

## Introduction to Computer Audio

Computer audio (sound) files are currently available in three basic types: uncompressed, lossless compression and “lossy” compression. Audio files are compressed to make them smaller, usually for use on the Internet or in small portable playback devices. Lossless compression uses a compression scheme that does not “throw-out” any of the original information; lossy compression deletes less important or redundant information. Lossy compression results in the smallest file size, lossless compressed files are somewhat larger and uncompressed files are the largest. In general, less compression means greater quality: the more a sound file is compressed, the worse its sound quality will be.

In order to play audio files on your computer, you must have an audio player installed. In order to play any specific file type, the audio player installed on your computer must support (be capable of playing) that file type. Some current audio players allow you to update the software in enable it to play an audio file of a type that it does not already support.

The most common audio players found on computers today are: *Windows Media Player* (Windows only), *QuickTime* (and Apple application also available for Windows) or *RealAudio*, a third party application primarily for use on the Internet and available for most operating systems.

Creating audio files on your computer requires an application specifically designed to create audio files. Most operating systems include simple sound recording software. In some cases, this built-in software allows you to edit—or change—the sounds that you record. Recording requires a hardware interface to convert sound to computer code. Sound files may be either analog or digital. Analog recordings record the sound as continuous waves, while digital recordings “sample” the wave values at specified intervals and create numerical codes from which the original wave form may be recreated. In general, analog sound files are of higher quality and larger file size, while digital sound files are of less quality and smaller in file size. However, any given digital sound file may be of higher quality than a particular analog file, simply because the recording procedures have a great deal to do with the quality of the file. Digital files are easily manipulated in ways that are impossible or extremely difficult to do with analog files. Sound recording applications require a *codec* (encoding/decoding instructions) for each audio file type it is capable of recording, converting or editing.

*The most common audio editor is Apple’s QuickTime Pro.* Apple QuickTime player is a free download; QuickTime Pro requires the purchase of a “key” code that unlocks the editing capabilities of QuickTime (approximately \$30). While Windows Moviemaker can edit sound, it does so as part of movie files and is not useful as an audio editor. Various free audio editors are available for Windows; the most well-known is *Audacity*.

Many audio files are protected by [Digital Rights Management](#) (DRM) protection to prevent copying and sharing of the files. Most commercially available music includes some form of DRM, including files contained on music CDs, DVDs, purchased from iTunes or other digital music suppliers. DRM protected files can only be played on authorized playback devices--- including desktop computers. Napster files are not generally protected and can be transferred from one device to another.

Numerous high-end, professional audio editing applications are available for both Windows and Macintosh OS. The most popular, widely used by music professionals, is *ProTools* (Avid/Digidesign); it features direct interaction with audio hardware that allows it to both control and be controlled by recording and mixing hardware.

### Audio File Formats:

AIFF (Audio Interchange File Format). Apple/Mac OS. Uncompressed file format; suitable for storing original sound recordings for archival purposes, but is not used for playback devices.

.au (audio). The standard audio file format used by Sun, Unix, and Java. Can be either compressed or uncompressed. You will not encounter this very often.

.cda (CD Audio) .cda is the format in which music on music CDs are stored and is uncompressed.

.mp3 (MPEG Layer-3). This is the most popular format for downloading and storing music used today. It uses a lossy compression system to create small file sizes for use on small portable devices.

.m4p (MPEG Layer-4 with DRM). A proprietary Apple variation of mp3 that includes DRM to create iTunes files that can only be played on iPods.

ogg -- a free, open source format supporting a variety of codecs, the most popular of which is the audio codec Vorbis. It is maintained by the [Xiph.Org Foundation](#). It is the most popular open source file format and can frequently be found on the Linux OS.

.ra, .rm and .ram. (RealAudio) The .rm format is designed for streaming audio over the Internet and cannot be saved to your computer. The .ra format allows files to be stored in a self-contained fashion on a computer, with all of the audio data contained inside the file itself; they may be played by the free RealMedia Player. The .ram format is a text file that contains a link to the Internet address where a Real Audio file is stored; the file contains no audio information.

.wav (Waveform Audio). Windows format uncompressed. "CD quality" large file sizes. This is the format most often used when recording audio into the Windows operating system. It is very common and almost all audio players/editors can use wav files.

.wma (Windows Media Audio) Microsoft format designed for use on Windows and Microsoft audio players; DRM protected. This is the native file format for Windows Media Player.