Tutorial 05
Creating Loops
Creating seamless sound
and musical looping files .

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Overview

One aspect of audio editing that is very useful for both sound designers and music producers is the ability to create sounds that loop endlessly without any disruption of the sound or the loop point being apparent. Creating seamless loops is not possible all of the time, very short sound samples or samples with very obvious audio highlights in them will often be impossible to repeat without the loop being obvious, but a great many sounds can be effectively looped and utilized without the listener being aware. A well created and effectively implemented looping sound can trick the listener into believing they are listening to a much longer sound event. Loops can also be very useful for creating music and in this case present a different series of issues to be dealt with.

One of the more common types of sound effects to be used in a looping manner is natural ambience recordings. The advantage of using a looping sound is that it requires a far shorter sound and as a result far smaller amount of data to be played. This is extremely useful if you are working on a project where data sizes are limited such as a video game or web based project where download sizes can be an issue. Choosing a good sample to begin with will make the rest of the process much easier and produce better results.

The aim of a looping sound is to give the impression of a long sound by repeating a much shorter sound over and over. To achieve this you need to avoid anything that gives away that we are repeating our shorter sound. If for instance you wanted to loop the sound of a crowd, it is best to choose material that consists of a consistent level of crowd murmur, avoiding anything that stands out or is too noticeable. When recording a room full of people at a good distance and input level, the result should be an overall mumble of people talking without any particular word or sentence being understandable. This is the cliichéd "Rhubarb Rhubarb" effect where a crowd of people could actually be talking about anything in any language and from a certain distance it wouldn't actually matter. This is exactly what is needed for a good looping recording. If for instance there was a point where someone audibly yelled out "Stop" then every time the sound was looped the "Stop" would repeat at the same point every time and the loop effect would be broken. If however the entire sound is a low level ambiguous rumble of voices it can be repeated infinitely without being noticeable. The same would apply to a recording of birds in a forest; any loud or too noticeable patterns will break the illusion you are trying to achieve with a loop.

Method 1

Choosing appropriate material to start with is important. It might be possible to edit out an offending audio event from an otherwise suitable sound sample allowing it to be usable to create a loop. Sometimes it may not be apparent if a sound will work well as a loop or not, but because it is a simple and straightforward process to create a loop a method of trial and error with various sounds can be a good approach. For this tutorial I am going to break the rule I usually stick to of using freely downloadable audio editing software. This is because I am so used to doing this with my main editing program and some of the free programs don't quite have the functionality required to create loops. Having said that I am going to continue to check some of the free programs and I will list the ones that can create loops in this manner. I am going to use Adobe Audition version 1.5. This program used to be called Cool Edit and any of the previous or current versions are capable of creating loops in this manner.

One of the main requirements for creating a seamless loop is the ability to either lay out sounds in a multi track format or perform clean mix paste functions. First the multi track process. Load the file you want to create a loop out of into one of the tracks in a multi track editor.
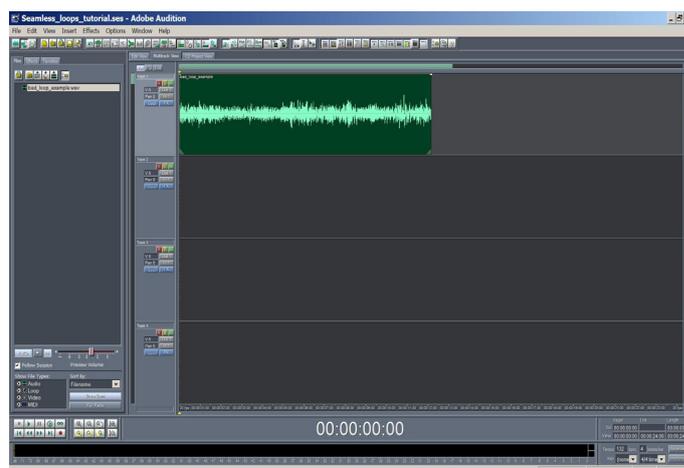

Figure 1. Sound file in multitrack editor
Using a multitrack editor makes creating seamless loops much easier

Next select an area around the middle of the sound and place the selection curser at that point. This is where you will split or cut the sound in half. The split edges of the file will become the new beginning and end of the sound. These two edges will join together seamlessly because they were joined seamlessly before they were spit.
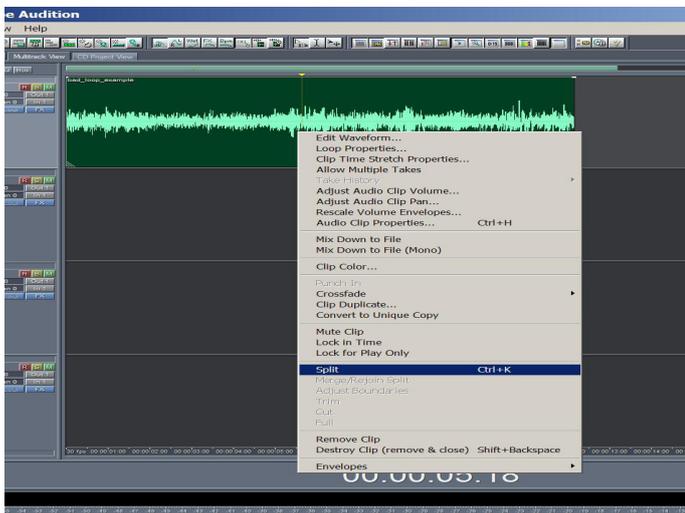
Figure 2. Splitting the sound file
The split function will cut a sound file into two piece at the point that the curser is located

Take what is currently the last half of the sound and move it to become the new beginning of the sound and vice versa taking the first half and shifting it to be the end of the sound. The split edges have become the very beginning and end of the sound creating a loop. The next step is to rejoin the middle.
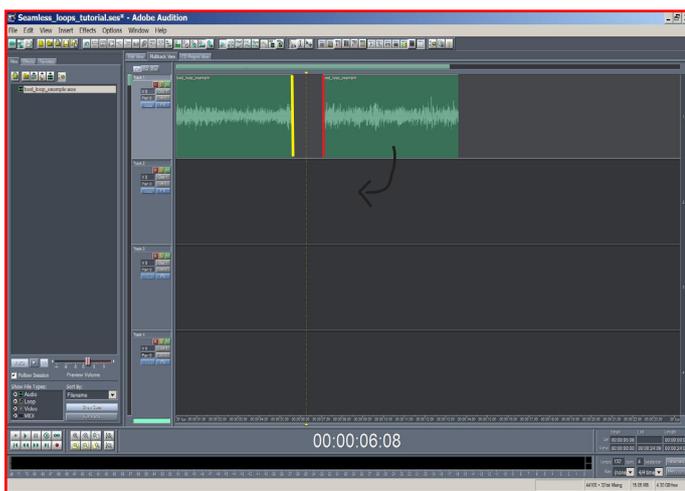

Figure 3. Repositioning the two halves
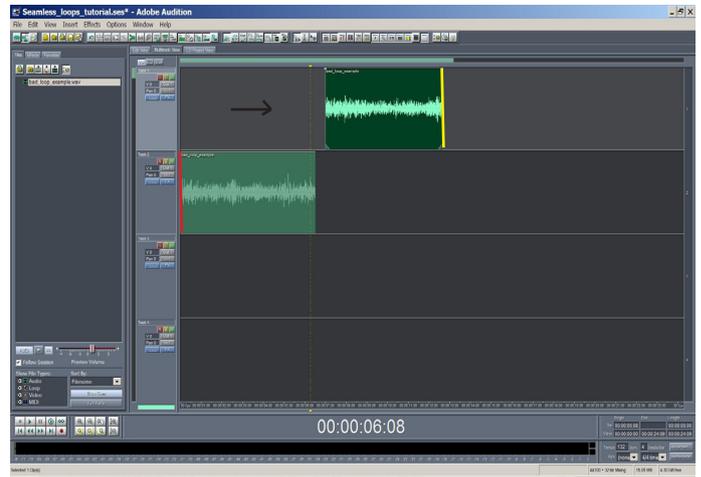The red edge will become the begining of the new sound file and the yellow end will become the end.

Figure 4. Repositioned ready for cross fade
With the two halves repostioned they now need to be moved together so a cross fade can be created.

The important step is in overlapping the two halves. By fading out one half while fading in the other you manually create a cross fade between the two unmatched edges. If the two edges are just joined together the transition will be obvious. This would be the same as just looping the original sound file. The cross fade allows for the non matching edges to slowly blend together and create a new continuous sound. The fades in Audition are created by clicking and dragging the white nodes on the green line. This line is the amplitude line, extra nodes can be created by clicking on an area without a node. By manipulating the nodes it is possible to create complex amplitude curves or just simple fades.
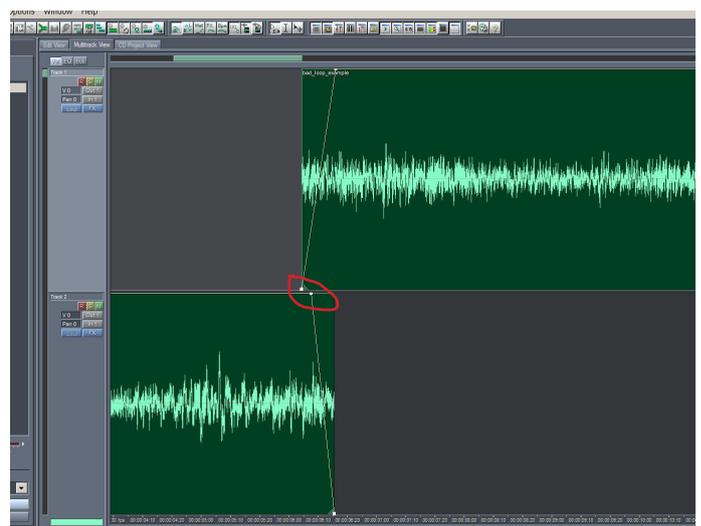

Figure 5. Creating a cross fade
By fading out the lower sound and fading in the upper sound the two halves are blended together without an audible join. Note the node onthe amplitude line. Draging these nodes allows the creation of changes in amplitude such as fades.

Listen to the cross fade over and over several times to hear if it joins cleanly. I often find I need to move the files around and change the fades several times to get a clean join. Fading out too soon the final sound may have a noticeable dip in amplitude, fading in too soon can create an unwanted surge in the new file. Remember that you are trying to create a loop with no highlights. If the sound is of rain, or water of even birds, fading in the second half too soon can create an overlap where, just for an instant, there is twice the number of raindrops, or twice the number of birds, and this can create a noticeable event and break the loop effect.

Using the **Edit/Mix Down To File** function will create a new sound file that should loop seamlessly as desired. In this example a mono sound was used, this process works equally well for stereo files. In fact this method for creating loops can also work for video as well. It is possible with this method to create a loop of clouds moving, or a river running or waves on a beach. It still needs the same consideration of avoiding noticeable events. A simple example of clouds moving would be suitable, but should a bird fly across the camera in the clip, looping it will simply repeat the bird as well and break the illusion.
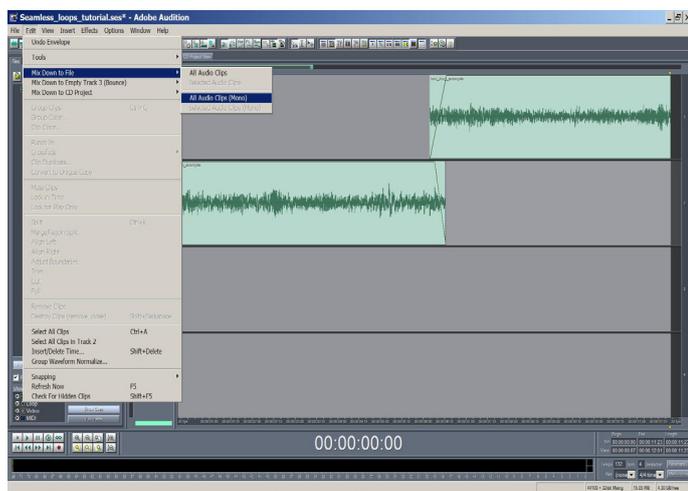
Method 2
The reason that I use a multi track layout to create the loop is that I have found trying to create the cross fades in single track layouts produce very unsatisfactory results. I will now explain another method to create loops and explain why it does not work very well. For this example I will use Wavosaur which is another free to download audio editor. You can download Wavosaur here http://www.wavosaur.com/
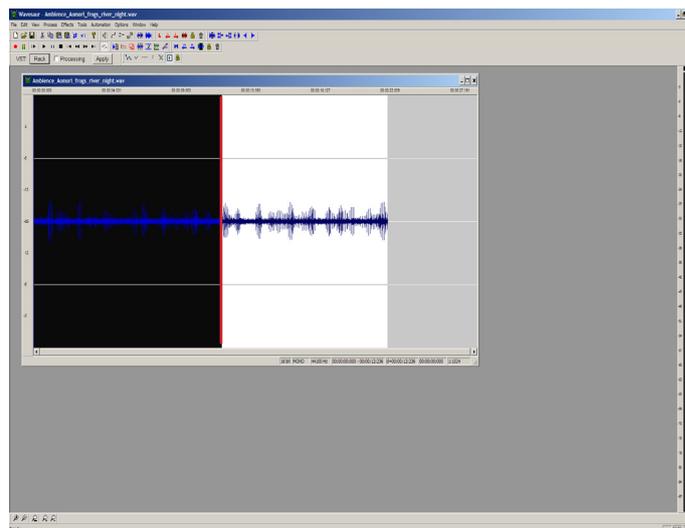

Figure 7. Wavosaur drag select
Selecting half of a wave file in Wavosaur by left clicking and drag selecting. Note the red edit line.

Figure 6. Mixdown
The Mixdown function combines any of the sound files in the multi track view into a single file.

Firstly select the sound file to create a loop out of and load it into Wavosaur. Next drag and select from the beginning of the sound file to approximately the middle of the sound file as in the image above. **Edit/Cut** this selected area. Like most editor programs it will remove the gap and as a result the left hand edge of the unselected area will shunt down and become the new beginning of our sound. So far this is exactly what we want to occur. The next image now shows the shorter duration sound file with the end section now becoming the beginning of the sound. Wavosaur has a function that allows you to mix paste, that is, paste audio material over the top of existing material and Wavosaur will automatically mix them together as a cross fade. On paper this looks like the perfect solution, by pasting the original first half of the sound onto the rear position with a slight cross fade it should achieve exactly the result needed without the need for a multi track layout.
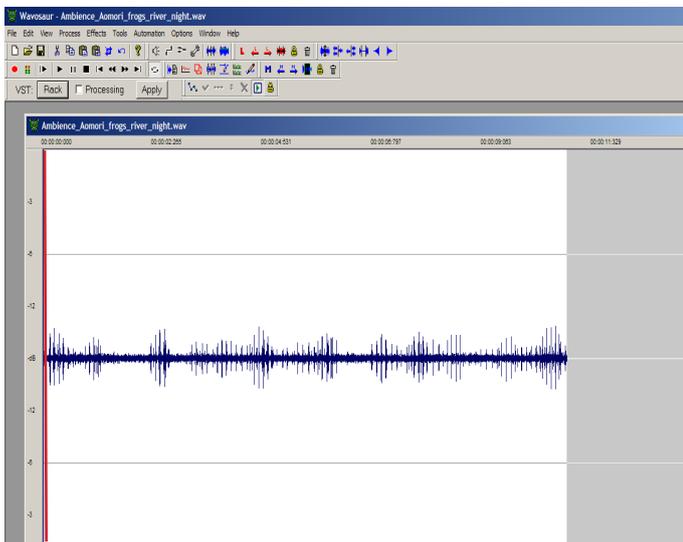
Figure 8. The result of a mix paste
The red edit line is now the new begining of the sound file. Wavosaur can automatically paste over existing material and blend them together. Unfortunately the function does not work very cleanly.

Unfortunately the result of the mix paste is not as positive as I had hoped, and in fact this is why I will always create loops with multi track layouts. All the audio editing programs I have used, including ones you have to pay for seem to have a very limited capacity to perform decent mix paste functions. The images below show the area where the mix paste occurred in Wavosaur, the actual blending between the two sounds is very unclean. The new sound that is fading in does so very abruptly, it doesn't cleanly fade from zero, and then towards the end of the high lit area the second sound stops just as abruptly. As well as these two issues the program cannot mix them together and maintain the amplitude at the level of the two individual files. When you mix sounds of any particular amplitude level the combined amplitudes will result in an increase in the new mixed sound. In a multi track layout it is possible to set each of the amplitude levels and shape the curve of the fades as required. A mix paste function is an automatic function. With some editors you do have the ability to alter some values of how the sounds will be mixed together, but for most programs it is a preset function. In this case the result sounds awful.
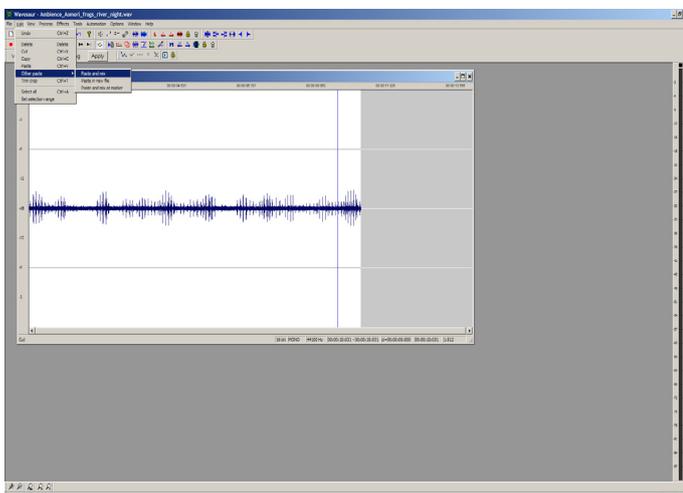

Figure 9. Mixpaste

Audacity (http://audacity.sourceforge.net/)doesn't have a separate mix paste function so it can't create loops with this process at all. Audacity doesn't even allow you to play sound files in a looping manner as far as I can tell so you would have no way of auditioning your file to see if it loops correctly anyway.

Music Loops
Creating loops for use in music requires a completely different approach. Unlike ambient sound events musical events will almost always contain highlights like rhythm beats, harmonic changes and melody that need to transition smoothly and the repetitive nature of the loop is in fact a useful aspect rather than one to be avoided. The length of the musical passage to be looped is critical as beats and bars need to be retained when the looping section is defined.

In some ways creating musical loops can be easier. Strong beats within a musical piece become obvious locations to use as cut or split points. Splitting a track just before the first beat of a new bar creates a natural loop as the piece will loop back to the first beat of the very first bar. The important factor is to create loop cuts that complement the beat count of the music. If the music is in 4/4 time then ensure that cuts are made at the end of entire bars. In a lot of music bars are often grouped together as groups of 4, 8 or 16. Making a split somewhere other than these points will break up the rhythmic feel of a piece (which can useful if an unusual effect is desired)

The most suitable musical passages to create loop out of consist of regular repetitive patterns that repeat often enough to be able to isolate a series of bars and create a looping group out of them. If the music is constantly shifting and changing it will be more difficult to loop. Vocals can also make looping difficult as the constant repetition of a vocal line will become annoying very quickly.

Generally creating a musical loop consists of selecting an appropriate track and a suitable smaller section within that track and then isolating it either by copying it out to a new file, or deleting the excess music around the section. Extra trimming to get the timing exactly right might be required. The best way to understand the process is to practise doing it over and over. It will become easier and faster as the method is used.