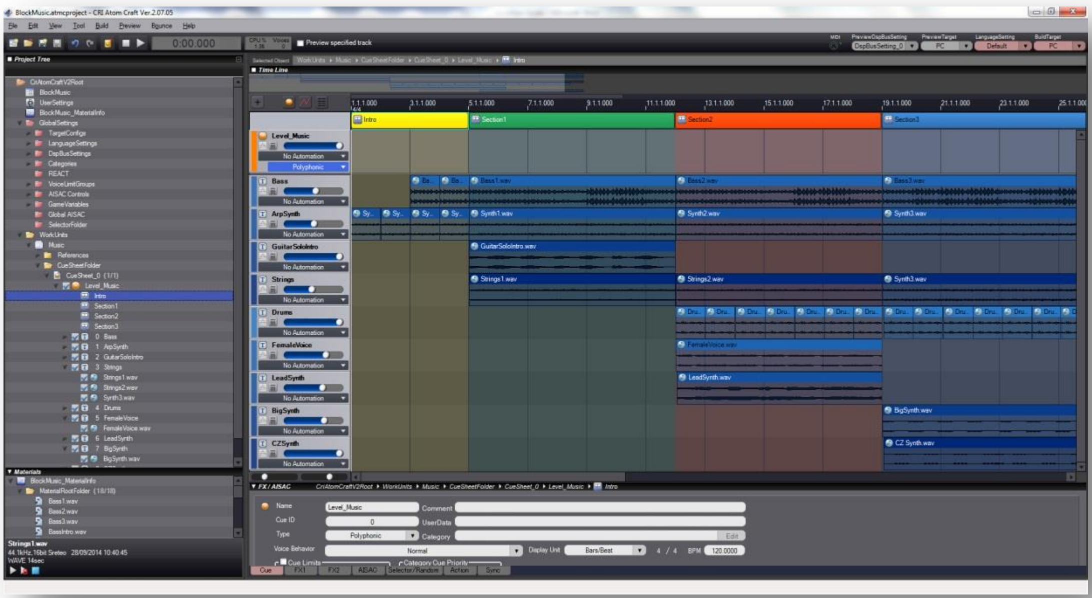


This is a good time to use the color options of AtomCraft!

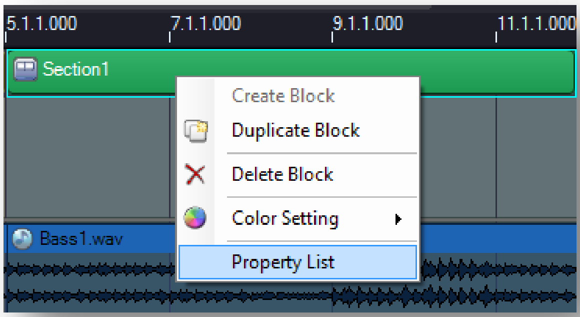
Key Term

A *Block* is a vertical structure which groups all the waveforms that are playing in a specific time slice. By opposition, a track is a horizontal structure defining what will be played over time.

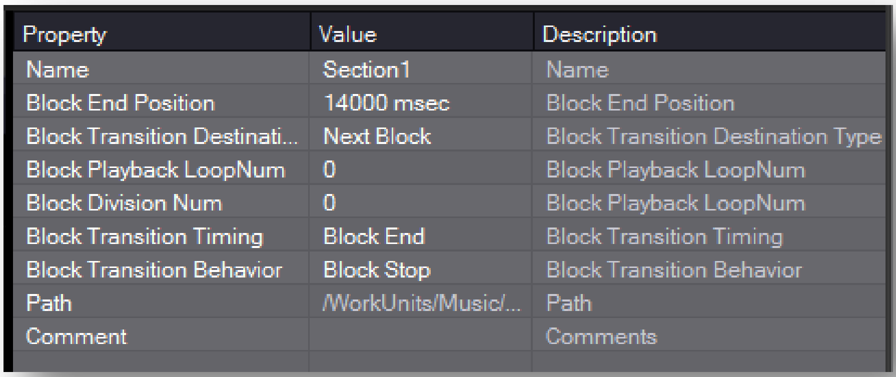
Now simply add your loops and riffs in the material folders, and create a track per instrument. Drop the loops in the appropriate blocks and on the right tracks. Here is an example:



Notice how AtomCraft looks and feels very much like a DAW! Now select a block and open the properties from the context menu:



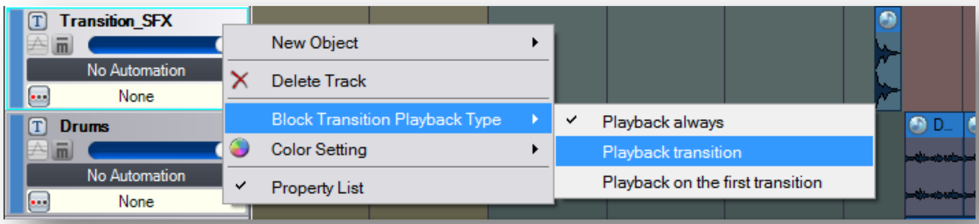
You can decide how many times a block will play and to what block it should transition to when it has finished looping.



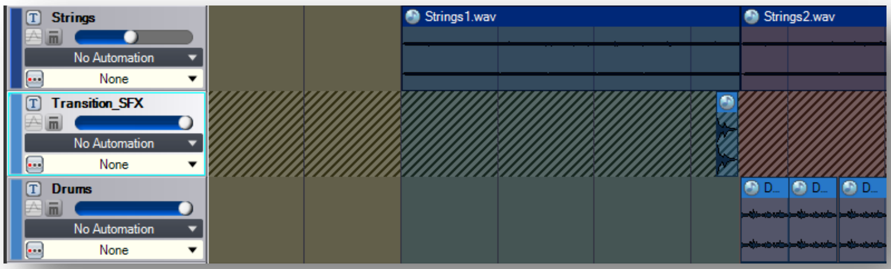
Property	Value	Description
Name	Section1	Name
Block End Position	14000 msec	Block End Position
Block Transition Destinati...	Next Block	Block Transition Destination Type
Block Playback LoopNum	0	Block Playback LoopNum
Block Division Num	0	Block Playback LoopNum
Block Transition Timing	Block End	Block Transition Timing
Block Transition Behavior	Block Stop	Block Transition Behavior
Path	/WorkUnits/Music/...	Path
Comment		Comments

You can also simulate what would happen in the game and switch from one block to another by clicking on the blocks while the previewer is playing. Once you click on a block, it will start blinking to indicate it will be the next to play.

Another interesting feature makes it possible to play some tracks only when transitioning. Create a new track and insert the waveform you want to play when it transitions (typically at the end of the block). Here we put a transitional sound effect at the end of our second section. Then select the track and in the context menu select *Block Transition Playback Type -> Playback transition*.



The track will appear differently to show it will only be playing for transitions:



This is a nice trick that works especially well with a small drum pattern, a reversed piano note etc…

Coming back to our initial example for interactive music, it is easy to see how each block could actually correspond to a state of the game (walking, encounter, battle and relax).

Tip

Because of their advanced sequencing capabilities, blocks can also be very useful when creating sound effects!

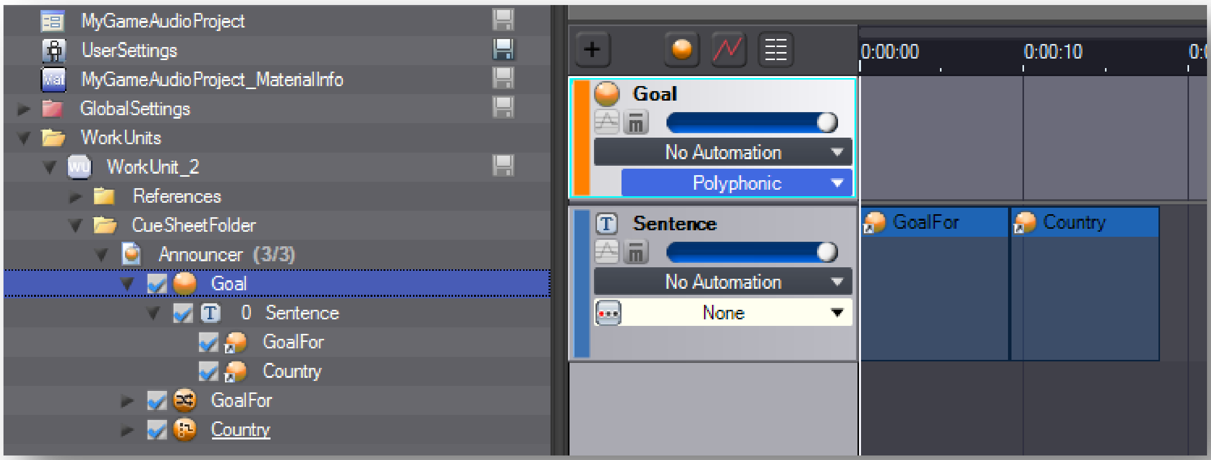
Adding dialog

Using cues

Dialog lines can be defined as any other cues in AtomCraft, which means they will automatically benefit from 3D positioning, DSP effects and so on... For example, you can use the DSP effects to create radio-transmissions or robotic voices in real-time. You can also use the cue's filter to make the voice appear behind a wall or far away.

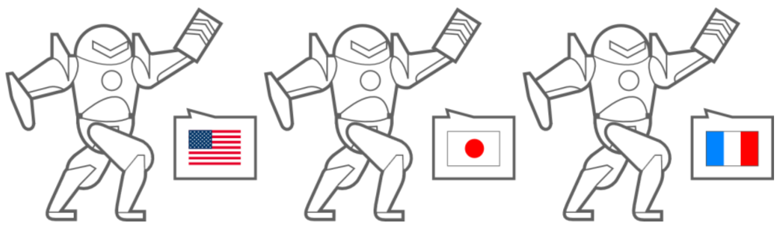
Thanks to all the potential combinations of the different types of cues, it is possible to build complex sentences at run-time, based on what is happening in the game. You can for example have a track referencing different cues, one for each part of a sentence.

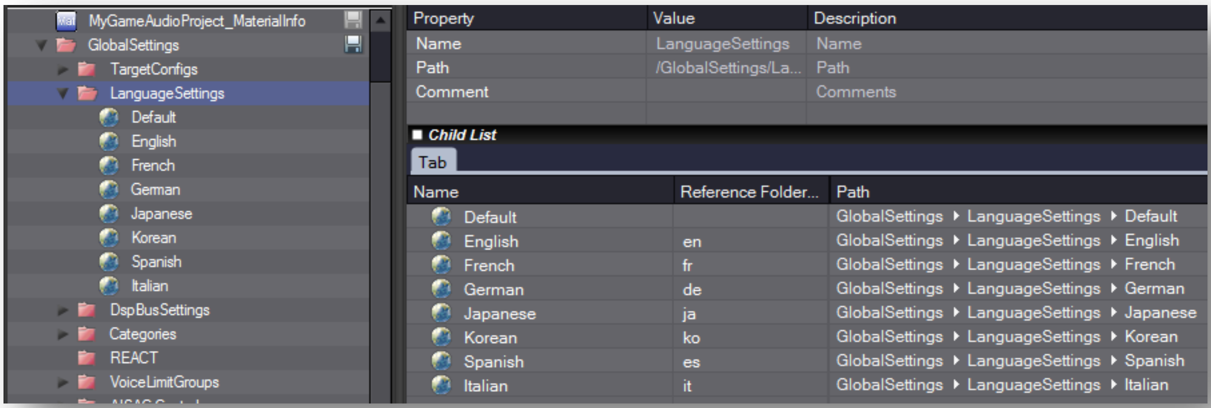
Let's imagine a soccer game. When the player scores a goal, you may want to have a few variations of the announcer message to avoid repetitiveness. Therefore the first cue could be of Shuffle type to announce the goal (e.g. "What a wonderful goal for", "This is a fantastic goal for", "And it goes into the net for", "That's one more for" etc…) Then you could have a second cue of Switch type, which would allow ADX2 to play the name of the team (e.g. "England", "Brazil") who scored, based on a game variable.



Localization

Dialog usually needs to be translated in various languages. AtomCraft offers the possibility to define alternative paths for the sample materials for each language.





MyGameAudioProject_MaterialInfo
GlobalSettings
TargetConfigs
LanguageSettings
Default
English
French
German
Japanese
Korean
Spanish
Italian
DspBusSettings
Categories
REACT
VoiceLimitGroups

Property	Value	Description
Name	LanguageSettings	Name
Path	/GlobalSettings/La...	Path
Comment		Comments

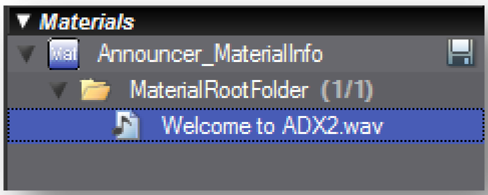
Child List

Tab

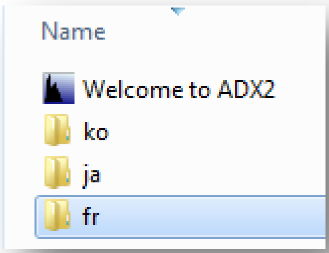
Name	Reference Folder...	Path
Default		GlobalSettings ▸ LanguageSettings ▸ Default
English	en	GlobalSettings ▸ LanguageSettings ▸ English
French	fr	GlobalSettings ▸ LanguageSettings ▸ French
German	de	GlobalSettings ▸ LanguageSettings ▸ German
Japanese	ja	GlobalSettings ▸ LanguageSettings ▸ Japanese
Korean	ko	GlobalSettings ▸ LanguageSettings ▸ Korean
Spanish	es	GlobalSettings ▸ LanguageSettings ▸ Spanish
Italian	it	GlobalSettings ▸ LanguageSettings ▸ Italian

Click on the *LanguageSettings* folder in the project tree. Here you can add and remove languages and specify a subfolder name for them.

For example, the default subfolder name for French is “fr”. Later, when you will be adding dialog files (.wav) to a material folder, you can create a subfolder called “fr” at the same level than the wave files you want to localize. Then, you can put your French dialog files in that subfolder. The translated samples must have the same name than the original ones.



Materials
Announcer_MaterialInfo
MaterialRootFolder (1/1)
Welcome to ADX2.wav

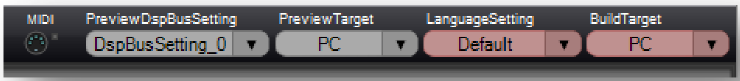


Name
Welcome to ADX2
ko
ja
fr

The pictures above show the dialog line *Welcome to ADX2.wav* in the Materials folder and in Windows Explorer. Another *Welcome to ADX2.wav* file must be in the ”fr” subfolder. It will contain the line in French. If no file is present, then the default one will be used.

Note
You need to create a subfolder in Windows Explorer. This is different from creating a regular material subfolder in the tool, and it will not appear in AtomCraft.

For testing purposes, you can select the language used by the AtomCraft previewer in the top-right corner of the main window. All the cues will be played using the material files corresponding to the specified language.



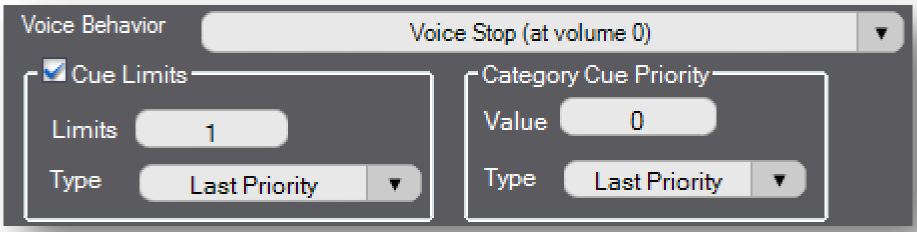
MIDI	PreviewDspBusSetting	PreviewTarget	LanguageSetting	BuildTarget
	DspBusSetting_0	PC	Default	PC

Playing everything together

Voice limiting and grouping

With so many things simultaneously happening in games, they usually trigger a large number of requests to play cues, be it sound effects, dialog or music. However, smartphones, handhelds, and even consoles have hardware or software limitations that prevent them to play too many sounds at the same time (and it would be too noisy too!).

To avoid some sounds being cut off brutally or not even getting started at all in such cases, cues have both priorities (to know which ones are important and should be played) and instances limiting (to know the maximum number of similar sounds that can be played simultaneously). Also depicted below, voice behavior can be used to determine what happens when a voice becomes inaudible (in order to save resources). It could simply be stopped, or maintained in a virtual mode with or without update of its parameters in case it becomes audible again.



Voice Behavior: Voice Stop (at volume 0)

☑ Cue Limits
- Limits: 1
- Type: Last Priority

Category Cue Priority
- Value: 0
- Type: Last Priority

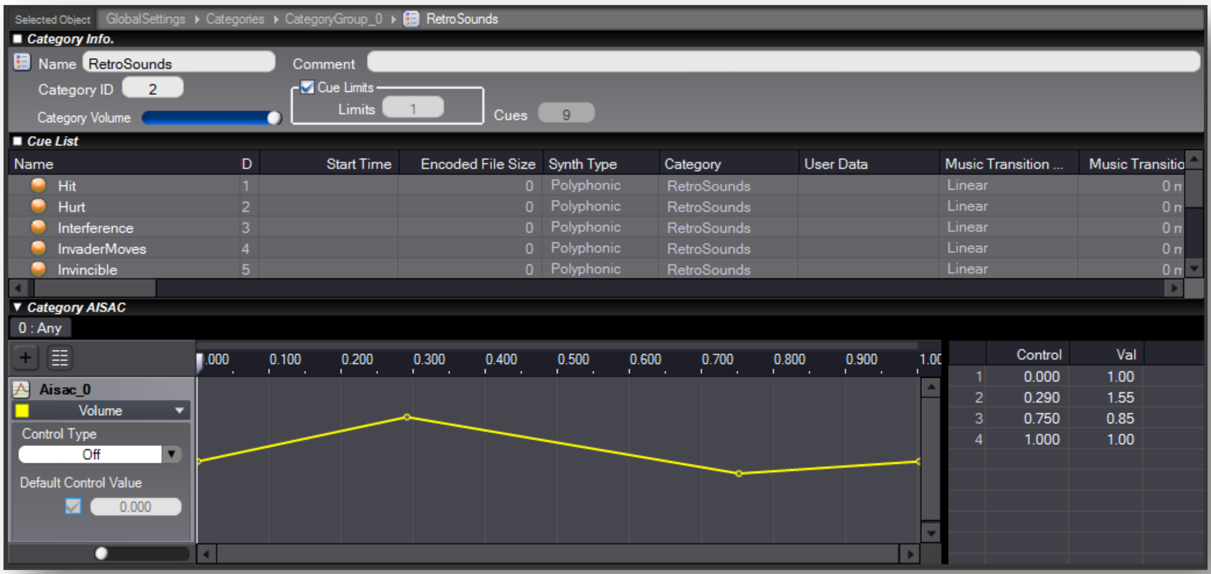
Because it would be cumbersome to set the behavior of all voices manually and because a lot of them are used in the same context (character Foley sounds, weapon's projectiles, impacts etc…), AtomCraft offers the possibility to group them into categories.

Key Term

A *Category* is a group of volume and playback rules that applies to a set of cues.

Category groups and categories can be created by selecting the *Categories* folder in the project tree and using the context menu commands.

To assign a category to a cue, you can drag the cue from its cue sheet (in the project tree) to the *Categories* folder.


Selected Object GlobalSettings ▸ Categories ▸ CategoryGroup_0 ▸ RetroSounds

Category Info.

Name: RetroSounds Comment:
Category ID: 2
Cue Limits ✓ Limits: 1
Cues: 9
Category Volume

Cue List

Name	D	Start Time	Encoded File Size	Synth Type	Category	User Data	Music Transition ...	Music Transitio
Hit	1		0	Polyphonic	RetroSounds		Linear	0 n
Hurt	2		0	Polyphonic	RetroSounds		Linear	0 n
Interference	3		0	Polyphonic	RetroSounds		Linear	0 n
InvaderMoves	4		0	Polyphonic	RetroSounds		Linear	0 n
Invincible	5		0	Polyphonic	RetroSounds		Linear	0 n

Category AISAC

0 : Any

Aisac_0
Volume
Control Type: Off
Default Control Value: 0.000

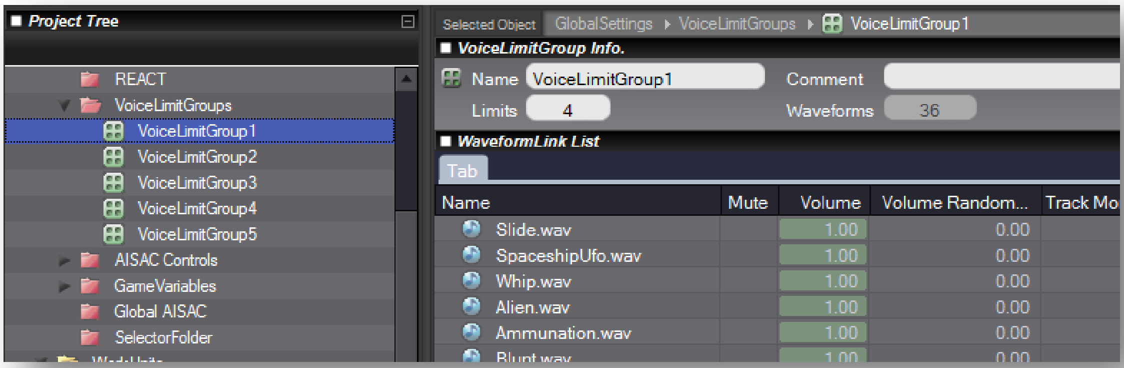
	Control	Val
1	0.000	1.00
2	0.290	1.55
3	0.750	0.85
4	1.000	1.00

As shown above, categories offer a parent volume for all of their cues as well as a limit to the number of cues from this category that can be played simultaneously. It is also possible to define a common ASIAC control for the category. Although it makes more sense for the volume, AISAC curves can be created for other parameters too.

In a similar way, a *VoiceLimitGroup* allows instances limiting at the waveform level.

Key Term
A *VoiceLimitGroup* is a set of waveforms for which the total number of instances playing can be limited.

A VoiceLimitGroup can be created in the project tree under the *VoiceLimitGroups* folder. To add waveforms to it, you can drop either tracks or cues onto it (all their waveforms will be included).


Project Tree

- REACT
- VoiceLimitGroups
  - VoiceLimitGroup1
  - VoiceLimitGroup2
  - VoiceLimitGroup3
  - VoiceLimitGroup4
  - VoiceLimitGroup5
- AISAC Controls
- GameVariables
- Global AISAC
- SelectorFolder

Selected Object GlobalSettings ▸ VoiceLimitGroups ▸ VoiceLimitGroup1

VoiceLimitGroup Info.

Name: VoiceLimitGroup1 Comment:
Limits: 4 Waveforms: 36

WaveformLink List

Tab

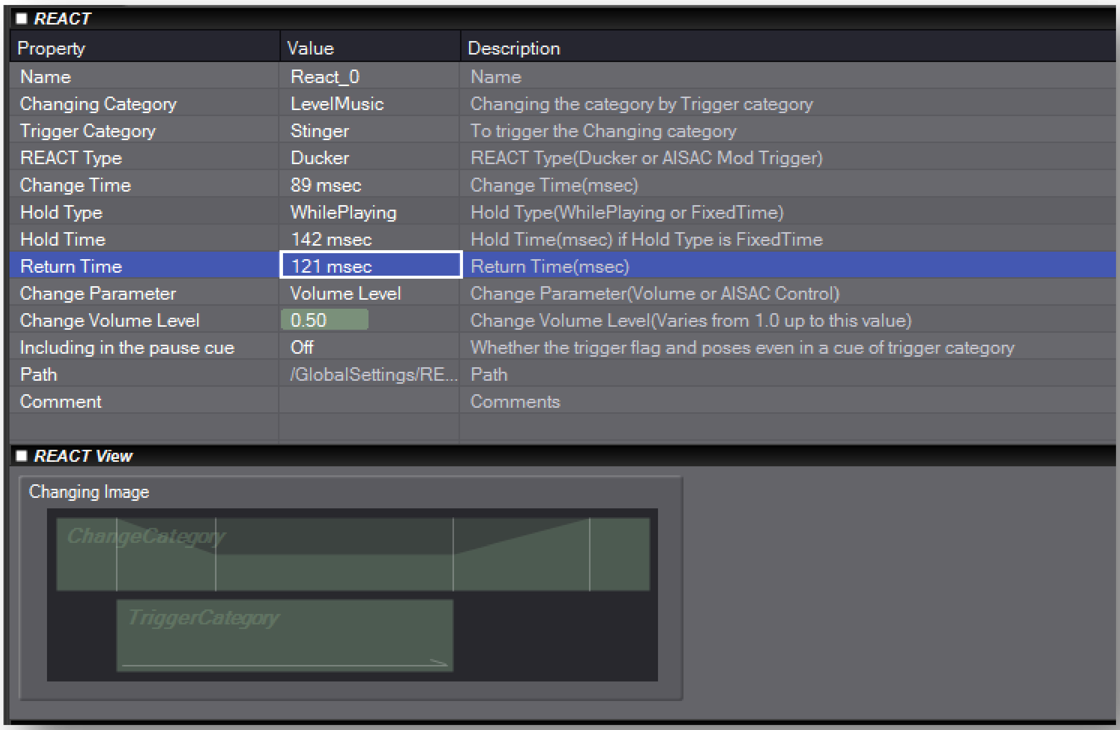
Name	Mute	Volume	Volume Random...	Track Mo
Slide.wav		1.00	0.00	
SpaceshipUfo.wav		1.00	0.00	
Whip.wav		1.00	0.00	
Alien.wav		1.00	0.00	
Ammunation.wav		1.00	0.00	
Blunt.wav		1.00	0.00	

REACT

In the previous section we have seen how we can limit the number of waveforms or cues playing and group them into sets which are more convenient to control. But even with a limited number of voices playing it, it can sometimes be difficult to single one of them. Making sure a cue is heard is the job of REACT.

Key Term
REACT is an automatic ducking system for cues.

To ensure the player will not miss an important sound, the REACT system can perform ducking automatically. Creating and setting up a REACT object is very easy. Select the *REACT* folder in the project tree and in the context menu chose *Create REACT*. Once you click on the new REACT object you will be presented with the following window:



REACT

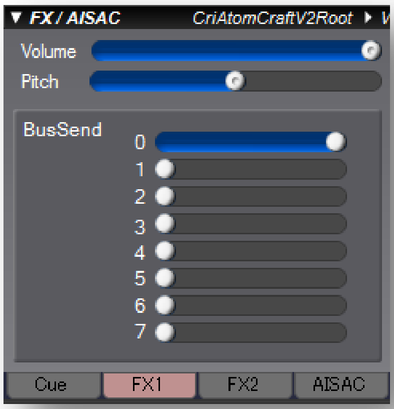
Property	Value	Description
Name	React_0	Name
Changing Category	LevelMusic	Changing the category by Trigger category
Trigger Category	Stinger	To trigger the Changing category
REACT Type	Ducker	REACT Type(Ducker or AISAC Mod Trigger)
Change Time	89 msec	Change Time(msec)
Hold Type	WhilePlaying	Hold Type(WhilePlaying or FixedTime)
Hold Time	142 msec	Hold Time(msec) if Hold Type is FixedTime
Return Time	121 msec	Return Time(msec)
Change Parameter	Volume Level	Change Parameter(Volume or AISAC Control)
Change Volume Level	0.50	Change Volume Level(Varies from 1.0 up to this value)
Including in the pause cue	Off	Whether the trigger flag and poses even in a cue of trigger category
Path	/GlobalSettings/RE...	Path
Comment		Comments

You can select a category for the sound that should trigger the ducking and a category for the sounds that should duck. For example here we specified that the level music should duck if a stinger is played on top of it.

You can of course set the fade-out and fade-in durations for the ducking as well as the level to which the playing sound should duck. A graphical representation helps making all these values very clear.

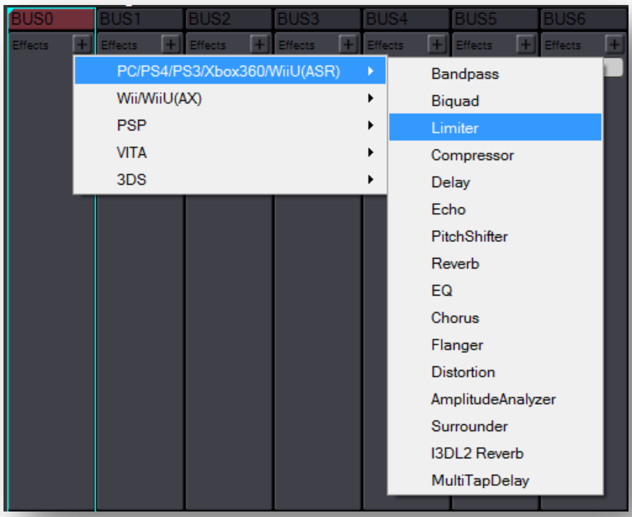
Mixing and effects

Mixing is also an important part of how so many sounds can coexist together. ADX2 offers seven busses to which the cues can be sent. The send levels are set in the FX1 tab of the FX / AISAC pane for the cue.



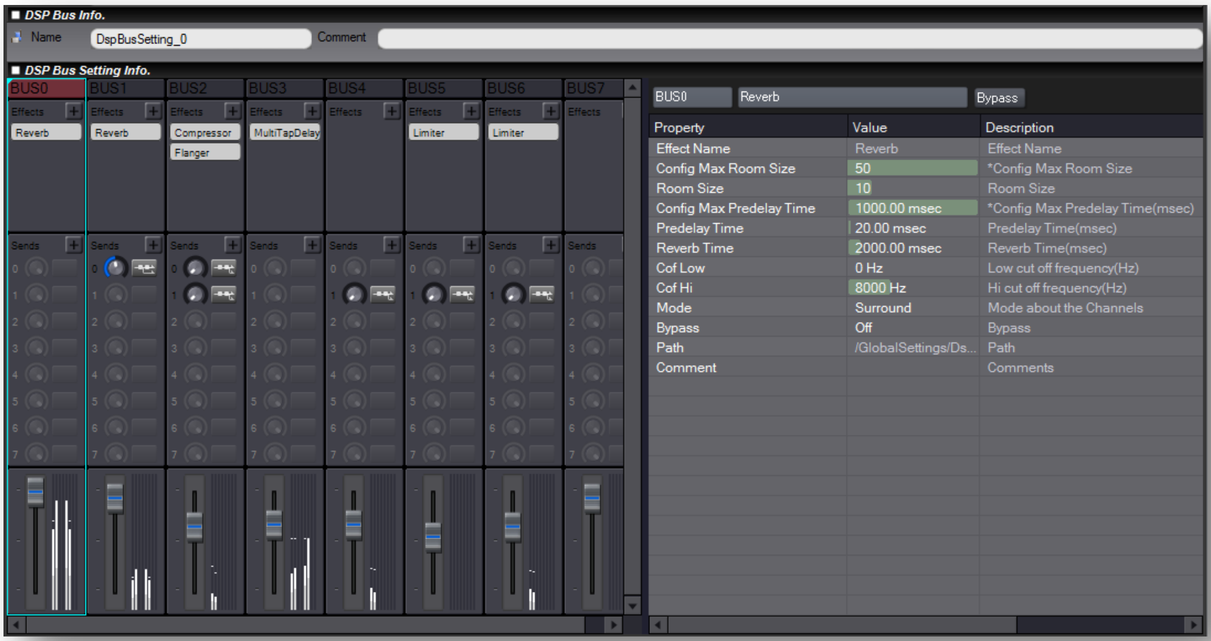
Key Term
A *DSP Bus Setting* is a snapshot of a mixer, including volume and send levels, effect chains and their parameters.

It is possible to create several DSP bus configurations which will be available in the *DspBusSettings* folder in the project tree. The effects available to insert on a bus depend on the target platform. For example, here are the effects available for PC / PS4 / PS3 / Xbox360 and WiiU:



The *DSP Bus Settings* editor looks like a typical mixer, with faders and send buttons (the send can be pre-volume, post-volume or post-pan) as well as real-time display of levels while previewing.

Clicking on an effect will bring up its parameters in the property grid on the right. Effects can also be bypassed.



DSP Bus Info.

Name: DspBusSetting_0

Comment:

DSP Bus Setting Info.

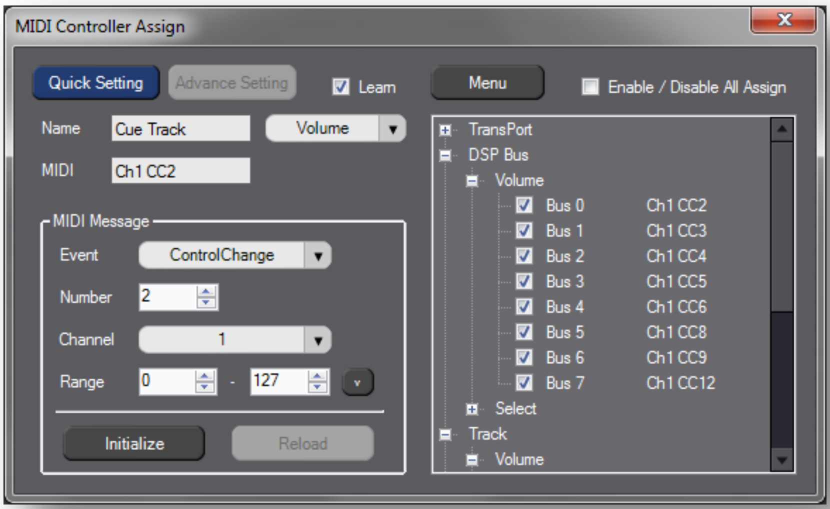
BUS0	BUS1	BUS2	BUS3	BUS4	BUS5	BUS6	BUS7
Reverb	Reverb	Compressor, Flanger	MultiTapDelay		Limiter	Limiter	

BUS0 — Reverb — Bypass

Property	Value	Description
Effect Name	Reverb	Effect Name
Config Max Room Size	50	*Config Max Room Size
Room Size	10	Room Size
Config Max Predelay Time	1000.00 msec	*Config Max Predelay Time(msec)
Predelay Time	20.00 msec	Predelay Time(msec)
Reverb Time	2000.00 msec	Reverb Time(msec)
Cof Low	0 Hz	Low cut off frequency(Hz)
Cof Hi	8000 Hz	Hi cut off frequency(Hz)
Mode	Surround	Mode about the Channels
Bypass	Off	Bypass
Path	/GlobalSettings/Ds...	Path
Comment		Comments

MIDI control

Like in any DAW, you can also use a MIDI control surface (or any other MIDI controller) to drive AtomCraft! It is especially convenient to quickly adjust parameters and debug while the previewer is playing. Once you have selected your MIDI input device in the *Tools->Properties* menu, you can use the *MIDI Controller Assign* window (also in the *Tools* menu) to assign MIDI CC's to bus levels, track volumes and even AISAC parameters!



MIDI Controller Assign

Quick Setting | Advance Setting | ☑ Learn | Menu | ☐ Enable / Disable All Assign

Name: Cue Track — Volume

MIDI: Ch1 CC2

MIDI Message

Event: ControlChange

Number: 2

Channel: 1

Range: 0 - 127

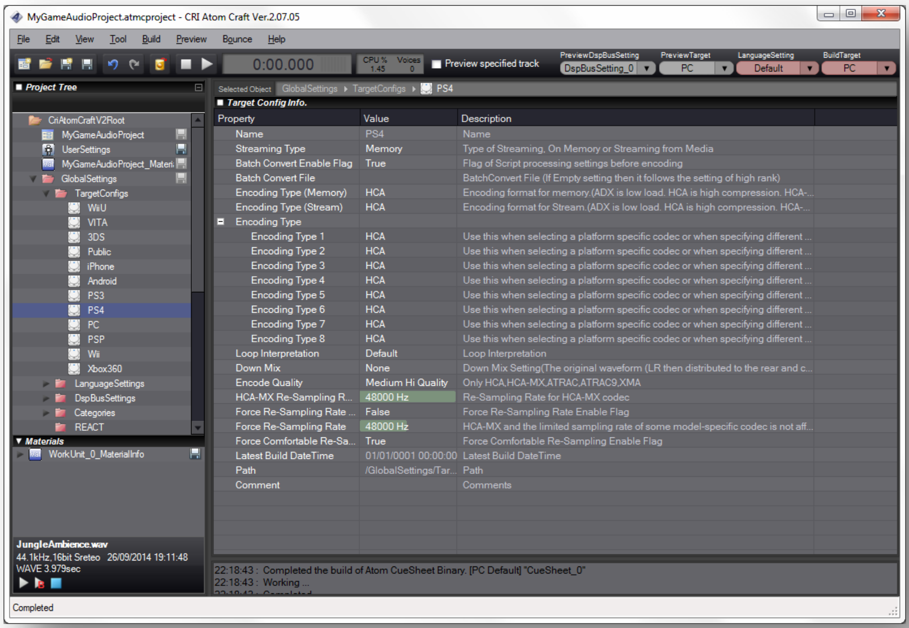
Initialize | Reload

TransPort	
DSP Bus	
Volume	
☑ Bus 0	Ch1 CC2
☑ Bus 1	Ch1 CC3
☑ Bus 2	Ch1 CC4
☑ Bus 3	Ch1 CC5
☑ Bus 4	Ch1 CC6
☑ Bus 5	Ch1 CC8
☑ Bus 6	Ch1 CC9
☑ Bus 7	Ch1 CC12
Select	
Track	
Volume	

Exporting

Target configuration

Once you have prepared your cues for sound effects, music and dialog, it is time to export the cue sheets towards the game. First, make sure that the target platforms and target languages are correctly configured. We have already seen in the dialog section that you can setup the languages by clicking on the *LanguageSettings* folder in the project tree. Similarly, you can configure the target platforms by clicking on the *TargetConfigs* folder. In particular, you will be able to select the encoding for each platform:



Target Config Info.

Property	Value	Description
Name	PS4	Name
Streaming Type	Memory	Type of Streaming, On Memory or Streaming from Media
Batch Convert Enable Flag	True	Flag of Script processing settings before encoding
Batch Convert File		BatchConvert File (If Empty setting then it follows the setting of high rank)
Encoding Type (Memory)	HCA	Encoding format for memory.(ADX is low load. HCA is high compression. HCA-...
Encoding Type (Stream)	HCA	Encoding format for Stream.(ADX is low load. HCA is high compression. HCA-...
Encoding Type		
Encoding Type 1	HCA	Use this when selecting a platform specific codec or when specifying different ...
Encoding Type 2	HCA	Use this when selecting a platform specific codec or when specifying different ...
Encoding Type 3	HCA	Use this when selecting a platform specific codec or when specifying different ...
Encoding Type 4	HCA	Use this when selecting a platform specific codec or when specifying different ...
Encoding Type 5	HCA	Use this when selecting a platform specific codec or when specifying different ...
Encoding Type 6	HCA	Use this when selecting a platform specific codec or when specifying different ...
Encoding Type 7	HCA	Use this when selecting a platform specific codec or when specifying different ...
Encoding Type 8	HCA	Use this when selecting a platform specific codec or when specifying different ...
Loop Interpretation	Default	Loop Interpretation
Down Mix	None	Down Mix Setting(The original waveform (LR then distributed to the rear and c...
Encode Quality	Medium Hi Quality	Only HCA,HCA-MX,ATRAC,ATRAC9,XMA
HCA-MX Re-Sampling R...	48000 Hz	Re-Sampling Rate for HCA-MX codec
Force Re-Sampling Rate ...	False	Force Re-Sampling Rate Enable Flag
Force Re-Sampling Rate	48000 Hz	HCA-MX and the limited sampling rate of some model-specific codec is not aff...
Force Comfortable Re-Sa...	True	Force Comfortable Re-Sampling Enable Flag
Latest Build DateTime	01/01/0001 00:00:00	Latest Build DateTime
Path	/GlobalSettings/Tar...	Path
Comment		Comments

```
22:18:43 :  Completed the build of Atom CueSheet Binary. [PC Default] "CueSheet_0"
22:18:43 :  Working ...
```

Codecs

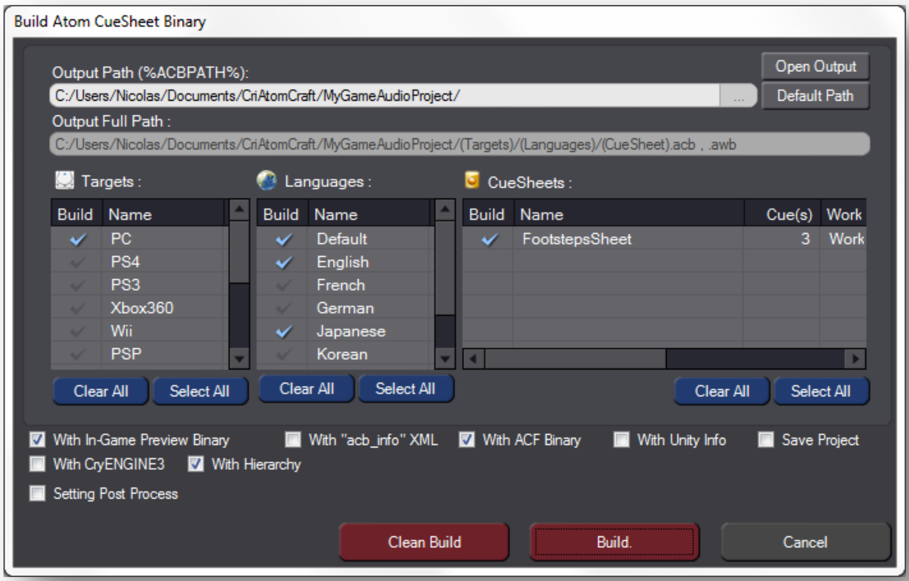
In addition to the regular offer from the console manufacturers, CRI Middleware has developed two proprietary codecs for sample data.

ADX is a high-fidelity, high compression, low CPU-load codec running on all game platforms, mobile devices, and embedded systems. With ADX, 48kHz stereo sounds can be compressed up to 1/16.

The HCA codec (for High Compression Audio) offers a compression ratio from 1/6 to 1/12. This codec has been tuned for games, the CPU load is very low (compared to MP3 and AAC) and stable during decoding. HCA also supports seeking. The HCA-MX codec is a variation of the HCA which reduces the CPU load when playing back a large number of sounds simultaneously. Thanks to this, the engine can play hundreds of sounds on consoles, and tens of sounds on mobile platforms.

<u>Files exported</u>

The export itself consists in generating a binary representation of the cue sheets (you can think of them as the equivalent of the binary sound banks in other systems). To trigger the export, call the *Build Atom CueSheet Binary* command from the *Build* menu or from the toolbar:



Build Atom CueSheet Binary

Output Path (%ACBPATH%): C:/Users/Nicolas/Documents/CriAtomCraft/MyGameAudioProject/

Output Full Path : C:/Users/Nicolas/Documents/CriAtomCraft/MyGameAudioProject/(Targets)/(Languages)/(CueSheet).acb , .awb

Targets :

Build	Name
✓	PC
	PS4
	PS3
	Xbox360
	Wii
	PSP

Languages :

Build	Name
✓	Default
✓	English
	French
	German
✓	Japanese
	Korean

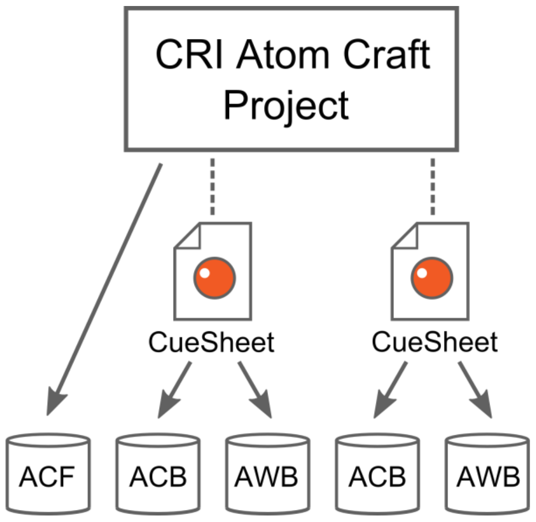
CueSheets :

Build	Name	Cue(s)	Work
✓	FootstepsSheet	3	Work

[✓] With In-Game Preview Binary [ ] With "acb_info" XML [✓] With ACF Binary [ ] With Unity Info [ ] Save Project
[ ] With CryENGINE3 [✓] With Hierarchy
[ ] Setting Post Process

You will be able to select the target platforms, the target languages, and of course what cue sheets you want to export.

When AtomCraft exports a project, several files are generated: one ACF file for the whole project, and one ACB and one AWB file per cue sheet exported.



The ACF file (for *Atom Configuration File*) contains the general information about the project and what cue sheets are parts of it. There is only one ACF file outputted per project.

The ACB files (for *Atom Cue sheet Binary*) contain all the parameters of a given cue sheet as well as any sample data destined to be played in memory by that cue sheet. If the audio data is expected to be streamed, it is stored in the corresponding AWB file.

The AWB files (for *Atom Wave Bank*) contain the encoded data for the streams referenced by the cue sheet (the parameters for the stream playback are in the ACB file).

Where to go from here?

Congratulations! You know how to create a new project in AtomCraft, build cues for sound effects, dialogue and music, organize them and mix them, and export them to the game.

This Quick Start manual is only the beginning. Very complex things can be simulated with AtomCraft by combining AISAC, all the different cue types, blocks, automation etc... Whatever your project you will find creative ways to implement it within AtomCraft.

AtomCraft and ADX2 in general have been developed over many years and have been used in a multitude of games: you will find a lot of other useful features in the tool to create engaging interactive audio content. Sky is the limit!