

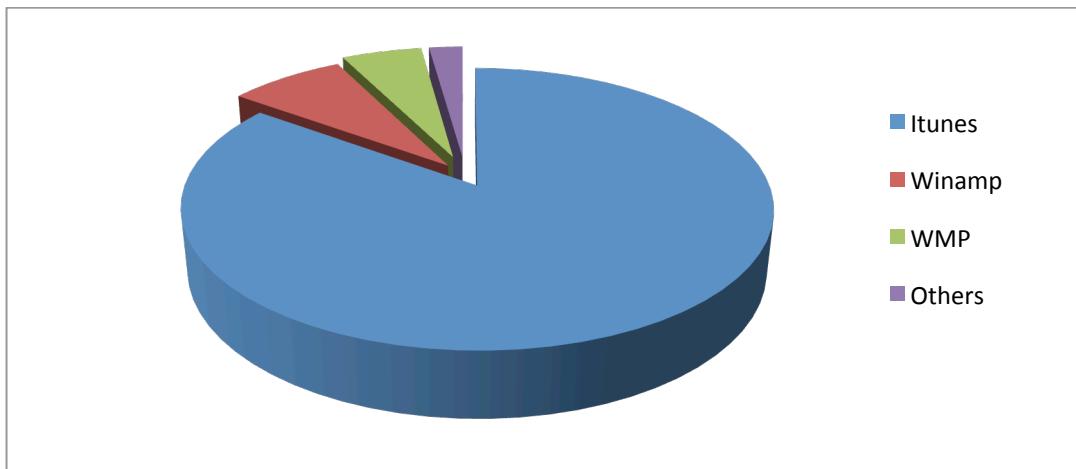
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## Music Informatics: Music Database Visualization

The research goal was to identify current problems with music software and ultimately create our own prototype by implementing new and experimental database visualization methods. Our primary research provided our group with the information to make a prototype with many great features taken from modern music library software as well as new features, which have never been seen in applications.

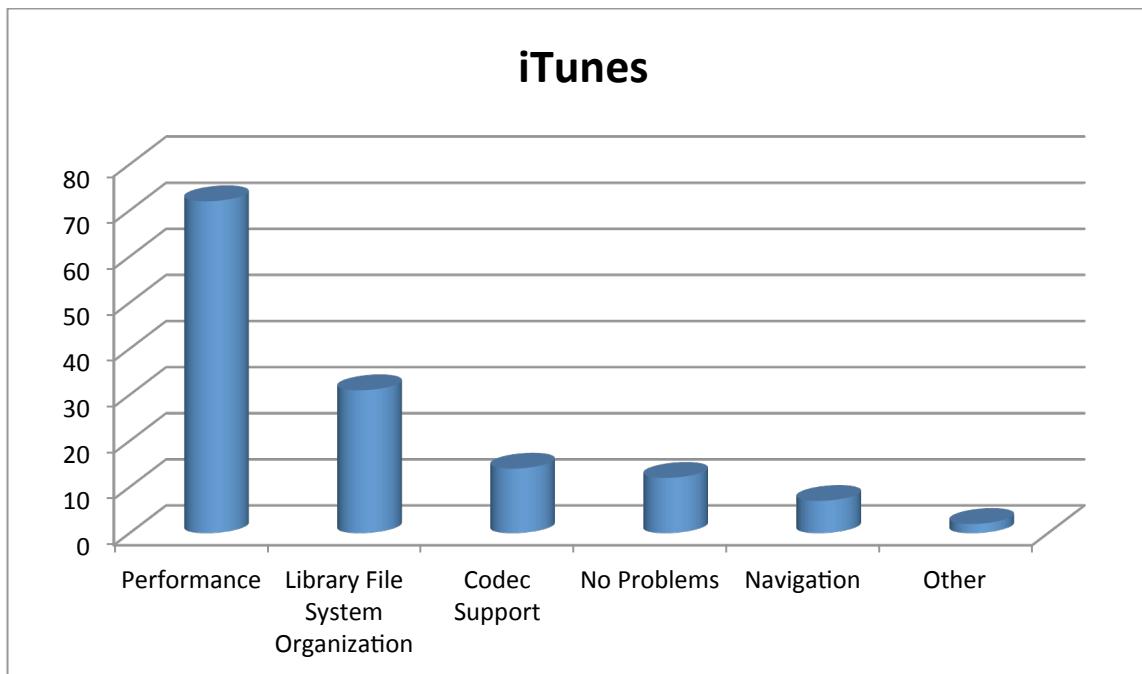
Music recommendation was a feature our research heavily focused on. With the rise of many music recommendation systems such as Pandora or Last.FM, users felt the need to integrate this technology with standalone software such as iTunes. Though the basic list view wasn't user friendly therefore the research focused on different ways to visualize the database. The most effective method was to utilize the web method to show relationship models between artists, albums, or even songs. This gave a familiar interface for the user without much interference with other design elements.

## Data Analysis

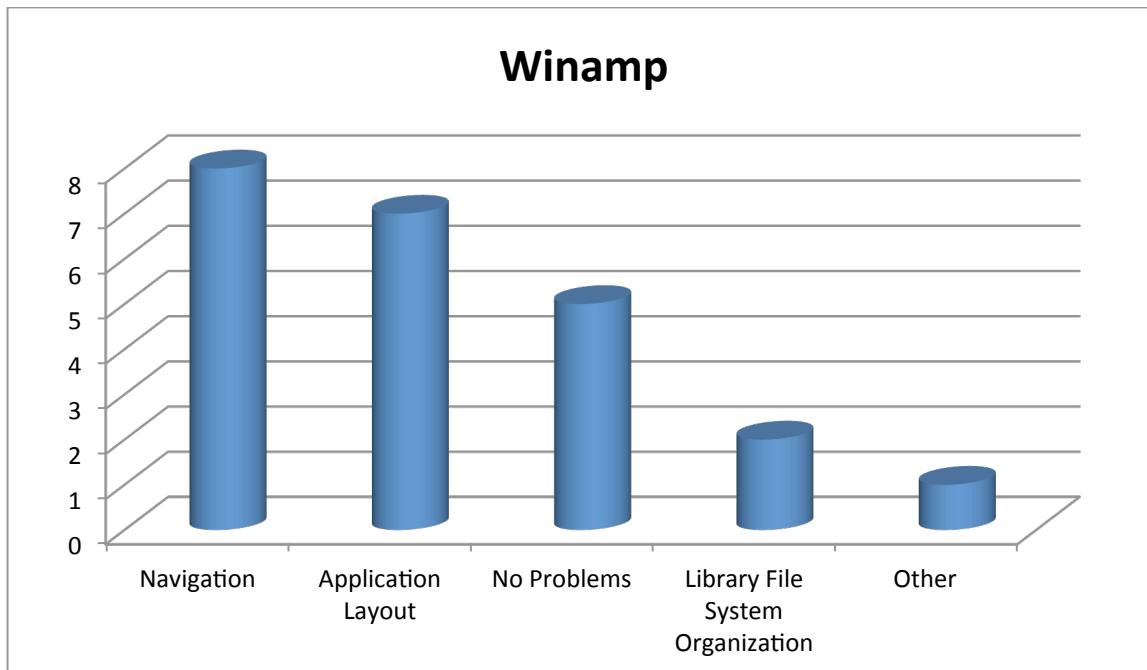


In order to gain an understanding of the most popular music interfaces, the first question we asked was the user's main music software on their PC. The result from this question is above and it is sufficient to prove that our hypothesis was correct. We predicted that most people would use iTunes as their main media player because of the number of people with iPhones and iPod. Both iPhones and iPods require iTunes to be installed in order to update OS system and to sync music and applications. The second most used player was Winamp. Although this program is very old, (created in 1997) it is still very popular among users who prefer more control of their software and their database of music. Also the fact that Winamp is now supports Android devices and also its new feature that allows users to wirelessly sync their music over Wi-Fi is making this software more popular.

The following criteria were the focus of our interface: codec support, audio quality, library file system organization, performance, navigation, and application layout. These criteria were the most important aspects of the software. These criteria gave a baseline when comparing the various softwares.

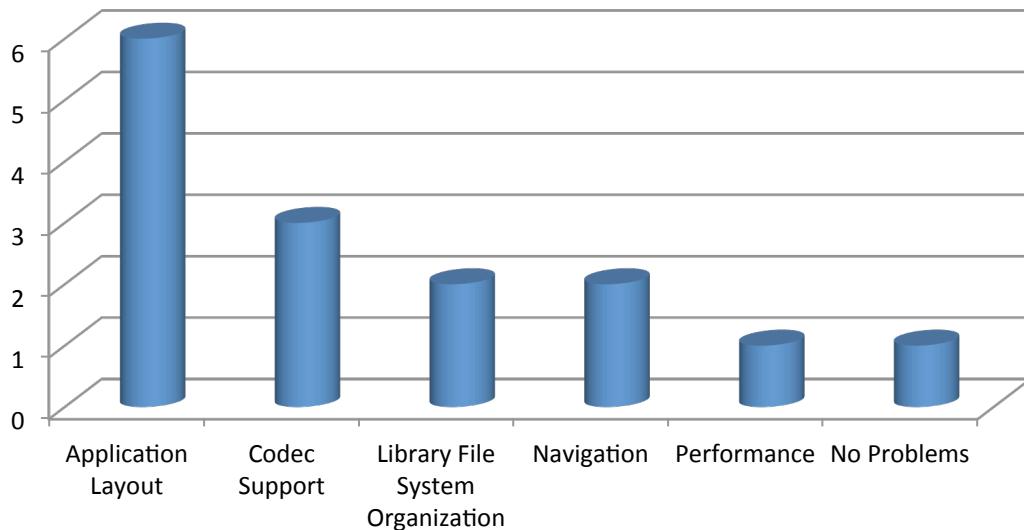


Our data shows that performance is the most problem with this software. Most of people used this software before and most of them also experienced lags and sporadic scrolling while using the software. We've also seen that spinning beach ball many times while searching through cover flow. Considering that iTunes is just a jukebox that supposed to play music files puts a remarkable strain on your system resources. Of course this is not a problem if the user has a computer with quad core processor and 12GB DDR3 RAM but the fact is that most college students do not have such technology, and iTunes still seems excessive for just playing music. Next in the problem list is the library file system organization. Our understanding of this problem is that iTunes tries to do everything on its own. The library can get very confusing when iTunes try to reorganize the folder without asking. The third on the problem list is the codec support or should we say, absolute no support for other music formats like Ogg, FLAC, etc. ITunes existed for almost a decade and they never bothered to have any downloadable plugins to support other music file formats and it's probably never going to happen.

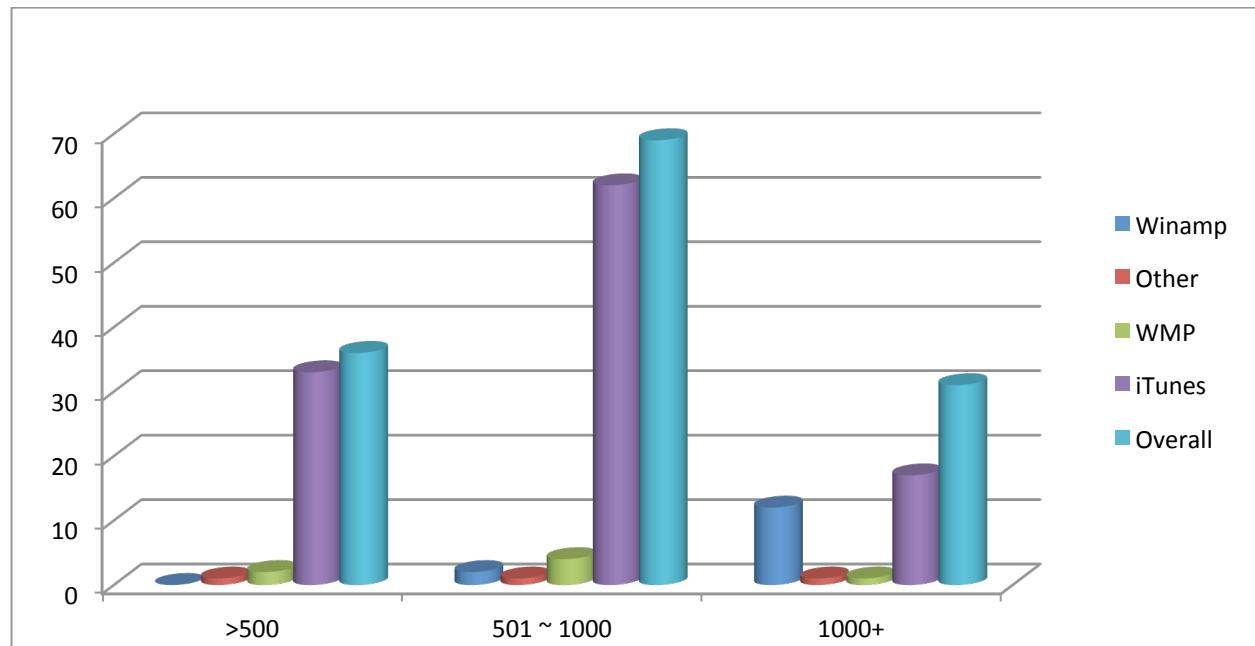


Both navigation and application layout was a problem for Winamp users. This makes sense for this software because the fact that Winamp has over thousands of skins and visualization. Nullsoft makes not all the skins, which is the name of the publisher. Many Winamp users around the world can create unique skins for the software and share online. Winamp is very customizable and different skins can make the software look totally different from the original design. This may cause problem for navigation and application layout because depending on the skin of the software, whole navigation system and application layout might change.

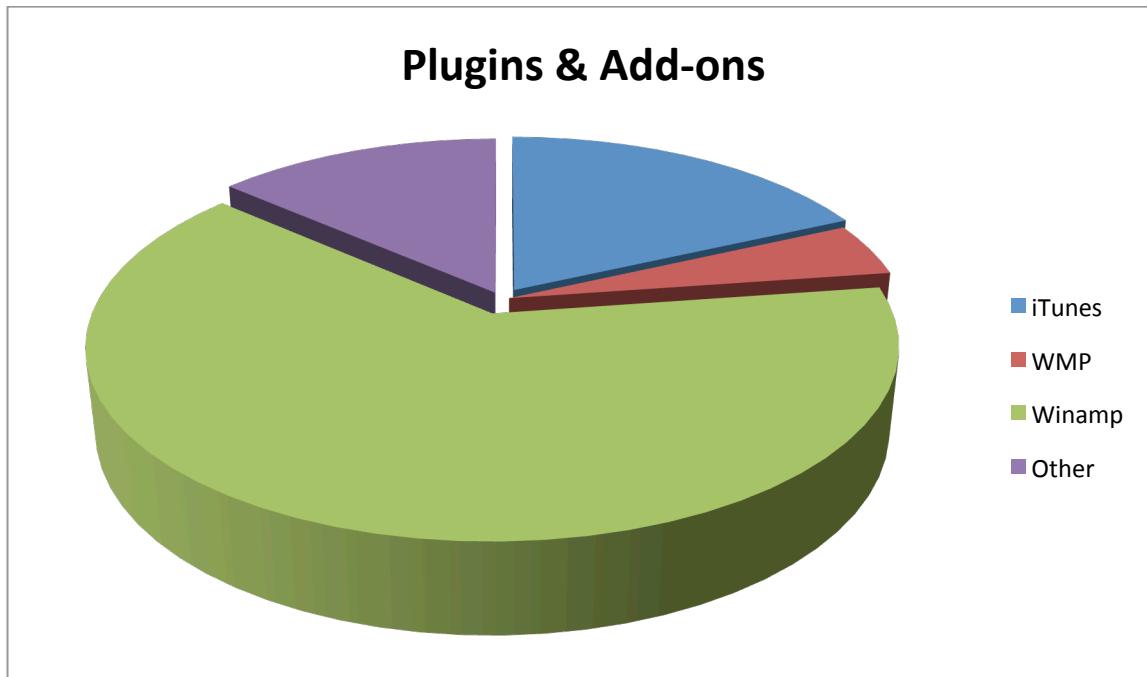
## Window Media Player



Application layout was the biggest problem. It is quite remarkable that six out of seven Windows Media Player users said application layout is a problem. The name of the software is Windows Media Player. It is preinstalled in Windows and there is no way to get rid of it. The software looks like Windows software.



The chart above depicts the size of users music libraries. Most of the people we surveyed had 501 to 1000 songs in their library. Most of the iTunes and WMP users were in this category while majority of Winamp users had over 1000 songs in their library. This data shows that Winamp is the software of choice for the users with big music library.



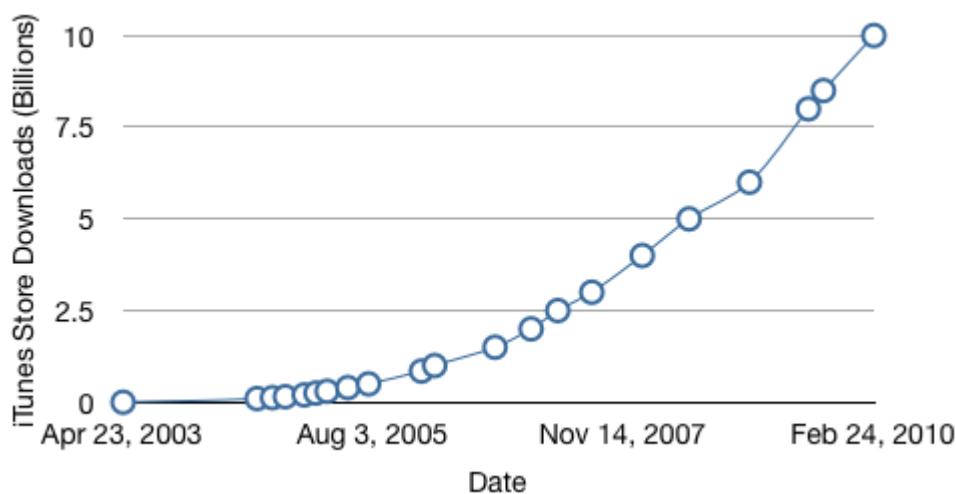
Our data shows that while iTunes and WMP users do not use much plugins and add-ons for their software, 100% of all Winamp users use some sort of plugins and add-ons. It is notable that Apple does not offer any plugins or add-ons for iTunes. However, there are some plug-ins and add-ons made by third parties for users to download. Almost all these plugins and add-ons are free and they are also open source.

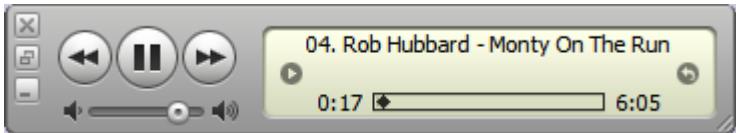
## Software Overview

### iTunes

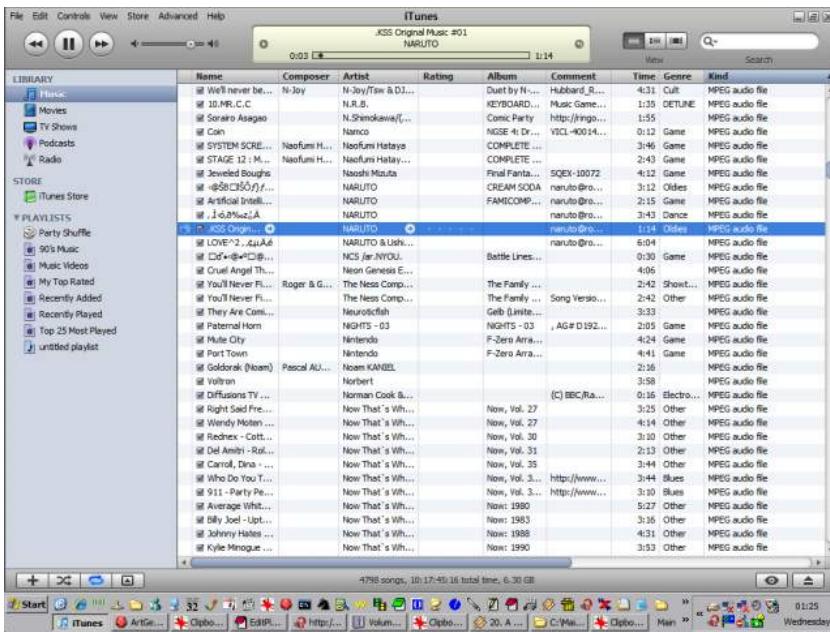
iTunes is a digital media player software made by Apple. It was first introduced in 2001 as an interface to manage the content of iPod. This software has a number of different functions, which include the playing of music files and the management of files on external devices, namely iPod, iPhone, and iPad. Another main function of the iTunes is the iTunes Store. iTunes allows the users to connect to the iTunes Store to purchase and download music, videos, applications, podcasts, and ringtones.

The iTunes Store launched as part of Apple's free iTunes jukebox application for the Mac on April 28, 2003, with just 200,000 songs in the catalog. The software had pioneered the uniform 99 cents a song pricing model that would be replicated in 2008 with a three-tier pricing structure (29 cents, 99 cents and \$1.29, depending on a labels' preference determined by the song's recency, popularity, and more). In October 2003, Apple brought iTunes to Windows, hailing the software as the "best Windows app ever."

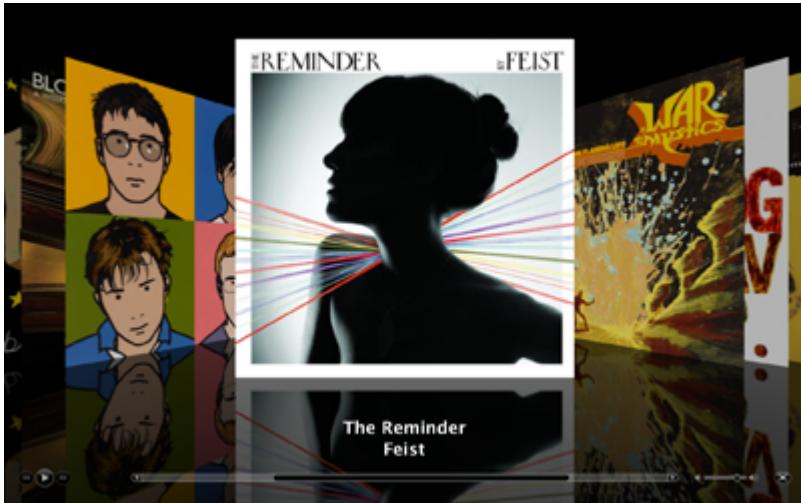




Although there are many music media programs available on the Internet but iTunes is superior to the competition because of its ease of use and other various features it offers. Simplicity is the one of main reasons that makes iTunes superior to other music media programs. Apple always has been known for its simple and clean design and iTunes is definitely a good example of this. There is not a lot of computer knowledge that is necessary for a person to be able to easily buy and upload music into their library.



Looking at the design of the iTunes interface, it is very obvious what each section of the program does. Another benefit to using iTunes is that it automatically syncs information to the computer so that users do not have to manually organize their library. As a user uploads songs into iTunes and creates their playlist, iTunes automatically organizes it by artist and album. iTunes has a cover flow, which is an animated graphical user interface which allows the users to visually flip through snapshots of the album cover organized by artists and albums.



iTunes is not an application in the traditional audio file player sense. It is more of a storefront for Apple to sell music, movies, and more. The fact iTunes Store is a main function and that it has huge library of songs and movies for users to buy is not the problem just by itself. However, this feature can get in the way of other features. Update is the main problem that iTunes Store causes. Due to the iTunes Store, there are many updates and the download for the recent update is about 100 MB. Although we live in the modern age where majority of iTunes users are connected on the web by high speed cable internet, it is still four to ten times longer download time comparing to Windows Media Player and Winamp. (25MB for WMD and 10MB for Winamp)

Performance is the main problem people have with iTunes. Even from our survey data, we were able to see this problem. iTunes is just slow. It takes very long time just to open the program and even when it opens up, the users have to wait longer for iTunes to check for updates or to do something that consumes more computing resources. Most of people using this software experienced lags and jerky scrolling. Even MAC users have seen that annoying spinning beach ball many times while searching through cover flow. Considering that iTunes is just a jukebox that supposed to play music files, put a remarkable strain on your system resources.

Next is the library file system organization. Although the automated playlist maybe be good for some users, users with large libraries of music may want to organize their music in different ways. A long list in the cover flow of 1000+ albums makes it almost impossible to find a song. iTunes library also gets confusing when it tries to reorganize the folder without asking. If the users have many playlists, adding music to them can be very awkward because iTunes do not allow drag and drop from the desktop.

Codec support and plugins/add-ons is very limited for iTunes users. This means that iTunes cannot play other popular music formats like OGG, FLAC, etc. and also that iTunes is not customizable like many of other open source programs. The fact that iTunes has very little plug-in architecture does not make any sense because just about everything Apple makes these days has a plug-in architecture of some kind. For example, programs like Apple's Garage Band and Aperture has nice ways for outsiders to write plug-ins. Also the iPhone also demonstrate how third parties could be adding many useful applications and features. Apple is changing this slowly as more third party add-ons are available on Apple website like Massivelyrics, DPS Plug-In, and Ultragroovalicious iTunes Visualizer.

## **Windows Media Player**

Windows Media Player is free software that is available to users of Windows 95 and later versions of the Windows operating system. There are several different versions of Windows Media Player, including version 11 for Windows XP and Vista, and version 12, which comes with Windows 7. Windows Media Player is a highly versatile program that can be used to view videos, listen to music files and streaming audio such as Internet radio. You can also use Windows Media Player to rip your CDs to your computer's hard drive, to burn CDs or DVDs and to sync files to a portable device such as an MP3 player. Windows Media Player creates a library from your music, videos, and pictures and recorded TV. The Windows Media Player Media Guide provides an interface where you can download free media and purchase media online. Windows Media Player also has advanced features such as the ability to create playlists and synchronize with external devices.

Windows Media Player is a full-featured player that plays back audio CDs, audio files, DVDs and videos. It can also play some audio and video streams directly from the Internet. You can see the selection that's currently playing in the "Now Playing" tab. There is a wide range of visualizations that you can watch as music plays in Windows Media Player. You can also use the graphic equalizer within the "Enhancements" sub menu of the "Now Playing" menu to get the best sound quality. Other enhancements include a "Color Chooser" which alters the appearance of Windows Media Player, "Crossfading and Auto Volume Leveling" which reduces the volume differences between songs, and "Quiet Mode" which reduces the volume differences within a song.

Windows Media Player can also search your hard drive for audio, image and video files that are already in your library. Your media library will then be visible from the "Library" tab along with the accompanying album art and information. You can use Windows Media Player to rip audio CDs to Windows Media Audio (WMA), MP3 or WAV format. You can also burn audio CDs or data CDs or DVDs. You can use the "Sync" feature to copy your media library to a portable device.

Windows Media Player comes with Windows operating systems such as Windows XP, Vista and 7. In some ways, this is both a benefit and a detriment. Windows Media Player is ready to use when you set up your computer, but it can't be completely uninstalled and reinstalled should it experience problems. If you have installed a later version of Windows Media Player, however, you can roll back to the earlier version.

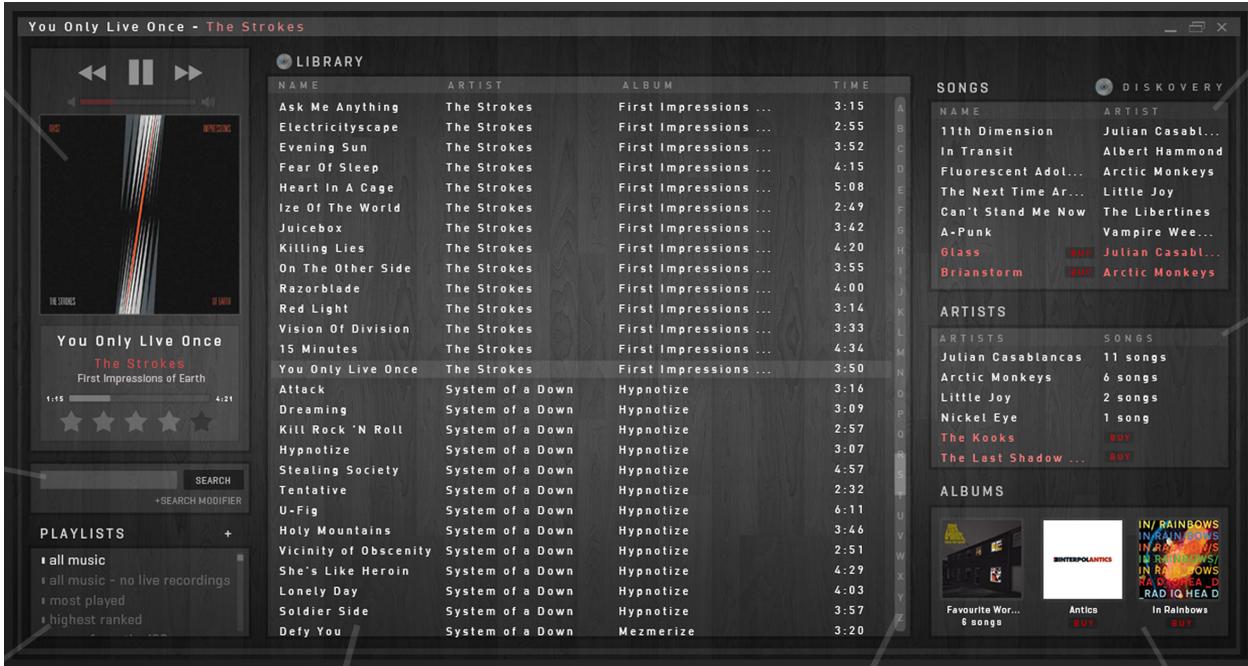
Windows Media Player offers intuitive navigation of the audio and video library. You can organize your songs by album, genre, year, rating or artist. Videos can be organized by actors, genre or rating. One of the most useful features of Windows Media Player is the ability to create playlists. You can mix up songs from different albums or unrelated videos in any order in your playlist, then save your playlist for future use. Later versions of Windows Media Player also include access to the Media Guide, a website where you can browse for music, movies, TV and

Internet radio. You can watch music videos, streaming TV and movie trailers, download music files, play games and listen to streaming Internet radio through the Media Guide.

One of Windows Media Player's biggest disadvantages is that it often doesn't stream video properly, especially over slow DSL connections. Windows Media Player is also limited as to which portable devices it can sync to. For example, it won't sync to an iPod or even Microsoft's own Zune. Also, the classic Windows menu is disabled by default. You must right-click the toolbar to access these menus, or you must select "Show Classic Menus" to gain access to them above the toolbar. Although the tabbed interface is fairly intuitive, many people don't think to check the down arrows for the drop-down menus, and thus can't access many of Windows Media Player's advanced features and options. (User's lack of fluency)

Although you may encounter a few annoyances with the program, the fact remains that Windows Media Player is free for anyone running Windows. Overall, when you examine all its features, Windows Media Player comes up a winner.

## Prototype



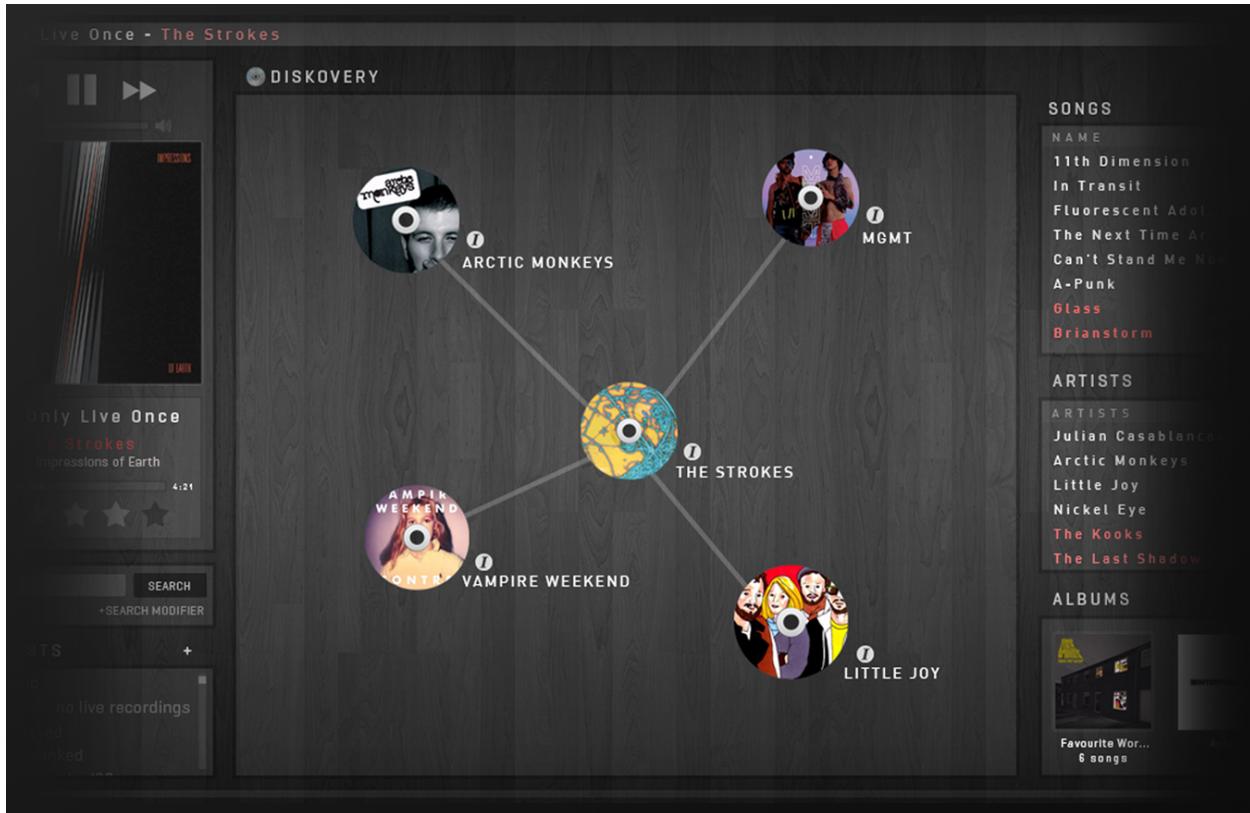
On the left hand side, the basic song information can be found. This area houses the basic controls for the software: play/pause, rewind, fast-forward, volume, and song ratings. This area also shows the CD artwork and song meta information such as song name, artist, and album.

The prototype interface also has an advanced query and search function. With this area the user can input complex queries in order to make very concise playlists. Criteria such as date released, genre, beats per minute, and song rating can be included. This feature has not been included in any music software to date.

Beneath the query input, the user can scroll through playlists. These can be saved queries or customized playlists of random songs selected by the user. This allows the user to quickly recall playlists or previous queries. Users can also save automated playlists made by the Diskovery feature.

The main segment houses the current library information. The scroll on the right hand side shows the current position relative to the alphabet so the user can quickly scroll to other songs in the library. Selecting different playlists on the right hand side can change the content within this area. This feature also would contain the query results in real-time and also contains the Diskovery feature when activated.

On the right hand panel, the user can use the real-time Diskovery feature. This area contains recommendations for songs, artists, and albums. The recommendations are provided from the very robust Amazon API. Amazon collects usage information from customers of their online stores and recommends users information through previous purchases, current customer trends, and genre information. Items in white signify items that are currently owned and within your playlist. Items in red signify similar songs to which the user is listening too and that the user would also potentially be interest in purchasing. The integration with Amazon would provide the backend for selling music.



This view represents the Diskovery view. This view is a visual interactive way of discovering new music. A user would click on the CD icon found at the top-center of the application and this would open this view in the library area. The current song would be represented in the middle and similar artists would branch out in different directions. The user can continually expand items in order to find various artists. The user can also click on the information button to pull up information on the artist's Wikipedia page.

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