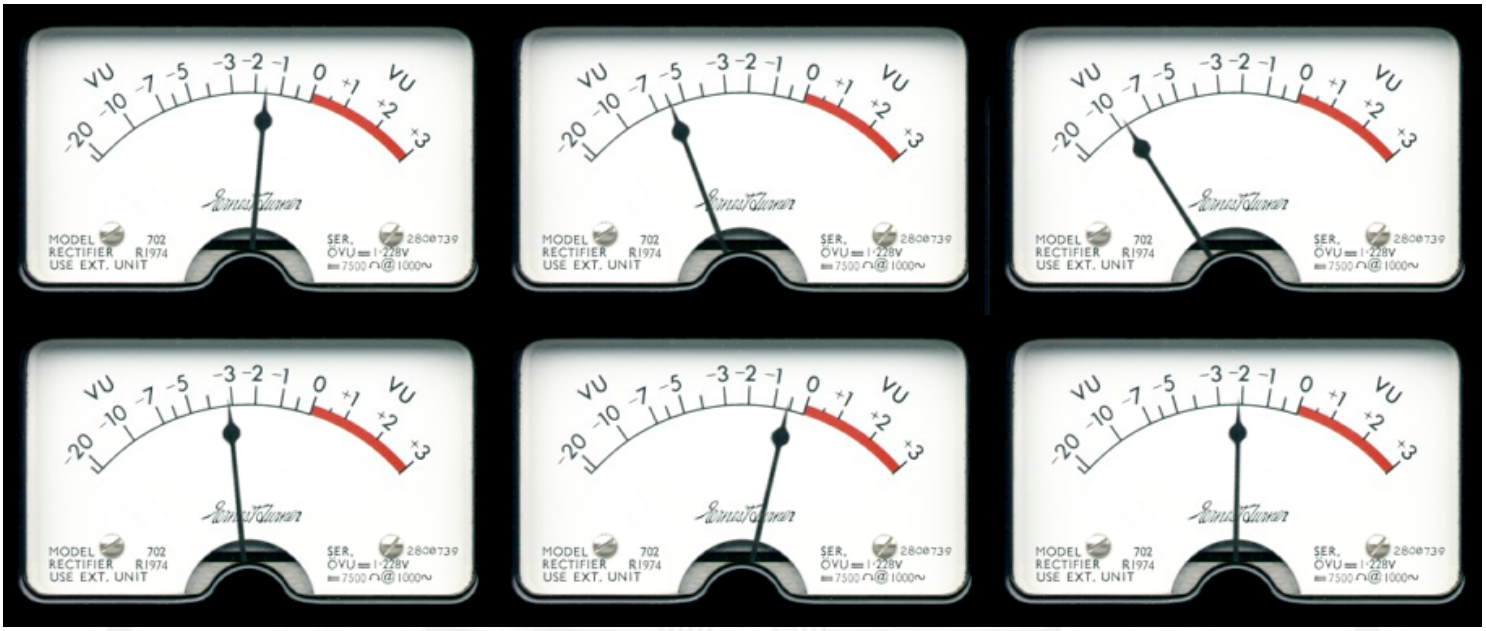
The Media Streaming Journal

June 2018



Covering Audio and Video Internet Broadcasting

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publicdomainvectors.org/en/free-clipart/Vintage-microphone-vector-graphics/6111.html

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Welcome to The Media Streaming Journal

Greetings,

Producing quality audio is the hallmark of any audio aficionado, so why should it be different for radio stations. Stations use audio for advertising, promotions, announcements and general information and this audio is a reflection of the commitment of the station staff for maintaining the highest quality standard possible.

Quality audio production can be achieved through the use of open source software and understanding its use. Contrary to popular belief, the use of Open Source software in a production environment does not indicate a short-sighted financial decision. The Internet was created and still operates through the use of Open Source software.

Knowledge and understanding are powerful forces that can help stations achieve the gold standard of audience and peer recognition for quality audio production.

Namaste

David Childers

Editor In Chief

David Childers

The Grand Master of Digital Disaster

Current Member: International Association Of Internet Broadcasters

Former Member: Society of Motion Picture and Television Engineers

Published Author

Introduction To Internet Broadcasting
Amazon Publishing

Numerous Creative Commons Computer, Technical and Internet Broadcasting Guides
http://www.ScenicRadio.com/Library/BroadGuide/index.html

Newspaper Interviews

New York Times

Internet TV: Don't Touch That Mouse!
Tim Gnatek
July 1, 2004

Lagniappe - "Something Extra for Mobile"

Mobile Gets Hoaxed
Rob Holbert
Mar 16, 2016

Cited By

Five Essays on Copyright In the Digital Era
Ville Oksanen
2009

Turre Publishing
Helsinki Finland

Open Source Developer

Developed software architecture to continuously source multimedia content to Youtube Live servers.
Scenic Television – The sights and sounds of nature on the Internet.
http://www.ScenicRadio.com

Projects

Researched and developed documentation for Peercast P2P multimedia streaming project.
http://en.wikipedia.org/wiki/PeerCast

Researched and developed technical documentation for NSV / Winamp Television.
https://web.archive.org/web/20080601000000*/http://www.scvi.net

MidSummer Eve Webfest

A virtual International festival focusing on Digital art and Free Software that was coordinated by OrganicaDTM Design Studio.

Presentation and discussion regarding Internet multimedia content distribution.
https://web.archive.org/web/20061104230522/http://www.organicadtm.com/index.php?module=articles&func=display&catid=37&aid=61

LinkedIn Contact Information

http://www.linkedin.com/pub/david-childers/4/736/72a

The Media Streaming Journal

What is in this edition of the Media Streaming Journal

Join our technical discussion on Facebook

http://www.facebook.com/groups/internetradiosupport/

Magazine cover: VU meters for surround sound.

https://commons.wikimedia.org/wiki/File:Vumeters-audio-5.1.png

RADIOSOLUTION

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Our Mission

Let our friendly, knowledgeable staff assist you to build your project, such as an online radio station using our high end reliable video and audio streaming technologies. We want to become your partner for all your hosting needs, as well as your one stop shop for radio products such as custom DJ drops and radio ID's.

Start An Internet Radio Station

Whatever you need to start Internet radio station, we will deliver! We provide high quality Internet Radio services to make your music radio project a success. We can provide Wowza, Icecast, SHOUTcast hosting and internet radio services to hobbyists, deejays, amateurs and established professionals. No radio station client is too big or too small for Radiosolution.

Choose between complete hassle-free service packages or new features to add to start internet radio station. Benefit from customized services and the latest in internet radio technology. You will receive professional, personalized and better Internet Radio Station services than you have received up till now. If you already have an Icecast or SHOUTcast hosting provider, we can still help you transfer your radio server over to us with no hassle and at no charge.

Internet Radio Station Services

Launch your internet, digital, satellite or AM/FM radio station anywhere in the world with all of the right tools. A broadcasting specialist is on standby to help you get started with an SHOUTcast or Icecast hosting package. We have servers ready for reliable streaming in North America and Europe. Our hosting packages have all the features you need to make your radio station project a success.

If you stream live or with an Auto DJ, we can provide you with the latest in web-based Cloud technology. You will love the simple to use control panel. Discover how easy it is to manage live deejays, upload fresh music and create custom scheduled programming. You will be able to track your listeners by getting real time statistics.

Starting your own Internet radio has never been easier. Get in touch with us anytime to start your Internet radio station.

Radiosolution is a SHOUTcast hosting provider located in Quebec Canada. We also offer Icecast, Wowza and Web Hosting services. Contact us to discuss the best option available as you start internet radio station. Radiosolution can provide personalized service in English, Dutch, and French. Starting an internet radio station can be intimidating, many people want to start one, but have no idea where to start. Radiosolution will be there for you every step of the way. Everyday people are searching the internet for free SHOUTcast servers. With Radiosolution SHOUTcast hosting we will allow you to try our services for FREE. By trying our services, you can be confident that you have chosen the best radio server hosting provider. You have nothing to loose because we offer a 30 day satisfaction guarantee. What are you waiting for? Contact us now! Radiosolution offers everything you need to start internet radio station. You will not need to go anywhere else. We can create your website, market your station and help you submit your station to online directories. We also feature the voice of Derek Bullard aka Dibblebee He can create affordable commercials, DJ intros, sweepers, jingles, ids and so much more.

Relax With The Sights And Sounds Of Nature

Scenic Television

Your Window To The World

Scenic Television is an Internet television station that presents the sights and sounds of nature 24 hours a day. Let us soothe and relax you wherever you are. Savor the tropical beaches of Puerto Rico or relax at a rain forest in Costa Rica. Meditate at the Danube River in Germany, or relish the view of Lake Zurich in Switzerland. We have scenic videos from locations all over the world.

Scenic Television originates from the Gulf coast of South Alabama and broadcasts to a global audience. The television broadcast is accessible on any device with an Internet connection. Such electronic devices include desktop computers, laptops, tablets, smartphones, game platforms, and Internet-connected televisions.

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Audacity Audio Editor Handbook

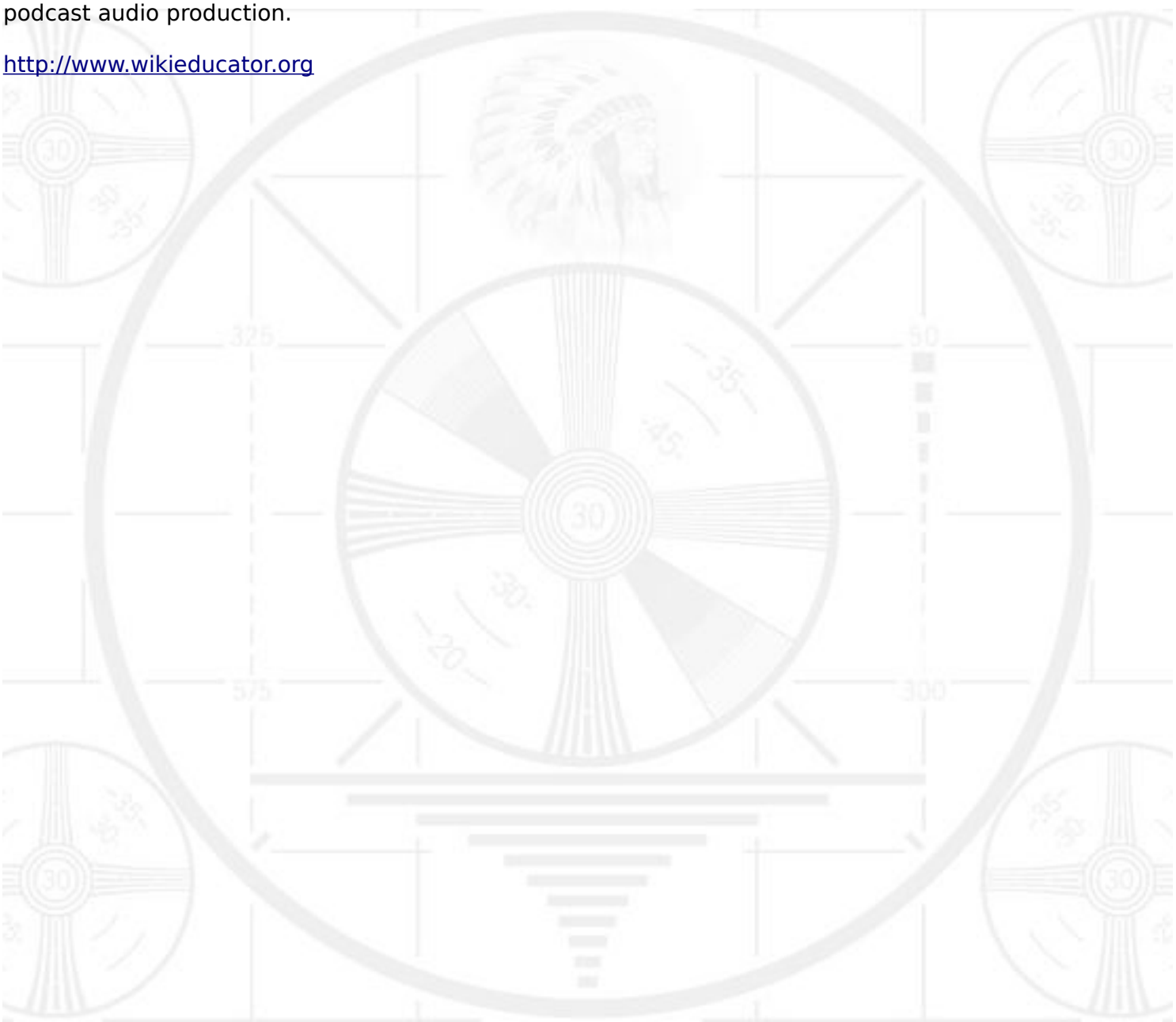
This Creative Commons licensed textbook provides an in-depth information resource that can be used by Internet broadcasters to understand and effectively use the Audacity audio editing software application.

http://www.flossmanuals.net

Audacity Tips And Tricks For Podcasters

This Creative Commons licensed publication provides tips and suggestions for using Audacity for podcast audio production.

http://www.wikieducator.org



AUDACITY

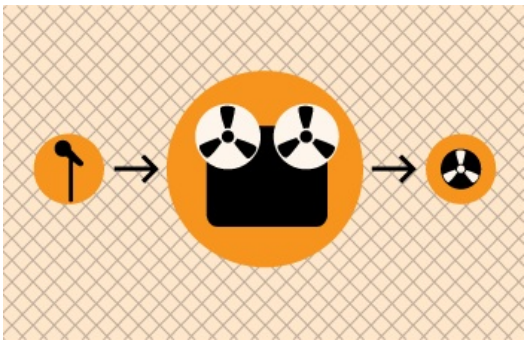
Contents

INTRODUCTION
1. Audacity
2. WHAT IS DIGITAL AUDIO?

1. Audacity

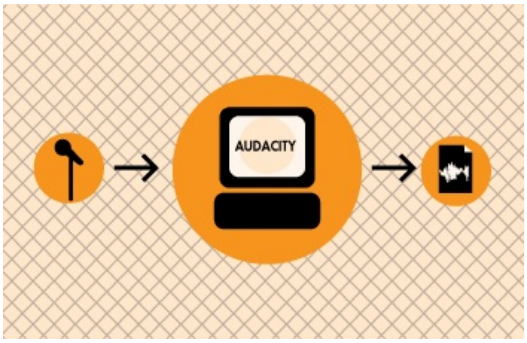
The Audacity program is an example of a digital 'audio editor', which means that Audacity can record and edit audio in common digital formats. Typically, one uses Audacity for recording sounds such interviews or musical instruments. You can then use Audacity to combine these sounds and edit them to make documentaries, music, podcasts, etc.

In the old days, audio editing was done with huge machines that recorded sound to magnetic tape (similar to the tape in tape cassettes).



Audio engineers would then edit these tapes using razor blades and sticky tape. Much of the jargon used in audio editing today comes from this process. Making a "cut" meant literally cutting the audio tape at a certain point. "Multitrack" referred to recording many separate sounds onto extra wide tape to fit more 'tracks'. The recording industry still uses these terms, along with many others, today. Many of the fundamental techniques which formed good audio recording and editing practices in the audio-tape era laid the foundation for recording and editing software.

While many of the terms and techniques remain the same today, computers replaced tape machines, and digital files succeeded tapes. Hence, one records audio and edits with a computer (using software like Audacity), and stores these sounds in files on a computer. This makes the process much faster and requires a lot less physical storage space and specialized skills and equipment.



Audacity is a powerful tool for recording and editing audio on a home computer. It's is a very sophisticated program and can do everything one would expect from a modern audio editor. As a free, open-source tool, Audacity is not quite as feature-rich as some expensive audio editing software used by professional recording studios, but more and more independent musicians (as well as podcasters and

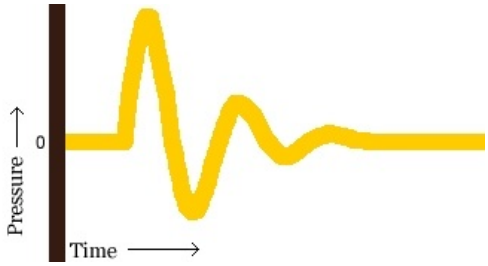
others) are using it in their own audio creations.

One can install and run Audacity on **Linux**, **Mac OS X** and **Windows**.

Audacity: DigitalAudio

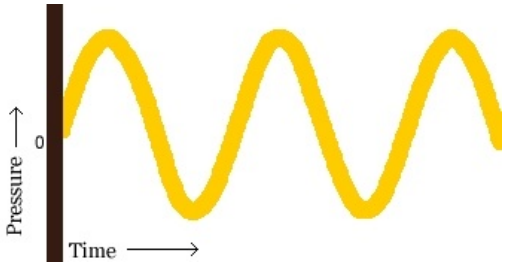
What is sound? What is sound recording?

Sounds are waves of air. We hear sounds because our ears are sensitive to these waves. One of the easiest types of sound waves to understand is a short, sudden sound like a hand clap. When hands clap together, they create a *pressurised* wave of air which moves at about 340 meters per second ("the speed of sound" through sea-level earth atmosphere). When this wave reaches one's ear, it pushes on the eardrum slightly, causing it to vibrate and the individual hears the clap.



A hand clap is a short event that causes a single wave of air that quickly dies out. The image above shows the shape of the wave ("waveform") for a typical hand clap.

Other sound waves are longer events. A ringing bell serves as a good example of this. When a bell rings, after the initial strike, the sound comes from the ongoing "ringing" of the bell. While the bell rings, it vibrates at a particular speed ("frequency") and this causes the nearby air to vibrate at the same speed. This causes waves of air to travel from the bell, again, at the speed of sound. Pressure waves from continuous vibration look more like this:

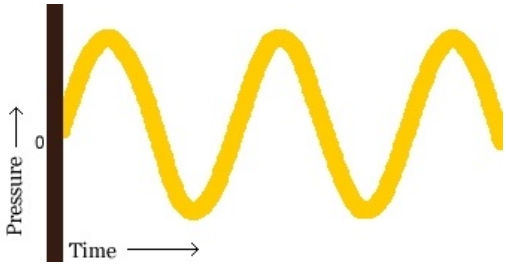


Both of these types of waves are called **sound waves** or **acoustic waves**.

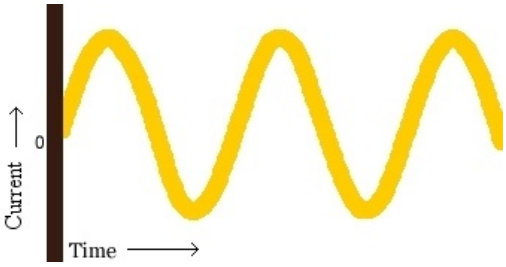
Digital recording and playback

A **microphone** consists of a small membrane which vibrates when it meets these acoustic waves. The microphone translates movements of the membrane into electrical signals. Basically, a microphone converts acoustic waves into electrical waves.

If we examined the shape of an electrical wave from a microphone, we would notice that it looks very similar to the shape of the original sound wave. The following is the sound wave we saw in the above explanation:



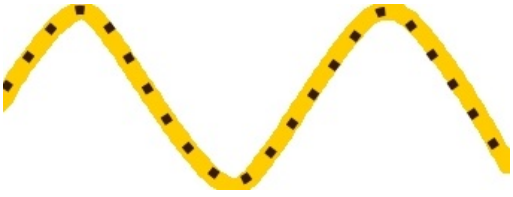
The following is the electrical wave created by the microphone (notice the measurement for "Current"):



One could say that the shape of the electrical wave is *analogous to* ("similar to") the shape of the original sound wave. This is why these electrical waves that represent sound waves are called **analog waves**.

Indeed, earlier methods of sound recording were themselves **analog**: the literal wave-shape of the original sound, as picked up by the microphone, was physically imprinted on the recording device -- first in the form of soft-wax cylinders, then soft-wax master records, and finally magnetic tape where a coating of magnetized iron oxide (or chromium oxide) dust was rearranged by the sound waves. Magnetic tape became the dominant technology for recording audio as well as video and other data in the second half of the twentieth century, until the advent and rapid adoption of **digital recording.**

The main device used in *digital recording* is an **Analog-to-Digital Converter** (**ADC**). The ADC measures the voltage of an electrical wave thousands of times per second. It then uses these measurements to create a data map of an electrical wave:



Each dot in the figure above represents one audio *sample*. The more samples per second, the more accurate the mapping of the electrical wave.

Playback of digital audio uses a **Digital-to-Analog Converter** (**DAC**). This takes the samples and converts them back into an electrical wave. In a computer, this electrical wave is sent to a sound card's headphone or speaker sockets and the speakers recreate the original sound wave by vibrating their diaphragms.

A computer's sound card comes with an Analog-to-Digital Converter (ADC) for recording, and a Digital-to-Analog Converter (DAC) for playing audio. Your

operating system (Windows, Mac OS X, Linux, etc.) relies on the sound card to actually handle the recording and playback, and audio applications rely on your operating system so that you can play sound files, capture sounds to a file, edit them, and mix multiple tracks while playing, etc.

Quality

Two factors determine the quality of a digital recording:

- **Sample rate**: this is the rate which the ADC records samples or a DAC plays them back. Sample Rate is measured in Hertz (Hz), or samples per second. A conventional audio CD has a sample rate of 44,100 Hz (often written as "44 KHz" for short). An 'HD' (High-definition) DVD can have a sample rate of 96 KHz or even 176 or 192 KHz. At the other end of the spectrum, MPEG audio files intended for streaming (especially if they are only recording voice, not music) can have a sample rate as low as 11KHz.

- **Sample format** or **sample size**: Essentially, this is the number of digits in the digital representation of each sample. Think of the sample rate as the horizontal precision, and the sample format as the vertical precision. An audio CD has a precision of 16 bits.

Higher sampling rates allow a digital recording to accurately record higher frequencies. Higher sample sizes allow for more dynamic range—better reproduction of loud and soft sounds. Both of these, of course, entail the storage of more digitial information, meaning that high-sample-rate/high-sample-size formats are much larger to store and transmit.

Audio file formats

There are two main types of audio files on a computer:

- **PCM** stands for **Pulse Code Modulation**. This is just a fancy name for the technique where each number in the digital audio file represents exactly one sample in the waveform. Common examples of PCM files are **WAV** files, **AIFF** files, and **Sound Designer II** files.

- Compressed audio files are the other type. Modern compressed audio files use sophisticated *psychoacoustic algorithms* to represent the essential frequencies of the audio signal -- those audible to the human ear --in far less space than PCM files. Examples include **MP3** (MPEG I, layer 3), **Ogg Vorbis**, and **WMA** (Windows Media Audio). Creating one of these files sacrifices some quality in order to use less disk space.

- Thus, for example, an audio recording you make directly to your computer is often stored as a WAV file; if you transfrom that same sound recording into an MP3 file (as you can in Audacity), the resulting file will be far smaller than the original WAV file. When editing music, it is typically preferable to work with 'raw' sound formats such as WAV or AIFF when possible, then compress to MP3 or similar format only when you are satisfied with the mixed and edited piece.

3. Audacity: Installing on Linux

Installing Audacity on Fedora

The simplest way to install Audacity on recent versions of Fedora is to use the command line. You must be root or have administrative privileges to install software. There are 2 versions of Audacity for Fedora: audacity and audacity-freeworld.

The latter version includes a variety of libraries which are not part of the main Fedora repositories, so you would need to first install rpmfusion-free-release and rpmfusion-nonfree-release. In spite of these additional steps, I would recommend the freeworld version of audacity, since it will have more flexibility with file types it can work with and for export. Go to rpmfusion.org and download the appropriate releases for your version of Fedora. These represent additions to your repositories. On the command line, type

```
sudo dnf -y install rpmfusion-free-release...
```

where the ellipsis at the end needs to fit the rest of the particular version you need. For example in Fedora 26, it would be *rpmfusion-free-release-26.noarch.rpm*. Once you have both of these installed, then type

```
sudo dnf -y install audacity-freeworld
```

after which the assessment of dependencies, downloads and installations should proceed automatically. After installation, your are ready to use it. Simply type 'audacity' on the command line or find the application under Multimedia with your application launcher.

Installing Audacity on Ubuntu based systems

As there are quite a few flavours of Ubuntu screenshots are not used here however the following advice should be appropriate to most different versions.

Via the Command Line

A quick way to install Audacity on Ubuntu is to use the command line.

On the command line, type

```
sudo apt-get install audacity
```

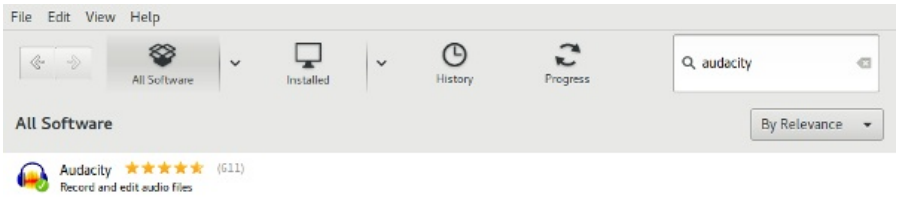
You will need to enter your admin password to proceed.

After installation, your are ready to use it. Simply type 'audacity' on the command line or find the application under Multimedia with your application launcher.

Via the Ubuntu Software Centre

Open the Ubuntu Software Centre through your main menu.

Then use the search for audacity, select it and click on the Install button to proceed.



After installation, your are ready to use it. Simply type 'audacity' on the command line or find the application under Multimedia with your application launcher.

4. Installing Audacity 2.2.1 on OS X

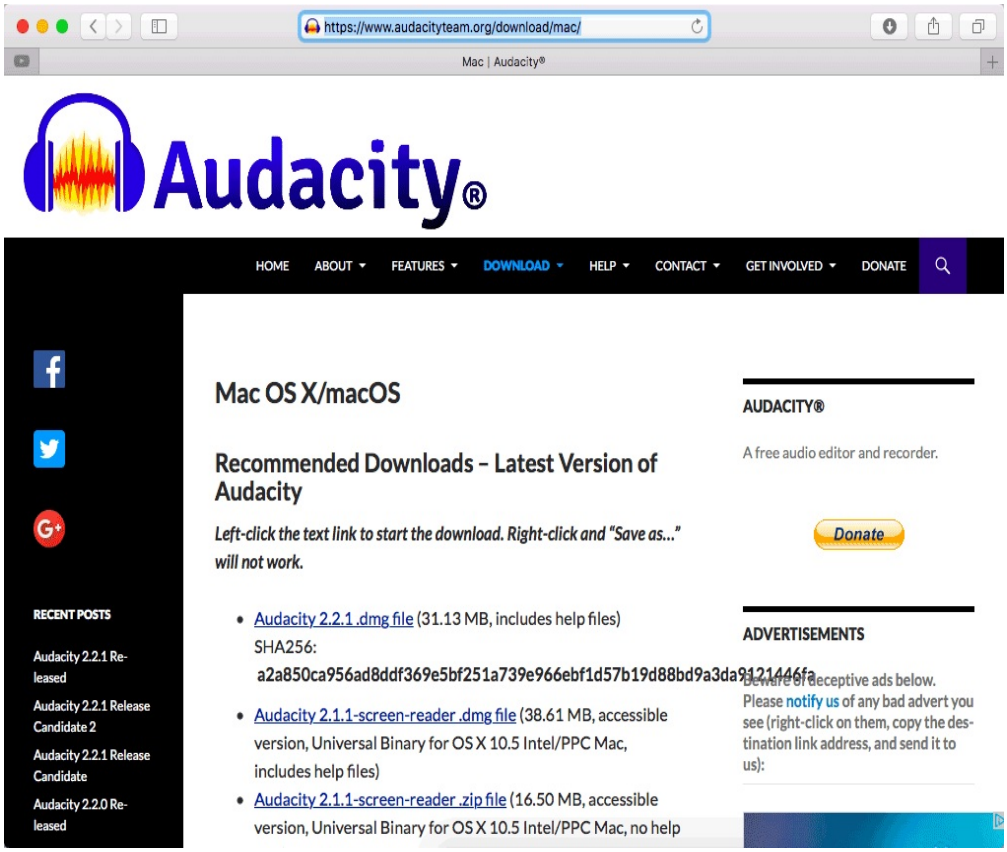
If your Mac has a previous version of Audacity

You can update this version by selecting **Help > Check for Updates....** and skip the rest of this chapter.

If you have Audacity 2.1.2 or earlier installed in your Mac, read the section titled "**Leftover plugins from previous versions of Audacity**" at the end of this chapter.

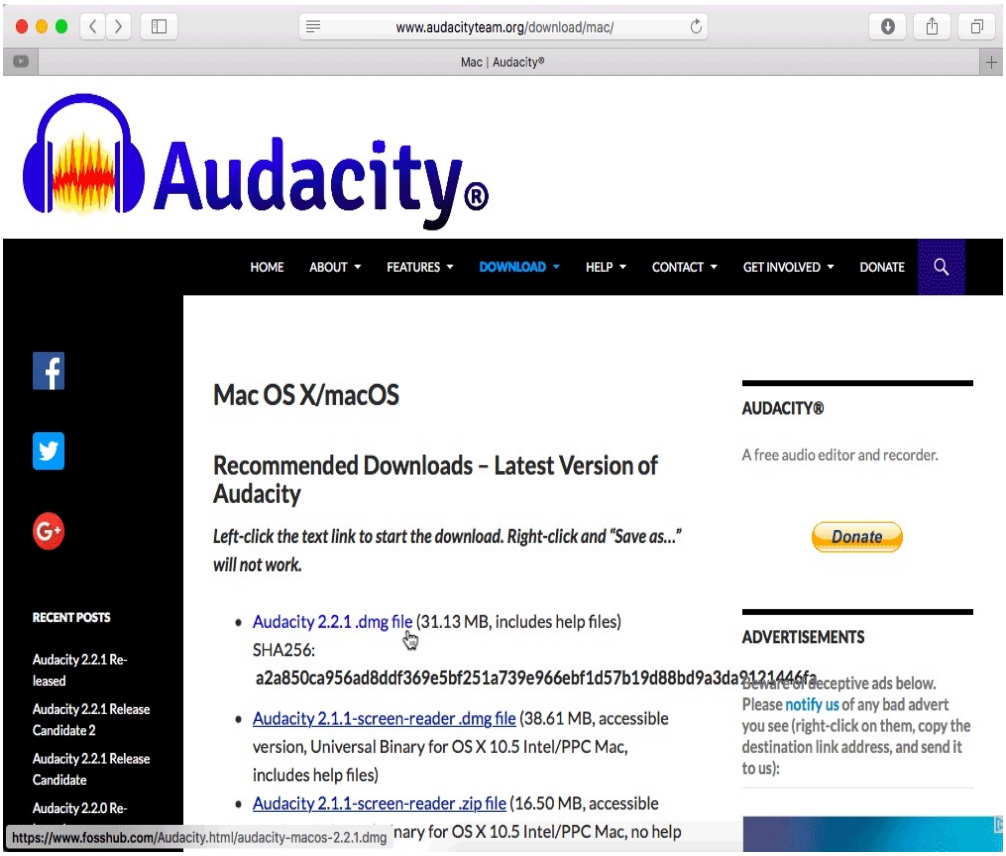
Downloading

1. Using a web browser, go to Audacity's site, and navigate to its webpage where you can download Audacity 2.2.1 for the Mac.

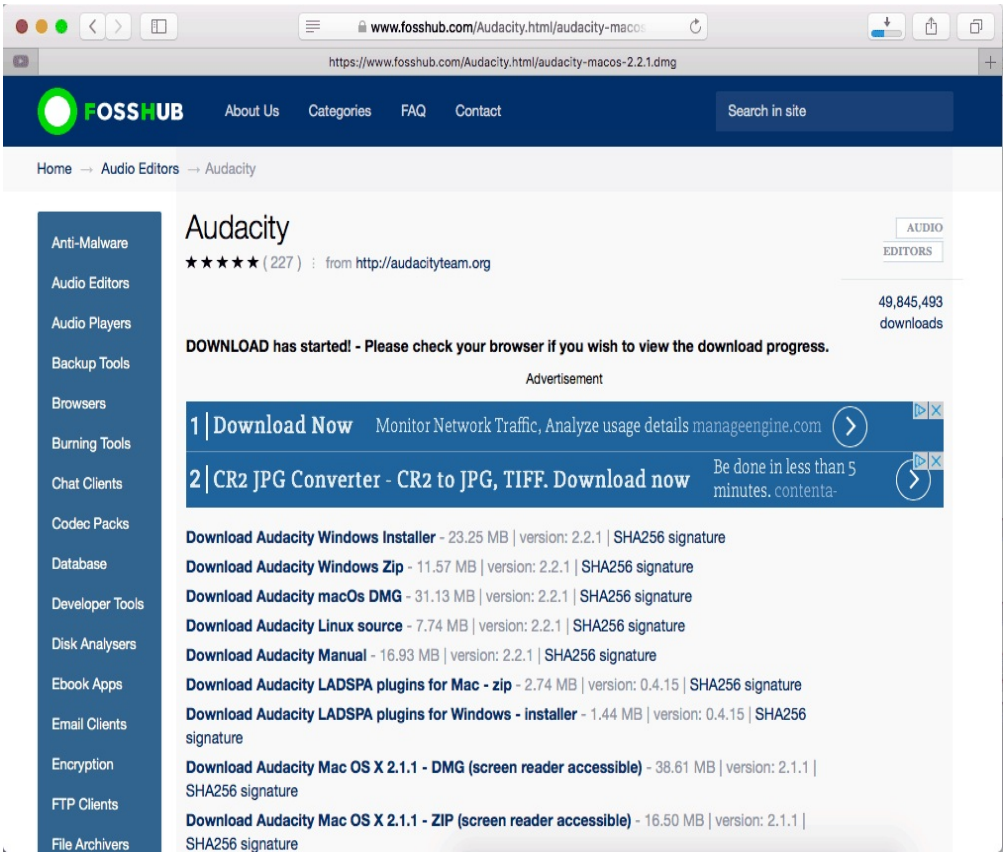


2. Click any of the links for downloading Audacity 2.2.1, which include versions of this program with screen readers for the visually impaired.

4. Installing Audacity 2.2.1 on OS XINSTALLING

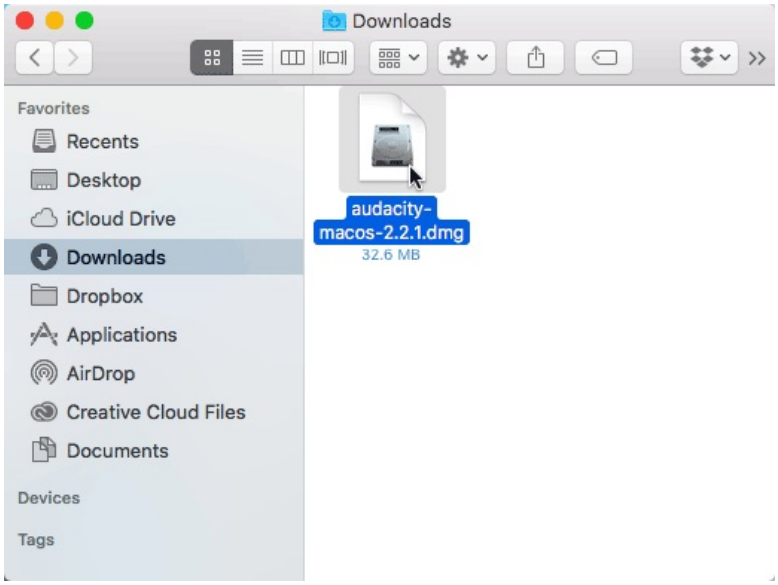


3. A webpage saying this file is downloading will appear.

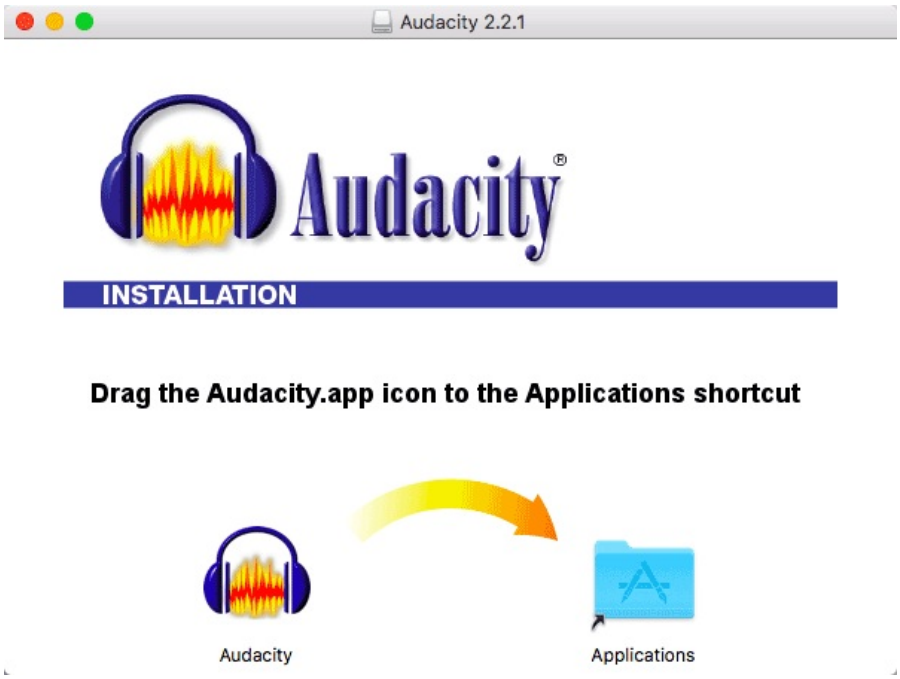


Installing

1. Once it's fully downloaded, go to the folder your browser is set for files to be downloaded into — usually it's the Downloads folder (System/Users/nameofuser/Downloads) — and double-click the audacity-macos-2.2.1.dmg file to open it.



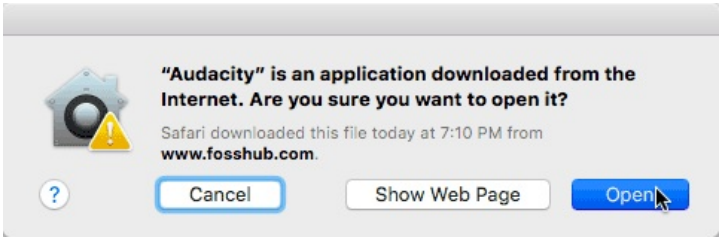
2. Click and drag the Audacity 2.2.1 icon to the Applications icon as instructed in this window. This will install Audacity 2.2.1 to your Mac.



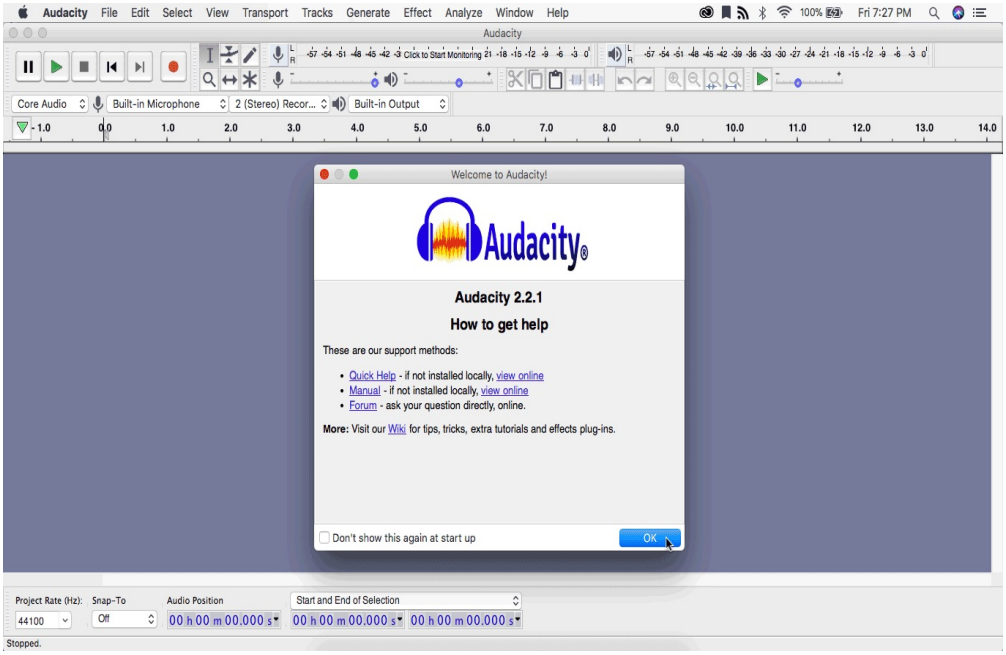
Setting Up

1. A new window asking if you're sure you want to open Audacity will appear.

Click the Open button.



2. The Audacity interface will appear. You are now ready to use Audacity 2.2.1.



Leftover plugins from previous versions of Audacity

If you had Audacity 2.1.2 or earlier installed in your Mac before you updated it to Audacity 2.2.1, there will probably a folder named "Audacity" in your Applications folder (**~/Library/Applications/Audacity**).

Plugins you want to keep, and Audacity 2.2.1 doesn't have

The Audacity folder might have optional plugins that you installed manually into the old version of Audacity.

If you want to keep these optional plugins, move them to to the new Audacity Plug-Ins folder at **~/Library/Application Support/audacity/Plug-Ins**.

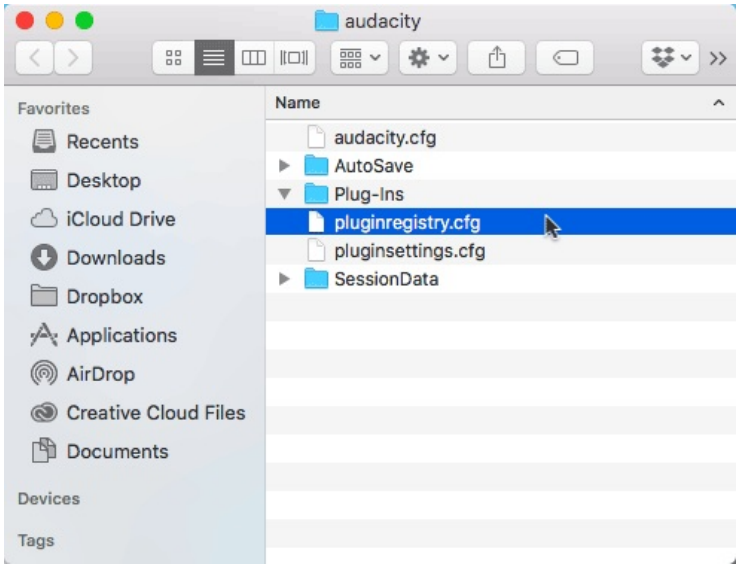
Disabling and deleting duplicate plugins

The Audacity folder will also contain plugins that you will no longer need, since Audacity 2.2.1 now has these plugins bundled inside the application itself.

You could just delete the Audacity folder, but that will not be enough. If you install Audacity 2.2.1, and open it, these plugins will still appear in certain menus as duplicates whether or not the Audacity folder has already been deleted, and will not work if you select them. So you will need to disable them first.

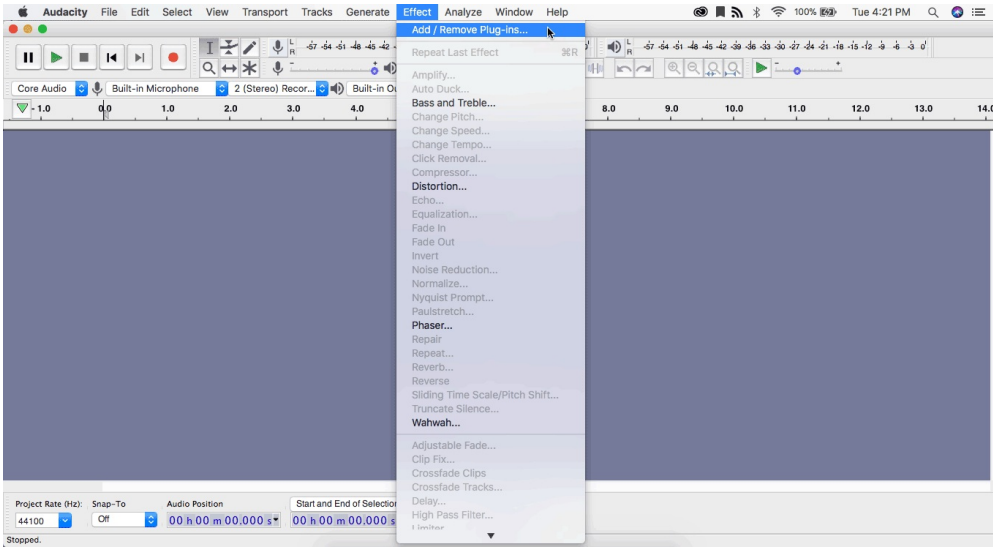
There are two ways to disable old plugins.

- Delete the file **pluginregistry.cfg** in **~/Library/Application Support/audacity/**. You might only want to choose this option if you haven't already put optional plugins in the new Audacity Plug-Ins folder.

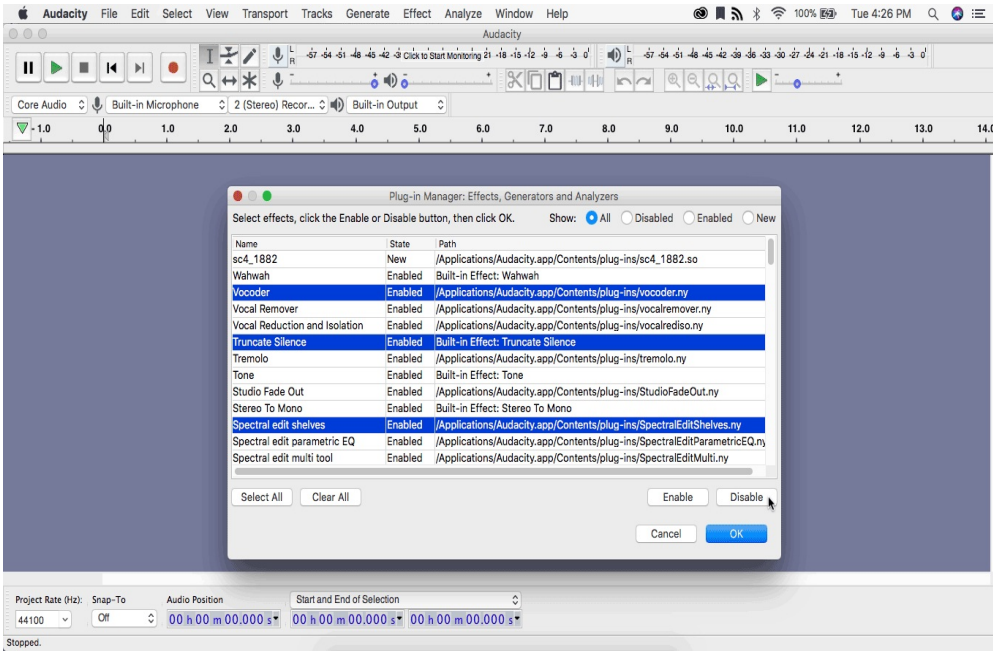


- Disable the plugins in Audacity 2.2.1:

  1. Select Effect > Add / Remove Plug-ins... in the main menu.



2. Choose the plugins you don't want in the Add/Remove Plugins window, and disable them. Then click OK.



Now you can delete the Audacity folder, if you haven't already.

Audacity: InstallingWindows

4. Installing Audacity 2.2.1 on OS XINSTALLING

Installing Audacity on Windows

Software name : Audacity
Homepage : http://audacityteam.org

Software version used for this installation : 2.2.1
Operating System use for this installation : Microsoft Windows 10

Recommended Hardware :

Windows version	Recommended RAM/ processor speed	Minimum RAM/ processor speed
• Windows Vista Home Basic (32/64-bit) • Windows 7 Starter	1 GB / 1 GHz	512 MB/1 GHz
• Windows Vista Home Business/ Premium/Ultimate (32/64-bit) • Windows 7 32-bit (except Windows 7 Starter) • Windows 8 32-bt	4 GB /1 GHz	1 GB / 1 GHz
• Windows 7 (64-bit) • Windows 8 (64-bit) • Windows 10 (32/64-bit)	4 GB / 2 GHz	2 GB / 1 GHz

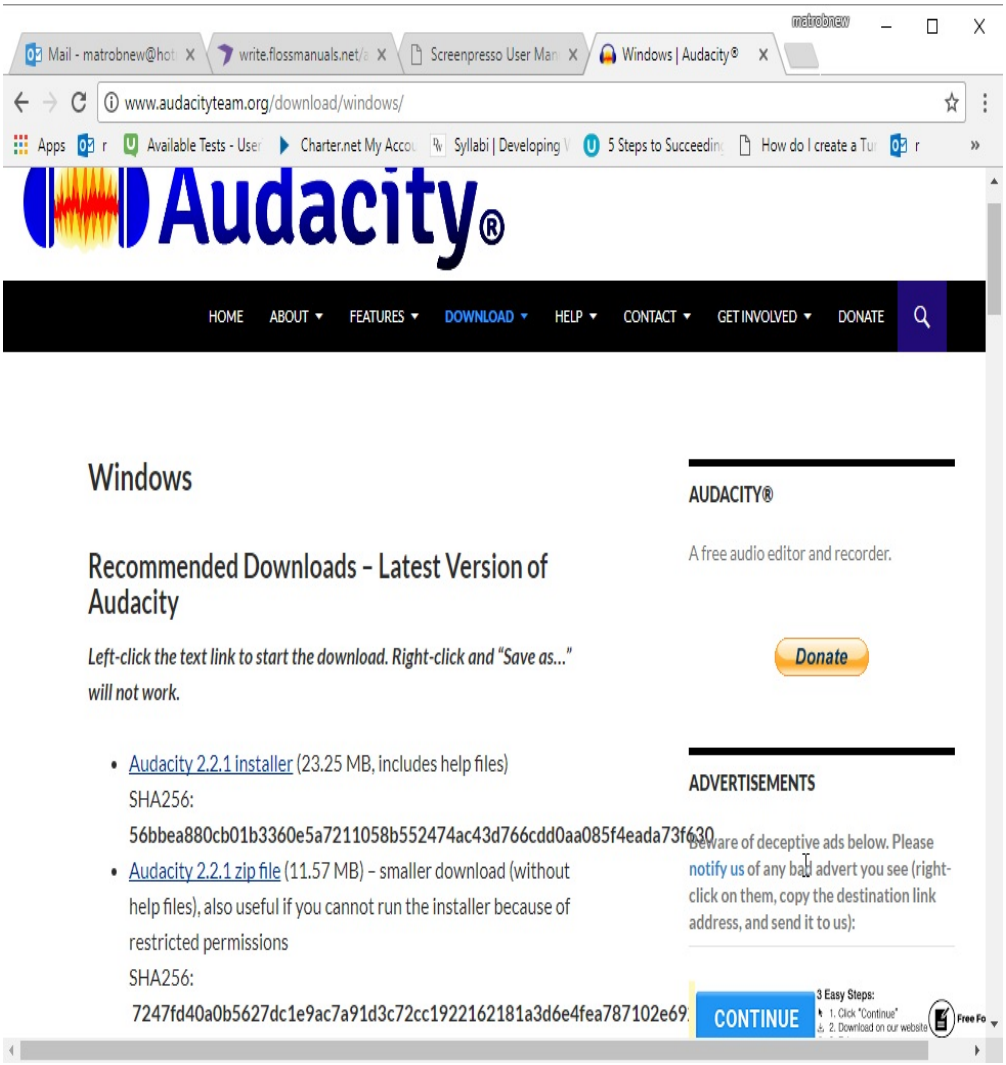
According to the official documentation, Audacity works best on computers meeting more than the minimum requirements stated above. For lengthy multi-track projects, the Audacity team recommends using machines of substantially higher specification than the minimums.

Older versions of Windows/old hardware

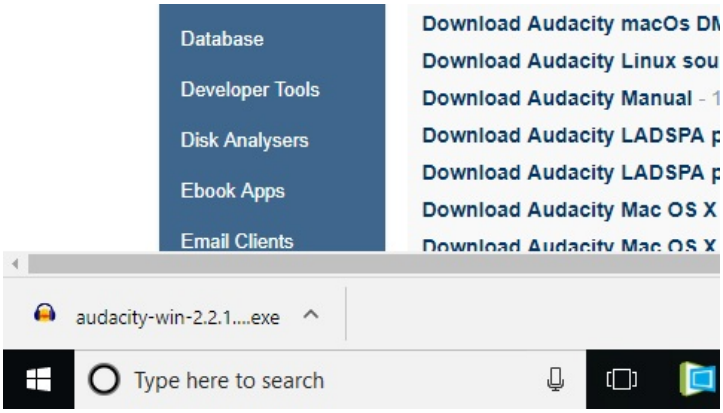
For Windows 98, ME 2000 and XP see Legacy Windows Downloads.

Downloading Audacity

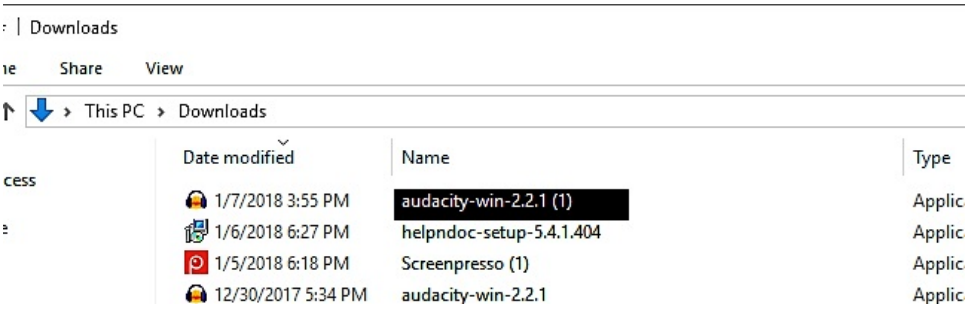
The latest stable version of Audacity for **Microsoft Windows** can be downloaded from http://www.audacityteam.org/download/windows/. The latest stable version at the time of writing this document is **Audacity 2.2.1.**



Click on the "Audacity 2.2.1 installer" link. This should automatically launch the download of audacity-win-2.2.1.exe. Once the download is complete, this file should be shown near the bottom of your browser (in this case the browser is Chrome):



or you can browse directly to your "Downloads" directory, and look for the most recently downloaded file:

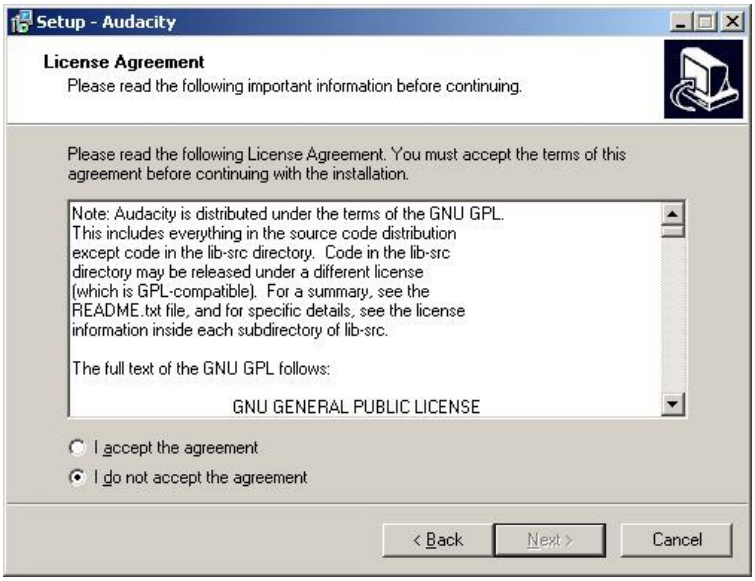


Open this file to begin installing Audacity by double clicking on the icon or clicking on "Open" on the downloads window.

You should now see a **Setup Wizard** like this:

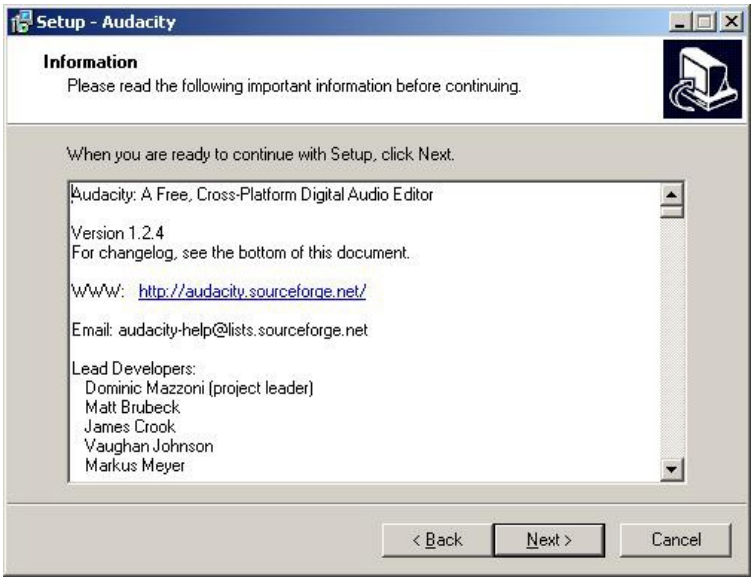
Click "Next" to proceed.

The next step asks you to read and accept the **License Agreement**.



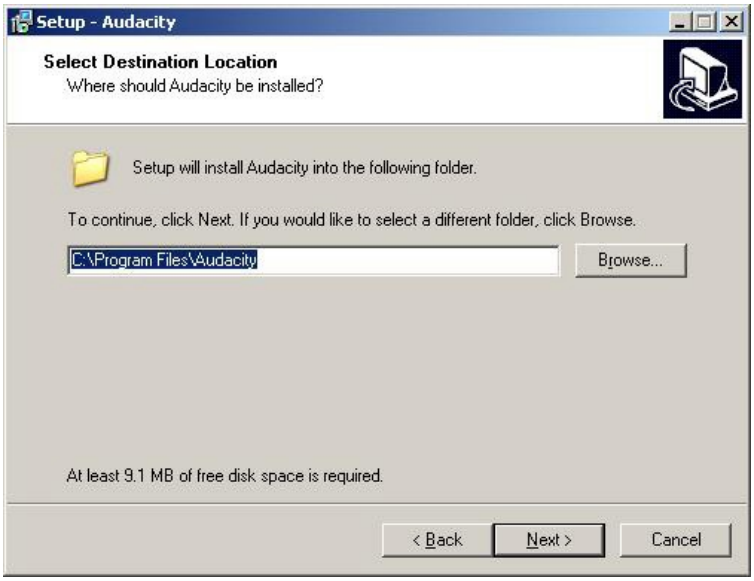
You cannot continue with the installation until you have accepted the agreement, so click on the **radio button** labelled "I accept the agreement" and then click "Next" to continue.

You should now see an **Information** window like this:



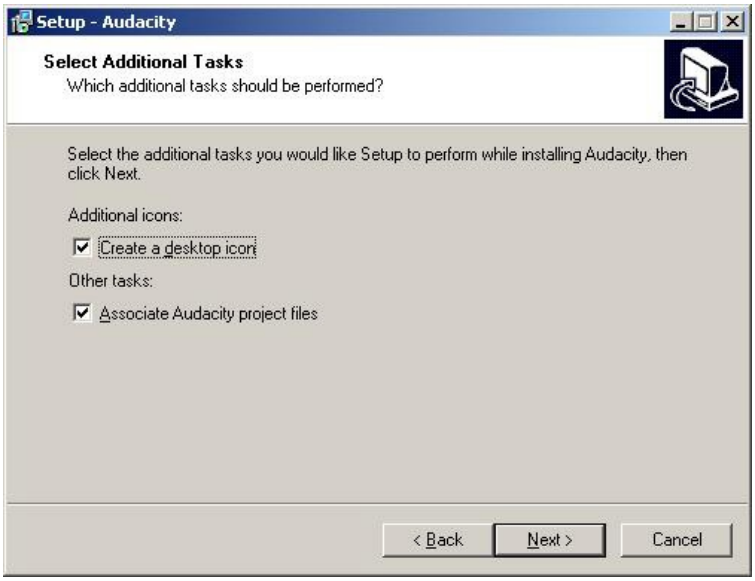
This window contains information such as credits and a changelog that you may find useful to read. Click "Next" continue.

You will now be prompted to select the folder Audacity will be installed into.



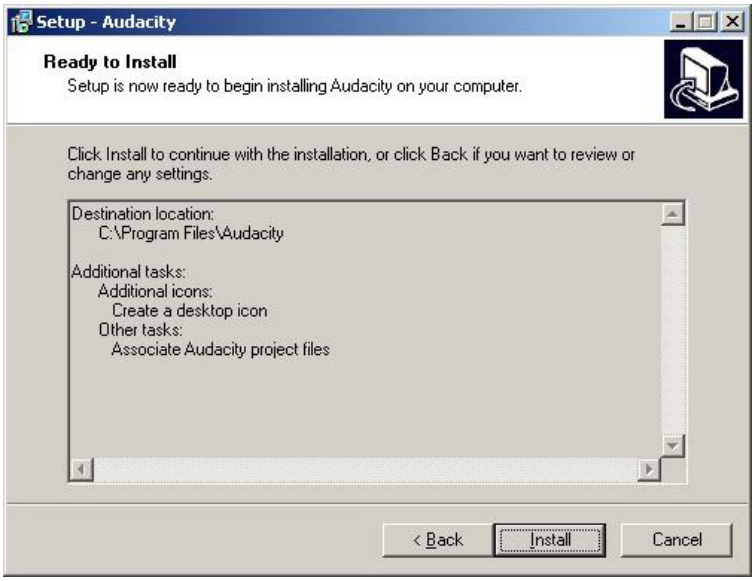
The **Setup Wizard** will automatically create a folder called "Audacity" in your "Program Files" folder so unless you want to install it somewhere else you can simply click "Next" to continue. If you wish to install Audacity somewhere else click "Browse".

You will now be asked to select which additional tasks you would like Setup to perform during the installation.



Click the check boxes to select or deselect the additional tasks then click "Next" to continue.

You will now see a window displaying the destination location and additional tasks.



Check that this information all correct and if it is click "Install" to continue. Click "Back" if you wish to change any of the installation settings.

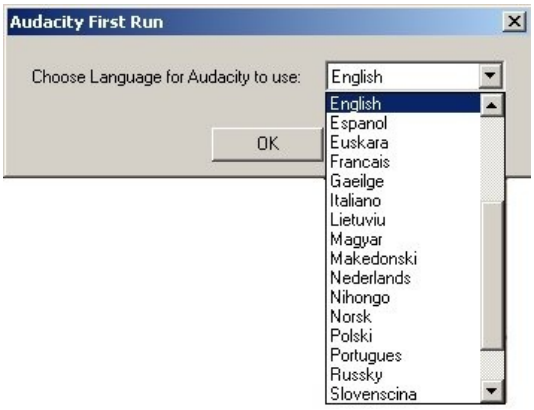
You should now see a window like this:

Click "Finish" to complete the installation. If the check box labelled "Launch Audacity" is ticked Audacity will open straight away.

Installation is now complete. If you didn't choose "Launch Audacity" in the options above then you can launch Audacity by double clicking the following icon in the Audacity folder (or on your desktop if you checked that checkbox in the second setup screen above):

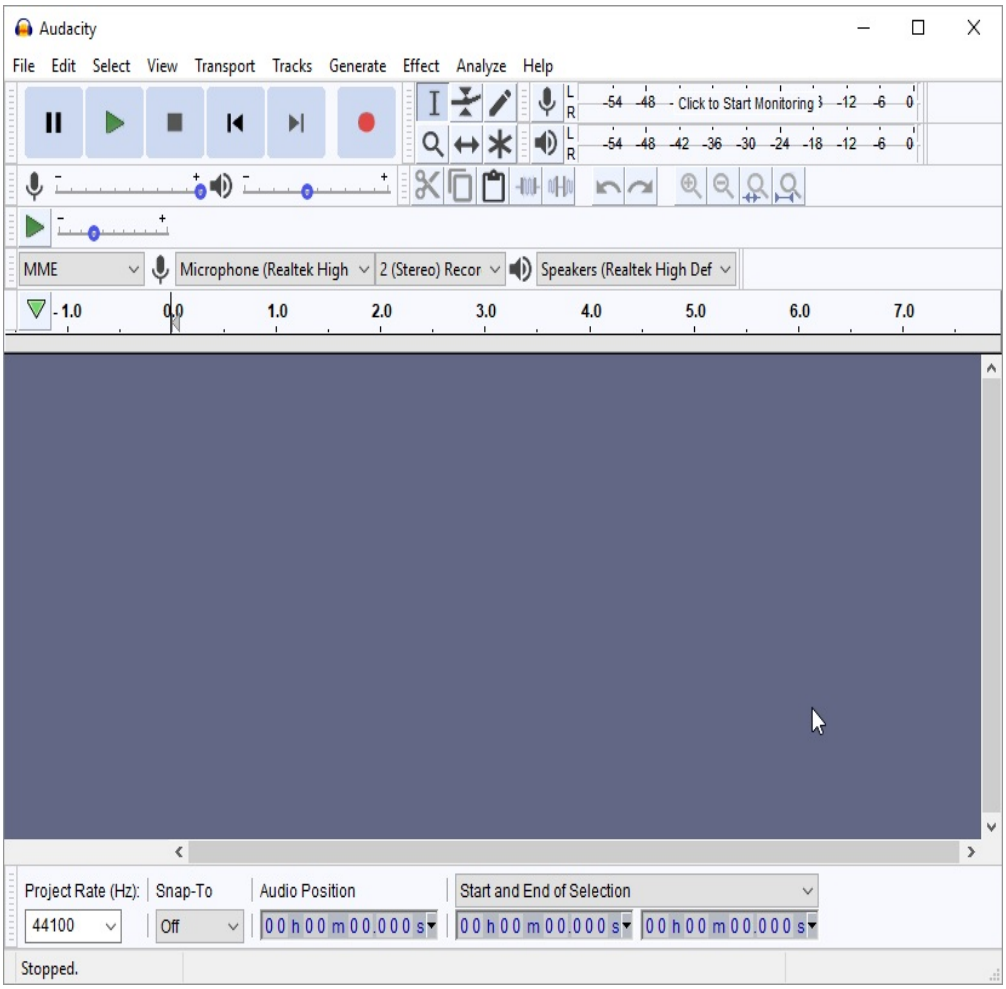
The first time you launch Audacity you will be prompted to select which language you want it to use.

Click on the dropdown menu to select the language you want.



Once you have chosen the language you want, click on "OK" to finish launching Audacity.

The Audacity interface should look like this:



That's it! You now have Audacity up and running and can begin making and editing recordings.

You may need to install an extra library to be able to export a file as an mp3.

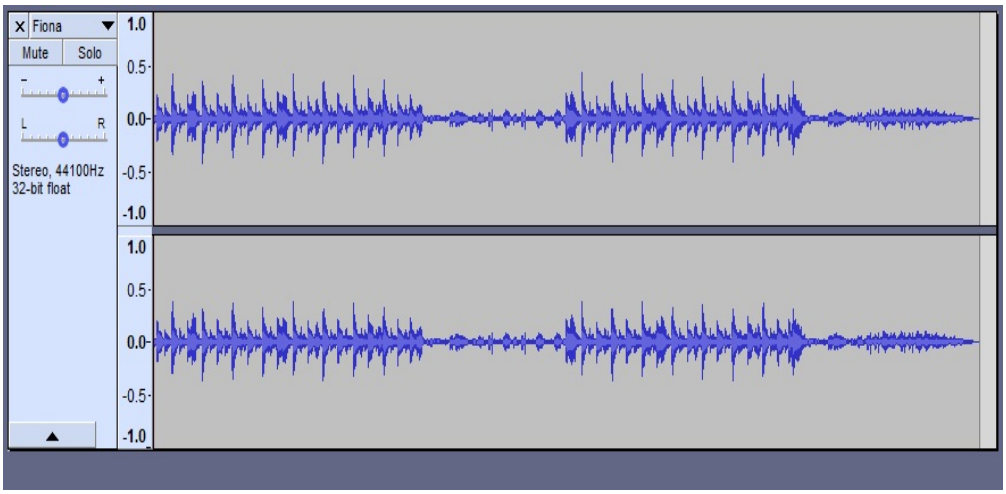
INTERFACE
6. TRACK BAR
7. MENU BAR
8. TOOL BAR

Audacity: TrackBar

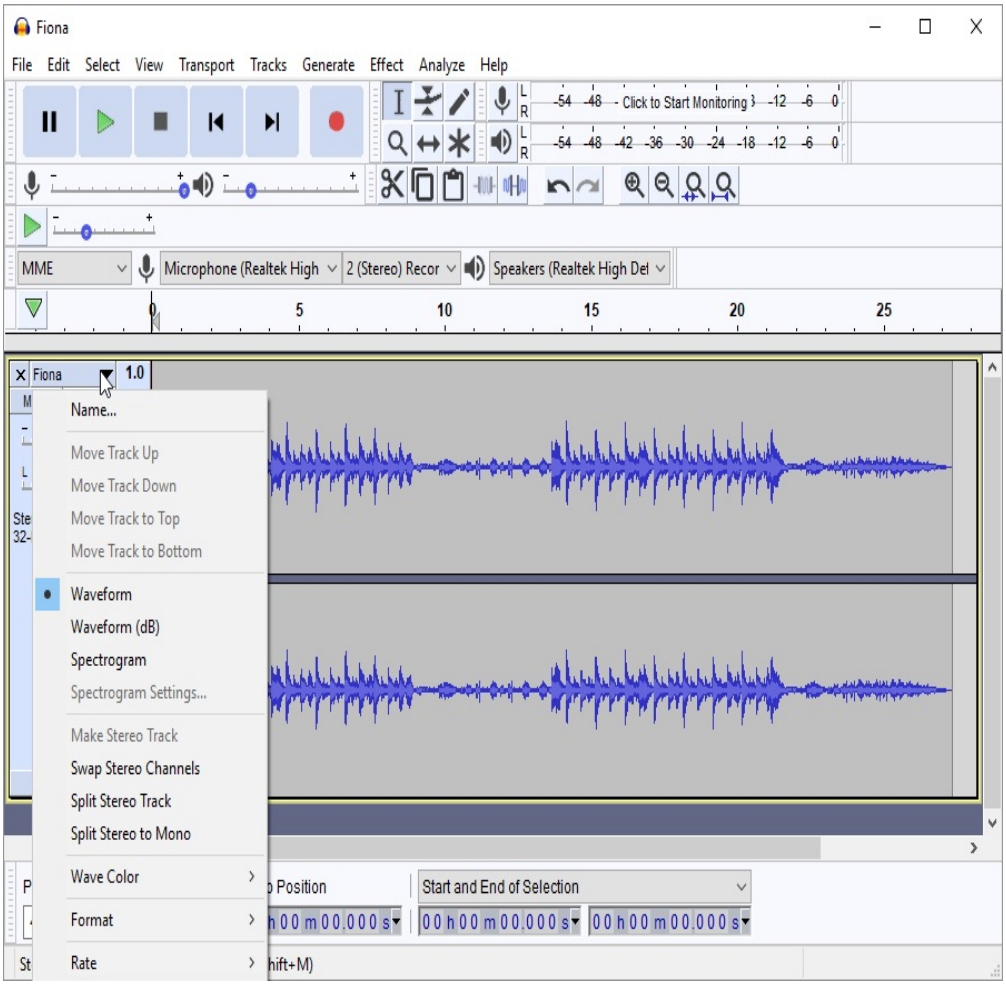
Track Area

Software name : Audacity
Software version : 2.2

In Audacity, a single channel of sound is represented by one mono audio track; a two-channel (L/R stereo) sound by one stereo audio track. The example below is a stereo track labeled 'Fiona', as loaded into Audacity:



Lets look at some of the controls available to you from this interface (click the arrow next to the track name to get this dropdown menu):



option	***action***
Name	edit the name of the track
Move Track Up/Down/To Bottom	move Track Up or Down within the larger GUI
Waveform	traditional display of audio material.
Waveform (dB)	like Waveform, but logarithmic instead of linear vertical units .
Spectrogram	display the frequency spectrum of the audio over time.
Swap Stereo Channels	swap out the Left and Right stereo channels (Left appears above by default)s
Split Stereo Track	turn one stereo track into two single channel (mono) tracks, representing the Left and Right stereo tracks
Split Stereo to Mono	create two identical mono tracks, each mixed down from the original L and R stereo tracks.
Wave Color	mark different instrumental tracks with up to four different colors

Format	pick the sample format for this track: 16-bit PCM, 24-bit PCM, 32-bit float
Rate	set the sampling rate of this track, 8000 to 384000 Hz or custom
(greyed out above) Make Stereo Track	combine a selected mono track with another mono track directly beneath it into a single L/R stereo track

Solo button:
When multiple tracks are displayed in the project GUI, selecting the 'solo' button on one track will cause only this track to play.

Mute button

When multiple tracks are displayed, selecting the 'Mute' button on one track will mute it during play (all un-muted tracks will be audible).

Gain and Pan Controls

Like the Solo and Mute buttons, these controls will appear on each separate audio track in the project. The top slider controls the track **volume**, or rather the overall gain of that particular track relative to all other tracks displayed in the GUI.

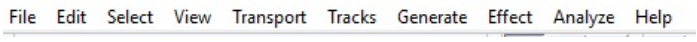
The bottom slider sets the panning position of a stereo track (moving toward L will emphasize the Left track sounds, moving toward R will emphasize the Right track).

Audacity: MenuBar

Menu Bar

Software name : Audacity
Software version : 2.2

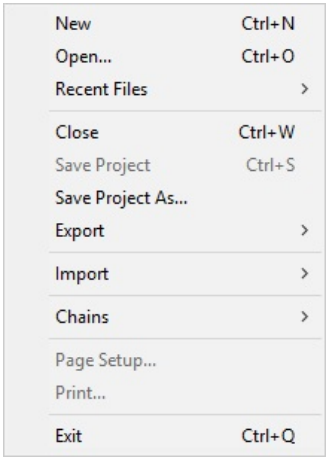
Lets look at the basic elements of the Audacity Menu Bar :



The **Menu Bar** is a typical element in many applications. It will look slightly different to this if you are not using **Windows**; most notably in **Mac OSX** this Menu Bar is not located on the application window itself but at the top of the screen in the "Apple Menu". Let's go through the Menu Bar one item at a time.

File

By clicking on "File" in the Menu Bar you get a drop down menu with numerous options to choose from. As with other drop-downs in the menu bar, some options here may be "greyed out," meaning you can't select them; you will only be able to choose the options that appear in solid black. The options available depend on the state of your Audacity project at the time. For example the following image of the File drop-down displays when Audacity has just been opened and no recording or editing has yet been started (thus no audio tracks are displayed in the GUI). As in subsequent menus from the menu bar (see below), a '>' symblol following the option name indicates that a submenu will appear, with more specific options or functions:



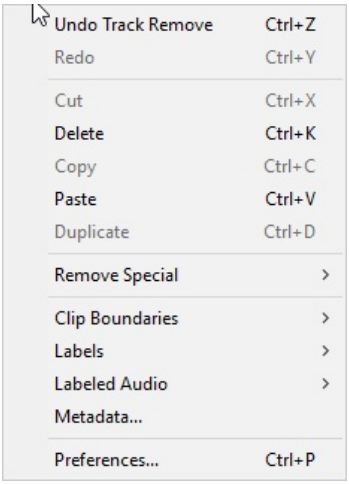
The File Menu is where you can add, import and export all the things related to the audio and project (.aup) files.

option	***action***
New	creates a new empty project window.
Open...	selecting "Open" presents you with a dialog where you can choose a file to open. Note: if you choose any type of audio file other than an Audacity project file (.aup), you are essentially 'importing' it, as in "Import" below, except that any changes made will be saved to the original file

	except that any changes made will be saved to the original file.
Recent Files	Shows the ten most recent .aup or other audio files you have opened.
Close	closes the current project window (will prompt you to save the current project if not already done)
Save Project	saves the current Audacity project (AUP) file.
Save Project As...	allows you to save the current Audacity project (AUP) file with a different name or in a new location.
Recent Files...	Submenu gives a list of recent files you ahve been working on.
Export	Submenu exports the current Audacity project as a standard audio file format such as WAV, MP3 or OGG. Also allows for the export of Labels, MIDI, as well as combinations of these. Finally, allows export of just the selected tracks or areas of a track within an open project.
Import	Submenu allows you to import audio files, MIDI, Labels and raw data into the current Audacity project
Chains	Allows you to apply a chain or edit chains. See section on "Chains" below.
Exit	closes all project windows and exits Audacity. It will ask you if you want to save changes first.

Edit

The **Edit Menu** groups together functions for editing audio tracks, labels or metadata in your project:

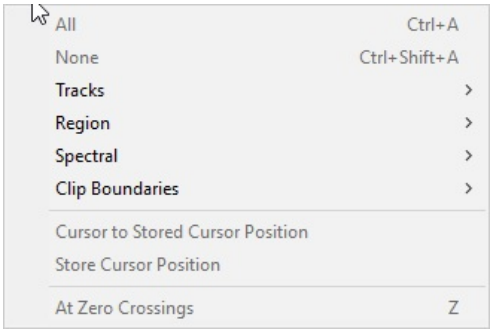


option	***action***
Undo	This will undo the last editing operation you performed to your project (in this case a sound track was removed; the label will tell you which operation you are undoing).
Redo	This will redo any editing operations that were just undone.
Cut	Removes the selected audio data from the project and places it on the clipboard.

Delete	Removes the audio data that is currently selected without copying it to the clipboard.
Copy	Copies the selected audio data to the clipboard without removing it from the project.
Paste	Inserts whatever is on the clipboard at the position of the selection cursor in the project.
Duplicate	Duplicates whatever is selected: a track section, a track or multiple tracks.
Remove Special	Submenu allows for more advanced removal commands: split cut & split delete keeps the material to the right of the selection from moving left; you can also silence selected audio or trim selected audio (removing all audio in a track except for selected part).
Clip Boundaries...	Submenu allows you to manipulate the boundarie of 'clips' within a track: split the track into 3 clips on boundaries defined by your selection, do the same and create a new track with the middle 'clip', join several clips together into one, or detach a track into multiple clips at silences.
Labels	Submenu allows you to add labels or text to audio track locations specified by your cursor or selection. You can also invoke the Labels Editor, which allows editing of all existing project labels.
Labeled Audio	Submenu allows you to perform edit operations such as cut, delete, split cut, split delete, silence, copy, join, detach etc on the audio of selected range labels (useful for batch operations on audio with like labels).
Metadata...	Allows you to edit the metadata tags that will be applied to export files.
Preferences...	Opens a dialog window that lets you configure Audacity.

Select

The **Select menu** provides commands for defining selection regions within your project (which you can then edit, delete, export or apply various effects to in other menus). These functions can save time and be much more precise than selecting a region manually via your mouse cursor.

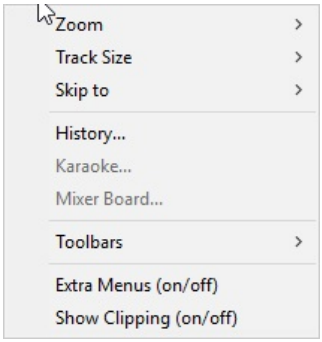


option	***action***
All	This will select all audio in all tracks in your project.
None	This will deselect all selected regions in your project.
Tracks	This submenu has commands to extend the current selection up and/or down into all tracks in the project, or into all Sync-Locked

Tracks	and/or down into all tracks in the project, or into all Sync-Locked tracks in the currently selected track group.
Region	This submenu has commands for defining selection regions by either the playback head (to its right, to its left) or by the cursor position (cursor to track start, cursor to track end) and also lets you store and retrieve the position of the editing cursor.
Spectral	This advanced function is used to make selections that include a frequency range as well as a time range on tracks in Spectrogram view. See Spectral Selection for details.
Clip Boundaries	This submenu allows you to make selections based on any clips you have in a given track: previous clip boundary to cursor; cursor to next clip boundary; all of previous clip; all of next clip.
Cursor to Stored Cursor Position	Defines a selected region between the playback head (during playback or record), or in other cases the active editing cursor, and the previously stored cursor position defined by **Select > Store Cursor Position.**
Store Cursor Position	Stores the position of an editing cursor, or playback head during playback/record, which can then be used with the previous command. Note that there is no visual cue for the stored cursor position.
At Zero Crossings	helps to avoid clicks at edit points when making cuts and joins by moving the edges of a selection region (or the cursor position) very slightly so they are at a rising zero crossing point.

View

The **View Menu** is used to manage the display of the tracks ("channels") for best viewing of track details, and also has various options to show and hide some interface elements:

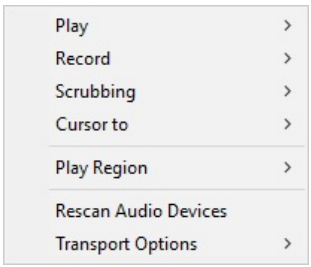


option	***action***
Zoom	This submenu allows you to zoom in by percentage, zoom out by percentage, back to default, and in so that the selected region fills the entire screen size.
Track Size	This submenu allows you to zoom in/out so that the entire project fits the width of the project window or the height of that window; it also allows you to collapse all tracks (hiding their mute, solo, pan and volume controls), and to re-expand collapsed tracks
Skip to	This submenu allows you to skip your cursor to the start or the end of a given selected region, without changing the zoom level.
History...	Brings up the History window, which lists all undoable actions performed in the current project, including importing and effects, along

	with their impact on the disk space used by the overall project.
Karaoke...	This shows a bouncing ball that follows text as audio plays. The **Karaoke...** command is enabled whenever you have at least one label track. If you have more than one, it uses only the first one.
Mixer Board...	This is an alternative view to the audio tracks in the main tracks window, and is analogous to a hardware mixer board. Each audio track is displayed vertically in a Track Strip, with its own pair of meters, gain slider, pan slider, and mute/solo buttons, echoing that track's controls in its track control panel. For more detail see Mixer Board.
Toolbars	This submenu toggles on/off a total of eleven toolbars, of which all but Scrub toolbar and Spectral Selection toolbar are shown by default.
Extra Menus	Toggles on/off a set of extra navigation menus (after "Help") with less frequently used commands
Show Clipping	Toggels on/off the display of clipped samples.

Transport

The **Transport** menu includes the record and playback commands also accessible through the record/playback GUI buttons, with some refinements of these:

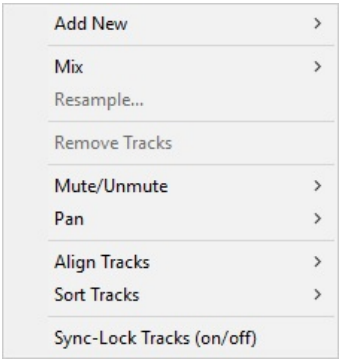


option	***action***
Play	This submenu allows you to start, stop, pause or loop playback of a selected track.
Record	This submenu allows you to start, stop, pause a recording, record a new track from current cursor position, or open the Timer Record dialog to schedule when a recording ends and begins.
Scrubbing	This submenu allows you to toggle into Scrub and Seek modes. Scrubbing means moving the mouse pointer right or left so as to adjust the position, speed or direction of playback, listening to the audio at the same time. Seeking is similar to Scrubbing except that it is playback with skips, similar to using the seek button on a CD player
Cursor to	This submenu allows you to move the cursor to the start or end of any selection, track or clip you may have, or to the start or end of the project as a whole.
Play Region	This submenu allows you to lock playback to the current position of a playback region (which now appears as a red segment within a track). While locked, playback is confined to this region. This region can then be unlocked here as well.
Rescan Audio	Rescan for audio devices connected to your computer, and update the playback and recording dropdown menus in the Device Toolbar (see

Audio Devices	playback and recording dropdown menus in the Device Toolbar (see Toolbars section).
Transport Options...	This submenu allows you to manage and set various options for the record and playback controls.

Tracks

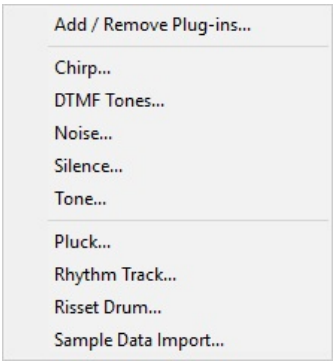
The **Tracks menu** features operations allowing for creating, deleting, muting, panning, aligning and labeling multiple tracks at once:



option	***action***
Add New	Submenu allows you to add a new mono or stereo audio track, label track or time track.
Mix	Submenu allows you to mix or render your selected tracks to a single mono or stereo track.
Resample...	Allows you to resample the selected track(s) to a new sample rate for use in the project, leaving the length, and hence playback speed and pitch of the track, unchanged.
Remove Tracks	Remove the selected track(s) from a project (only if part or all of a track has been selected)
Mute/Unmute	Submenu allows you to mute or unmute all project tracks at once.
Pan	Submenu allows you to change the L/R panning of all selected tracks at once.
Allign Tracks	Submenu allows you to align selected tracks in relation to each other or to the cursor.
Sort Tracks	Submenu allows you to sort tracks (top to bottom in GUI) by their names or start times.
Sync-Lock Tracks On/Off	Toggles on/off the sync-lock feature, which ensures that length changes occurring anywhere in a defined group of tracks also take place in all other audio or label tracks in that group, even if those tracks were not selected.

Generate

The **Generate Menu** allows you to insert various generated audio elements (tones, noises and silence) into a track, either extending the track or replacing a selected region, or inserting the element into a new track:



The duration of the generated audio (when inserted into an existing track) is determined by the length of your selection and the position by the left boundary of your selection, or by a specified duration. If no selection is made and no duration specified, the default length inserted at the cursor position is 30 seconds, or whatever your most recent previous entered duration was. Please see Examples of Generator Usage for some detailed examples of using the Audacity generators

name	***action***
Add/Remove Plug-ins...	The default plug-ins for Audacity are shown later in this menu: Pluck, Rhythm Track, Risset Drum and Sample Data Import. This option invokes a dialog which allows further plug-ins (for effects, generatiors and analyzers) to be added or removed.
Chirp...	Chirp produces four different types of tones like the Tone Generator below, but also allows separate setting of the start and end amplitude and frequency (hence the 'chirp' effect). As with Tone, frequencies can be specified anywhere between 1 Hz and *half* the current project rate as shown in the Selection Toolbar.
DTMF Tones...	Generates dual-tone multi-frequency (DTMF) tones like those produced by the keypad on telephones. For each tone you wish to generate, enter numbers from 0 to 9, lower case letters from a to z, and the * and # characters (emulating a telephone keypad).
Noise...	Invokes the Noise dialog allowing you to generate 3 different types of noise--white, pink, and Brownian--and specify amplitude and duration of each. Experiment to get a sense of these different types of noise.
Silence...	Generates silence (audio of zero amplidute) either applied to a given selected region of audio, or at the cursor with a designated duration.
Tone...	Generates one of four different tone waveforms: Sine, Square, Sawtooth and Square (no alias), the name of each corresponding to its appearance when zoomed in sufficiently to see each waveform cycle. Experiment to get a sense of these different tones. Frequency, amplitude and duration can all be specified.
Pluck...	Creates a single synthesized pluck tone at the cursor with abrupt or gradual fade-out, and selectable pitch corresponding to a MIDI note.
Rythm Track...	The Rythm Track dialog allows you to create a track with regularly spaced sounds at a specified tempo and number of beats per measure (bar), also allowing control of duration (in bars or whole seconds), start time offset, specific beat sound (5 options) and MIDI pitch of strong and weak beat. This is NOT a 'drum track' but could be used as a metronome for synching a drum track.

Risset Drum...	Produces a single realistic drum sound consisting of a sine wave ring-modulated by narrow band noise, an enharmonic tone and a strong sine wave at the fundamental. Can be copied and synched with other audio to produce a drum track, with beats of various pitch, volume and decay.
Sample Data Import...	An advanced feature which produces audio from imported numeric data

Effect

The **Effect Menu** allows you to apply a wide (potentially infinite) range of effects to a selected audio track or region. Note that this menu cannot be accessed while any tracks are in Playback or Record mode.

Note that the menu pictured here represents the default effects plug-ins in Audacity as of the 2.2.1 release (and there are a dozen more below those pictured in the menu here). The following table addresses only some of the most familiar effects from among those available. Within and beyond this set, you are encouraged to experiment.

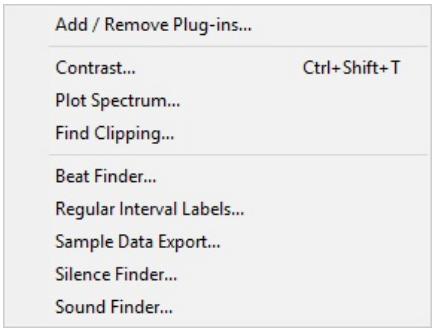
name	***action***
Add/Remove Plug-in…	Functions just like the 'Add/Remove Plug-in..." feature of the Generate menu (and Analyze menu).
Repeat Last Effect	Applies the most recently-used effect to a new selected track or region.
Amplify	this effect increases or decreases the volume of a track or set of tracks.
Bass Boost	this is a smooth filter which can amplify the lower frequencies while leaving most of the other frequencies alone.
Change	changes the pitch/frequency of the selected audio without changing

Pitch	the tempo.
Change Speed	changes the speed of the audio by resampling. Making the speed higher will also increase the pitch.
Change Tempo	changes the tempo (speed) of the audio without changing the pitch.
Click Removal	this effect is designed to remove the annoying clicks on recordings from vinyl records without damaging the rest of the audio.
Distortion	applies a distortion effect familiar from much mid- and late-1960s rock music.
Compressor	compresses the dynamic range of the selection so that the loud parts are softer while keeping the volume of the soft parts the same.
Echo	this effect repeats the audio you have selected again and again, softer each time. There is a fixed time delay between each repeat. Effect frequently used for vocal sounds in live performance (and guitar sounds for some groups like The Who).
Equalization	boost or reduce frequencies.
Fade In	applies a linear fade-in to the selected audio.
Fade Out	applies a linear fade-out to the selected audio.
Invert	this effect flips the audio samples upside-down. This normally does not affect the sound of the audio at all.
Noise Removal	this effect is ideal for removing constant background noise such as fans, tape noise, or hums. It will not work very well for removing talking or music in the background.
Normalize	allows you to amplify such that the maximum amplitude is a fixed amount, -3 dB.
Nyquist Prompt	allows you to express arbitrary transormations using a powerful functional programming language (for advanced users).
Phaser	the name "Phaser" comes from "Phase Shifter", because it works by combining phase-shifted signals with the original signal. Much 1970s rock music makes heavy use of phasing.
Repeat	repeats the selection a certain number of times.
Reverse	this effect reverses the selected audio.
Wahwah	just like a guitar's wah-wah peddle.

In addition to these and other effects available by default from the Effect menu, many other effect plug-ins are available as Nyquist effects, LADSPA effects, LV2 effects, and VST effects. Beyond the specific links supplied here, referencing these different groups of effects, see Audacity's overall effects documentation page. As noted there, some effects do not support the 'Preview' function, which allows you to preview the result of applying an effect to an audio track before applying it permanently.

Analyze

The Analyze Menu gives you many options for finding out about the characteristics of your audio tracks, and labeling key features. The five default Audacity plug-ins shown at the bottom of the menu, but many more plug-ins are available. Rather than modifying your audio tracks, as in Effect functions, Analyze functions typically create a new label track indicating the audio features you are seeking. These labels can then be used for export or edit functions or for mixing.



name	***action***
Add/Remove Plug-ins...	Action is identical to Add/Remove for Generate and Effect menus
Contrast...	Analyzes a selected, single mono audio track to determine the average rms difference in volume (contrast) between *foreground* (the speech) and *background* (music, audience noise or similar). The purpose is to determine if the speech will be intelligible to the hard of hearing.
Plot Spectrum	displays the Power Spectrum of the audio over a selected region (ie, a graph of frequencies (the horizontal scale in Hz) against amplitudes (the vertical scale in dB).
Find Clipping...	Displays runs of clipped samples in a Label Track, as a screen-reader accessible alternative to **View > Show Clipping**. A run must include at least one clipped sample, but may include unclipped samples too.
Beat Finder...	Creates a label track which attempts to place labels at beats in a selected audio region which are much louder than the surrounding audio. This tool works better with some genres than others; it will not necessarily work well on a typical modern pop music track with compressed dynamic range.
Regular Interval Labels...	Places labels in a long track so as to divide it into smaller, equally sized segments. Can be useful for distributing a large file on the internet. You can choose the number of labels to be created, or the interval between them. Each label produced contains the chosen label text.
Sample Data Export	Advanced feature: Reads the values of successive samples from the selected audio and prints this data to a plain text, CSV or HTML file.
Silence Finder	Divides a track by placing point labels inside regions of silence. Useful if you just want to split a recording into tracks at specific boundaries, without removing the silences between them.
Sound Finder	Divides a track by placing region labels for segments of sound that are separated by silence. Use this to make labels showing the exact region of each track to be exported (useful for example if you want to split up a full-length CD or LP recording into individual song tracks for export).

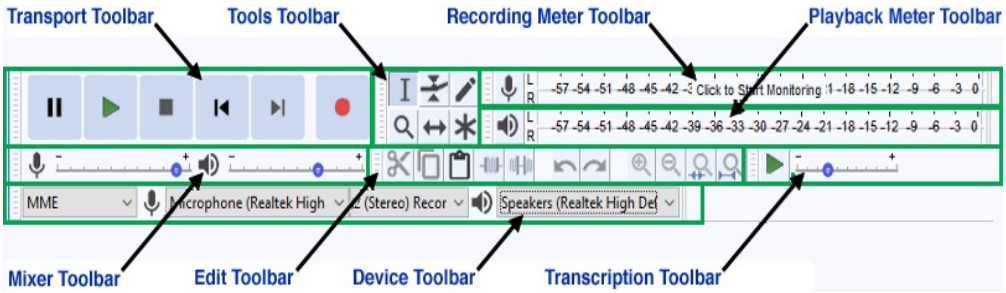
Audacity: ToolBar

Tool Bar

Software name : Audacity
Software version : 2.2.1

The **Tool Bars** are where you choose tools to directly work on the tracks. There are eight main Tool Bars in the Audacity GUI, shown by default:

- Transport toolbar
- Tools toolbar
- Recording Meter toolbar
- Playback Meter toolbar
- Mixer toolbar
- Edit toolbar
- Device toolbar
- Transcription toolbar



Below we will walk through the individual controls in each toolbar.

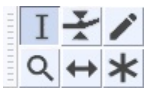
Transport Tool Bar

These controls will be familiar from most Record/Playback devices. Let's look at each button:

button	***action***
	Will pause during playback or recording. Press again to unpause.
	Press the play button to listen to the selected audio (or all audio) in your project.
	Press the stop button or hit the spacebar to stop playback immediately.
	Press to move playback head to start of track.

	Press to move playback head to end of track.
	press the record button to record a new track from your computer's sound input device.

Tools Toolbar



This toolbar groups together a range of commonly-used functions that can also be accessed from the Edit, Select, View and Tracks menus.

button action

Selection -- Click to select a start point for audio playback, or click and drag to select a range of audio.

Envelope -- Allows smooth volume changes to be made over the length of a track by means of embedded volume "control points". Click in the track to create a control point, then set the volume of that point by dragging one of its four vertically arranged "handles". When you create other control points at different levels, a smooth curve is interpolated between them. See tutorial chapter for example.

Draw Samples -- Draw Tool enables you to manually redraw the waveform in a track; it can thus be used to make volume changes to individual samples or to eliminate clicks, noise etc.

Zoom -- Left-click this button zooms in one step at the position of the mouse pointer. Click and drag zooms in to the dragged region. The drag draws a dotted region in the waveform which is fitted to the entire track width when you release the drag. Shift and left-click or right-click zooms out one step at the position of the mouse pointer. Shift and drag zooms out

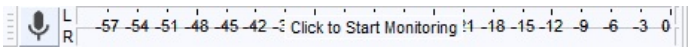
out one step at the position of the mouse pointer. Shift and drag zooms out based on the dragged region. The drag draws a dotted region in the waveform and when you release the drag, the audio at the left edge of the dotted region is repositioned at the start of the visible waveform.

Time-shift -- When selected, this tool lets you synchronize audio in a project by dragging individual or multiple audio tracks, note tracks or audio clips left or right along the Timeline. Also use this tool to drag individual tracks or clips up or down into another track.

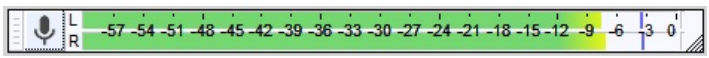
Multi-tool -- For advanced users: This combines all five previous tools in one. One tool is available at a time, according to the mouse position and modifier key chosen. The shape of the pointer changes to show which tool is active. If you exit Audacity with Multi-Tool Mode selected, it will be also be enabled next time you launch Audacity. More detail on Multi-Tool Mode here.

Recording Meter Toolbar

When Audacity first launches, this meter will be inactive and thus display "Click to Start Monitoring", as below.

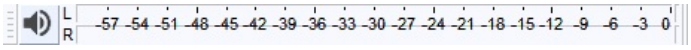


If you click on the toolbar, OR click the record button, this meter will activate and monitor the audio input level from whatever input device you have selected (with separate L and R channels if the input is in stereo). As shown below, the meter reads green until just before -6 dB, at which point the tip starts turning yellow. At around -3 dB it turns red, indicating that your recording input is too high or 'hot' and distortion or clipping may occur.



Dropdown menu: clicking on the microphone icon will invoke a dropdown menu which allows you to enable/disable monitoring (same as clicking inside the meter itself) and can also launch an "Options" dialog, allowing you to set the meter's style, visual orientation, the scale format and other parameters.

Playback Meter Toolbar



The Playback Meter will activate when you begin Playback on an existing track (with separate L and R channels if the track is stereo). As with the Recording meter, the Playback meter tip turns yellow around -6 dB, and red just before -3 dB, indicating that the volume on your recorded audio is too high, Audacity may have clipped the audio, and/or distortion may occur on most standard playback devices.

Dropdown menu: clicking on the speaker icon will allow you to invoke an "Options" dialog similar to the one for the Recording Meter.

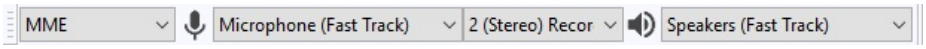
Note: for both meters, a blue line (as shown above in active recording meter) indicates the maximum peak level attained in that channel during the current playback or recording session. This line will remain until a new monitoring

session is started.

Mixer Toolbar

The left-hand slider adjusts the volume level of the input (recording) device you have selected in the Device Toolbar. The right-hand slider adjusts the volume of the output device you have selected for Playback.

Device Toolbar



The Device Toolbar allows you to select which device you would like to use for input (recording) and for output (playback). The options available in each dropdown will depend on which **Audio Host** you have chosen in the left-hand dropdown, as well as which physical devices are installed in/attached to your machine and enabled with your sound card. For more on the relationship among these three selectors, for different operating systems, see the official Audacity documentation for the Device Toolbar.

Edit Toolbar

This toolbar provides alternate access to common tools accessible through the "Edit" and "View" menus. Taking the buttons individually:

button	***action***
	removes the selected audio data and places it on the clipboard.
	copies the selected audio data to the clipboard without removing it from the project.
	inserts whatever is on the clipboard at the position of the selection cursor in the project.
	deletes everything but the selection.
	erases the audio data currently selected, replacing it with silence instead of shortening the track.
	this will undo the last editing operation you performed to your project.
	this will redo any editing operations that were just undone.
	zooms in on the horizontal axis of the audio, displaying more detail and less duration.
	zooms out, displaying less detail and more duration.
	zooms in until the selected audio fills the width of the screen to show the

	selection in more detail.
	fits the entire project in the available screen space.

Transcription Toolbar

The **Transcription Toolbar** is intended to assist with manual text transcription of recorded voice. It has its own Play-at-Speed button which plays (or restarts playback) at the speed set by the Play-at-Speed slider. Playback can be paused and resumed at the adjusted speed using the Pause button ⏸ in the Transport Toolbar. Double-clicking on the slider opens up a Playback Speed dialog for more precise adjustment of the playback speed.

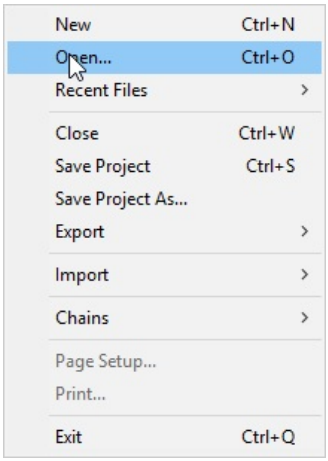
TUTORIALS
9. OPEN (IMPORT) A FILE
10. RECORDING
11. ADD A NEW TRACK
12. CREATING FADES
13. BASIC EDITING
14. ADVANCED EDITING
15. EXPORTING

Audacity: OpenFile

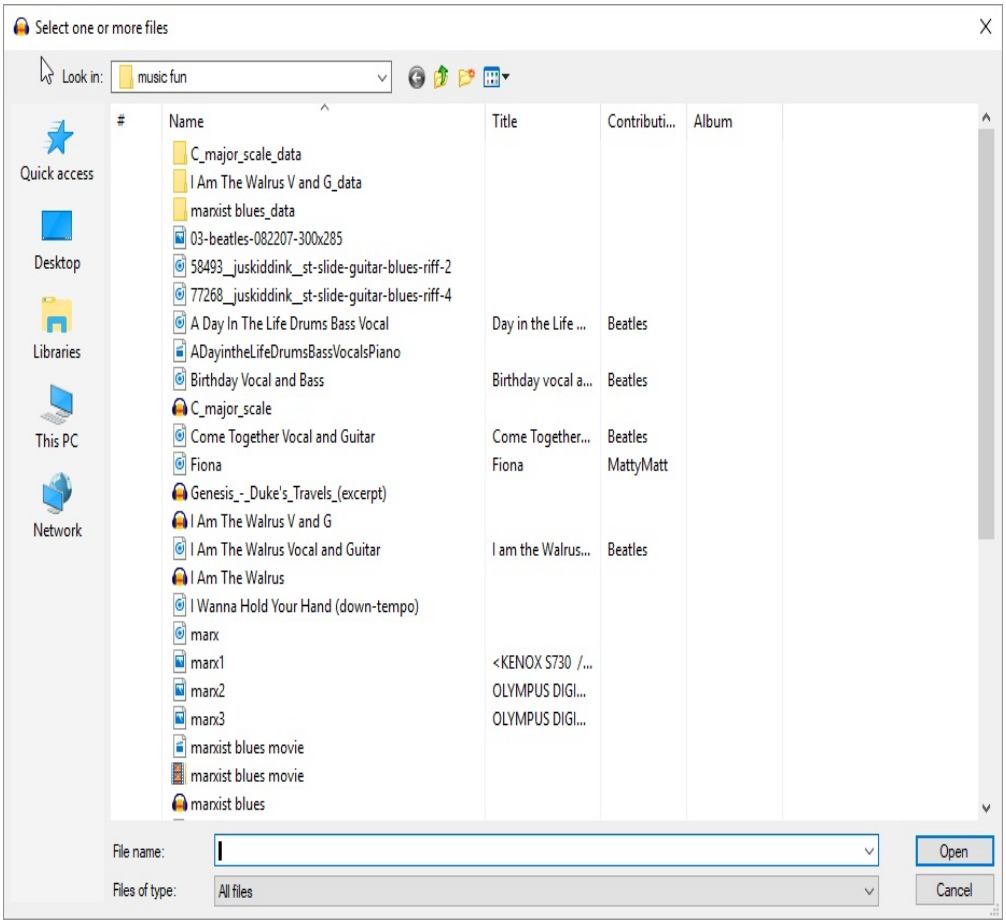
Open/Import an Audio File

You will need to have an audio file available to edit. If you don't have one locally, download an MP3 or .wav from somewhere. Make sure it's not too big: 1-4 minutes is fine for all our tutorial purposes in this book. Choose either the **Open** option or the **Import > Audio** option from the **File** menu (the difference between **Open** and **Import** will be discussed shortly).

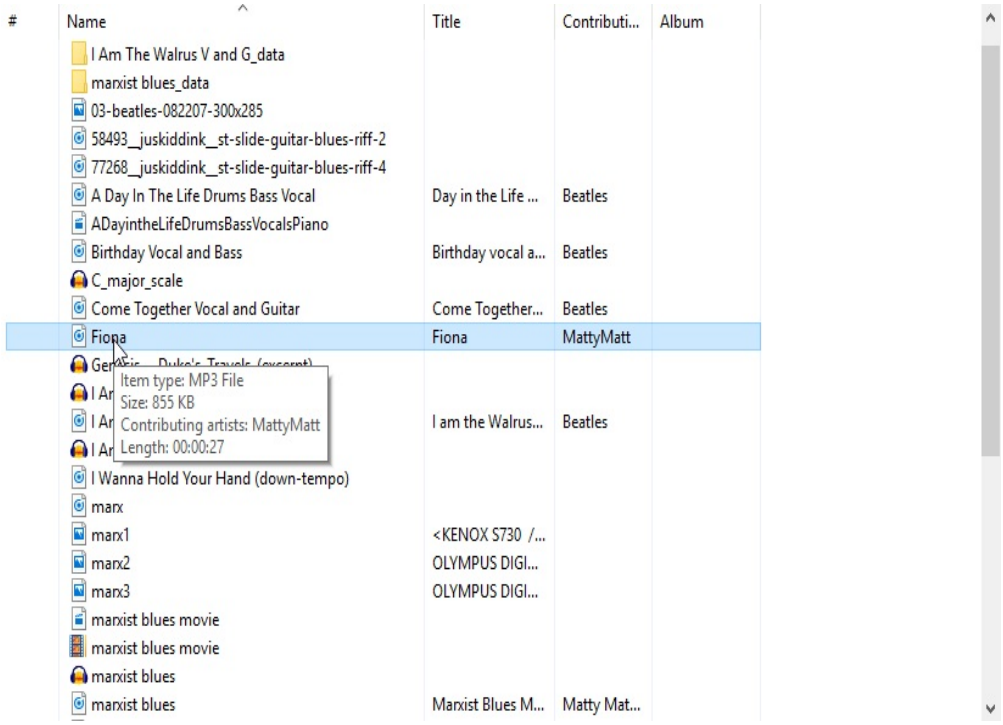
Please note that these and all following tutorial images are captured from Audacity running on Windows, so if you are running Mac or Linux instead, your GUI might look slightly different.



You will then be presented with a window where you can browse to the location of the audio file on your computer:



You can see in the above example there are a large number of audio files here, some as MP3s and others as Audacity projects (marked with the Audacity logo). Note that this directory also contains some video (MP4) files and static image files; selecting any of those would trigger an error message. I will select Fiona.mp3, a dance mix I created previously in Audacity based on vocalization by my cat Fiona:



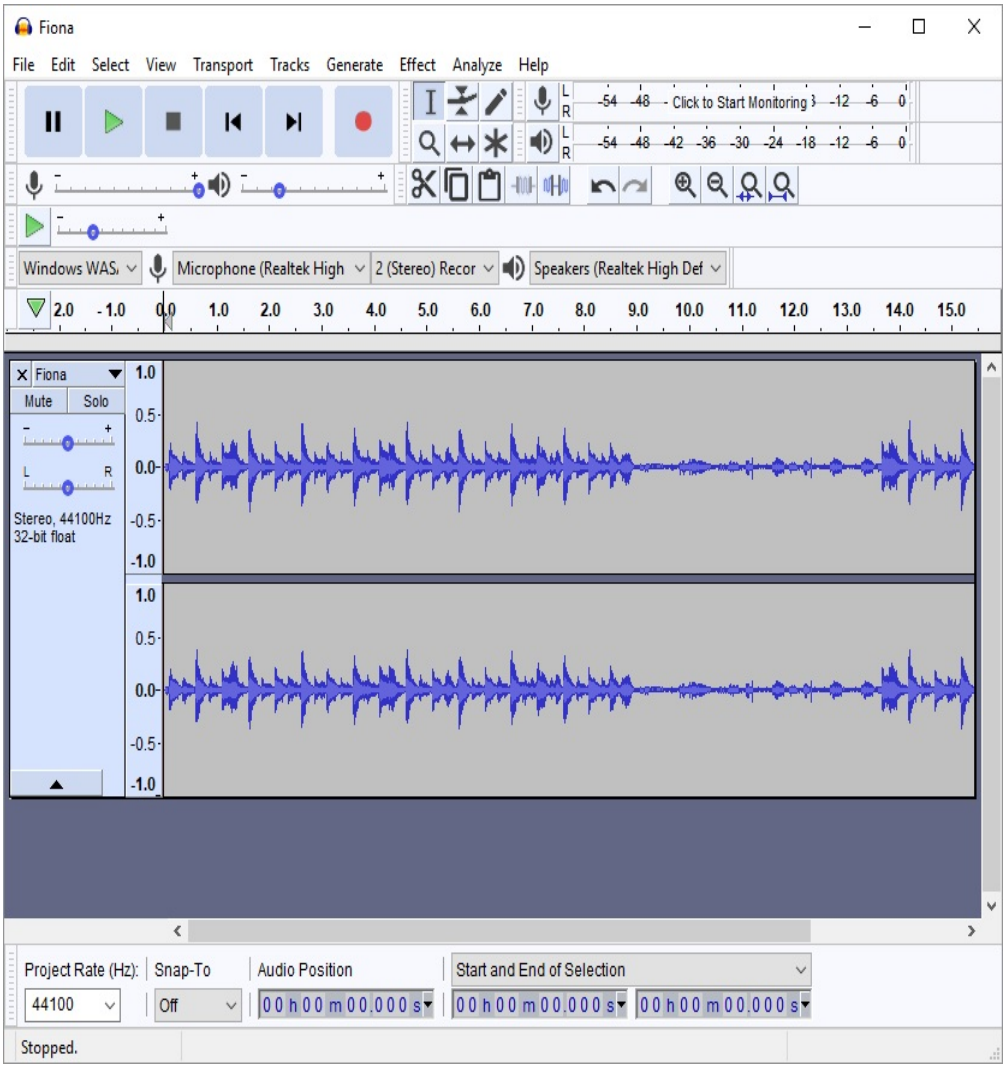
If I now press OK the file will be imported into Audacity.

Open vs Import, Save vs Export

It should be noted that for adding the ***first*** audio track to a new or empty project, "opening" a standard audio file such as MP3 or .wav is effectively the same as "importing" that same file, through the **Import** function further down in the **File** menu. In either case Audacity imports the file into its own proprietary format, adding it to an open Audacity project which will be saved as an AUP file. However, if your open Audacity project *already* contains one or more audio tracks, additional tracks can *only be* ***imported***, not 'opened', to be added to that project. For this reason it is probably better to get in the habit of always adding standard-format, non-Audacity audio tracks via 'Import' rather than 'Open'. You should reserve the 'Open' function for opening Audacity project (.aup) files themselves (which can *only* be opened through **Open**, not through **Import**).

Conversely, after you have edited (or created) audio in Audacity, if you simply select "Save Project" or "Save Project As..." it will save as an AUP file, which is proprietary to Audicity and cannot be played or edited in other software. To get the audio back to a common file format, you will need to **Export** the open project (for example, as an MP3 or .wav) through the Export function further down the File menu.

Once the import has finished you will see the audio file displayed in the Audacity window. The file I chose is in stereo format, so both left and right channels are displayed in a single track:



That's it! The audio is now ready for editing or other manipulation.

Audacity: RecordingASound

Recording a sound

Software name : Audacity
Software version : 2.2.1

Recording sound with Audacity is very straightforward: you just need to have a computer that has a sound card with at least a **microphone** (**mic**) or **line** input.

Getting started

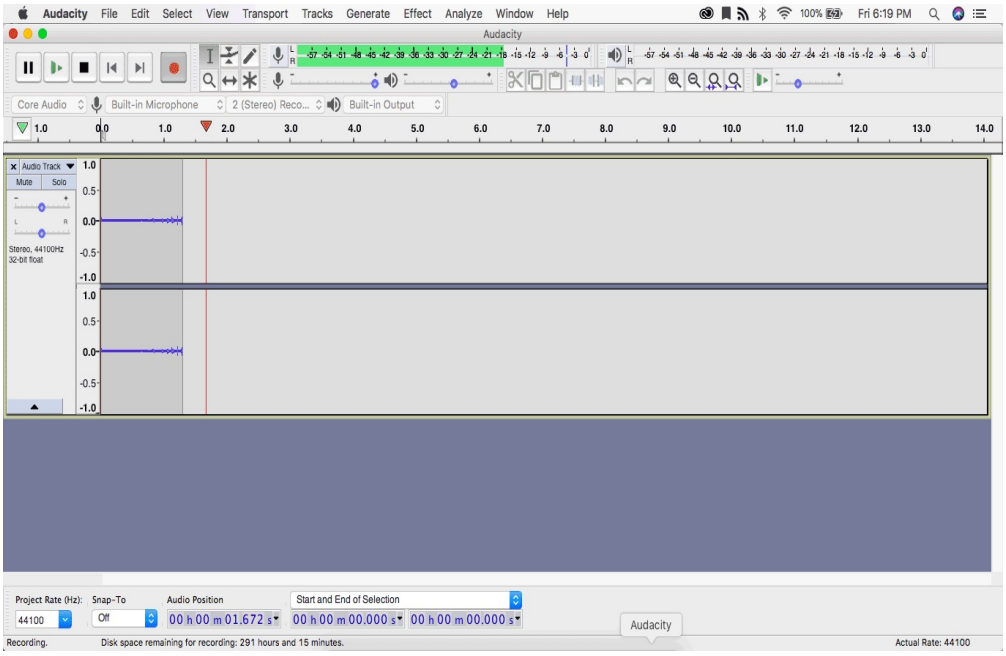
Before making a recording you need to make sure that the device you want to record from is connected to the **audio input** of your computer's sound card. To do this you can use your computer's sound control panel or the custom mixer application for your specific soundcard, selecting the input device you want to use and verifying that you are getting sound into the computer from that device. Note that you can also use Audacity's own Recording meter to test whether your desired recording device is inputting properly, and at appropriate levels. However, and especially if this is your first attempt to record, it is preferable to first use your OS control panel or sound card's mixer application to verify audio input connectivity. Then you can launch Audacity.

MacOSX Recording Configuration

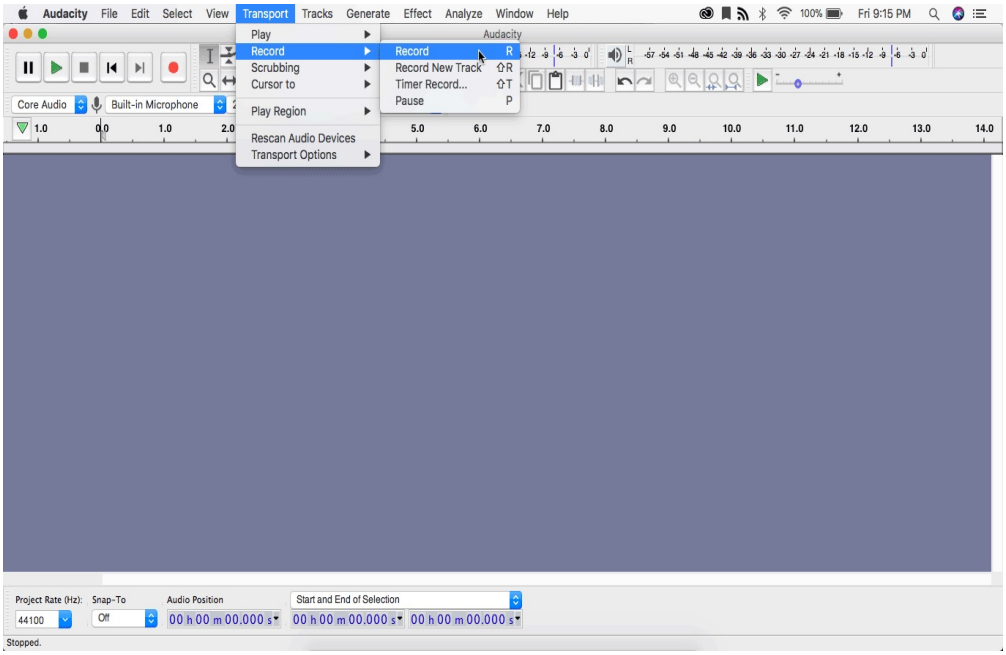
If your Mac has a built-in microphone (most do), Audacity 2.2.1 for OS X should already be connected to it once it is installed. This means you can start recording in Audacity 2.2.1 right away.

Recording Sound Using Audacity in OSX

To record, simply press the R key, and a new audio track will appear and automatically start recording. You can then speak, and/or play any other sounds on your Mac.



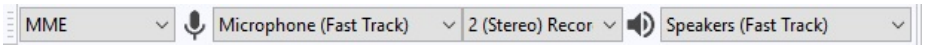
You can also record sound by selecting Transport > Record > Record in the main menu:



Windows and Linux Recording Configuration

Windows and Linux use controls that can be accessed entirely from the Audacity GUI. First you need to choose the input device. As we saw in the Toolbars chapter, the **Device Toolbar** is where you select your desired Recording Device (second

dropdown), as well as desired Audio Host (first dropdown: for Windows the options will be MME, Windows DirectSound and Windows WASAPI-- see Device Toolbar for more detail on these options). Here you can also select whether you want Mono or Stereo recording (second dropdown):



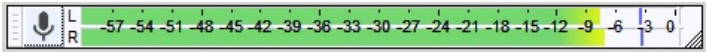
Testing Audio Levels

Now that you have everything set up and ready to go you can begin the recording process.

Before making the recording it is important to preview the loudest section of the source audio so that you do not end up with a distorted recording.

For this you will use the **Recording Toolbar** and **Mixer Toolbar**, as detailed in the Toolbars chapter:

The recording meter here will automatically be activated when you begin an actual recording; but since in this case you want a preview, simply click anywhere on the meter to activate monitoring. Now play the *loudest* passage of the audio you want to record and, while doing so, look at the recording meter:



At the *loudest* point in the audio, the green bar should ideally stretch all the way to around -9 dB (decibals); it's tip wil turn yellow between -9 dB and -6 dB, which is a warning margin, and will turn red just before -3 dB (which indicates that your input is is too loud or 'hot', and may be clipped by Audacity). Adjust the input/record slider of the **Mixer Toolbar** downward (toward the minus) if you see any red or much yellow; adjust the slider upward if your maximum input or 'peak' is far short of -12 dB.

While an ideal input level peak is between -12 dB and -9 dB, if you have difficulty hitting this target zone with input slider adjustments, it is better to err on the side of too little recording input (not green all the way to -12) as opposed to too much (a red tip). The output volume of a quieter recording can always be boosted in a subsequent editing stage; but a too-loud recording will be 'clipped' by Audacity, meaning it is too loud for Audacity to process and the top and bottom of the wave-form will be chopped off, thus losing some of the recorded wave information.

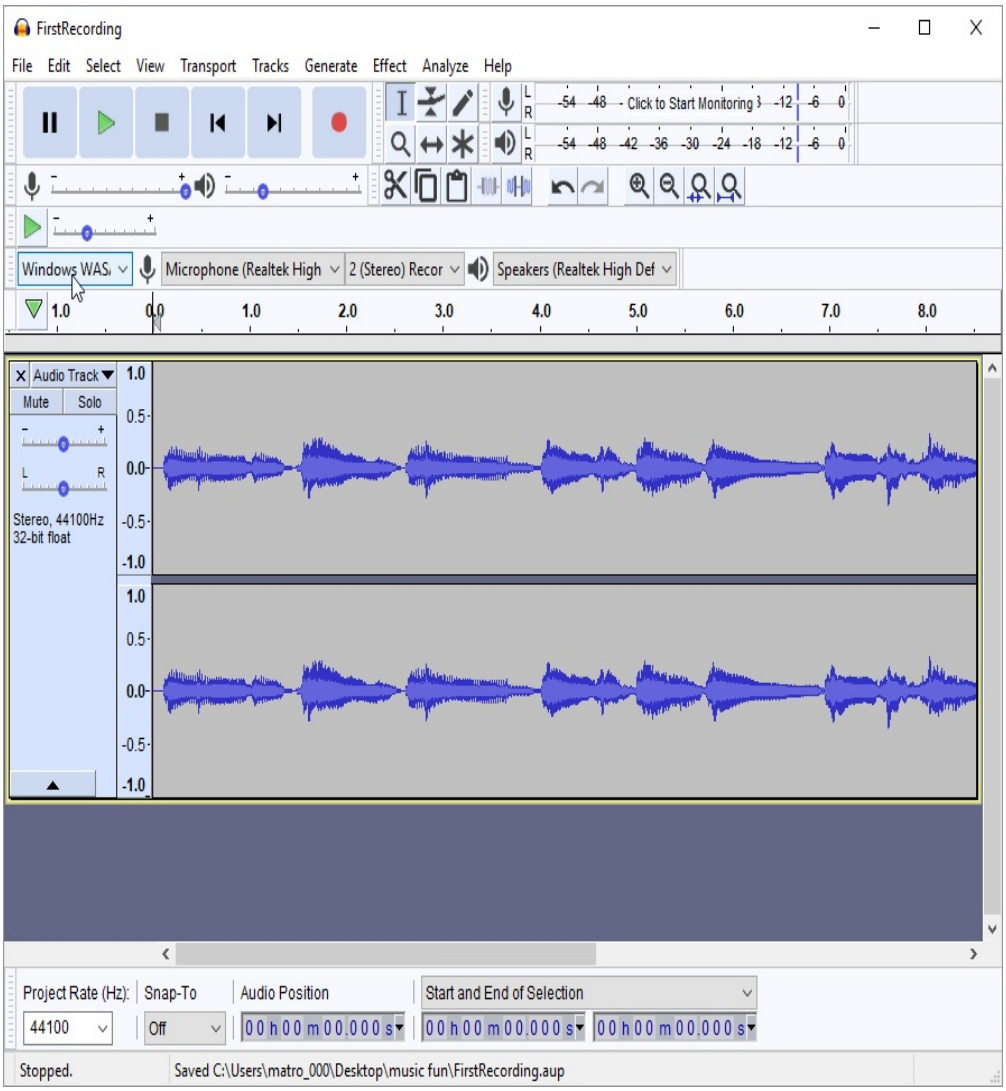
Recording

Now that you've tested your input device and recording levels, you are ready to make your proper recording.

Click the "Record" button on the **Transport toolbar**:

then play the audio you wish to record. Once the sound source has finished click the "Stop" button:

Your recording is now complete. It should appear in the Audacity GUI as a single audio track, showing either a single channel (if you've chosen mono recording) or dual L/R channels (if you've chosen stereo). Here I have made a stereo recording of a simple chord riff on accoustic guitar, from my built-in computer mic:



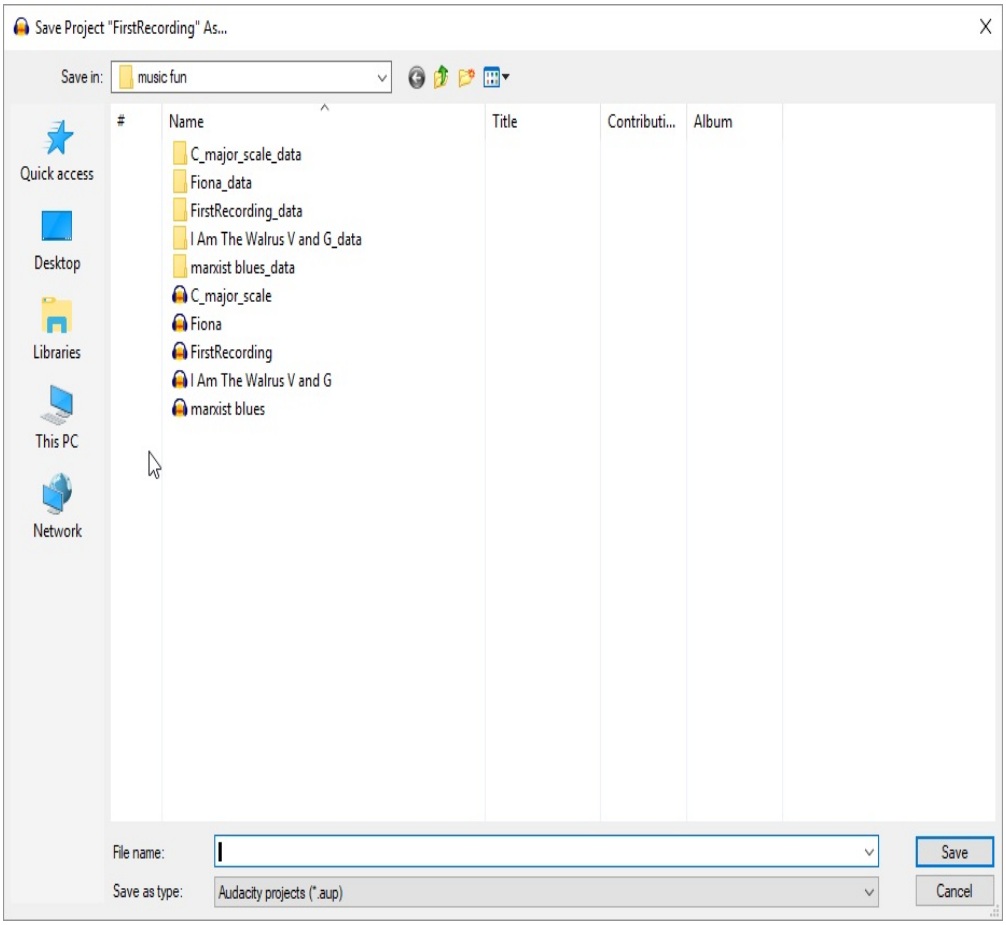
Note that the "Project Rate (Hz)" dropdown on the bottom left indicates that I have made my recording at a **sample rate** of 44100 Hz (44 KHz). This sample rate is compatible with traditional music-CD sound quality, and is the defaut for Audacity's recording mode. However, in the dropdown I could set the rate to as low as 8 KHz

or as high as 384 KHz (which would produce a very high-fidelity but very large sound file).

Now listening to your recording with the Play button on the Transport toolbar:

If you are not satisfied with the recording, you can delete it from the project using the X in the upper left corner of the track bar (or by going to **Edit > Delete** in the main menu). However, before discarding a recording completely, you will want to consider whether it can be edited or otherwise modified, using Audacity's multitude of tools, to bring it closer to what you had in mind. Only experimentation and practice will help you decide whether to aim for perfection in the recording itself, or edit it after the fact.

If you decide to save the recording, do so by selecting "Save Project As" from the "File" menu (this will save the wave form as is, including all separate tracks in the project, allowing you to come back later for editing and export). As this is a new project, you will be prompted for a Project name as well as the location to save the Project file:



That's it! Your recording is completed and saved. If you want to access this project again for editing and/or export to a common audio file format such as MP3, use **File > Open** (*not* Import, which will not work with Aup files) and browse to the location of your saved Audacity project.

Audacity: AddTrack

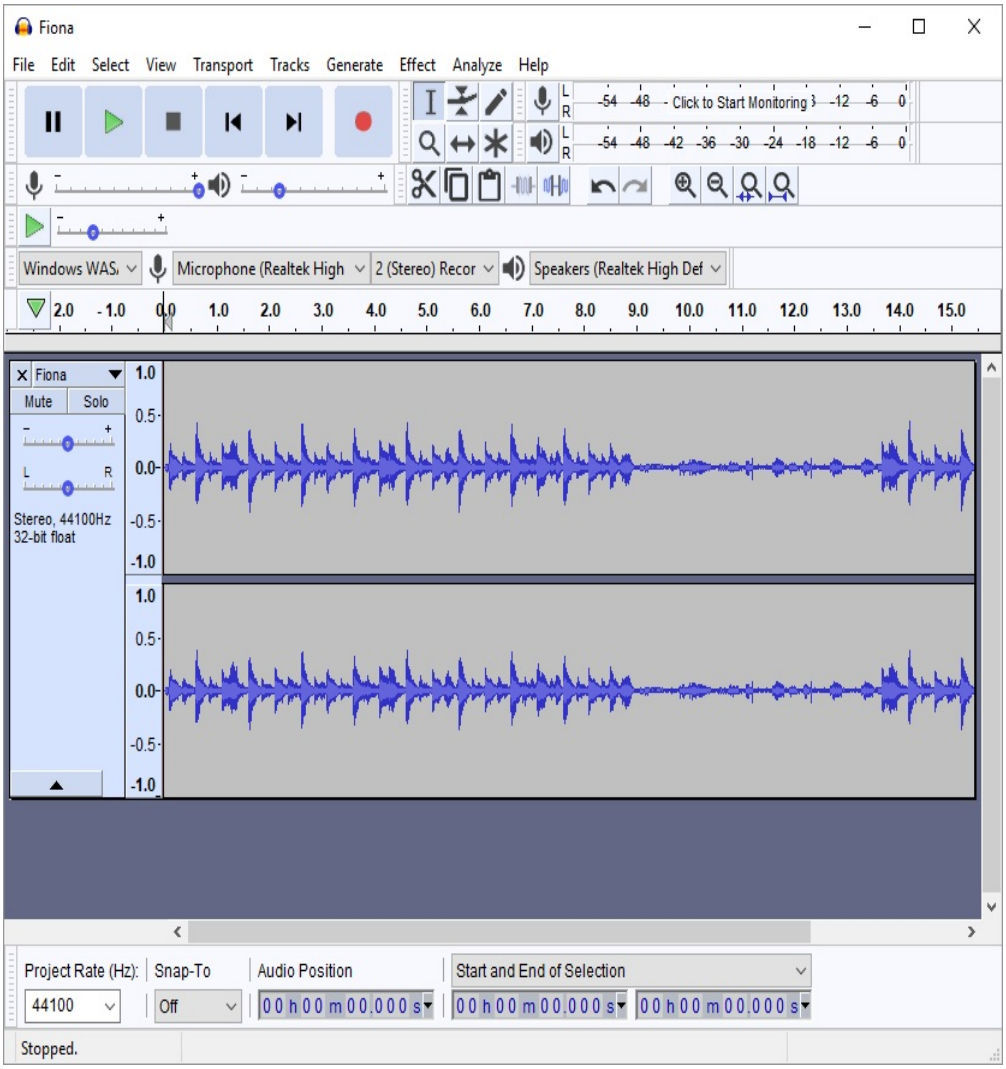
Add Another Audio Track

Software name : Audacity
Software version : 1.2

Audacity enables you to mix multiple sounds together. You will need Audacity open and an audio file already loaded, and then you can add as many new files (or recorded tracks) as you like.

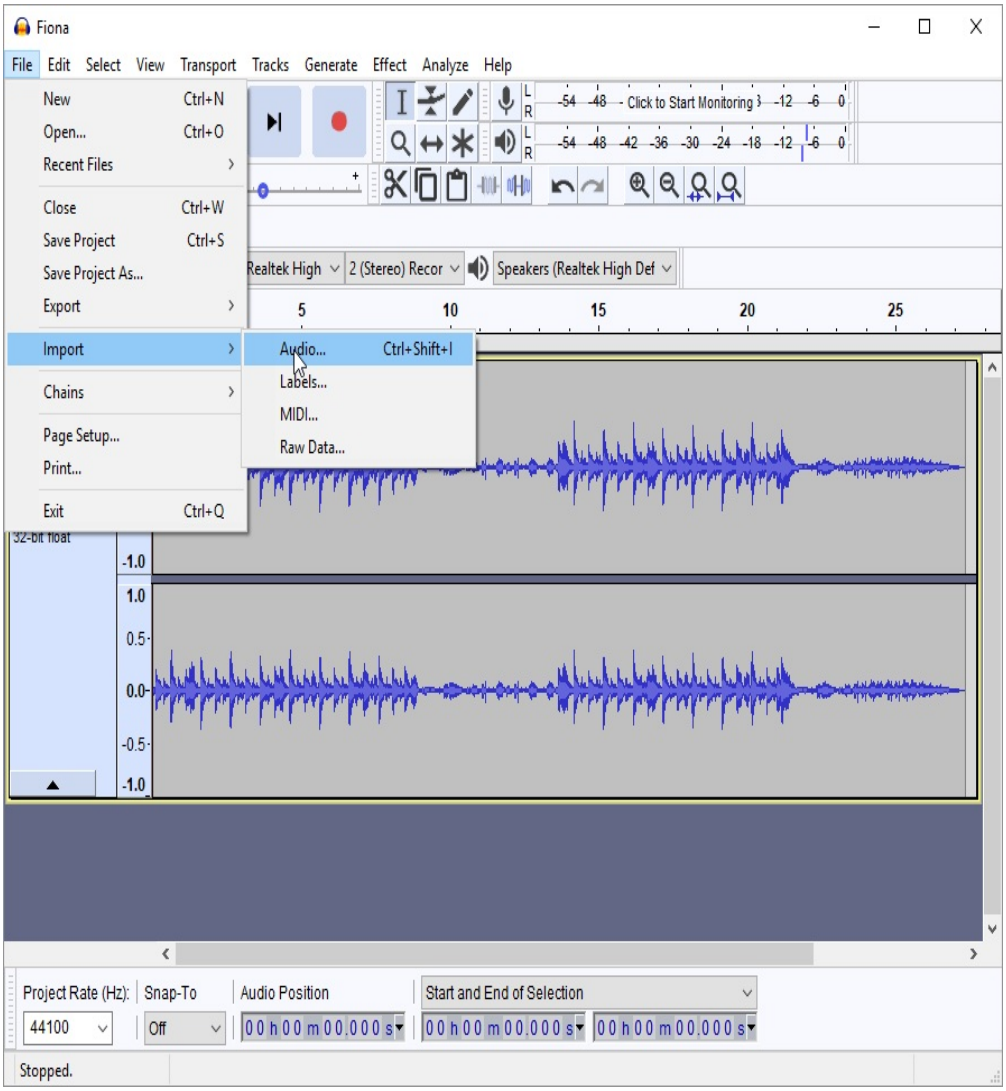
Adding your new track

Audacity should be open in front of you and you will have some audio already loaded. In this example we will be working with the audio track 'Fiona' I opened in first tutorial, so when I reopen the 'Fiona' project my Audacity window looks like this :

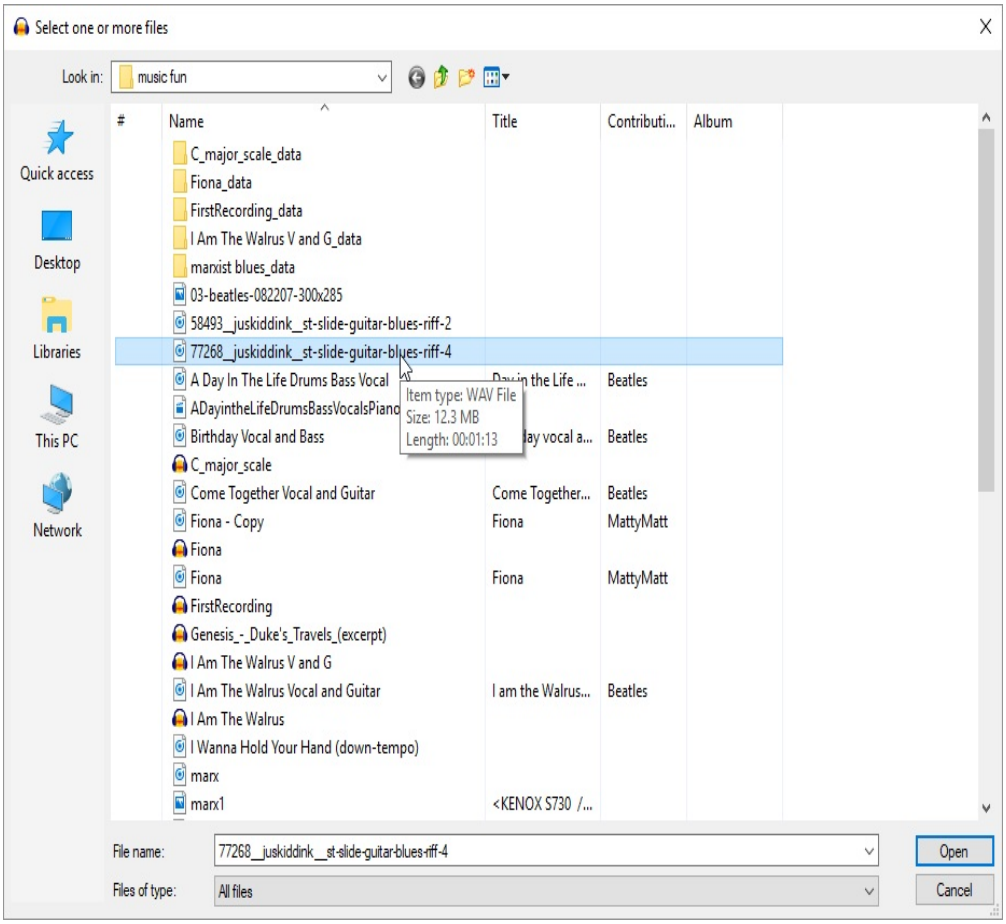


Now, we wish to add another audio track to this mix--in this case a pre-recorded

track that I have on my computer. To do this, in the main **File** menu choose **Import**, then **Audio** from the submenu. (Note that when adding a new track to an existing project with one or more tracks, you *must* use 'Import' rather than 'Open', which would cause a new project to open rather than adding your new track to the existing project.)

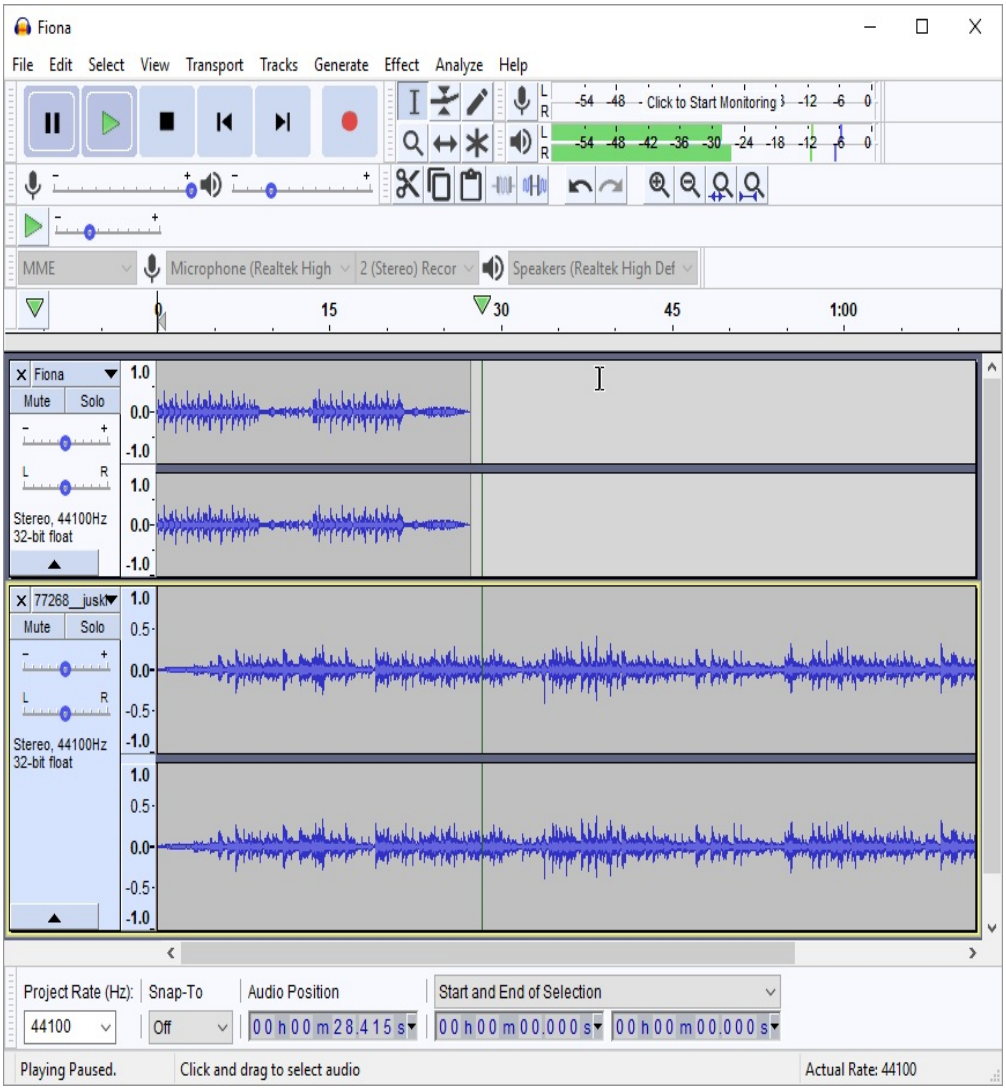


When you have done this a file browser will open, by default in the same directory in which Audacity last opened or imported from, or saved or exported to. In this case I will chose a recorded guitar riff (as mp3 file) residing in the same directory:



I now press **Open** and the file will be imported. As explained previously, 'Importing' means that the file will be converted into Audacity's proprietary editing format, and it will appear in the Audacity window as a new track. The importing process itself can be nearly instantaneous or some seconds long, depending on the length and complexity of the imported file.

When it is complete the new track can be seen in the Audacity window, directly beneath the existing 'Fiona' track. The new track is also in stereo, so it too displays both L and R channels:



If you don't see your newly-added track immediately, you might need to scroll down on your Audacity window. Note that there are several ways to minimize track display vertically so as to see more tracks at once. One way, as I have done here with the 'Fiona' track, is to hover your mouse over the lower boundary of that track until your cursor becomes an up-and-down-arrow; then that boundary can be dragged up to make the track more narrow. An efficient alternative is **View > Track Size > Fit to Height**, which will show all tracks within the available window height.

Playback and Exporting

If you now press the 'Play' Button:

you will hear *both* tracks playing back at once. If you were now to **Export** this project (for example as an mp3 or .wav), the tracks would be combined together into one sound file. You've just done your first sound mixing!

Of course, things can rarely stop at this point. Note that by default, the new track is added to the project with its starting position flush left (point 0 on the timeline). Since the original track 'Fiona' also started at point 0, and since the newly added track is considerably longer in duration than the original, this difference shows up both visually (as in the screenshot above) and audibly: during playback, once the 'Fiona' track ends (at about 28 seconds), only the second track is audible for the remainder of its run. To properly mix these two tracks into a coherent sound (or as coherent as a feline dance mix and a slow blues guitar could ever be), you would need to do some advanced editing of one or both tracks, to make them both the same length and/or with matching or complementary beats and sound features. We will cover some of this in subsequent tutorials.

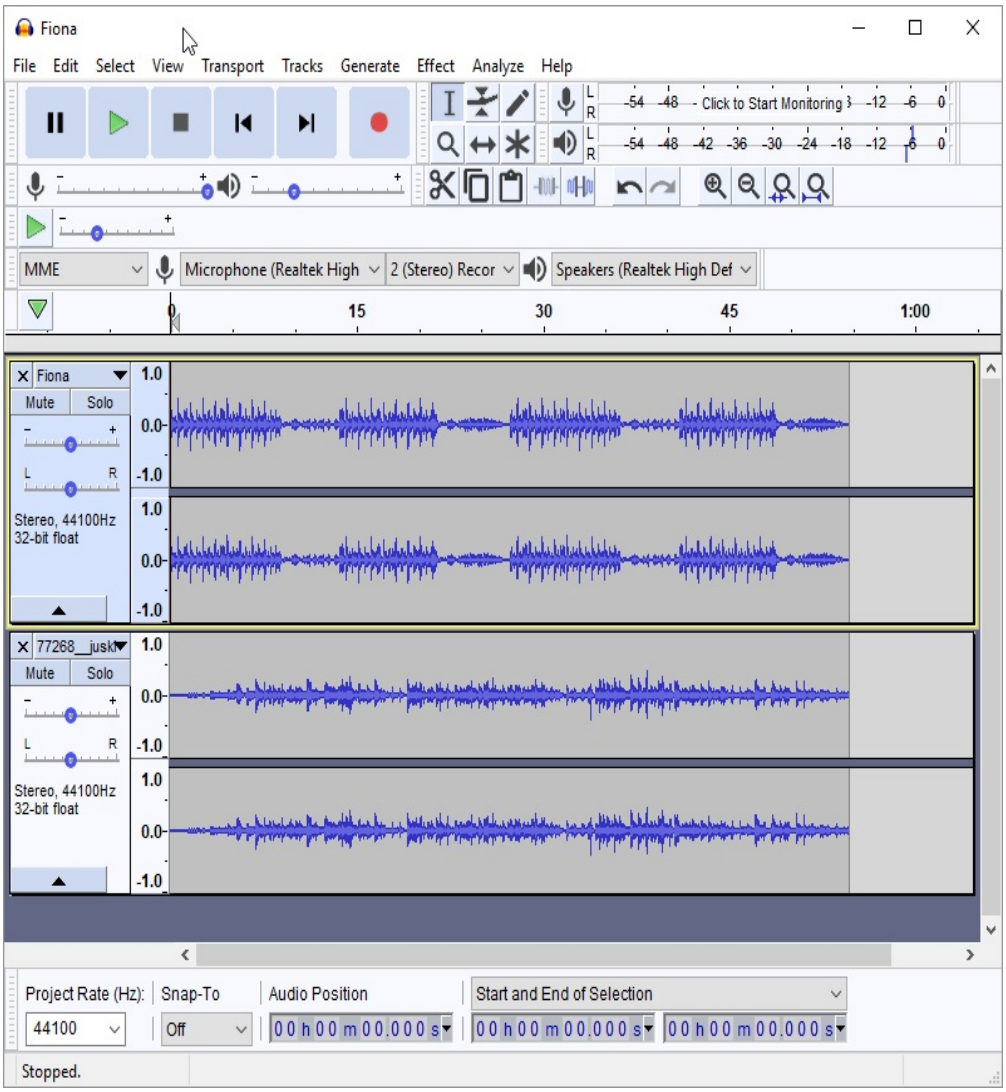
Audacity: EnvelopeTool

Envelope Tool

The envelope tool is among the most useful editing tools for Audacity users. It allows you to alter the volume of individual tracks in Audacity, which is especially important when you are combining ('mixing') several tracks together.

Open Audacity

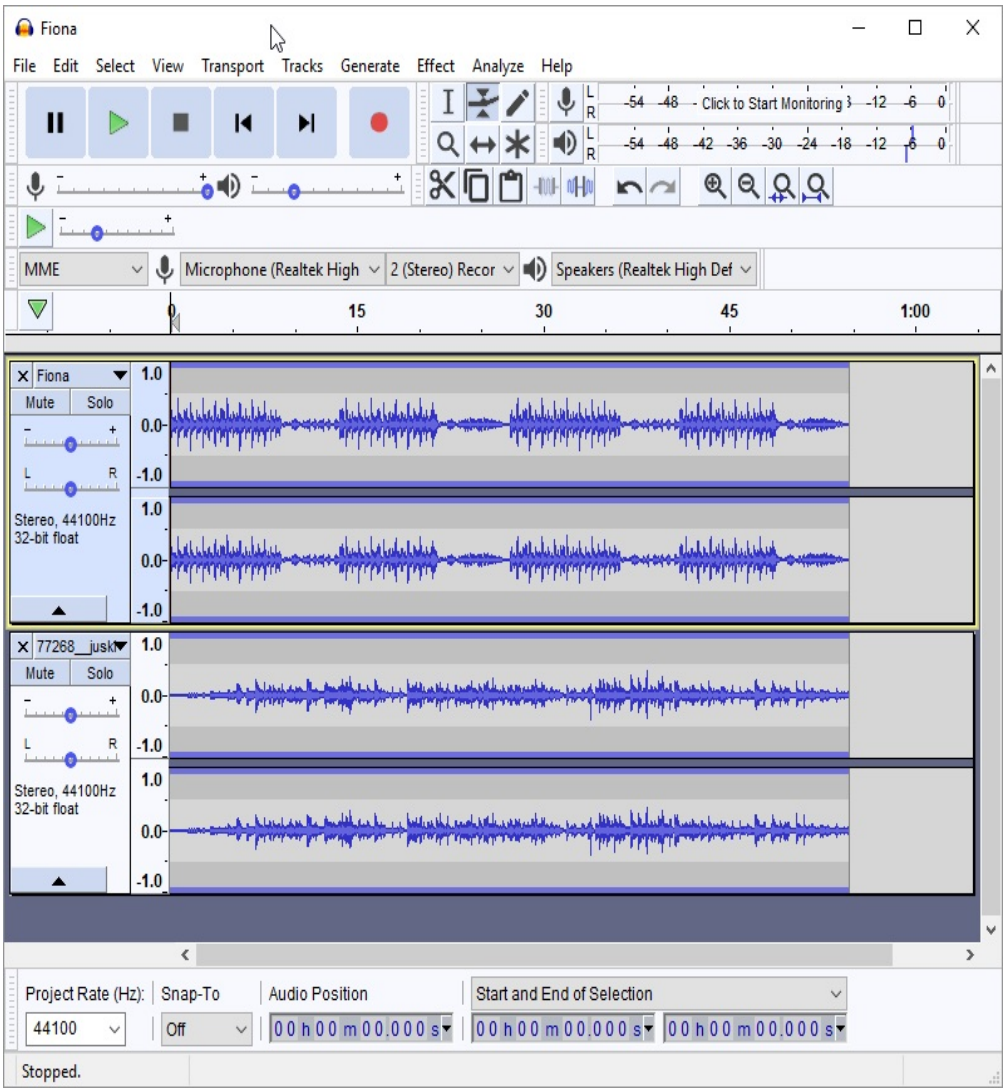
You will first have to have Audacity open with more than one track. We will begin with my 'Fiona' project from the previous tutorial, with some editing of both tracks so that they are now exactly the same length (I doubled the Fiona track end to end, and slightly truncated the blues guitar track). At this point, then, my Audacity project looks like this:



Activating the Envelope Tool

The Envelope Tool has an icon in the Audacity **Tools Toolbar**, which looks like this:

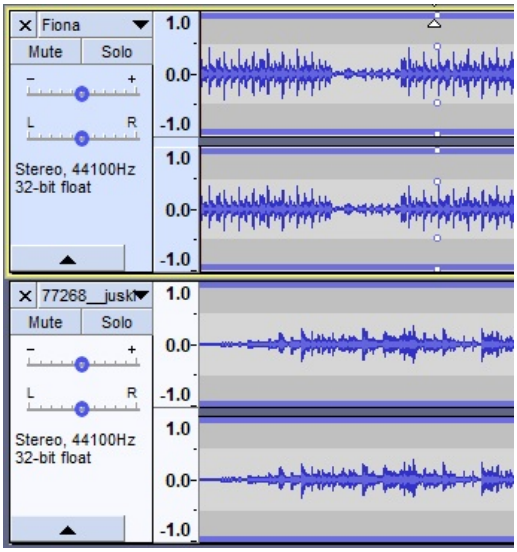
When you click on this button, the tracks are surrounded by a blue line. Compare the screenshot above (before activating the Envelope tool) to this one:



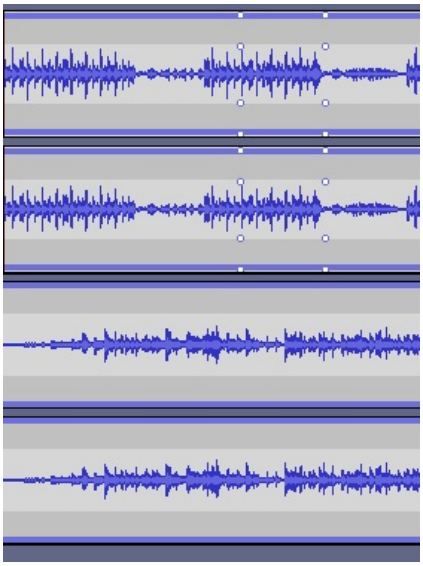
You can see the Envelop tool button depressed, as well as the blue lines around each channel of each track. This indicates that the envelop tool has been activated.

Alter the volume

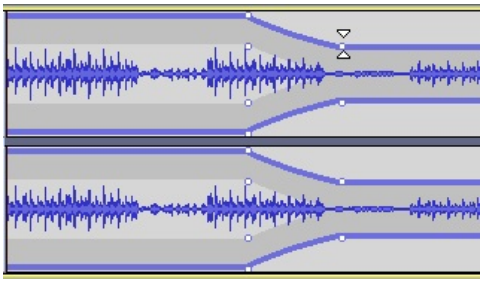
The blue line actually represents the volume of each channel/track. You can now lower the volume on chosen sections of a track by changing the shape of this blue line (as opposed to altering the volume of the *entire* track, using the volume control to the left). To do this click on the blue line at any particular point in the top track (in this case 'Fiona'), and you will see small white squares, or control points, appear where you clicked :



Now you can 'grab' the blue line at the point where these squares appear. To show you how this can change the volume of just one part of the audio, click on the blue line at a separate point near where you first clicked. A second set of blue squares now appears at that new point on the track (top track only):



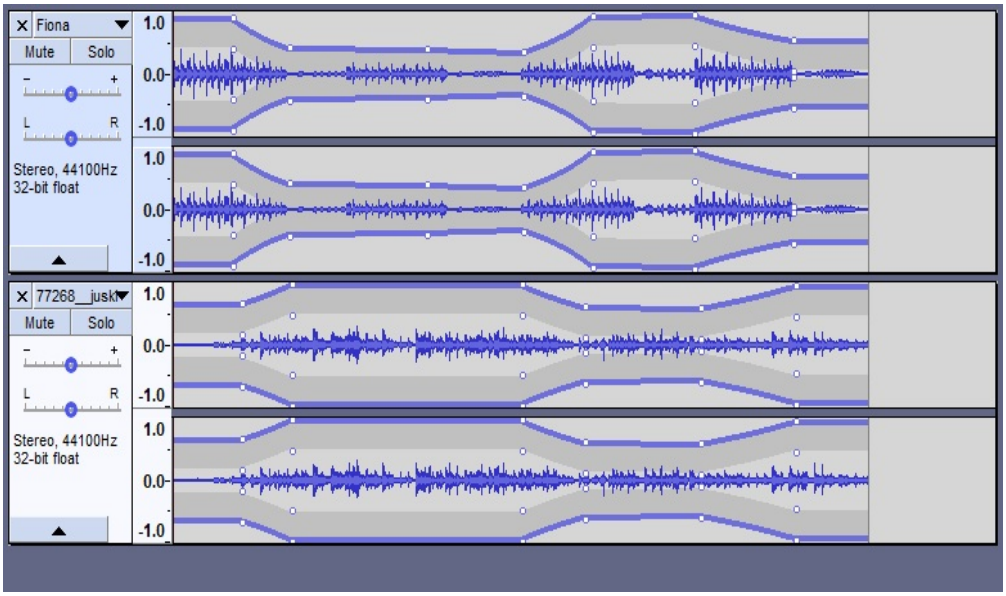
Now place your mouse cursor on the top white square in this second set (to the right of the first), and while your mouse finger is still down, drag the square downwards to reduce volume:



You will notice that this action reduces the amplitude of the wave (ie, the volume) of both the L and R channels of this (Fiona) track uniformly, taking the earlier, left-hand point as its 'hinge'. The separate guitar track beneath the Fiona track is unmodified. If you now play back the project you will hear the volume of the modified (top) track 'fade' smoothly, following the shape of the blue lines, and continue at the lower volume while the lower track plays unmodified.

Mixing 2 tracks together

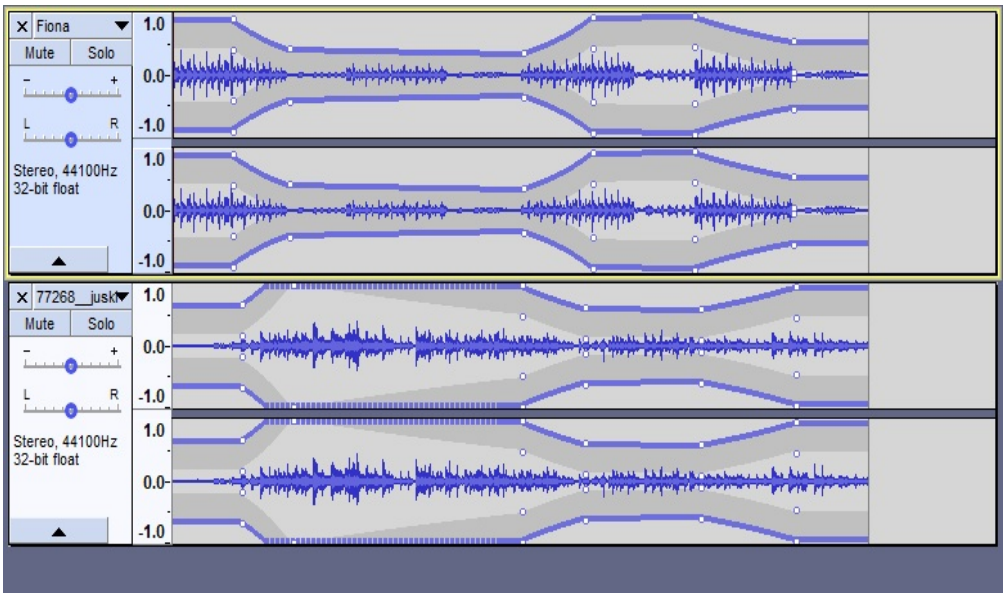
In mixing two tracks together, sometimes you simply want one track to have a single 'fade out' in relation to the other track, as the above example demonstrates. More commonly, though, you might want to 'cross fade' the two tracks in a number of different places--ie, fade one track in while fading the other out--so that different segments of the two audio sources are emphasized at different times. To accomplish this, simply click on the blue lines of either track wherever you want to create a 'hinge point' for fading in or out. The result could look something like the following. Bear in mind that this is still a very simplified example, as this piece is only about 55 seconds total duration -- a 4-6 minute song could have any number of cross-fade operations:



If you have inadvertently added a set of control points (white squares) that you don't need or want for volume adjustment, you can simply grab one of those white squares and drag it entirely up or down out of the track. You can also always use Edit > Undo to undo the most recent operation(s).

Inner Control Points for Greater Volume Gain

Note that so far we have been using only the *outer* control points, or the furthest top and bottom white squares, to manipulate the blue envelope lines. The *inner* control points have the same effect, but these can be used to increase the volume beyond what is visible in the track view. For example, if I wanted my lower (guitar) track to come in louder than it does above, I could use the inner control points to accomplish this by dragging the top one up (or the bottom one down); see this effect applied in the screenshot below. Note that since the entire envelope here cannot be shown in the track view now, the solid blue line has become *dotted* for that segment.



Finally, we should note that the envelope control only allows the volume of a given track segment to be increased up to the point where the inner control square touches the track border (as shown here). If you want to amplify beyond that range, de-activate the Envelope feature, select the section you want amplified and go to **Effects > Amplify...**, which will launch a dialog with various amplification options. Be advised, though, that depending on the options chosen, using the Amplify effect can easily produce distortion-level amplification, which is nearly impossible with the Envelope tool unless the original track is already extremely loud.

Audacity: BasicEditing

Basic Editing with Audacity

Software name : Audacity
Software version: 2.2.1

As far as audio editing software goes, Audacity is about as easy as it gets. Which is not to say it's falling off a log: if you haven't edited audio before then the whole concept can get a little bewildering. However with a little practice you should be able to make fast work of editing.

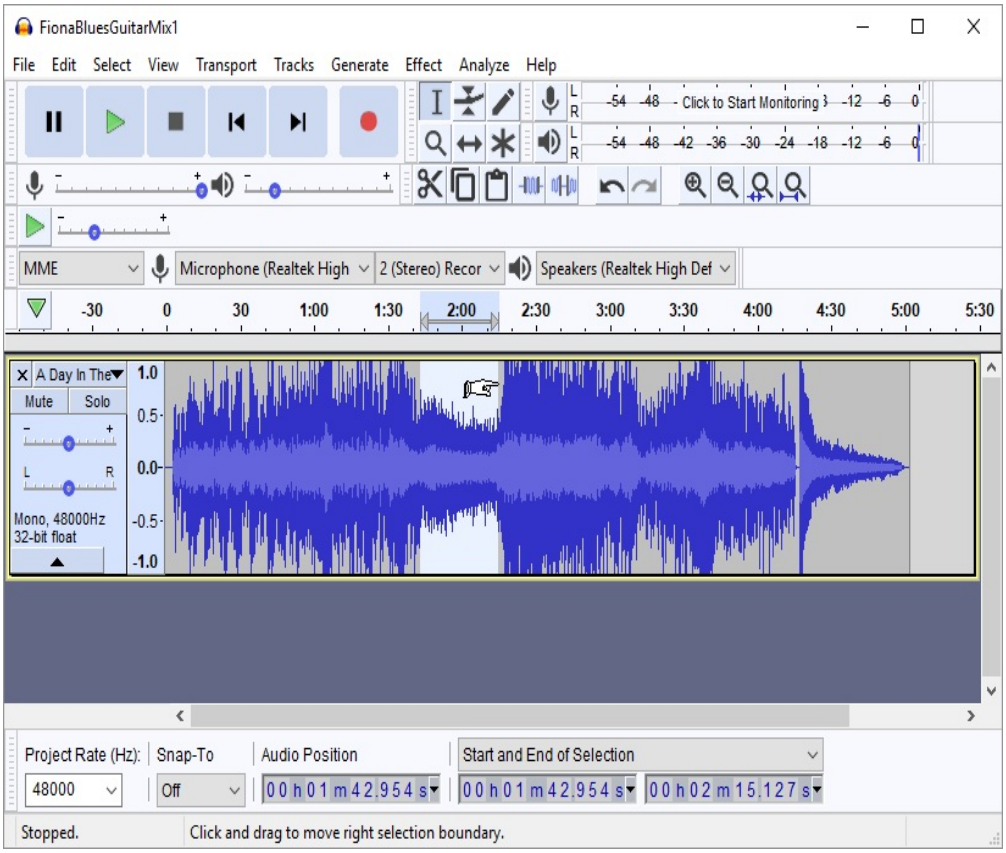
Firstly, you will have to have some audio to edit. You can either record some audio using Audacity, or open an audio file from your computer.

There are some simple methods that form the basis of editing with Audacity. We will look at deleting sections of audio ('cutting'), as well as shifting audio. With these two methods you can already do quite a lot.

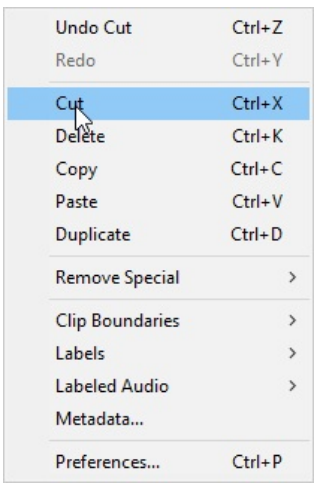
Cutting/Deleting

You will need to have Audacity open in front of you with an audio file ready to edit. The process of editing requires that you first know your source file quite well, or more specifically the audio track wave-form of that file loaded into Audacity. You need to know exactly where a cut needs to be made, to achieve some intended effect, so play the audio track repeatedly and listen for where you want to make your first edit.

Lets assume you have chosen the area to be cut. You need to now select the area by clicking on where the cut should start, holding down the mouse button, and dragging the mouse (either left or right) to the end of the area to be cut. The area to be deleted will be highlighted in a lighter shade of grey than the rest of the track (notice also that when you select an audio region in Audacity, your mouse curser changes into a pointing hand):

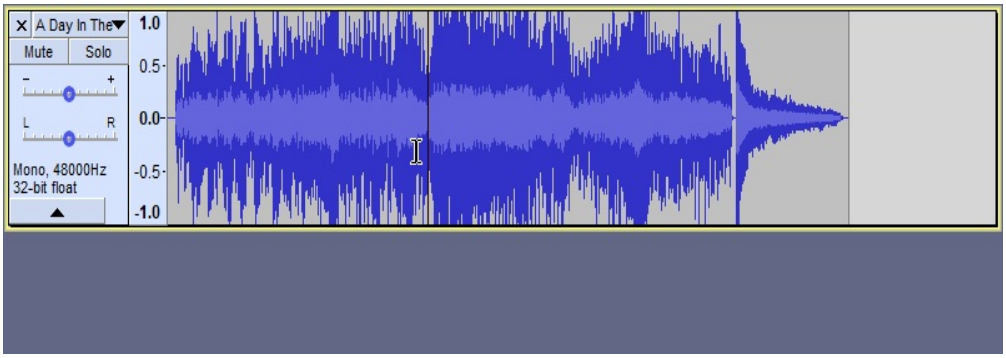


In the above example you can see that I have highlighted the area from about **1:32** to **2:17**, a selection of about 45 seconds. To delete this selected region I can now click on the **Edit** menu and choose 'Cut':



We should observe here that 'Cut' and 'Delete' are distinct functions, with the important difference that with Cut, the selected audio region is removed from the track but loaded onto the clipboard (from which it can later be **Pasted**, if desired), while with Delete that segment simply disappears. But with either function, once you select it in the Edit menu you will see that the selected region of your audio

track has disappeared, and the length of that track will have been reduced by a corresponding duration:



Focusing on the area to be cut

If you have just opened an audio file, press the green play button to listen to the entire track:

Once you have listened to it you may wish to take some notes to help you decide which area you wish to delete/cut. You can take notes that reference the exact time in the timeline, or --probably easier--you can add a label track and insert a label marking the exact point or segment you think might be a candidate for editing. It is also a good idea to replay the segment that you will cut to make sure you are selecting the right area. To do this you can select the area, as described above, and then press the play button and Audacity will only play back the selected area. This will help you decide if the selected area is actually the audio you wish to delete. If it's not, clicking anywhere outside that track will deselect that area, and you can try again.

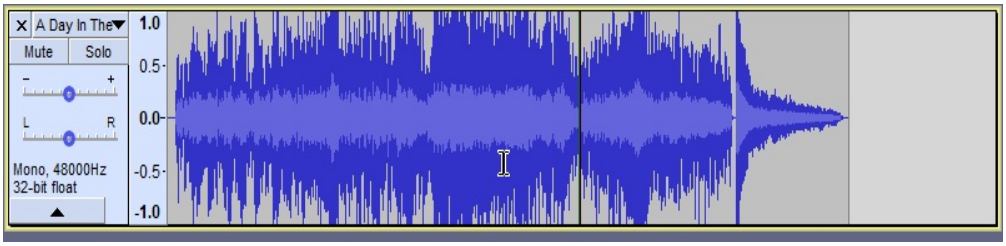
If you need to focus closer to the audio to make a 'finer' cut, click on the magnifying glass+ icon:

This will enlarge the time scale shown and give you a more detailed view of the audio wave-form. Remember that this wave-form is an exact visual representation of the audio signal itself: to edit one, at whatever level of detail, is to edit the other. You can 'zoom out' of the audio again by pressing the magnifying glass with the minus sign in it:

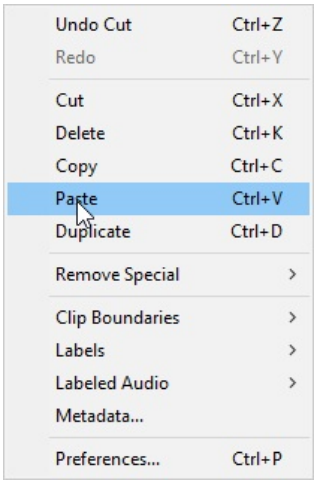
Pasting

If you wish to shift audio from one place to another then you can easily do so with Audacity. First select the area you wish to shift. I will use the same segment I used in the cutting example above. Now, as before, choose **Edit > Cut** to remove the selected region from the track and place it on the clipboard.

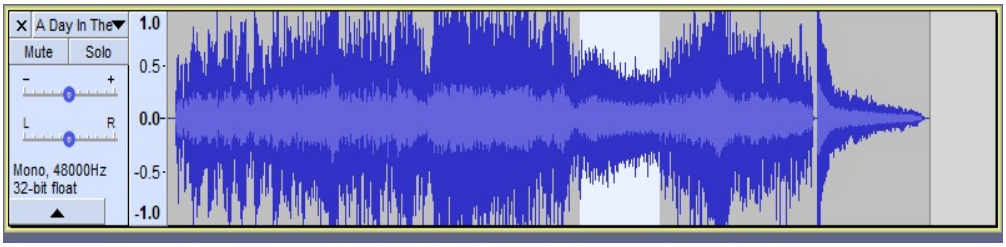
Finally, click on the remaining audio track at the point you where you want this audio to be shifted to.



In the above example you can can see that I have decided to insert the audio at about the **2:47** mark. Now choose the **Edit** menu and select **Paste**:



The audio segment will now be inserted, and you if you look at the Audacity window you should see the selected audio in its new place :



Now you can experiment with cutting and pasting audio! In the next chapter we will see more complex examples of cutting, copying and pasting, applied not only to single tracks but to multiple tracks across a project as part of what we call "mixing" audio tracks.

Audacity: AdvancedEditing

Advanced Editing and Mixing

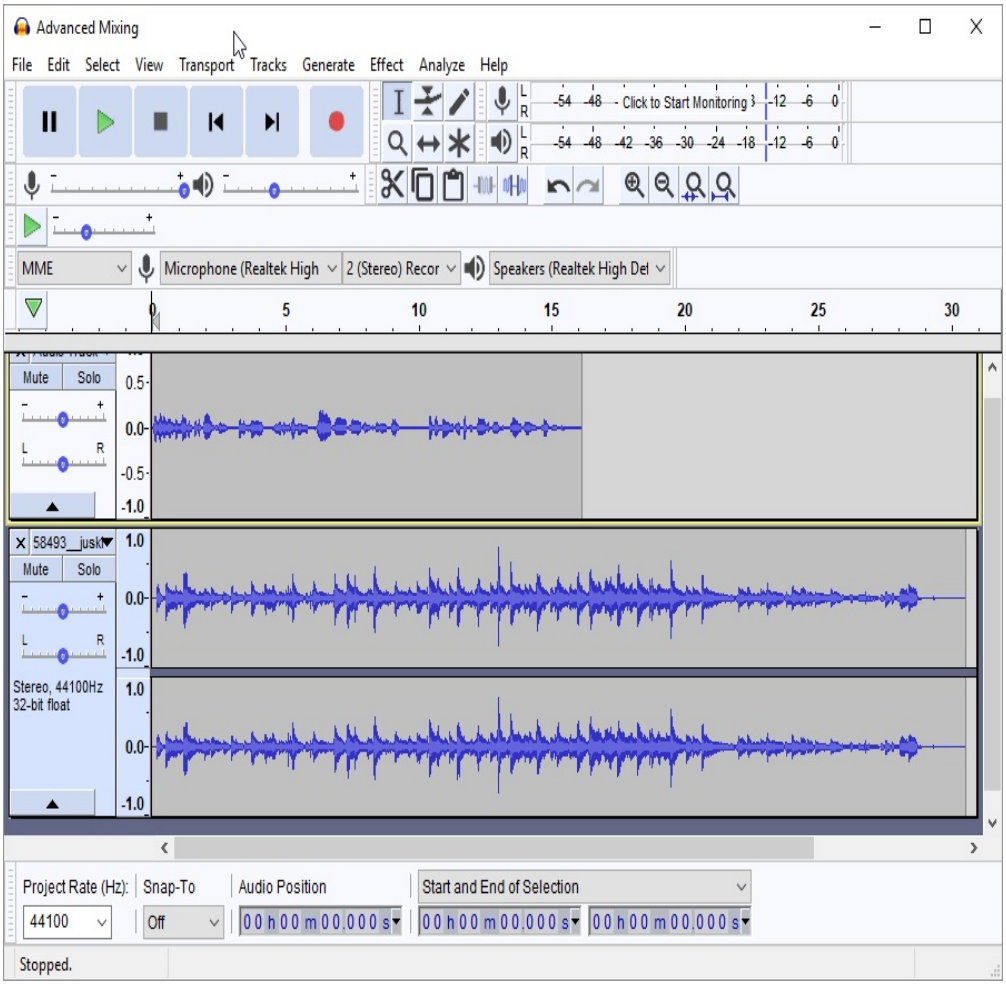
Software name : Audacity
Software version : 2.2.1

There are many more advanced steps for editing that you can carry out with Audacity. Some of the more common include adding silence, trimming audio, advanced cutting and pasting, splitting and joining tracks, and using panning. We will cover each of these operations below.

Add Silence

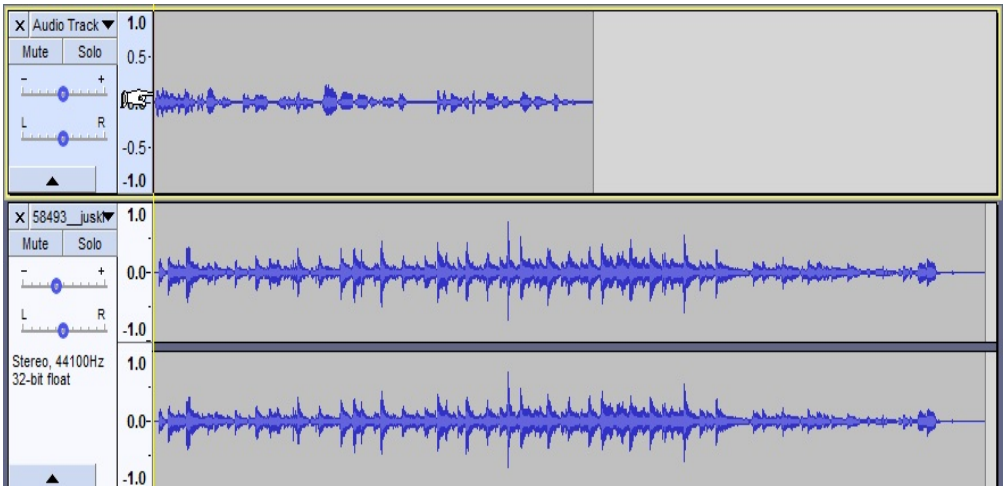
You may want to add a silence to a track for several reasons. If we take the example of a two track project with one track as music and the other track as a voice track, we can imagine that we might want to insert a silence in the voice track for several seconds to allow us to 'fade in' the music. This would work in a radio advertisement or introduction for a radio show or podcast.

Here I have loaded an audio track (in mono), and a stereo music track beneath it:

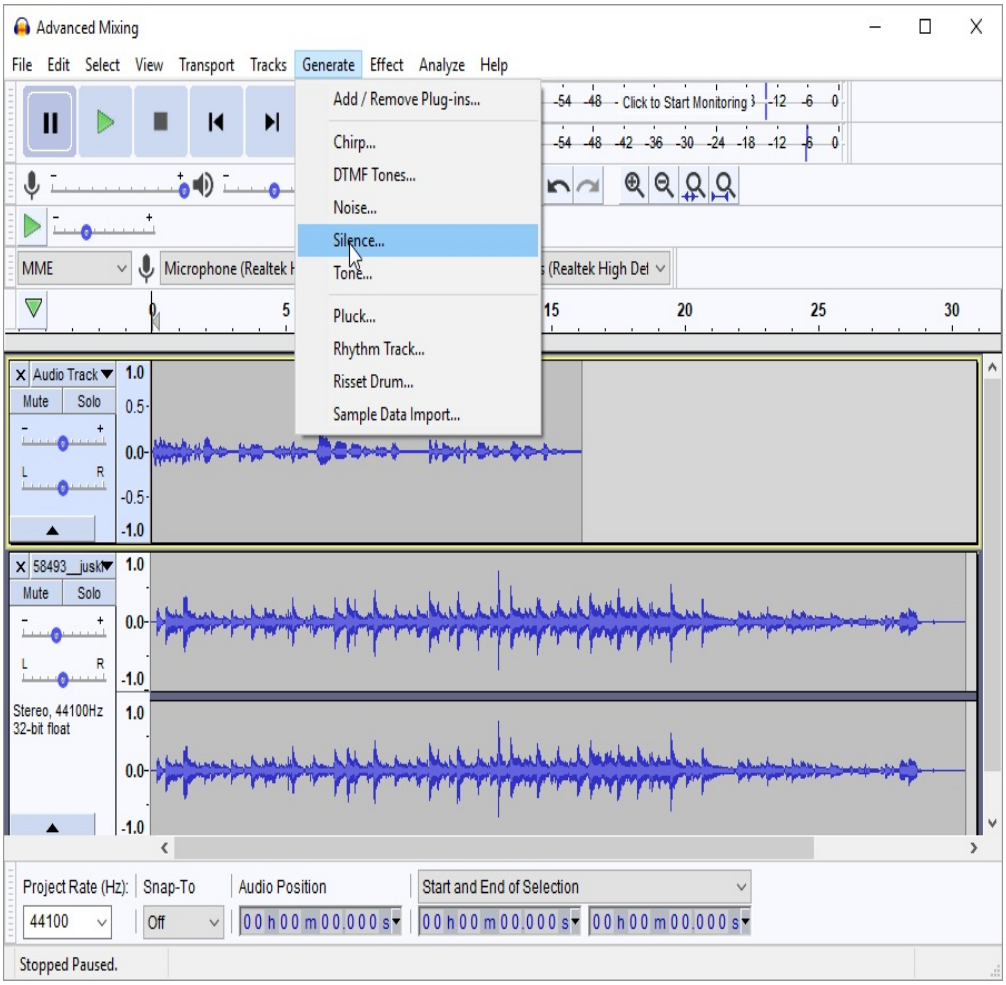


We now click in the voice track where we want to insert silence.

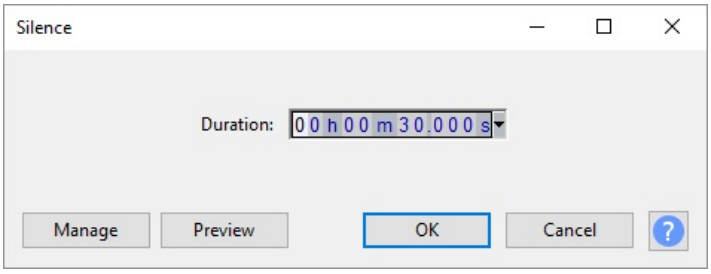
When the voice track is selected you will see the control set of that track go a darker color, and at the point of selection itself your cursor becomes a pointing hand. Here I have selected the very start of the vocal track, as I want to insert silence in that track to allow the music to come in *before* the voice begins speaking:



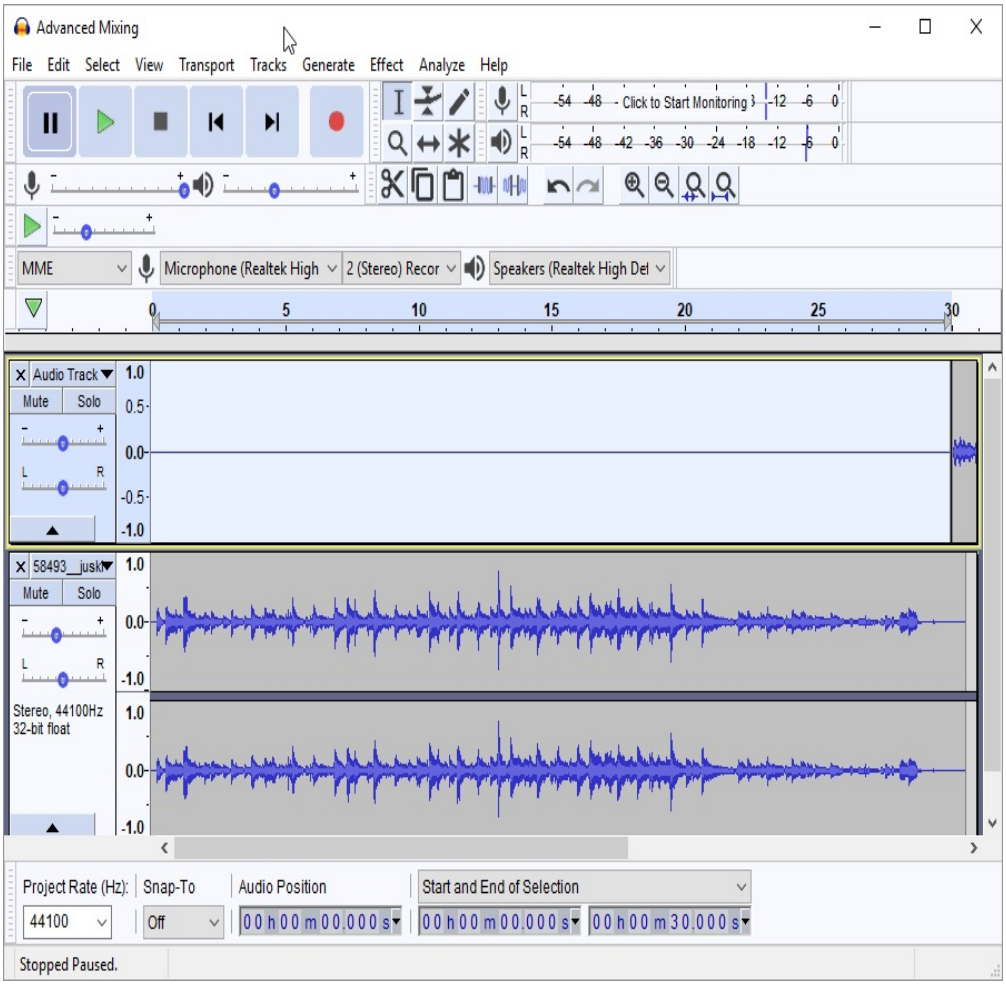
We are now ready to insert some silence. Do this by selecting **Generate > Silence** from the menus at the top of the screen.



Selecting 'Silence...' from the above menu will generate the 'Silence' dialog shown below, where we can set the duration of the silence to be inserted. The default silence duration is 30 seconds, as shown. 30 seconds would be quite a long silence in our example, but when you are adding Silence it is easier to add more and then delete some of it than to add in additional silence. So I'm going to keep the default 30 seconds to start with:

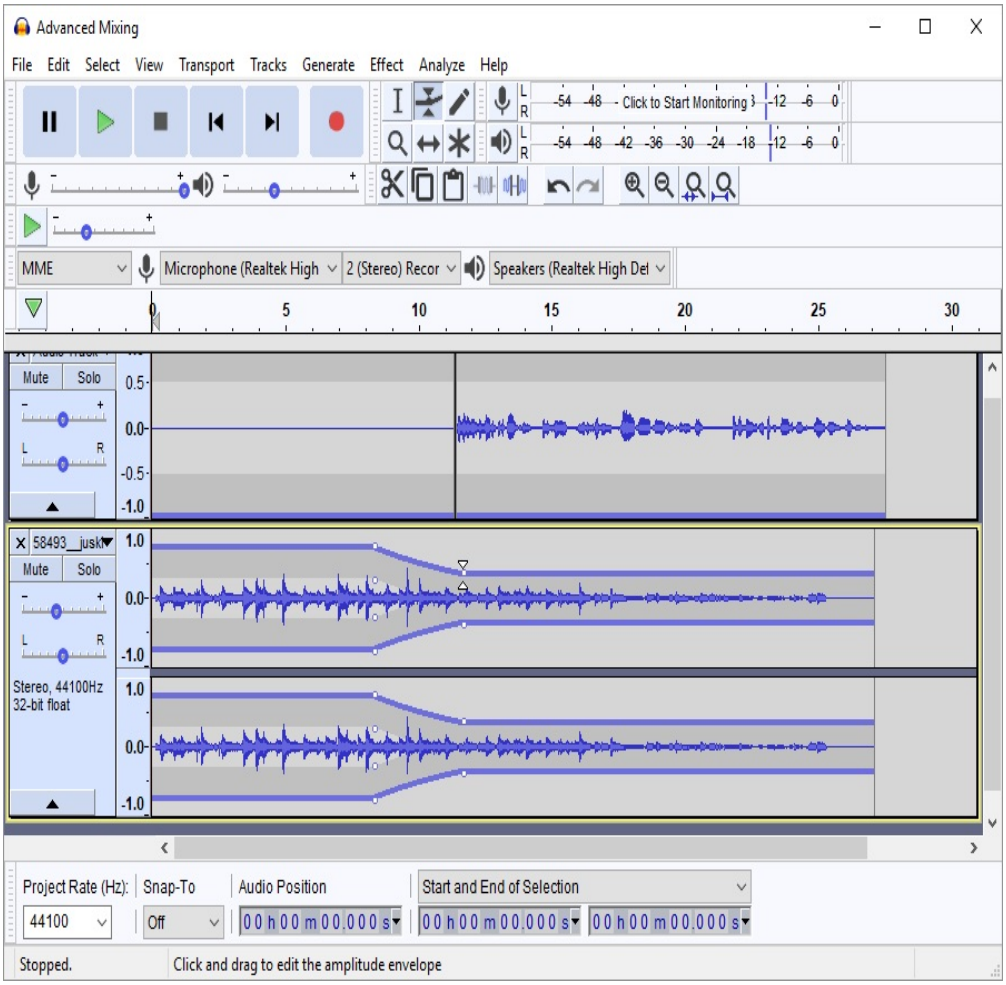


Press '**OK'.** We will see the silence appear as a flat line in the relevant track of the project.



As noted above, 30 seconds is a very long silence for our purposes; after some experimental listening I will end up cutting it down to 11 seconds. Meanwhile, note that the actual audio wave form of the vocal track has been pushed all the way to the far right of the window; in othe words the total voice track is now 30 seconds longer, including the silence at the beginning.

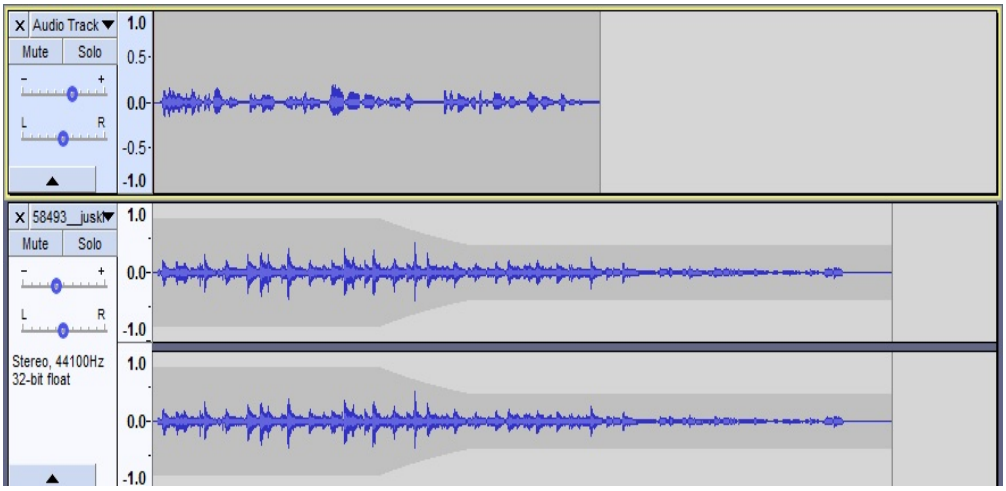
After I have trimmed the silence down to 11 seconds (I select the first 18 seconds and use the 'cut' tool, not shown here, to eliminate that segment), I now have an audio mix with 11 seconds of music before the voice comes in. However, the music is still too loud to serve properly as 'background' to the rest of the voice track. To fix this I will use the **envelope tool** (see previous chapter) to create a smooth fade out in the music track, just before the voice comes in:



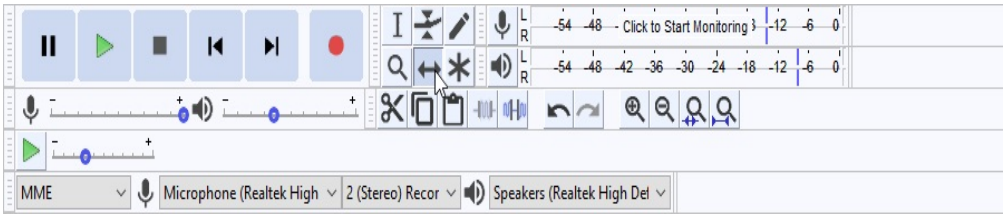
If I determined at this point that the voice track was still too quiet in relation to the music track, I could either increase the overall gain (volume) of the voice track, or decrease that of the music track. A great deal of audio mixing involves playing with the relative volume of different tracks.

Time Shift Tool

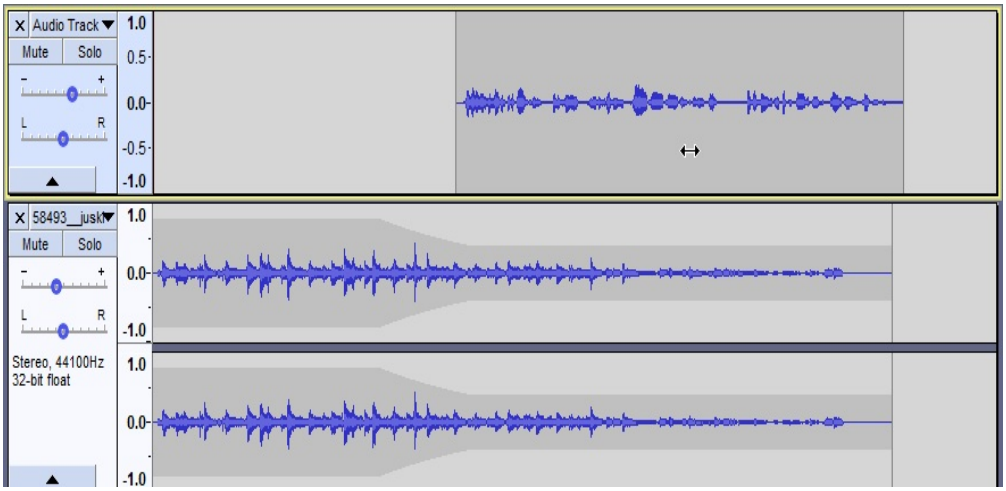
The time shift tool allows you to alter the time location of the audio on a particular track. This is useful when you are arranging audio on different tracks so that they are heard one after the other in a sequence. Indeed, this would have been an alternative approach to take in addressing our voice-and-music-background scenario above. In the screenshot below, I have deleted the rest of the silence from the vocal track, so that now both the vocal and music tracks begin once more at 0.00 seconds (I've left the 'fade' in the music track, as I will still want it):



Our goal now is to shift the voice track to the right, so that it doesn't begin until the appropriate moment in the fade-out of the music track beneath it. To do this, we select the Time Shift tool ↔ from the **Tools toolbar** at the top of the workspace:

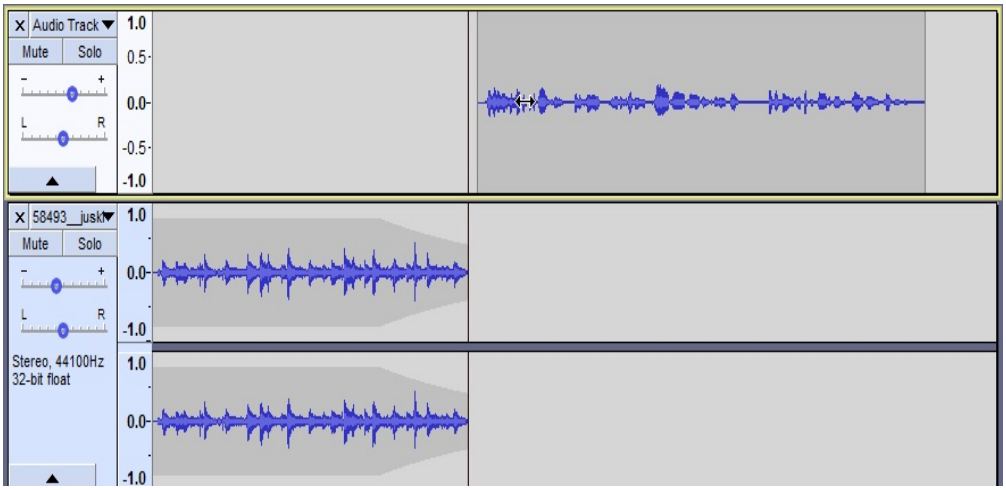


Then we select the track we want to move, and drag it left or right to occupy a new time location. In this case I'm dragging the voice track to the right, until it begins at the 11-second mark. When I now play the project back, the effect will be exactly the same as when the first 11 seconds were occupied by silence, since Audacity treats the opening blank space exactly as it would a duration of explicitly-defined silence:



In other cases, however, you might want one track's waveform to begin only after another track ends entirely, rather than overlapping, as above. For the screenshot

below, I have truncated the music track after the fade, so that it will no longer sound in the background of the voice track:



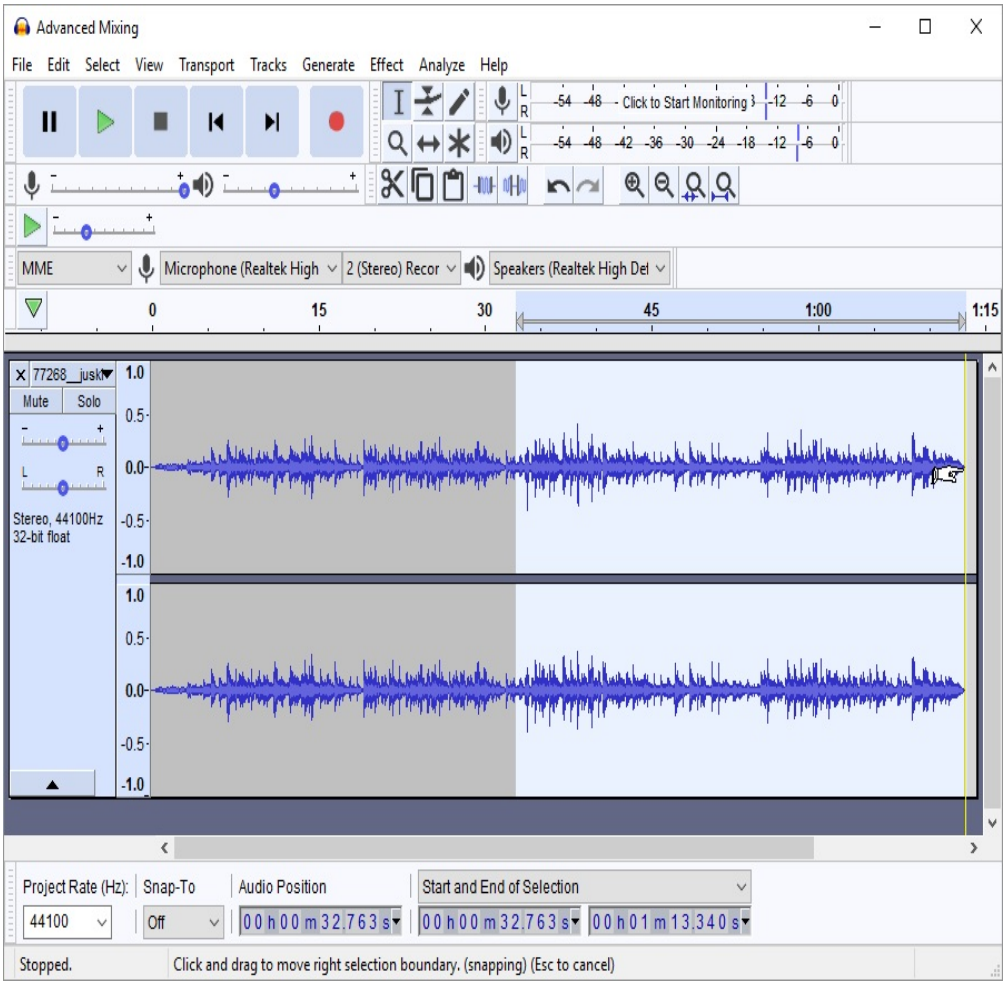
I have actually dragged the voice track just *beyond* the new end-point of the music track, in order to show that Audacity has guessed what I'm trying to do, and drawn a guideline (often called a 'snap line') for me at the precise point where the lower track ends. In practice, you may or may not want to align your tracks precisely this way, along the guide lines: in this instance, I would probably want to give the music track at least another second or two to fade out completely, as the voice track was coming in. But perfect end-to-end alignment is easy, as you can see. Indeed, rather than time-shifting manually, you could also use **Tracks > Align Tracks > Align End to End** to exactly align two selected tracks.

Trimming Audio

Trimming audio tracks is useful when we only want to keep one part of a given track. It is also different from using the cut or delete function as it maintains the time location of the part of the track we want to keep.

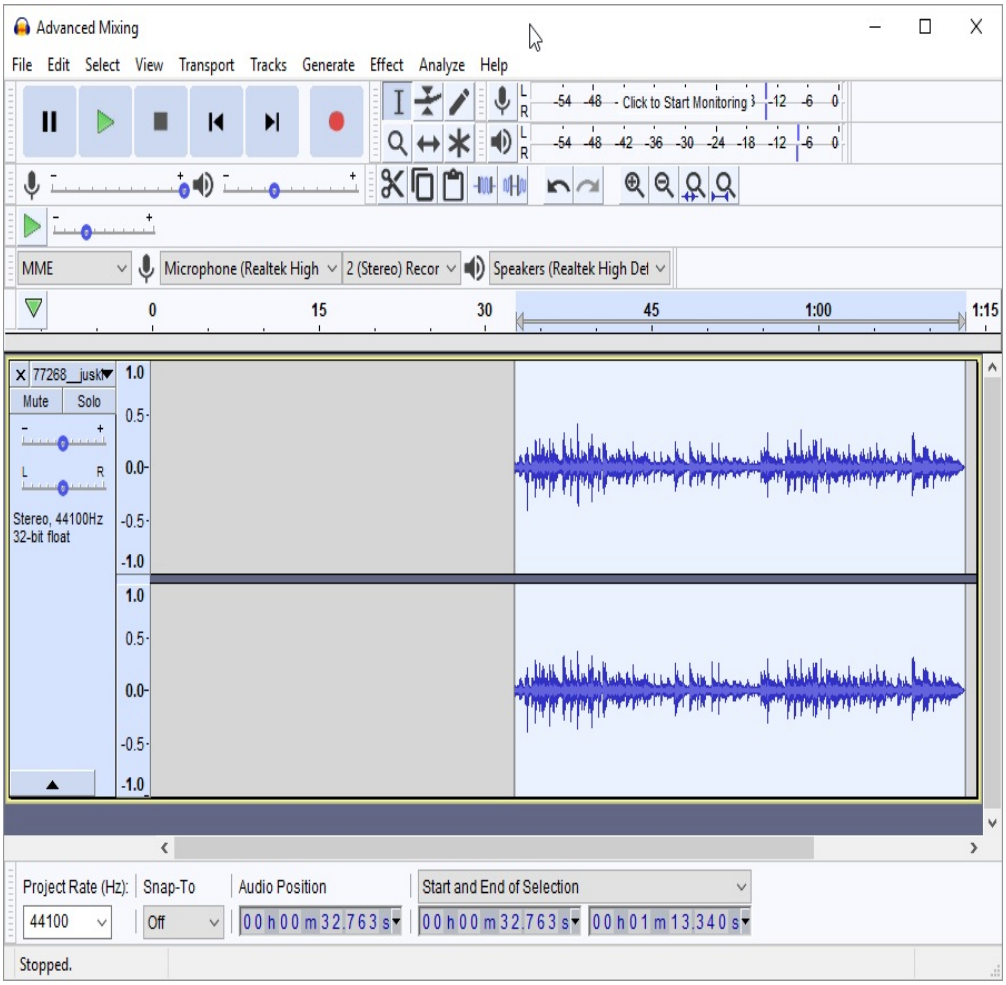
As an example, we are going to trim a music track to only include the segment after the first 32 seconds. First we click the Selection tool from the Tools toolbar:

then, using the mouse cursor, we select the region of the track after the 32-second mark. Note that for purposes of trimming, we select the segment of the track we want to *keep*, not the part we want to discard:



As always, when we have selected a particular region of audio it should show up in a lighter color, as above. Now we click on the **Trim** button of the **Tools toolbar**:

Once we have clicked the Trim button, only the region we selected should remain in the track:



Notice that the first 32 seconds is now gone, but the remaining audio waveform has *not* shifted to the left (to 0 seconds), as it would have had we instead selected the first 32 seconds and used **Edit > Cut** or **Edit > Delete**. Trimming is therefore a good way to preserve the relative position of a segment of audio track in relation to other tracks in the project, and to the overall timeline.

Advanced Pasting

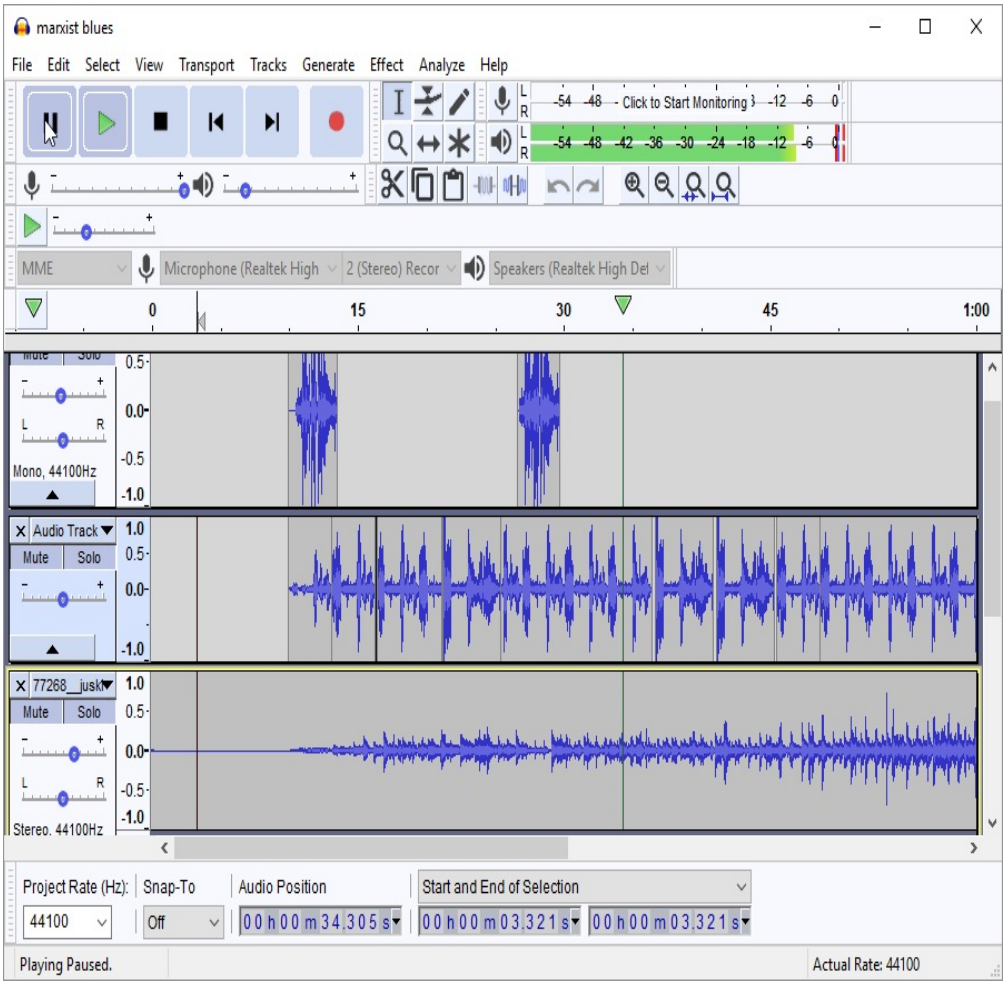
As we saw in the previous chapter, not only can you **Cut** or **Copy** a segment of audio track in Audacity, you can also **Paste** that segment at a different location, and as many times as you wish. We do this by selecting the audio segment of interest, then using **Edit > Cut** or **Edit > Copy,** depending on whether we want that segment to remain in its original place. We can also use the Cut or Copy buttons on the Tools toolbar:

Both Cut and Copy will load the selected audio segment onto the clipboard, where it will remain until we either end the current Audacity session or Cut/Copy a different segment. We can then place our mouse cursor wherever we want the

segment to go, and use Edit > Paste or the Past button on the toolbar:

Pasting is useful for any number of reasons. You might like a particular music segment for background to your voice or other music tracks, but find that it is too short; in this case you can simply copy and paste that segment end to end in the same track until it is the required length with respect to other tracks.

Of course, pasted segments needn't be end to end, or even be pasted into the same track they were copied from. One of the most interesting uses of pasting in Audacity is for 'sampling', when you've found a particular (typically short) segment of sound that you want repeated at regular intervals or other appropriate moments in the overall audio project. Give a listen to the Beatles' "Tomorrow Never Knows" or "Revolution No. 9" for early examples of extremely complex sampling or sound collage of this kind. In that era, the sound engineers had to literally copy and paste dozens or even hundreds of magnetic tape segments, and sometimes run dozens of tape players with looped tape segments simultaneously, to achieve this kind of sound collage. Happily, with digital music and editing tools like Audacity, we can achieve complex collage soundscapes with relative ease. Consider the following example:



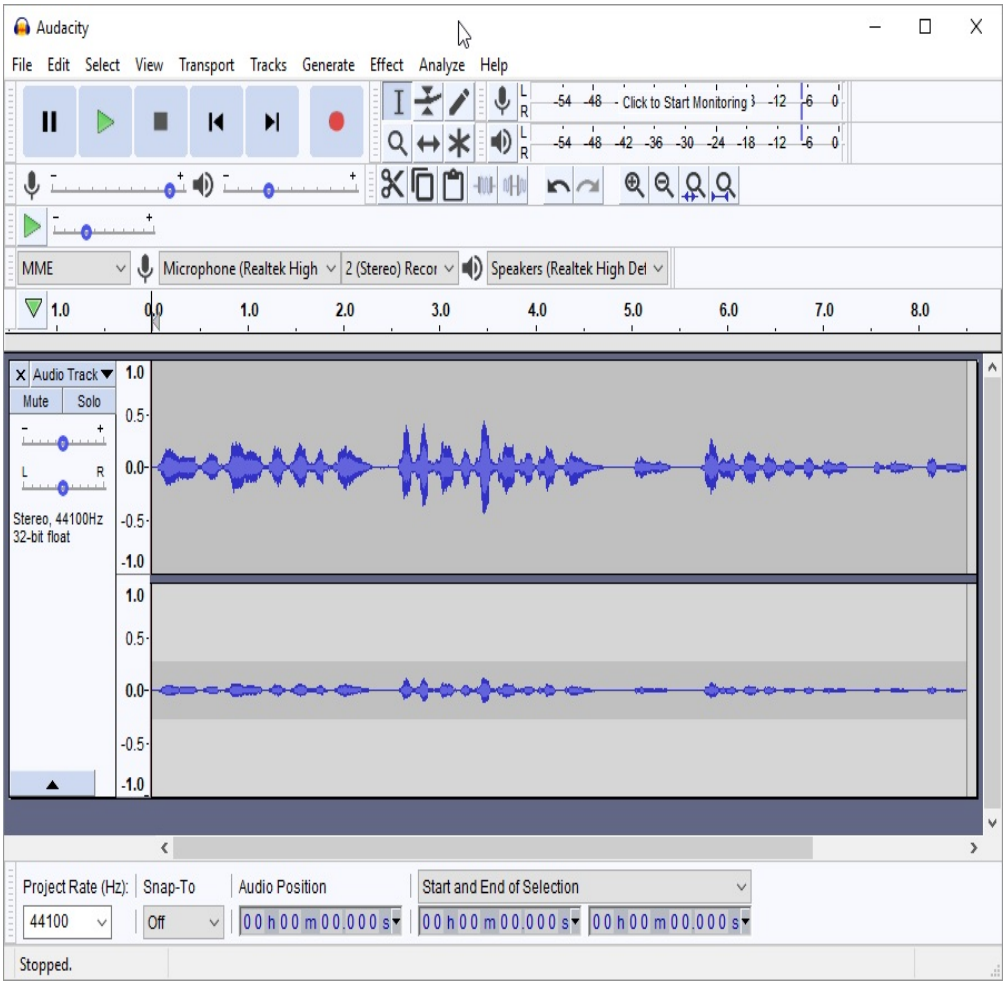
Visible here are the top three tracks of a five-track audio project I created. It is

structured around two main elements: a blues-guitar segment (third track down, duplicated once end-to-end to produce the overall song length), and the purring and vocalization of an old cat named Marx, from an originally quite short sound recording which has been edited and duplicated numerous times in track two, resulting in a continuous 1:45 audio track of purring punctuated by a short plaintive meow at regular intervals. The short, intense waveform segments pictured in track one represent the sound of a spoon dropped on the kitchen floor, an incidental noise in the original Marx recording that I picked out, amplified and used for further periodic punctuation. As with any other kind of collage, audio collage like this either 'works' or doesn't for a given listener; you can decide for yourself in this case: https://www.youtube.com/watch?v=oaqPzmURSMo . The point here is simply to illustrate the enormous scope for creativity made possible by the relative handful of editing tools we have surveyed in Audacity so far.

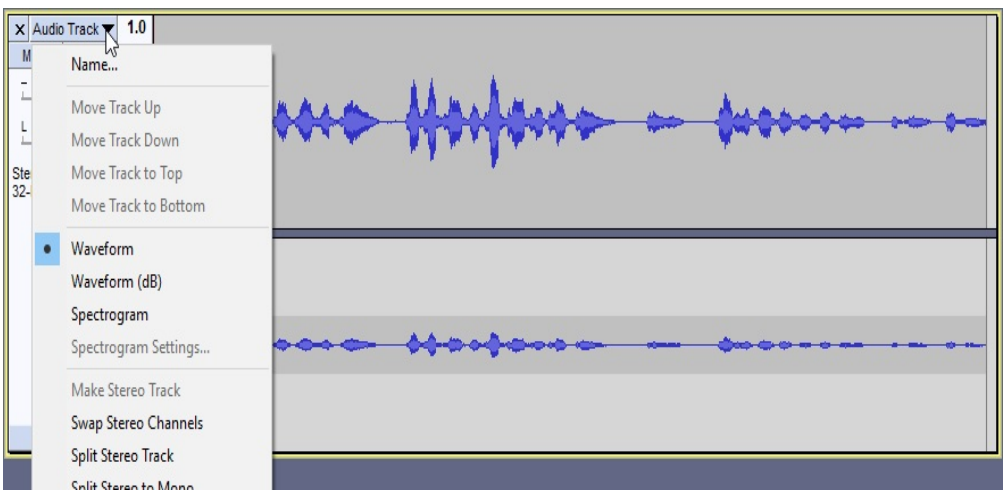
Splitting Stereo Tracks and Combining Mono Tracks

Sometimes when you are recording you may only record one channel of your track correctly; or there may be some other reason that you want to only work with either the left or right channel.

Below we see a recorded track with one channel (the left) much louder than the other:

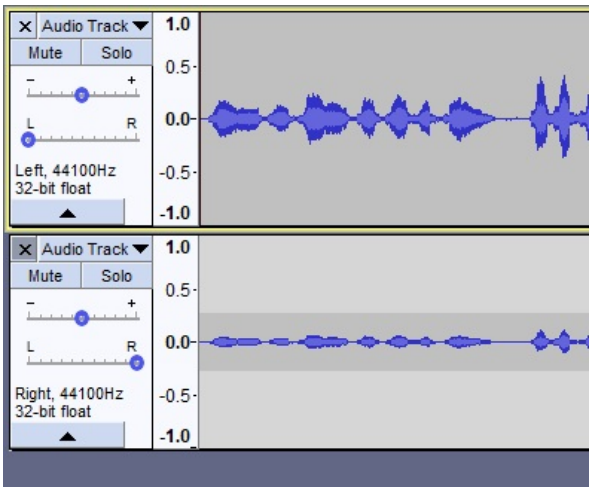


Rather than re-recording, we are going to work on only the left channel (the top one). So we need to select '**Split Stereo Track**' from the drop down menu we can invoke by clicking on the track Name:

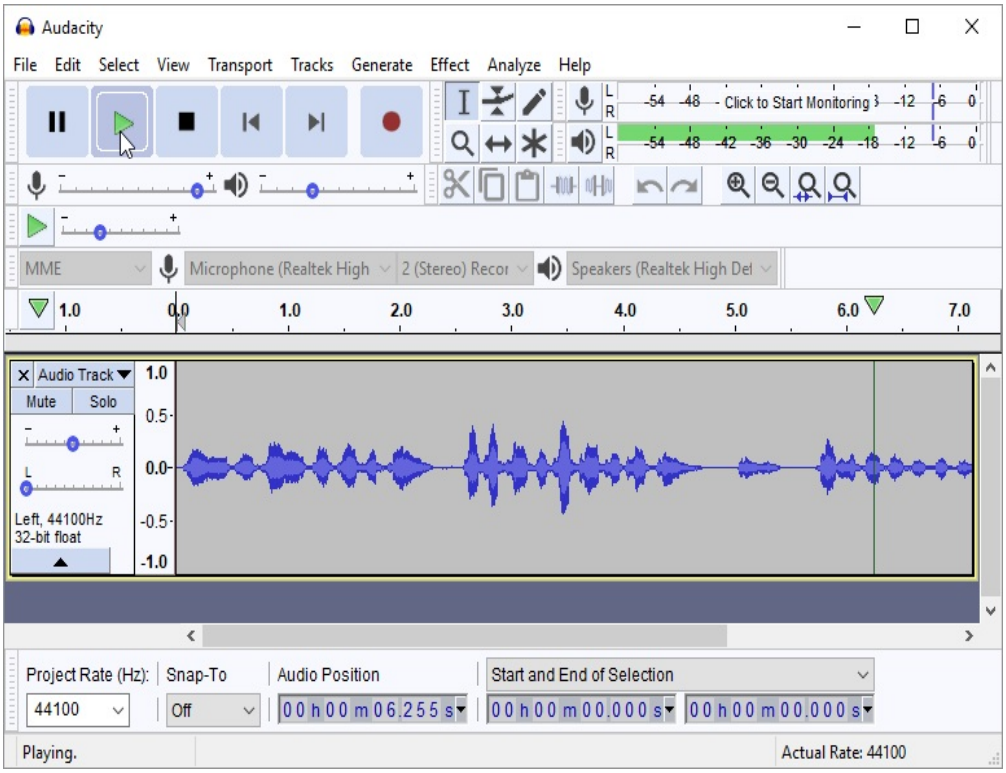


We can then delete the Right channel signal, as it has now become a separate

track. Do this by clicking on the X to the left of that track's name:



If we now play the one remaining track, we'll be able to hear that the sound is only coming through one channel (L). This can be seen in the green signal of the Playback meter in the screenshot below:



We will also notice that the Pan slider of this track is all the way to the Left (this happened as soon as we split the one track into two, with the second track's Pan slider all the way to the Right). So to fix this, we can simply move the slider to the middle, and the track will now play the same mono audio signal through both L and R channels.

If you need this track to be rendered in stereo again, there are several ways to do this. First, you can simply Export the track (**File > Export**) as an MP3, which will open a dialog allowing you to choose a Channel Mode of Stereo or Mono (see next chapter for details on Exporting). Of course, in that case the two channels will be identical as they will have been derived from the single mono track.

If you wanted instead to have two channels that you could edit or apply effects to separately, you could select the entirety of this track, then go to **File > Duplicate**, which will create a separate, identical mono track below the first one. Once you've edited one or both mono tracks to your satisfaction, you can recombine them into a single, stereo track by going again to the track dropdown of the top track and selecting **Make Stereo Track**:

Of course, the Make Stereo Track function will also work to combine *any* two mono tracks that are directly adjacent in your Audacity, even if they have separate origins. Just keep in mind the basic function of stereo sound: any L and R channels that are not perfectly synched up metronomically, and otherwise musically coherent, can make for difficult listening.

Audacity: ExportingAFile

Exporting A File

Software name : Audacity
Software version : 2.2.1

Projects created in **Audacity** are always saved in Audacity's own unique file format that cannot be opened by most other software. It is therefore necessary to **export** projects to more common file formats in order to use them with other audio software or media players.

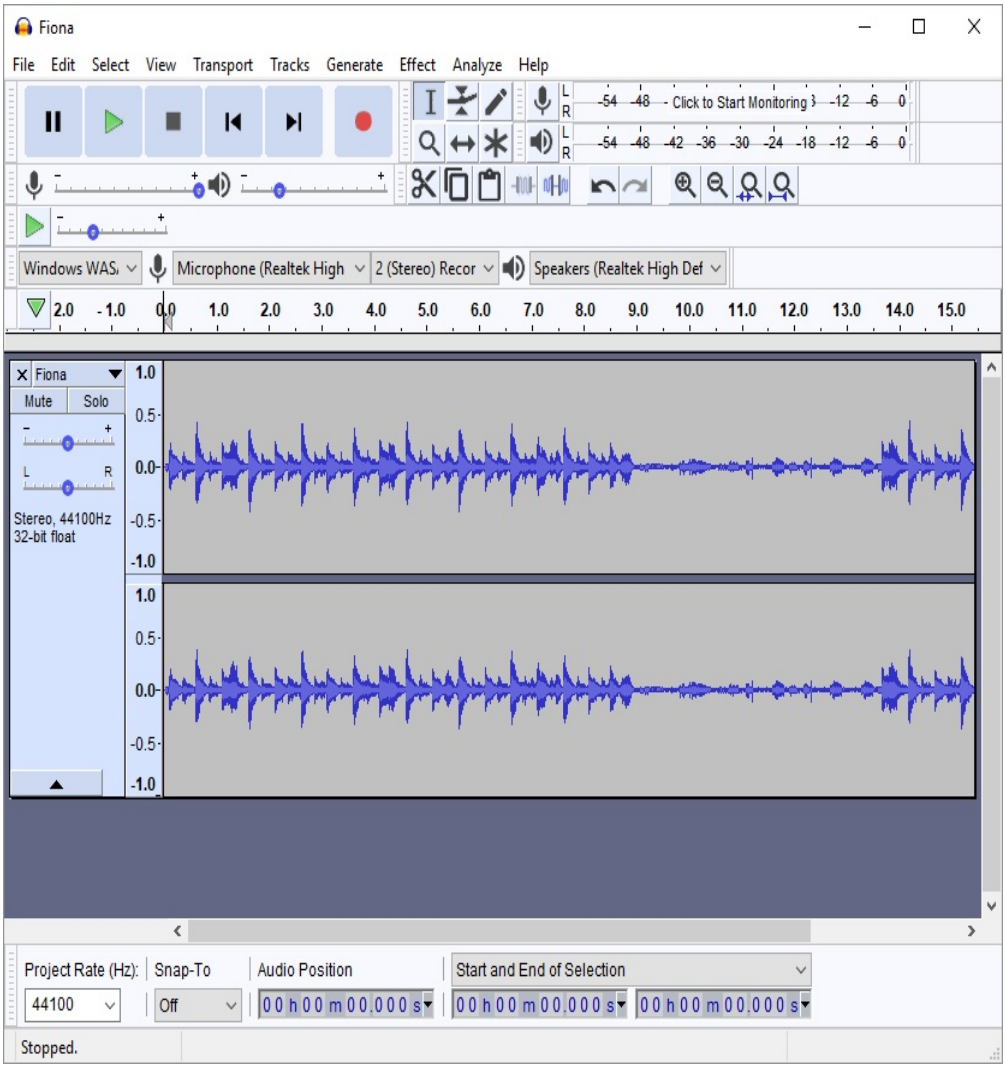
Audacity can export in the following common formats: AIFF, MP3, WAV, Ogg Vorbis. There are also half a dozen or so additional, more specialized formats that can be selected via **File > Export > Export Audio...**; however we will focus on the more common formats here.

AIFF and **WAV** files provide uncompressed CD quality audio, so one of these formats should be used if you want to open your Audacity project with other music production software or CD authoring software. AIFF is proprietary to Apple, while WAV was originally proprietary to Microsoft, so these two formats tend to play better with Apple and Windows tools respectively.

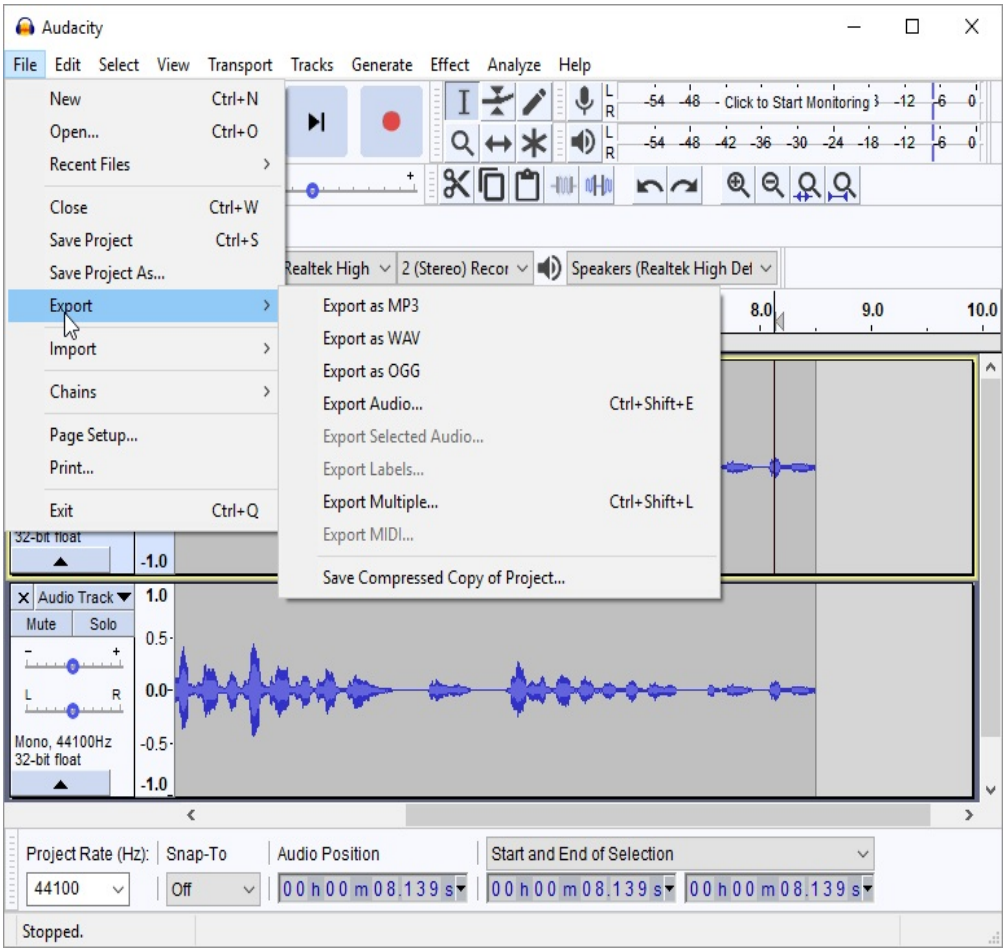
MP3 and **Ogg Vorbis** are both compressed audio formats so they have lower sound quality but much smaller file sizes, making them ideal for use in media players. An important difference between these two formats is that **Ogg Vorbis** is a completely open standard while **MP3** is not. However, current releases of Audacity incorporate the LAME MP3 encoder, and MP3 is by far the most widely adopted compressed audio format for playback devices today, making it a good choice for reaching the widest audience. (On the other hand, we should note that single-track OGG files can be bundled together as **MOGG** files, which preserve the separate tracks: this latter format cannot be *exported* from Audacity but it can be *opened* by Audacity, which may be of interest to rock music fans because many classic rock songs are now available as MOGGs, courtesy of the *Rock Band* and *Guitar Hero* games, giving Audacity users access to the original multiple tracks of these songs.)

To export a file from Audacity you need to have at least one audio track open in your Audacity project. If you do not already have a file open from a recording or editing session, see the instructions in the chapter on Opening (Importing) a File (including the differences between "Opening" and "Importing").

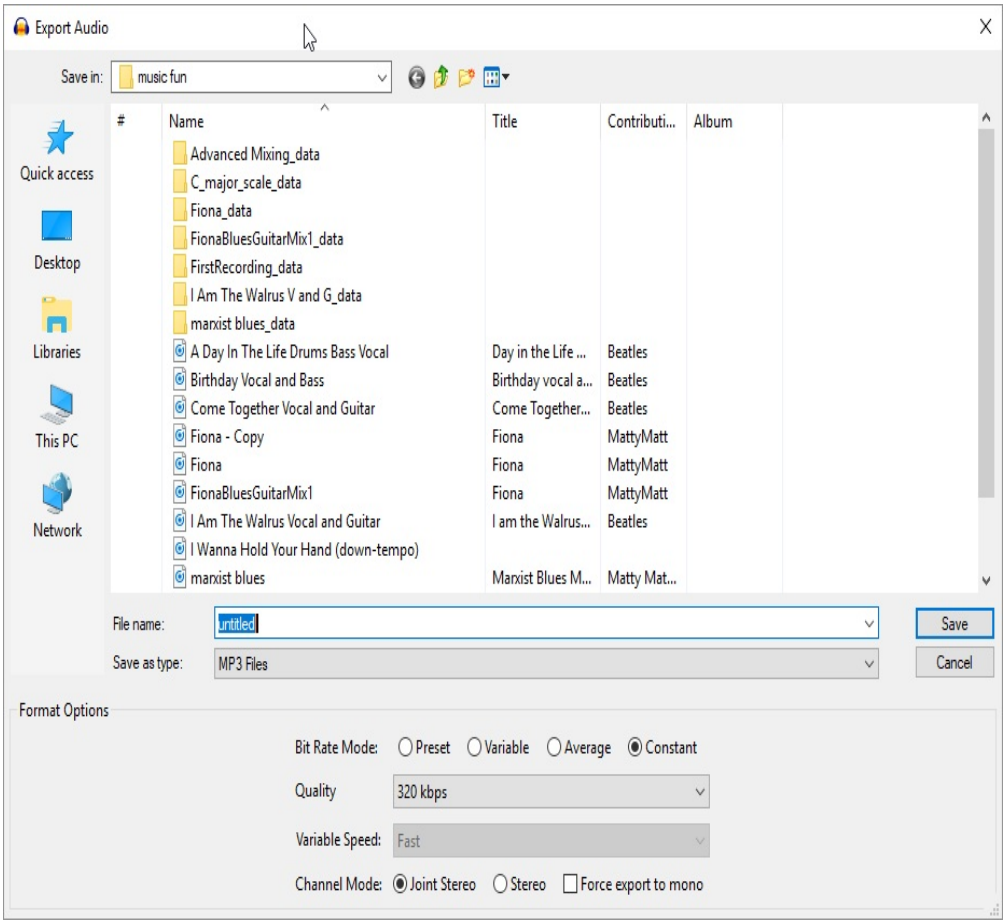
Here I have opened my audio file 'Fiona':



To export this file, go to File > Export, then from the submenu choose the format you want to export as:



Once you have chosen your format, a window will open allowing you to edit the file name and browse to the location where you want to save the file. You will also have various format options, depending on the specific format you have chosen. Here is the export window with format options for MP3:



Once you are satisfied with your file name, saving location and format options (unless you are a more advanced user it is not a bad idea to stick with the Audacity defaults on the latter), click on "Save" and the Export process will begin. The time it takes to export the project will depend on the length and complexity of the project (for example, how many separate tracks) as well as the processing speed of your computer.

When exporting is complete the above window will disappear. You should now be able to see the file in the folder where you chose to save it.

That's it. You can now enjoy listening to the results of your Audacity project through other audio software, transfer it onto your portable media player, or share it with others.

Audacity: Help

More Help

For more help with **Audacity** you can try these avenues:

Audacity User Guide

You should first look at the excellent documentation provided by the developers themselves, at http://manual.audacityteam.org/index.html. This page links to a multi-dimensional user guide, with interface and menu walk-throughs, tutorials, FAQs and more.

Audacity Wiki

The Audacity Wiki provides a wealth of additional information on the past, present and future of Audacity, along with a wide range of tips and tutorials contributed by the large user community.

Audacity Forum

You can also try searching through the official Audacity forum for information.

http://audacityteam.org/forum/ (also linked from the page above)

The forums contain a lot of postings from users on many topics. You can use the search system to locate topics or just browse the categories. If you don't find what you want then try subscribing to the forums and posting your question to the relevant category.

There are a few things to keep in mind when asking a question in a forum or to a mailing list. First, be as clear as you can with your question and provide any information that you might think would help some to try to help you. You might, for example, include information about the operating system you are using, or various specifics that relate to what you are trying to achieve. Additionally, it is always good practice to also post back to any forum or mailing list if you manage to solve your query and include clear information on how you solved the puzzle. This is so that someone else that may have the same issue can resolve it using what you have found out. If possible post back to the same thread (discussion topic) so that anyone searching through the forum can follow the discussion including the solution.

Mailing Lists

Mailing lists are good places to look through for answers to questions. The subscription (also the archives are listed on each info page) information is located here :

http://audacity.sourceforge.net/contact/lists

You can also subscribe to the mailing lists and ask a question. Please note the suggestions about posting to forums and mailing lists in the above section.

YouTube Video tutorials

As with nearly everything else these days, you can search YouTube for tutorials on using Audacity. Many of these are also linked from the Audacity Wiki above, but given the nature of YouTube, new tutorials appear regularly.

Web Search

Aside from YouTube, searching the wider web is always useful. If you are looking for problems arising from errors reported by the Audacity software, try entering the error text itself into a search engine such as Google. Be sure to edit out any information that doesn't look generic when doing this. Some search engines also enable you to try searches of mailing lists, online groups etc, this can also provide good results.

IRC

IRC is a type of online chat. It is not the easiest to use if you are not familair with it but it is a very good system. There are a variety of softwares for all operating systems that enable you to use **IRC**. The **IRC** channel for Audacity is where a number of the developers are online and some 'superusers'. So logging into this channel can be useful but it is very important that you know exactly what you are trying to find out before trying this route. The protocol for using the channel is just to log in, and ask the question immediately. Don't try and be too chatty as you are probably going to be ignored. It is also preferable if you have done some research using the other methods above before trying the channel. The details for the **IRC** channel are:

- IRC network: freenode
- Channel: #audacity

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REWRITE OF MANUAL FOR AUDACITY 2.x

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Audacity Tips and Tricks for Podcasters

Common Challenges in Podcast Recording

Pops and Clicks

Sometimes audio recordings contain pops or clicks caused by a too-hard “p”, “t”, or “k” sound, by a little too much saliva as a word is said, or by the microphone recording a sound incorrectly. For a truly professional podcast, we may want to get rid of any major instances of these pops and clicks.

Solutions

- Find Zero Crossings before deleting the selection.
- Click “Removal”
- Amplification

“Um,” “You Know,” Pauses, and Other Junk

Let’s face it. We don’t always articulate the way we’d like, especially when we’re not using a script. We may want to edit out words, phrases, filler words such as “um” or “er” or “like”, pauses, or non-constant background sounds (e.g., the rustling of pages as a script page is turned or the noise of an item dropped on the floor). However, editing can cause its own problems; for instance, the editing can introduce pops and clicks.

Solutions

- Find Zero Crossings before deleting selection
- Amplification

Ambient Noise

Recordings intended for podcasts will contain background noise unless they are recorded in a “dead room” (a soundproof room in a recording studio where the subject of the recording sits, surrounded by padding that seals him or her off from all outside sound). Even when care is taken to eliminate voices, music, rustling of papers, and other easily noticed background noise, ambient noise will likely come from an air conditioner, a computer fan, or other source of constant, low-volume noise. No normal room is ever truly silent.

Solutions

- Noise Reduction

Differences in Sound from Changes in Location, Equipment, or Subject

Each recording room or other recording location will likely sound a bit different from others because of differences in how sound reverberates in the space, and any change in recording equipment may cause sounds to be picked up differently. As a result, podcasts recorded in multiple locations or with multiple types of recorders may exhibit some inconsistency in ambient sound and in volume. In addition, certain speakers talk louder than others, and this variable can lead to differences in recording volume when a podcast contains multiple participants.

Solutions

- Normalization
- Amplification

Multiple Recordings and/or Music Files to Interweave Together

Maybe your podcast is a story, with multiple character voices connected by a narrator, and each actor recorded his or her part separately from the others. Maybe you are putting together interviews with multiple guests. Maybe you just want to use stingers or background music files, and you want to control the fading or volume of these sounds in relation to other voices. You can often imagine complex uses of audio, and implementing what you imagine can be a challenge.

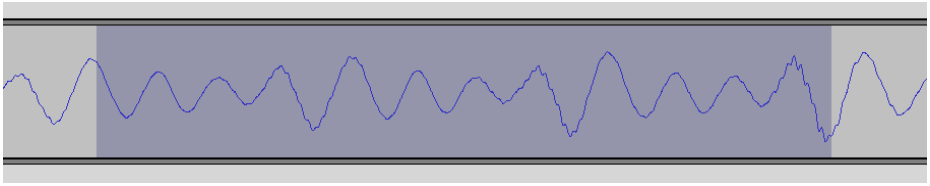
Solutions

- Time Shift tool
- Fade In / Fade Out effects
- Envelope tool
- Splitting tracks
- Quick Mix
- Generating silence

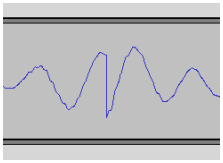
Solutions

Zero Crossings

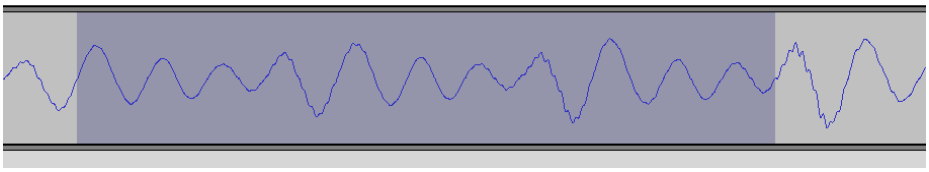
Sounds are made up of waves, and every sound file is represented in the computer as a waveform. When a portion of a sound is selected with the mouse, the beginning and end of the selection don't always (and in fact, usually won't) line up with a point where this wave crosses the horizontal midline dividing the crests and troughs. Thus, a selection (very zoomed in) might look like this:



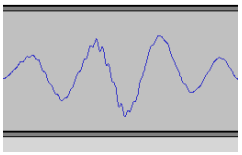
When the selection is deleted, the resulting waveform thus has an irregular drop from the crest on the left to the trough on the right (or vice versa), like this:



When the sound is played, this irregular drop is sometimes heard as a pop or click. A pop or click can also occur when an effect is applied to the selection, when the selection is cut and pasted, when the selection is replaced by silence, and so on. Fortunately, there is an easy solution. **Whenever a piece of a waveform is selected, choose "Find Zero Crossings" from the Edit menu in Audacity before taking any action on the selection.** This will move the selection both right and left to the nearest point where the waveform crosses the zero line, like this:



Then, when the selection is deleted (for example), the irregular drop seen above is omitted, as shown below:



Click Removal

Audacity also provides a simple, first-pass method to remove clicks and pops from audio files. Select "Click Removal" from the Effect menu in Audacity. Select the desired threshold and maximum spike width as described on the dialog box, and the click the "Remove Clicks" button. **Keep in mind that the greater the sensitivity you select, the better the program will remove pops and clicks; however, the distortion of the desired audio will be greater, as well.** The "Preview" button on the Click and Pop Removal dialog box may help you to find an acceptable level of sensitivity for the particular file you are working with, but sometimes determining the level is a matter of trial and error, requiring multiple "Undo" operations. Since each file may require a slightly different setting for optimal results, if your project contains multiple files, make sure that you do this procedure for only one track or file at a time.

Noise Reduction

Noise reduction works by reducing or eliminating sounds that match frequencies defined in a sample of what silence (or only constant ambient noise) sounds like in the particular file. Desirable sounds in these frequencies will also be reduced or eliminated, **so if noise reduction is overdone, the audio may sound**

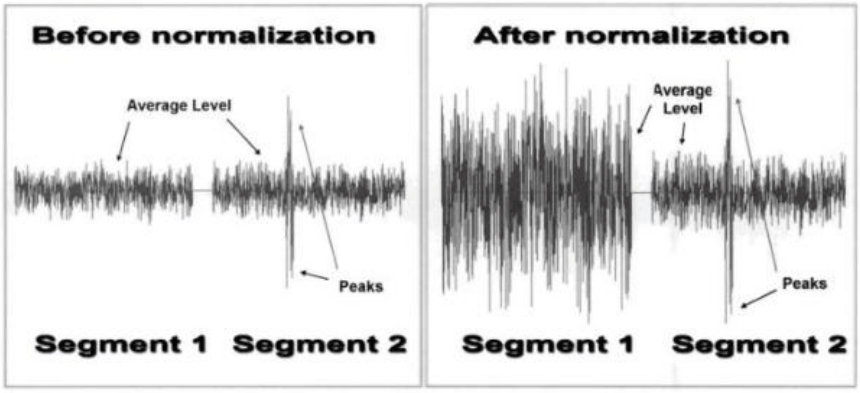
tinny, robotic, or otherwise distorted (kind of like talking into a fan). Also, noise reduction is primarily designed to remove constant sounds, such as the sound coming from an air conditioner or computer fan; it is far less effective at removing sounds such as rustling papers, background voices, etc.

There are two steps to using noise reduction. First, select a few seconds of the file in which there is nothing but the ambient noise in the room (computer fans or whatever). Then, choose "Noise Removal" from the Effect menu in Audacity, and click the "Get Noise Profile" button on the dialog box. Next, select the files, or section of a file, to which you want to apply noise reduction, and find the zero crossings for the selection (as described above, in "Zero Crossings"). Finally, choose "Noise Removal" from the Effect menu in Audacity again, select how much noise reduction to apply with the slider on the dialog box, and click the "Remove Noise" button. As with Click Removal, the "Preview" button on the dialog box may help you identify a proper level of noise reduction to use on the particular file, but sometimes identifying the proper level is a matter of trial and error. Perform noise reduction on only one track or file at a time.

Normalization

Normalization is a way to apply a consistent volume level across files. It ensures that the waveform of the normalized file is centered on the zero line, and that the maximum (volume of the file is -3 dB. **It is useful to apply normalization to all of your tracks before beginning to mix your podcast.** To normalize a track, select the entire track and choose "Normalize" from the Effect menu in Audacity. Make sure both check boxes on the dialog box are checked, and click the "OK" button.

Another tool that is useful in normalization is dynamic range compression (see "Compressor" under the Effect menu in Audacity). Dynamic range compression reduces the amount of volume difference between the loudest and quietest points in the selection, preventing the large differences illustrated below:



Amplification

The Amplify effect can be used to increase or reduce the volume of the selected track or section of a track. Amplification can be used to achieve a more consistent volume level, to reduce overly emphasized sounds (for example, *P, T, S*) that cause a spike in volume or undesired sounds that can't be completely

removed. Obviously, its primary purpose is to increase or reduce the volume of any recording, even a consistent recordings, to desired levels.

To increase or reduce volume, select the desired track or section of track, find the zero crossings for the selection, and then choose “Amplify” from the Effects menu in Audacity. Type in the decibels by which you want to increase (positive number) or decrease (negative number) the volume of the selection. This is the amount by which, not to which, the selection volume will be adjusted. Increments of 3 decibels work well as a starting point for experimentation. Make sure that the “Allow Clipping” check box is NOT checked. This prevents the selection from being amplified so high that the top of any piece of the waveform is chopped off, which would lead to high distortion. Then click the “OK” button.

Amplification amplifies all the sound in the selection, including background noise, and can lead to some distortion. Also, when reducing volume, bear in mind that amplification cannot undo the distorting effects of any clipping that happened at the time of recording because of incorrect microphone gain, so make sure that microphone gain is not set too high. As with all of these effects, use amplification judiciously. Frequently use the Preview button on the dialog box, plus a healthy dose of trial-and-error, to find the optimum level of amplification.

Time Shift Tool

The Time Shift tool allows you to drag the contents of a track to any point in time on the project timeline. This tool is found in the tool palette to the left of the playback controls and looks like this:

Click on the Time Shift tool, then click and drag the desired track to the proper location on the timeline.

Fade In / Fade Out

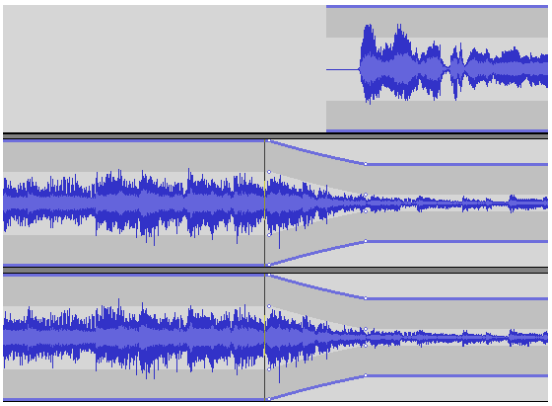
You may want to fade in or out certain tracks in your podcast, particularly if you are using stingers or music to signal the beginning and end of portions of the podcast. To use Fade In / Fade Out, select the length of the track over which you want the fading to occur. Find the zero crossings. Then, select either “Fade In” or “Fade Out” from the Effects menu in Audacity, which will result in the volume of the selection fading to or from complete silence. To fade a track to or from a lower volume, use the Envelope tool.

Envelope Tool

The Envelope tool is used to increase or decrease the volume of a track gradually (unlike the Amplify effect) and without going to or from zero volume (unlike Fade In and Fade Out). One example of where the Envelope tool might be used is to have music playing and then to fade that music to a lower volume for few seconds as a speaker begins to speak, then keep the volume lower but still audible while the speaker is speaking, and then gradually bring the volume of the music back to its original level as the speaker is ending her remarks.

The Envelope tool is found in the tool palette to the left of the playback controls and looks like this:

After clicking the Envelope tool, click the desired track at the point where you want the volume change to begin. There will be a small handle on the top and bottom edges of the track at this point. Hold the mouse button down and drag up or down while over one of these handles to increase or reduce the volume of the track (indicated by the amplitude, or height, of the waveform). Adding multiple such points on the track allows for complex shaping of the volume. For example fading from full volume to a lower volume then back to full volume again requires four such points or handles. Illustrated below are two of those handles, used to lower the volume of music as a speaker begins to talk.

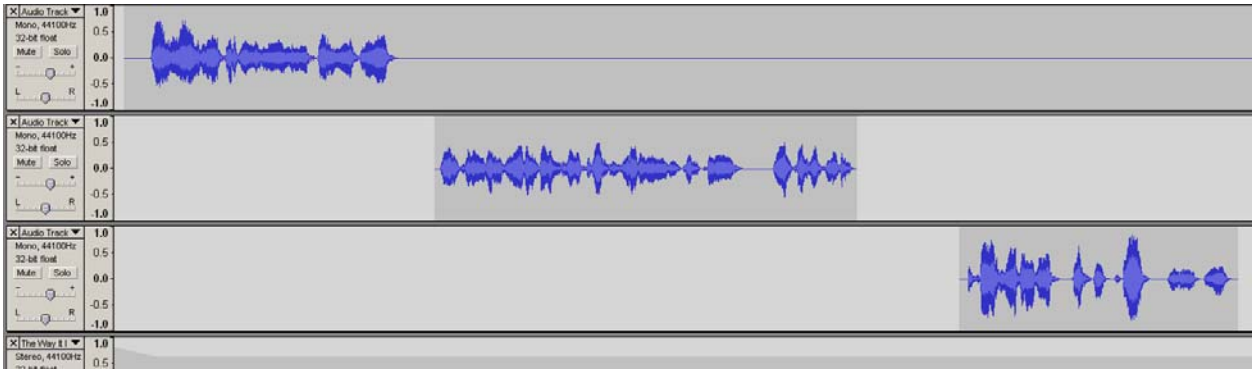


Splitting Tracks

Sometimes you may want to take what is on one track and split it into multiple tracks, to allow the pieces to be moved independently on the timeline with the Time Shift tool. One example might be a recording of a story using multiple voices, where each actor recorded his or her parts separately from the others, and these parts are imported as one track but must be broken up and interwoven with the parts of other actors. To split a track, select the section of the track that you want to split out and find the zero crossings. Then choose “Split” from the Edit menu. The selected section of track will be moved to a new track, and replaced by silence in the original track.

Quick Mix

Quick Mix is the opposite of splitting a track. It allows you to combine the contents of multiple tracks into one track. For example, the illustration below shows three tracks:



And the following illustration shows the first and third tracks combined with QuickMix:

Notice that the position of each track on the timeline is maintained in the combined track. If necessary, silence is generated between the clips on the combined track.

It is possible to combine tracks that overlap each other on the timeline**, but once this is done, the overlapping sections will NOT be able to be separated, as they will become part of a combined waveform.** Do this only with extreme caution.

Quick Mix is a great way to keep the number of tracks you are working with manageable by combining tracks once the need for them to be separate has passed. To use Quick Mix, select the desired tracks by clicking on the track information area to the left of each track (indicated by the red arrow in the illustration above). Hold down the Shift key while selecting the second and subsequent tracks. Then choose “Quick Mix” from the Project menu.

Generating Silence

One way to move sections of audio on a track further apart is by splitting the track into two, and then using the Time Shift tool. Another is to generate silence to lengthen the space between the two sections. To generate silence, put the cursor on the timeline at the point where you want the silence to appear, then choose “Silence” from the Generate menu in Audacity. Type in the length of the silence you want to generate, and click the “Generate Silence” button.

Proactively Addressing Challenges

Because most of the above effects, such as amplification and noise reduction, have both limits on what they can achieve and possible undesirable side effects, it is important to proactively address challenges

you can anticipate. For example, use a pop filter or windscreen between your mouth and the microphone to reduce the incidence of pops and clicks. Pop filters are inexpensive, but if needed, a pop filter can even be constructed from a bent hanger and a piece of nylon stockings.

Make sure that gains on microphones, and distances between microphones and the recording subject, are set properly so as to minimize the need for amplification. As much as possible, eliminate undesirable background noise, especially noise such as other voices, paper rustling, etc., from the recording environment. Use a script when possible to avoid undesired pauses and meaningless filler words like “um,” “er,” and “like.” Completely finish reading from one page of the script before turning the page and beginning to read again. This makes the rustling of the pages much easier to edit out than if pages are rustling while you are still talking.