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# Social Media and Search Optimization

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<p>The purpose of this project was to design a website MyInstrumentalMusic.com that focuses on up and coming, signed, unsigned, independent and currently popular music producers to sell their instrumental music online. The site promotes the instrumentals uploaded by the music producers exposing their talent for the artist who wants to make use of it. This social media format supports and encourages the interaction between producers and artists online. Producers show off their music by uploading their instrumentals to the market and make money out of it. The site is looking forward to shorten and improve the long-distance relationship that is holding music producers and artists to work together. MyInstrumentalMusic.com believes that exposed talent can be harvested easily with less pain bringing success in a short period of time. The website is designed from scratch using the Zend Framework. The entire project was developed and tested on my home computer using the XAMPP server which is an open source cross-platform web server capable of serving dynamic web pages.</p> <p><b><a href="http://www.MyInstrumentalMusic.com">www.MyInstrumentalMusic.com</a></b></p>	
Keywords	Social Media, Search Optimization, MyInstrumentalMusic.com, Zend Framework, Web 2.0

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## **Abbreviations and Terms**

### Zend Framework

An open source, object oriented web application framework for PHP 5.

### Model-View-Controller (MVC)

A design pattern used by applications to separate the maintenance, display and event handling of data objects.

### Crawler

A computer program that browses the web to index and store contents inside a database.

### Search Engine Optimization (SEO)

The technology used in maximizing search engine rankings with the ultimate goal of making the website popular by analyzing how search engines find a particular website

### Social Media Optimization (SMO)

The participating in social networks to spread one's content to network members or other groups of users.

### PayPal

E-commerce business that is a payment medium for fastest and safer way to send money and make an online payment.

### Instant Payment Notification (IPN)

PayPal's message service that sends a notification when a transaction is affected.

### ModelRight

A sophisticated database design tool with a comprehensive environment for designing, documenting and visualizing data models.

## **1 Introduction**

Music production is one of the major ingredients in the field of entertainment industry that is now growing at a rapid speed due to the advancement in digital audio recording, mass-production, distribution, manipulation and engineering. MyInstrumentalMusic.com is the domain name of the website that is developed in this project. The site provides opportunities for up and coming music producers to sell their instrumental music online offering them a medium to upload their music for musicians worldwide. In today's world of music, producers and artists might not have the ability to collaborate across long distances and work together due to various reasons. Internet has changed the information flow of plenty of media worldwide. It has dramatically changed the business, the politics and the social network of communication mediums.

The most widely used PHP framework known as 'Zend Framework' has been implemented for this project as a development tool to eliminate the tedious details of coding and let the developer focus on the big picture by making the code more reusable and easier to maintain [1]. Zend Framework is a general purpose widely used open source PHP web framework technology used for the development of advanced web applications. The site provides each producer with a simple customized profile page and supports the 'AddThis' web service as a way to boost traffic to the site by making it easier for the visitors to share the contents to the well known social networking sites currently available. Instrumental music buyers mostly artists are provided with better internal searches to narrow down their search results and easily choose the type of instrumental they want to purchase.

This project aims in creating an online music environment and generate maximum exposure by using the available top notch open source web technologies. It is designed to be as simple as possible so that anyone who accesses it for the first time will have a good sustaining first impression. The services provided are best suited to the demands of the target audiences and features the means to manage both the producer and the artist while maintaining their relationships and facilitating their communications.

## **2 Social Interactions and Web Technologies**

### 2.1 Web 2.0

In the 20<sup>th</sup> century technology has brought a vast improvement in our way of life. The web has been an important part of our life and takes a major portion of today's technology in many ways. Web based systems are used for a vast number of applications. The world has seen an unprecedented progress of web-based social systems during the last few years, now growing at an alarming pace.

The internet has become a forum of exchange of information and discussions for millions of people around the world. Communities including governments, private sector, media and the civil society attempt to adapt such social media systems and use them for their business. Moreover, individuals, both young and old, students and workers, men and women, the employed and unemployed are all into making social media the tool to improve their lives. The impact of such system is so immense that millions around the world share information and connect within seconds.

In the domain of the internet there are two broadly used terms known as Enterprise 2.0 and Web 2.0 that are generally similar but have differences in some manner. Enterprise 2.0 technologies are used by enterprises, factories, companies or organizations for improving productivity and communication. For example suppliers communicate with buyers, employees communicate with service providers, etc. In a sense, Enterprise 2.0 can be said to have boundaries and thus demand security mechanisms. Moreover, they need to enforce some access and usage rules to ease the specified users' access to major information regarding the organization. Web 2.0, on the other hand, is mainly used for social networking. Twitter, facebook, wikis, mashups are sites that social networks such as friends, families and even people who don't know each other communicate online on personal or entertainment issues. Limits or boundaries do not restrict Web 2.0. [2, 6]

Figure 1 illustrates the summary of some of the key applications for a whole range of social media tools.



trust-worthy sources of information about a particular topic; and learning what opinions and beliefs characterize a community and how do these opinions change.” [4, 283]

## 2.2 Basic Principles of Website Design

Web design is a broad term used to define how the content of parts of a web page such as the text, image, videos and audios are presented to the end user. Website designing can be broken down into three distinct parts.

### **Planning**

Website developers need to understand the fundamental questions related to the project and figure out what web technologies they have to use prior to engaging themselves into coding. The site's objective, purpose and target audience affect the way how a web project is designed, implemented and presented to the end user. It is generally believed that a little time spent on planning a site will save developers hours of frustration later on.

### **Designing**

This is the phase in which the actual design of the website takes place. List of consideration on the planning phase needs to be addressed and suited to be implemented for the next phase which is 'coding'. The developer needs to ensure that users can find what they are looking for easily. The layout of the webpage has to be logically designed in a user friendly fashion including its navigational system which is the most fundamental part in the structure of a website. While designing a website it is very important to focus on its content, usability, appearance and structure.

### **Coding**

Website coding is the process of writing problem solving algorithms using the available web technologies. There are two types of web site creation technologies called client-side scripting and server-side scripting languages.

Client-side scripts do not interact with a server but rather within a specific web page during events triggered by the user such as on mouse clicks, on mouse hover or keyboard

actions. JavaScript is the most popular client-side scripting language. Other client-side technologies include AJAX (Asynchronous JavaScript and XML), JScript, and VBScript (Visual Basic Scripting Edition). XML (Extendible Markup Language) is a language similar to HTML but handles complex data structure of any type and encodes documents in a machine readable form. XML is designed for ease of implementation, and for interoperability with HTML.

Server-side scripts are stored and executed on the server side. Installation of specific software is required for server-side scripts to run. Content of a website is separated from its code and stored either in a database or a text file. The advantage of using server-side technology is that only one page of code is required to implement for any number of similarly structured pages to run on a browser. In addition to this, it is easy to maintain web pages designed with server-side scripts as the content is separated from the code. PHP is one of the most popular server-side scripting languages that is used to display and update information dynamically [5, 1].

Coding using the Zend Framework is very flexible and robust because of its object-oriented approach and loosely coupled built in components that have a minimal interdependencies among them. 'Perhaps the most important contribution of the Zend Framework, however, is that it has advanced the art of PHP development by introducing PHP developers to a more standardized and structured approach to PHP programming.' [6, XV] Zend Framework components include tooling and rapid application development, database, internationalization, authentication, authorization, session management, web services, mail, formats, search, and core infrastructures. In such a framework based programming approach, coding involves importing the components and tweaking them to fit the purpose at hand without the need to build the whole problem solving algorithms from scratch.

### 2.3 Social Network Service

A social network service is an online service that helps build a relationship among people who share the same interest or activities. Users are able to create their own profile page with information about themselves to share with others. They are able to upload picture, post forums, reply to a post on forums, post blogs and practice information exchange with users of similar common interest. Such services are equipped with a profile page displaying the most basic information about the user while providing the user with tools to promote, communicate and engage with the audience. All social networking sites share some features in common. There is a difference between social network service and online community service.

Social network services are individual centered whereas online community services are group centered. Both of the services have recently brought a revolutionary change in our sociological structure by digitalizing real world connections. Most social networks require users to provide basic information such as age, gender, location, interest, picture or any detail related to the service the network offers. This information is used for internal site searches and allows new contacts to be recommended or introduced, thereby expanding the user's network. [7, 7]

The terms social media and social network are incorrectly used interchangeably. A social media is the umbrella term for the wide variety of tools and applications that give the Web its social capabilities by allowing a community to come together, communicate and build upon one another's opinions and ideas. Social-media enables social networks generate and access contents. These tools include email, instant messaging, blogs, and others. On the other hand a social network is a site that uses one or more of these social media tools for the primary purpose of promoting connectivity, interaction, facilitate communication and sharing information among people. [2, 154]

Figure 2 demonstrates the connection between contacts and how a user may be able to discover friends of a friend and friend recommendations based on friends in common.

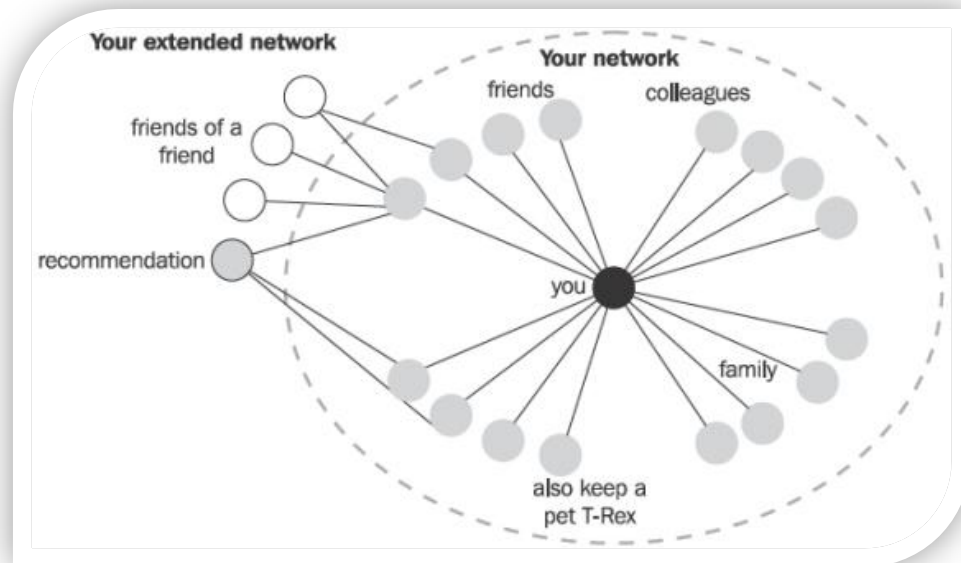


Figure 2. Example of how a user's network of contacts can be built up. [7, 8]

People want to ask questions, share information, news, insights, opinions, experiences and perspectives. Just as in real life, the various relationships that exist between profiles (people) often imply certain aspects of both the nature of the expected interactions and the context for them [8, 31].

Social networking tools offer a number of benefits to enterprises, individuals, communities, groups and institutions. One of the many benefits of social networking is its greater access to diversified audiences. People from various walks of life or disciplines can be reached through social networking easily and fast. The other benefit is the opportunity social networking creates for better control over the exchange of information or conversation made between the diversified network members. As experience has shown, people interested in conducting market research have a better chance of accessing data and information about a specific subject in a much more simplified manner than other systems provide. Moreover, improved branding opportunity and customer service are possible with social networking. Furthermore, it enables greater access to user information and improved customer service. [2, 155]

## 2.4 Content Development

In social-media systems, the most time-consuming, difficult and rigorous process is content development. If one wants to develop state-of-the-art content for a social network, the following key aspects should be well considered. These can enhance the acceptability and popularity of the social-media achievement of the intended goals [2, 160].

### **Planning for updating**

Planning is the key to content developing and updating. Planning for updating social-media systems on a regular and timely basis can help maintain a successful social network. This is important as random updating will result in loss of core visitors. Thus, a firm must have a schedule for updating contents with some flexibility that will not affect loyal visitors.

### **User-friendly, brand-oriented tone**

Although it is always good to let users of a site to interact in a user-friendly manner, it is important to see to it that the brand of the social system does not lose its image and features.

### **Relevance of content**

Audience of a brand wants to engage in relevant conversation. Thus, the central theme of a brand needs to be kept relevant at all times.

### **Transparency**

Social networks are engaged in communications or conversations. And people in social networking want to know who they are communicating with. Therefore, reliability of sources of information is absolutely essential.

## 2.5 Social Media

The term social-media does not have a commonly accepted definition. Nevertheless, the term is used for the many emerging websites. Social-media is dynamic, continuously evolving technology that enables users to create a network of friends and share information and experiences with each other. "Tell all your friends and have them tell their friends because that's what social media is all about, passing information back and forth between friends, family, and business associates. [9, 359]" Even though each social media genre is characterized with its own special features, it embodies most of the key feature of a social-media. For instance, a set of weblogs referred as blogosphere is a network of resources embedded into the larger web and exemplify many of the main aspects that characterize social-media in general. Users are drawn into social media sites to share information and even search for contents. As social networking evolves, search engines are taking notice too and techniques for generating traffic and branding are increasingly intersecting in both mediums. [4, 284]

The "social" in "Social Web" implies more than technology, more than the networks where people post photos and review books: It's less about the "what" and more about "how, why, and among whom" that distinguishes the Social Web from earlier, transactional online technologies. [8, 30]

In general social media has changed the way we connect with each other and promote our products and services on the Web. From social networking sites like Facebook, MySpace, Orkut, Bebo and hi5 to microblogging services like Twitter, Plurk and Plazes — even social bookmarking services such as Delicious, Digg, Stumbleupon, Mixx, Reddit and others "social" presents wonderful opportunities to chart the course of memes and discussions, and are widely known as effective ways to create huge streams of website traffic and, ultimately, inbound links. [10, 21]

### 3 Social Media Optimization

#### 3.1 Optimizing a Social Media

Social Media Optimization (SMO) helps to optimize the distribution of information to a wide range of population or traffic. There are two types of website optimization methods, Social Media Optimization and Search Engine Optimization (SEO). Social Media Optimization is a systematic approach of social media activities that aims in attracting visitors to a website by establishing a quality relationship among its users. Search Engine Optimization on the other hand is a systematic way to attract users to a website and is practiced prior to SMO; it is a means to bring users to your site from search engines.

It can be argued, however, that the techniques and tactics employed in each practice are universal and interchangeable. It is difficult to deny that a tremendous opportunity for profit exists when employing or at least thinking about common SEO best practices and apply them within the social media world. [10, 27] Figure 3 illustrates the interaction between humans via internet and through mobiles for discussion and sharing information around the world.



Figure 3. The concept behind social media optimization. [11]

Social media optimization has many benefits. Among the many is its investment and participation being free of charge. Of course, one needs to invest quite a time to be noticed by others as a serious network participant. "Although it has been around for sometime in our society, social media optimization (SMO) is a new concept in the field of website marketing. Men are social creatures and have a craving to stay with like-minded people. These like-minded people form a group and eventually lead to a society. Similar concepts are followed in the online world. [12]" SMO is proven to be a vital tool as a marketing strategy that spreads like a virus. 'Viral marketing' gets its name as a result of this. Viral marketing spreads exponentially as the content gets to millions and continues to spread around at a faster pace. This results in increased number of visitors to a site and the message reaching millions. As social media optimization is enhanced, the marketing strategy is certain to have a viral quality.

### 3.2 Some Strategies for Optimizing Social Media Efforts

Designing a social media optimization strategy that is effective keeps the web developers on track of targeting the proper social networks and attracts more traffic while gaining credibility and meeting the goals. Moreover, it is useful to apply the tactics that will not be detrimental to the efforts and build trust-worthiness. Revising the strategies and tactics constantly helps strengthen the optimization on the long run. Site visitors are interested in exciting contents. Frequent updating of contents is of paramount importance to attract more visitors and thus for social media optimization. Users want easy steps for adding contents to a site. Therefore, it is important to design a function that makes this process simple for social network members.

Mashups combines data from more than one source into an integrated experience for users of a site. The probability of attracting more and more users to a website depends on facilities that create possibilities for embedding links. Promoting such kinds of web applications is sure to enhance social media optimization. Mashup as described in wikipedia is a web page or application that uses and combines data, presentation or functionality from two or more sources to create new services. For example the YouTube

idea of proving codes of uploaded videos to be embedded inside other websites has affected its growth by driving more traffic to the site.

Social networks are give and take. Contents inside a site has to be bookmarkable and tagable. An important aspect in this regard is incorporating a space for keeping links into and out of a site directly related to the subject matter. In other words, reward valuable users. People love rewards and become loyal partners. Helpful and valuable users are the greatest assets in social media optimization. [13, 174]

Users of a site will find it easy to access the content and spread it easily fostering the sharing process with tools like 'AddThis'. This leads to the increase in the likability and shareability of the content. As can be seen from figure 4, MyInstrumentalMusic.com implements the 'AddThis' web service on top left side of its page.



Figure 4. Screen shot of MyInstrumentalMusic.com 'AddThis' functionality as of December 2010.

People in social networks want to access information easily. Even if one does not get anything in return, it is worthwhile to provide users with pertinent information that they make use of. Moreover, as content is very essential in social media marketing, it is useful to create up-to-date, unique, interesting content regularly so that site visitors are confident that they won't miss the current information they are looking for. Active, constant participation is vital in social media networks. Social media optimization strategies, tactics and activities should be a daily chores. Failure to approach the right

audience can become devastating. So it is a good practice to take the time and target the proper audience with whom to participate. [13, 173-174]

A content of a website has to be genuine to win the trust of the users. Users can easily detect fake contents. One important characteristic of a social media participant is humbleness. One should not be chauvinistic as being the top expert can be a short-lived position. Creativity is the spice of social media optimization. People want to see, read, learn about, and try new things. Creativity attracts more traffic and loyal, highly-interested network members. [14]

Maximizing the use of Backlinks that are also known as incoming links, inbound links, inlinks, or inward links is helpful in SMO. These links are incoming links to a website. Page contents with a social media features like RSS feeds are also important in strengthening the optimization process. RSS feed (Really Simple Syndication) is a part of web feed format used to publish frequently updated information; it is a way to distribute a list of information to a wide number of people which is then organized by special computer programs called "RSS aggregators". These programs automatically access the RSS feeds and organize the result in a readable format.

### 3.3 Searching on the Web

The evolution of Web search was seen at its highest peak in the early 1990s following the climax of content on the internet [2, 171]. At the initial stages, the Web was totally unstructured. Webpages did not have standards; there were no definite relationship between websites and content and there were no definite rules for taxonomy and structure. These were tremendous challenges that the Web faced and thus the search for solutions. Another challenge was related to the meaning of content which had to be solved and opened the route to scale up. The development of information technology has offered professionals from all disciplines to exchange research findings, ideas and experiences. The web houses tremendous amount of data in the various professions.

Most websites that integrate a database system have the ability to retrieve information from structured sources with specified properties among a collection of items based on business rules and database queries. For today's billions of information seekers, the Web has become the virtual information access and processing platform. The advent of Web 2.0 with its virtually unlimited scope and scale has become an unimaginable opportunity for data mining. Text mining and information extraction have been applied not only to the web but also to the analysis of other kinds of semi structured and unstructured information systems, such as on-line library catalog systems, on-line document management systems, and the more recently developed Web search engines. [15, 614-615]

### 3.4 Web Mining and Search

Web mining refers to the extraction of information or knowledge from the Web. Three domains can be cited in Web mining namely, content, structure and usage. Web content mining is a process that extracts useful information such as text, image, audio or video data, from the content of a Web page. Commonly used technologies in Web content mining include information retrieval, natural language processes and text mining. Users can directly retrieve and improve the content of a document. The other domain of Web mining is Web structure, which is a process that helps users access more information than the information in one document. For instance the popularity of a document can be known by links pointing to the document whereas the substance of a variety of topics discussed in a document can be indicated by links coming out of the document. The third domain, Web usage mining is used to learn about the behavior of the usage and the structure. This is possible through analysis of the Web access logs of different websites. Web usage mining applies general access pattern tracking that is used to analyze the web log to learn about access patterns and trends to construct better structure and clustering of content providers. On the other hand, customized usage tracking is commonly used to analyze individual trends so as to customize website users. [16, 913-914]

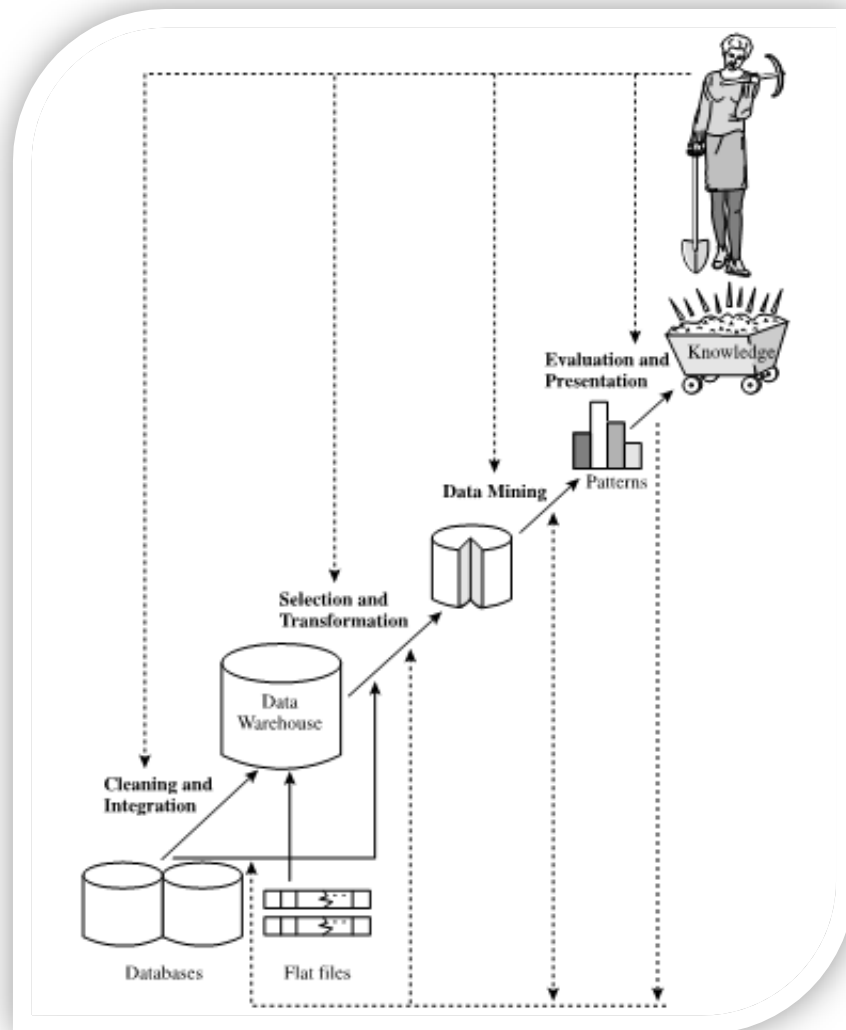


Figure 5. The Process of Data Mining in knowledge discovery. [15, 6]

The figure above illustrates the process of knowledge discovery which consists of an iterative sequence of the following steps: [15, 7]

1. Data cleaning: used to remove unnecessary and inconsistent data.
2. Data integration: the integration of multiple data sources together.
3. Data selection: only relevant data from the database is selected for analysis.

4. Data transformation: data is transformed into forms for mining by performing summary or aggregation operations.
5. Data mining: intelligent methods are applied in order to extract data patterns.
6. Pattern evaluation: the identification of interesting patterns to represent knowledge based on some measures.
7. Knowledge presentation: visualization and knowledge representation techniques are used to present the mined knowledge to the user.

### 3.5 Data Management

A database is a huge storage space where data on different subjects is stored. The storage areas have multiple data points about each URL (Uniform Resource Locator) that are also called Uniform Resource Identifier (URI). URL specifies the address of the web pages on the web server which is a combination of computer hardware and software program that is attached to the internet and holds all the assets of a website. Search engine companies determine how to arrange and rank the data in their own specific manner. For example, ranking methods that Google uses is called PageRank which is very intricate and discreet. The companies determine the scores for the ranking and keep them very confidential. These companies usually change the weighting factors of the elements on the basis of usage patterns on the Web. And scoring pages is based on the quality derived from page. Earlier keywords used to be the key factor for ranking pages and giving high scores.

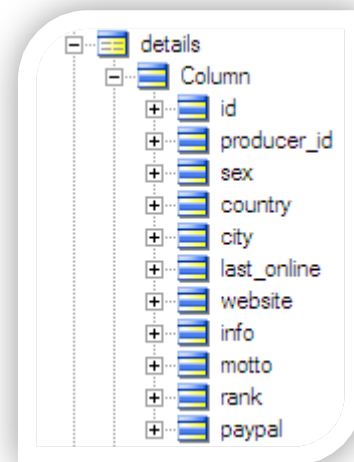
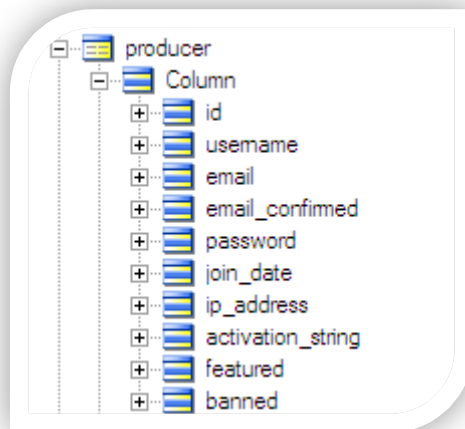
A database in terms of a web design is a collection of data that serves and supports the same purpose. DBMS (Database Management System) is a computer program that allows the creation, maintenance, and use of a database. In general DBMS is used to store, retrieve, maintain, update and delete data.

The sources of internal site searches are databases where the data resides. Before implementing the search the site should provide users with an input field for keywords or search terms. Keywords are search terms entered into a search engine or search input

field to locate only the user specific relevant information. These words should be used as meta tags on web pages to improve search ranking.

MySQL was a choice of database for this project. MySQL is an open source and popular database technology that uses methods of cataloging, retrieving, and running queries on data stored inside a database. MySQL is used on popular websites such as Wikipedia, Flickr, Google and Facebook.

There are a total of 17 tables inside the database of MyInstrumentalMusic.com. Below is the structure and explanation of tables related to the producers of the site.



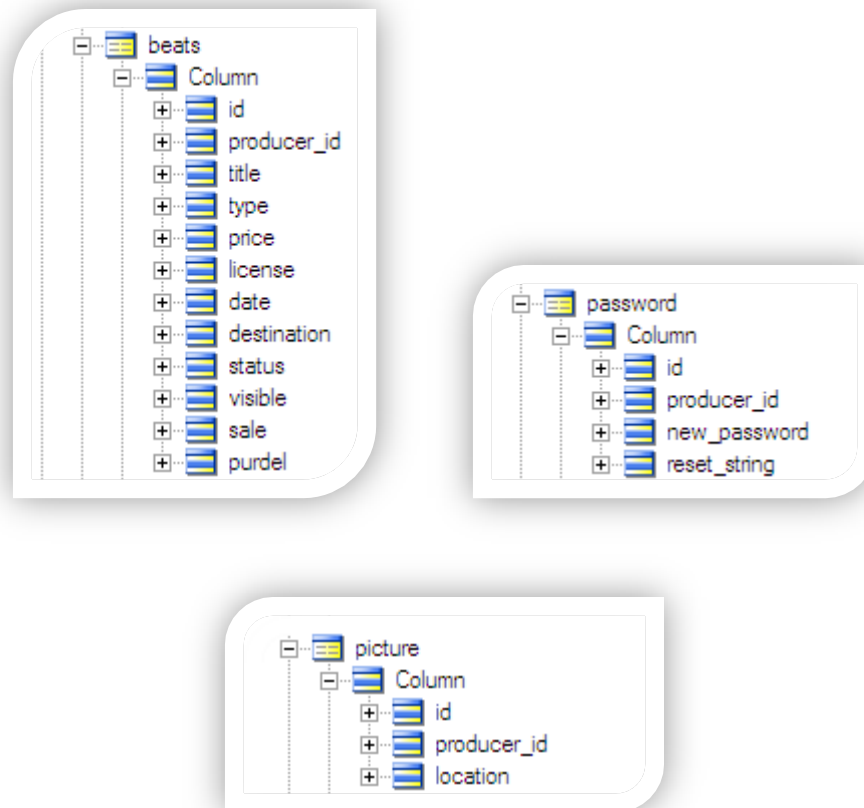


Figure 6. Screenshot of Database table structure for Producers taken from ModelRight software.

Producer registration information is stored inside the 'producer' table. In order to complete the registration, producers must understand and agree to be bound by the terms and conditions of the site. Once producers are registered they can login and fill in their profile details which will be stored inside the 'details' table. An input validator checks all the input data if it is valid and not malicious. If the input is not found to be sensible and secure, the validation control throws error exceptions back to the user with the proper message giving the user another chance to re-enter the fields again. The process of input validation takes place on the server side leaving the attacker with no chance of bypassing the validation test. Input validation is a process of validating all inputs to a web application before it is either stored on a database or sent to a server and process some query.

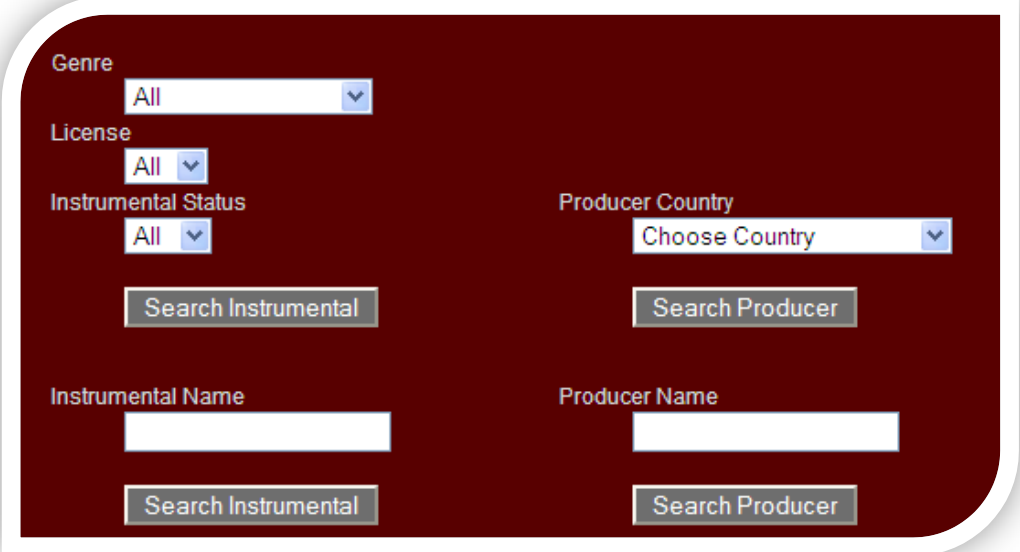
The authentication of producers to have access to their profile is controlled by the information that is contained inside the table 'producer'. Authentications grant users with a wide range of privilege capabilities to have access to the resource they are entitled to and deny access to the resources they don't have the privilege. The first step of a user authentication process prior to logging into a website is matching the username and password from the database. This is the first means of separating public and restricted areas of the application. It is up to the developer to help ensure users to increase the strength of a password. User's password has to be hashed before they are sent and stored in the database. And the reverse is true while matching entered password with the one stored in the database.

The table 'picture' in figure 6 stores the renamed value of the profile picture of each registered producer. Producers can change their profile picture anytime.

The 'beats' table is used to store details of the instrumental music the producers upload on the site. The details include such information as 'Title', 'Type', 'Price' and 'License' of the instrumental music.

### 3.6 Optimizing Internal Site Search

Optimizing internal site search is the means by which you narrow down the search results maximizing relevancy of the returned data from a query with a lesser amount of time. In order to optimize internal search results it is important to know what visitors are looking for, how often and why while preventing them from making queries that returns no result by providing them related and common search terms while they type. Keywords that are used for SEO should also be returned inside the internal search. Narrowing down the search query results is vital displaying only the relevant information when the query returns too many results. Therefore, there should be a mechanism to narrow down the result to a higher degree filtering out the unnecessary details. Search query results should be suited to sort out the results based any measurable result field you have on your search criterion. Misspelled search terms should be handled wisely providing users with the nearest correct match.



The screenshot shows a search interface on a dark red background. It is divided into two main sections: 'Instrumental' and 'Producer'. Each section has a set of filters and a search button. The 'Instrumental' section includes filters for Genre (All), License (All), and Instrumental Status (All), with a 'Search Instrumental' button. The 'Producer' section includes filters for Producer Country (Choose Country) and Producer Name, with a 'Search Producer' button. The 'Instrumental Name' field is also present but lacks a search button.

Section	Field/Filter	Value	Action
Instrumental	Genre	All	Search Instrumental
	License	All	
	Instrumental Status	All	
Producer	Producer Country	Choose Country	Search Producer
	Producer Name		
Instrumental	Instrumental Name		Search Instrumental

Figure 7. Screen shot of the site's Search page as of December 2010.

As shown in the figure above, MyInstrumentalMusic.com's search page provides visitors with an instrumental and a producer searching criteria using the specified fields.

## 4 Search Engines

### 4.1 Search Indexing with Crawlers, Spiders and Robots

Crawlers, spiders and robots are software programmes that operate on the internet by traversing through and cataloguing data by making it convenient for search indexing. There are no basic differences between these programmes and their task is to pull and gather information from a website and catalogue them appropriately in the database. This process happens behind the scene of the computer. It is only the query interface and search results that appear on the scene and viewed by the user. Web crawlers can also be called ants, bots and automatic indexers.

The World Wide Web (WWW) is a very huge, unstructured and geographically different entity commonly known as the web is a collection of interlinked hypertext documents. The presentation of information in a webpage in such a way that individual parts of the website are interconnected one another by hypertext links. A Hyperlink (Hypertext Link) is a reference to the path of the page and is used to link to the document. A Hyperlink can be of type text, or picture. These documents are called web pages. A website is a related group of these files available on the World Wide Web and stored on a web server.

All content on the Internet is published in HTML and can be retrieved with the HTTP procedure. HTTP (Hypertext Transfer Protocol) is a networking protocol and set of rules that defines how messages are formatted and transmitted across the World Wide Web. While there are specified standards for the inclusion of Meta information, all of the information indexed can be viewed openly by all users. On the other hand, such content acquisition can be complicated despite standard situation, i.e. the information comes from structured, centralized systems.

Content acquisition is possible with Crawling, Real-time Query and Feed mechanisms. Intranets, websites, file systems and at times databases commonly use the Crawling mechanism while the retrieval of meaningful results is usually possible with the use of Real-time Query mechanism and the Feed mechanism is used to insert content or meta into an index. Intranet is the opposite of internet that is confined and accessible to a

single organization. Access to intranet networks is restricted to securely share any part of information on its server only to that specific organization. [2, 174]

The main purpose of web crawlers is to provide up-to-date data enhancing the search functionality for applications like search engines.

#### 4.2 Mechanisms Behind a Search Engine

Search engine is a web based technology that is designed to look for information on the net. The materials available in return can be web pages that include text, image, video and other types of files. Search engines provide a user with two types of search lists; organic or natural search results and paid or pay-per-click (PPC) listings. It is essentially a very large database containing a record of individual web pages from all over the web [17]. Figure 8 illustrates the mechanism behind a search engine which can generally be described with three main elements: a search engine spider, a storage database and a relevancy algorithm.

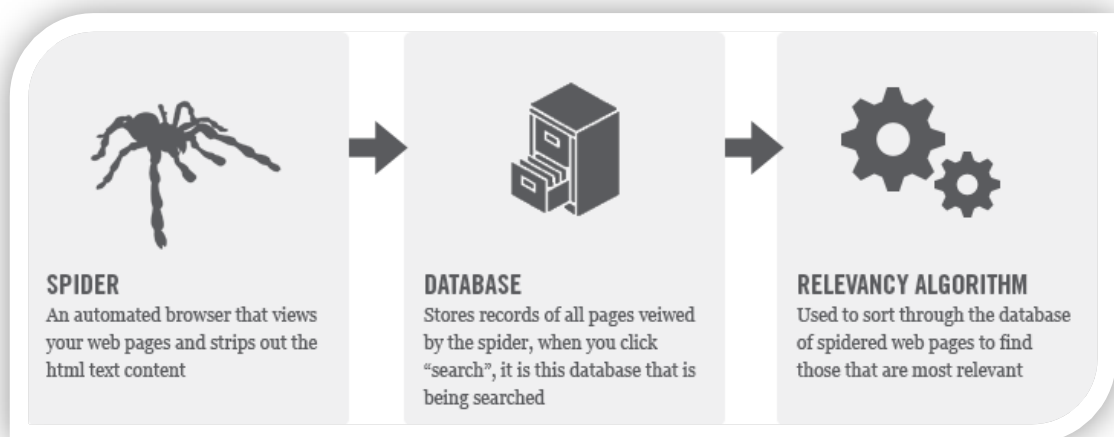


Figure 8. Structure of the mechanism behind a search engine. [17]

Search engine spiders crawls the web following links looking for web pages and documents to index. After new information has been gathered, it will be stored on the database for further processing.

### 4.3 Search Algorithms

Web-based search engines have different important parts. Among these, the search algorithm engine is the foundation for others. Its purpose is to serve as a problem-solving procedure. Search algorithms are broadly classified as on-page algorithm, whole-site algorithm and off-site algorithm. Each of these classifications evaluates different factors (elements) of a Web page. With search algorithm, the systems take a problem, do an assessment of a number of possible solutions and send back the solution to the problems. A problem can be expressed in the form of a word or phrase through a database which has the words or phrases. When found, the procedure returns pages that have the searched words or phrases. There are numerous classifications of search algorithms and each search engine makes use of algorithms that have slight differences. Because of this, one can get different results from different search engines for the same word or phrase. [18]

Factors considered by complex search algorithms include: [2, 175]

- Text matching which can be applied for phrase matching, exact matching or partial matching.
- Concept searching as Wikipedia describes it, is a concept search (or conceptual search) that is an automated information retrieval method that is used to search electronically stored unstructured text (for example, digital archives, email, scientific literature, etc.) for information that is conceptually similar to the information provided in a search query.
- Spell-checker and thesaurus looks at common misspellings of words, idioms and acronyms
- Query expansion which is the expansion of the search query to match additional contents.
- In-Linking where the quality and quantity of the incoming links to the site is calculated and presented as a search option output based on its relevance.

#### 4.4 Search Engine Optimization

Search Engine Optimization (SEO) aims at obtaining a high exposure on the internet by making all of the elements of the website geared towards meeting the objective of the web surfer. "Search-engine optimization, or SEO, is the process of setting up your Web site so that it ranks well for particular keywords within the organic search results of major search engines, including Google, Yahoo, and Bing" [19, XVI]. "SEO involves internal and external website analysis, including link building, proper website architecture and development, competitor analysis, keyword research, content development, and many other tasks" [20, 1]. "The top ranking in Google is not always the same as in Yahoo or Bing, so the designer may be able to learn something from a site that is unique to one search engine, or possibly more importantly, learn something from a site that is ranked consistently at the top of each engine" [21, 468].

Some methods of search engine optimization include the following: [13, 105-106]

- Not waiting for search engines to crawl and index your website. Instead submitting it manually. "You can wait for these crawlers to find your site organically, or you can be more proactive and tell the search engines about your site yourself" [9, 157].
- Websites must be attractive and easy for ranking. Creating a website that has a good content, Meta tags and keywords can improve its ranking. Paying special attention to title and description tags is extremely essential to a search engine.
- Keywords should correctly specify the context of the site's topic and content.
- Exchange links with other websites that have a similar content.
- Methods such as keyword advertising, exchange links and marketing campaigns should be used as venues to attract traffic.
- Visitors of a website search for a specific content. It is the quality of the content in terms of dynamism, relevance, freshness or timeliness and adequacy that satisfy and attract traffic. Outdated content has the change of being rejected or ignored by a search engine. To achieve a good search engine ranking, the contents have to be fresh and new.

- Programmes on the internet that are used to catalogue information such as Crawlers, Spiders and Robots help in site linking. It is, therefore, very important that links are working properly and accurately.
- A site map helps to link one's website accurately. This site map is an SML-based document that holds information about each page of the site. By using XML, all the pages of a website can be indexed. Therefore, it is essential to have a correct and up-to-date site map to make a good link.

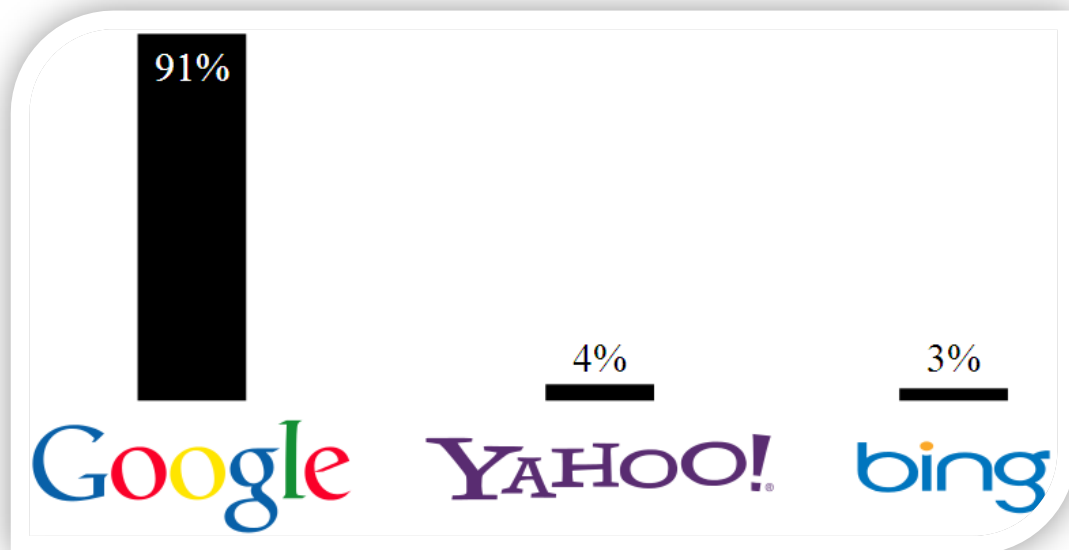


Figure 9. The three most widely used web search engines and their approximate share as of late 2010. [22]

As shown in the figure above, Google is the leading search engine in the market. It is therefore a good idea giving more emphasis optimizing a site for Google to get a better exposure on the net. "Simply put, if your site isn't being found in Google, you're missing a major opportunity to generate leads for your business. In fact, you're probably sending these leads to your competitors! [23, 55]"

"PageRank is a link analysis algorithm, named after Larry Page and used by the Google Internet search engine that assigns a numerical weighting to each element of a hyperlinked set of documents, such as the World Wide Web, with the purpose of "measuring" its relative importance within the set" [24].

Google describes PageRank as "PageRank reflects our view of the importance of web pages by considering more than 500 million variables and 2 billion terms. Pages that we believe are important pages receive a higher PageRank and are more likely to appear at the top of the search results. PageRank also considers the importance of each page that casts a vote, as votes from some pages are considered to have greater value, thus giving the linked page greater value. We have always taken a pragmatic approach to help improve search quality and create useful products, and our technology uses the collective intelligence of the web to determine a page's importance." [24]



Figure 10. Screen shot of Google search result as of January 2011.

The figure above shows the screenshot of first page search engine ranking across Google by the search term 'buy sell instrumental music'. The key marked search results show the results returned by MyInstrumentalMusic.com. The purpose behind any website's search engine optimization is to achieve a first page ranking across the three major search engines as shown in figure 9.

A producer by the name of 'ephdan' has been registered to the site. Now, let's do a Google search. Figure 11 shows screenshot of the first page search engine ranking across Google while searching for a producer named 'ephdan' from MyInstrumentalMusic.com by the search term 'ephdan MyInstrumentalMusic'.

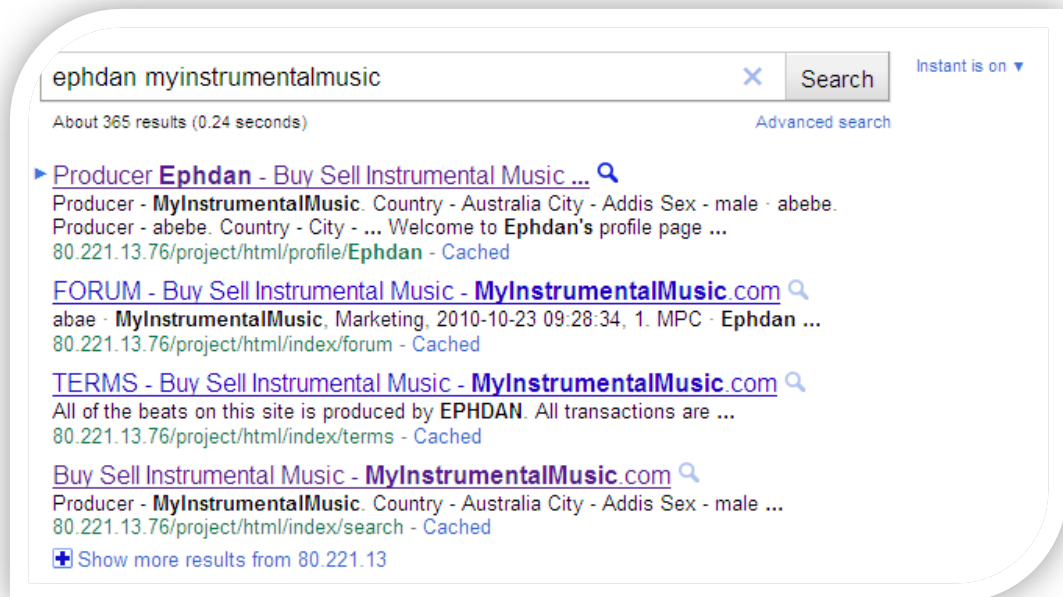


Figure 11. Screen shot of Google search result as of January 2011.

As can be seen on the figure 11, the first link (80.221.13.76/project/html/profile/Ephdan) takes the user directly to the profile of the producer. The search title returned 'Producer Ephdan – Buy Sell Instrumental Music ...' is descriptive enough for a visitor to access the link.

## 5 Framework Used

### 5.1 Implementation of Zend Framework

Zend Framework is an open source web application framework entirely implemented in PHP 5 intended to support the development of dynamic websites while improving the productivity of the developers. All frameworks aims to diminish the weight of the developer by providing readymade libraries that perform common activities in web development. Nowadays Zend framework is becoming the most widely used object oriented framework of choice for developing web applications and services. It is best known for its simplicity, object-oriented best practices, corporate friendly licensing, and a rigorously tested agile codebase. Furthermore, it is a complete object-oriented programming architecture that encourages code reusability allowing developers to significantly reduce the time spent writing duplicate code.

Zend framework uses loosely coupled architecture meaning the components of the framework are independent to one another and can produce a lightweight application as the developer can only use specific components out of the entire component library available for the task at hand. It incorporates current thinking on best practices by providing a standard file system layout, and provides built-in support for common application development tasks such as input validation and sanitization. In general practice it reduces the time and effort it takes to get a project completed. Therefore, implementing it as the basis for a PHP project will automatically produces higher-quality code and an application that's more forward-leaning on security issues.

Zend framework interacts with community-supported and third-party technologies like Adobe Action Message Format (AMF), the Google Data APIs, the Dojo Toolkit, Microsoft CardSpace, and Web services from Amazon, Yahoo!, Twitter, Flickr, Technorati, and Del.icio.us.sh. Developers can add new functionality to their project painlessly using these components is less time and smaller cost.

## 5.2 Working with Models, Views, Controllers

A typical approach when developing a PHP application is to embed PHP code into HTML documents using special delimiters. But this leads to a difficulty in maintaining the code as the PHP code is closely coupled with the HTML especially in complex and advanced website developments when the number of lines of codes gets bigger in size. This type of approach results in the mix of view and logic scripts. View scripts are scripts that are responsible for the interface or layout of the website and logic scripts are scripts that manipulate server side processing. This type of website development practice requires both the web designer (a person responsible for the look of the site) and the web developer (a person responsible for how the website works) to come together around a single computer and work on the project at the same time. In addition to this it might also lead to more time and money invested. In order to eliminate such problems it is a wise decision to implement Zend framework into your project. Zend framework supports an MVC (Model View Controller) architecture that separates the code into three logical groups. The following figure illustrates the interaction between models, views, and controllers.

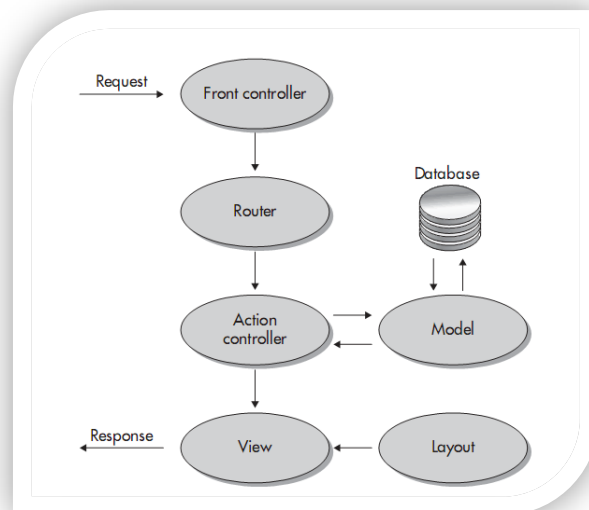


Figure 12. An illustration of the flow of a request through a typical Zend Framework application. [6,

## Model

Model is the representation of the data for the application which provides functions to retrieve, save, delete, and manipulate application data stored in a database. Models can be thought of a data layers. Figure 13 shows the list of all the models used for this project.

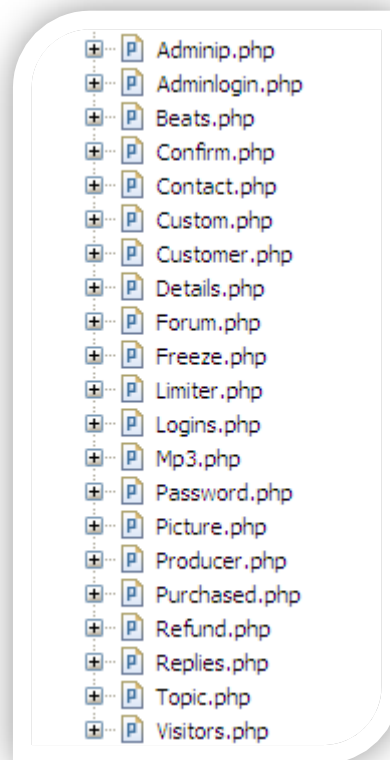


Figure 13. Screen shot of the model structure taken from Eclipse IDE as of December 2010.

Eclipse IDE is an open source integrated software development environment which is used to develop applications such as PHP, Java, C, C++, Python, etc.

## Views

Views are concerned with how the data is displayed for the user but not capable of directly accessing the data itself. Views can be thought of as a controlling layer for the visual display of the data. Figure 14 shows the list of all the view folder structures used for this project.

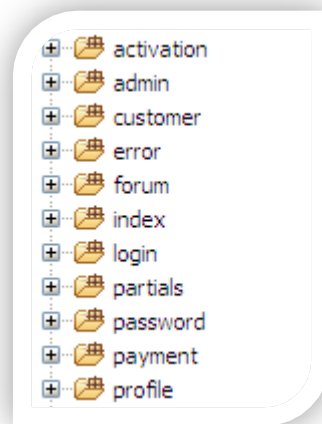


Figure 14. Screen shot of the view structure taken from Eclipse IDE as of December 2010.

## Controllers

Controllers link models and views. They process the user action and trigger change in the database based on the method inside the model. Controllers determine what needs to be displayed on the view. Figure 15 shows all list of all controllers used in this project.

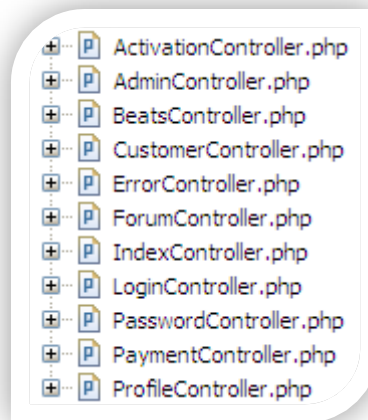


Figure 15. Screen shot of the controller structure taken from Eclipse IDE as of December 2010.

### 5.3 Explanation of Model-View-Controller as used in MyInstrumentalMusic.com

The model layer of the MVC structure handles the business logic. Models should support all the methods and core functionalities to manipulate the data inside a given database table. Most of the time, models represent a database table. If we look at the model structure as illustrated on Figure 16 and examine the 'Producer.php' class, it does have a number of methods inside to manipulate the data inside the table 'Producer' shown in figure 6 and present it for either the view or the controller layer. Some methods inside 'Producer.php' include counting all the producers, fetching a specific or all details of a producer, banning a producer, checking if a producer exist, generating a random producer ID, checking if a producer is featured, emailing all producers etc.

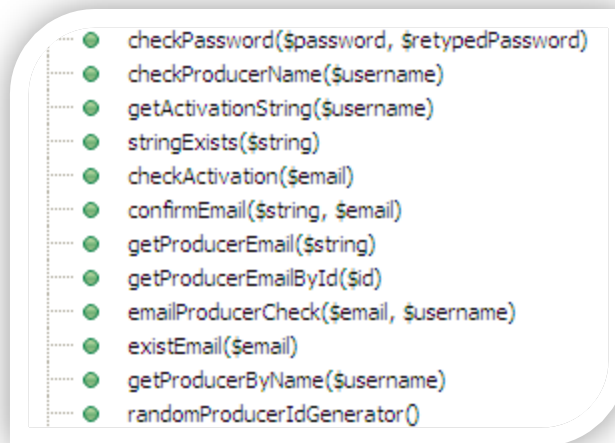


Figure 16. Screenshot of some methods of the 'Producer.php' class taken from Eclipse IDE as of December 2010.

The methods that reside inside the models are called by the controllers before the results are presented to the view layer. Controllers represent an action performed on models. For instance the AdminController class shown in figure 15 includes actions such as logging in and logging out the admin, resolving customer issues and refunding payments, emailing producers and customers, view the customer details, analyzing the producer payment etc. Figure 17 illustrates some of the actions contained inside the AdminController class.

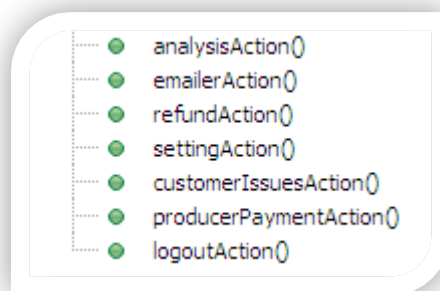


Figure 17. Screenshot of some actions from 'AdminController' class taken from Eclipse IDE as of December 2010.

Every view layer is affected by the controller before adjusting and presenting the data to the end user. In general the view layers are concerned about how to present the data to the end user, controller layers are concerned about what to present for view layers and models are concerned about how to logically present the data inside the database and pass it over to the controller layers.

## **6 MyInstrumentalMusic.com**

### 6.1 Background of MyInstrumentalMusic.com

MyInstrumentalMusic.com is a free music community or a social media format featuring signed and unsigned music producers from all around the world. It is a place where top-notch talented, experienced and self-motivated producers expose and promote their music to the music industry hoping to make a great leap forward.

The service package for registered producers includes:

- Free producer membership
- Free producer profile page and a link to the profile page to share it with others
- Free song upload space of up to 20 instrumentals for each producer, which then can be controlled by the admin
- Gives producers the ability to post and reply to a forum
- Rates producers according to their sale
- Gives visitors the ability to search for instrumentals of their interest
- Producers are paid each week by taking a certain percentage as a commission for the site

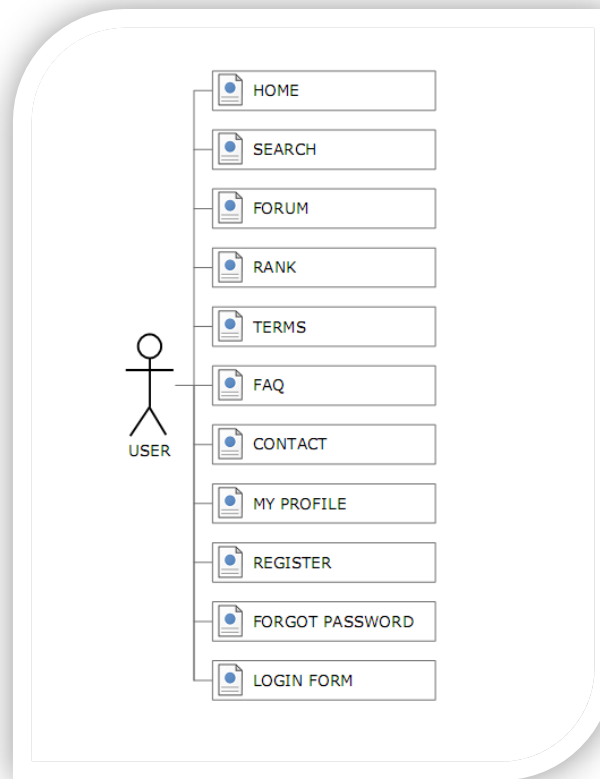


Figure 18. The site's structure as of December 2010.

The figure above illustrates the sitemap structure of the site prior to any user login.

The 'HOME' page consists of a list of instrumentals fetched from the database randomly. The lists are divided into four parts; hot, new, random and sold instrumentals.

The 'SEARCH' page offers customers with a full set of search options. Customers can search for instrumentals by name, genre, license and instrumental status. Searching for a producer is also supported by country and by name.

The 'FORUM' page displays the list of all the posted forums with their replies. Forums are an essential building blocks of a social media network facilitating the online interaction and discussion of the community. Every registered producer is capable of posting and replying to a discussion board. The forums are organized into a set of topics such as general discussion, production equipment, marketing and music business.

The 'RANK' page displays the list of top 20 producers based on their sale.

The 'TERMS' page gives a notice of the terms and conditions that apply to the site.

The 'FAQ' page displays frequently asked questions as an instant support for both the producers and the artists that are using the website.

The 'CONTACT' page displays a form for those who want to contact the site. The contact page handles customer issues and producer payment problems.

The 'MY PROFILE' page takes a logged in producer to the profile settings page if not redirect the user to the homepage.

The 'REGISTER' page presents the user with a free and fairly simple form to fill out. The registration fields include email, producer name, password and a checkbox to be checked out to insure the producer's agreement to the site's terms and conditions. An activation link will be sent via the user's entered email address for verification. After visiting the link, the producer is entitled to login to the system to access the account.

The 'FORGOT PASSWORD' page is designed for the purpose of resetting a lost or forgotten password. The user is presented with an email address and a producer name fields to fill out. There is also a CAPTCHA displayed on the page. "CAPTCHA or Captcha is a type of challenge-response test used in computing to ensure that the response is not generated by a computer. The process usually involves one computer (a server) asking a user to complete a simple test which the computer is able to generate and grade. [25]"

The 'LOGIN' page is displayed on the homepage for producers to log in. Producers log in with their email address.

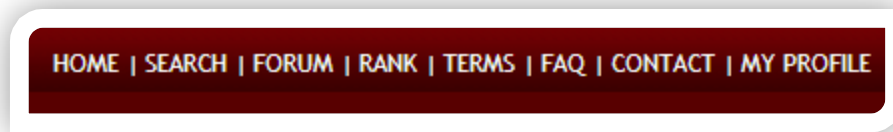


Figure 19. Screen shot of the main navigation bar as of December 2010.

The figure above shows the main navigation bar of the site. A Navigation bar is a set of links that helps visitors navigate to the main sections of the website. Navigation bars are commonly placed across the top of the page, vertically on the left-hand side and across the bottom of the web page.

## 6.2 Producers

Producers are the backbones of this site. As soon as they are registered and log into the system, they will have access to produce content and share information and opinions with other users. The site allows producers to upload up to 20 instrumentals in MP3 format. MP3 is a patented digital audio encoding format most commonly used on the internet and is compatible with virtually all computers and audio players.

Every producer on the site has a unique profile page and a link to the profile page to share it and reach their intended target audience. The figure below shows the navigational bar presented for the producer after a successful login.

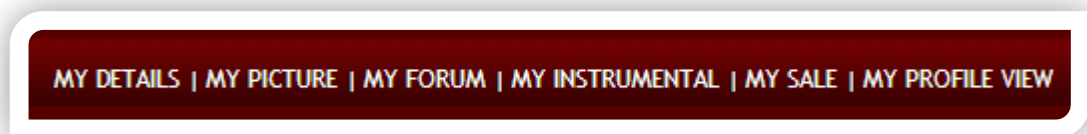


Figure 20. Screen shot of the producer's navigation bar as of December 2010.

The 'My Details' page is where producers view and edit their basic information.

The 'My Picture' page is where producers upload their profile picture.

The 'My Forum' page is where producers upload and view their forum.

The 'My Instrumentals' page is where producers upload their instrumentals.

The 'My Sale' page is where producers view the status of their sale history.

The screenshot shows the 'My Instrumental Music' website interface. At the top, there is a navigation bar with links for HOME, SEARCH, FORUM, RANK, TERMS, FAQ, CONTACT, and MY PROFILE. Below this is a section for 'Featured Producers' and a registration/login form. The main content area displays the profile of a producer named 'Katmando'. The profile includes a profile picture, a list of user details, and a table of sales.

Profile Details:

- RANK: ★
- COUNTRY: Australia
- CITY: Addis
- SEX: Male
- WEBSITE: www.addis.com
- MOTTO: Fight Back
- JOIN DATE: 2010-10-02 08:23:48
- PRODUCER INFO: Lorem ipsum Dolor Sit Amet, Consectetur Adipiscing Elit, Aliquam Sed Turpis Sapien, Aenean Turpis Urna, Venenatis Sed Hendrerit Sed, Ornare Et Magna, Vestibulum In Libero Leo, Sed Commodo Orci, Proin Orci Nunc, Pulvinar Vel Pulvinar Eu, Voluptat Sit Amet Urna, Aliquam Erat Voluptat. Ut Ac Quam Vellit, Suspendisse Dignissim Consequat Tellus A Rutrum, Nam Adipiscing Tempor Tortor, Vel Sodales Erat Tristique In, Donec Consequat Sempor Justo Pellentesque Scelerisque. Sed A Quam A Erat Iaculis Tincidunt, Fusce Et Laoreet Libero, Cras Ut Pharetra Urna.

Sales Table:

Play	Title	Genre	Price	License	Date	Buy
Play	Espoo	Hip-Hop	\$44.00	EX	2010-10-05 06:56:21	Buy
Play	Victory	Pop	\$0.10	EX	2010-09-29 16:51:06	Buy

Copyright © My Instrumental Music | MyInstrumentalMusic.com

Figure 21. Screen shot of the producers profile view as of December 2010.

Figure 21 shows the profile page view of a producer. Producers' profile picture and their detail information are displayed on the left and right side of the main content area respectively. A producer will have a default profile picture provided by the site unless

updated. Uploaded instrumental music list is placed at the bottom of the main content area underneath their profile picture and details.

### 6.3 Customers

MyInstrumentalMusic.com uses PayPal as a payment medium. Once an instrumental music is purchased an Instant Payment Notification (IPN) will be received by the site from PayPal. A script listens to this response and acts accordingly. If the transaction is marked 'Completed', the customer will automatically be emailed an account login information through email. Now the customer can login and have access to download the instrumental music purchased. At the same time producers will be notified by email about the sale with such information as the title of the instrumental purchased, the price, the license, the date the instrumental was purchased. If the transaction is not complete, customers will also be informed automatically about the failure based on the request received from PayPal. An email will also be sent to the admin about the issue. A refund will be processed if necessary after processing the transaction.

Thanks for doing business with MyInstrumentalMusic.com  
Your verified purchased instrumentals

Showing 1 - 5 of 5

1

Title	Producer	Genre	Price	License	Date	Download
Certified	MessTormal	Instrumental	\$55.00	NE	2010-11-06 10:05:26	Certified
History	BeatMakerZ	Reggae	\$100.00	EX	2010-09-29 16:50:45	History
History	BeatMakerZ	Reggae	\$100.00	EX	2010-09-29 16:50:45	History
Doing It	Ephdan	Hip-Hop	\$45.00	EX	2010-09-29 17:51:55	Doing It
Victory	Katmando	Pop	\$0.10	EX	2010-09-29 16:51:06	Victory

Figure 22. Screen shot of the customer page as of December 2010.

Figure 22 illustrates a logged in customer page of the site. As can be seen, this customer has purchased five instrumentals from the site and their details are provided together with the download link for each.

## 6.4 Administrators

The administrator of the site has the responsibility to track and resolve both the producer and customer issues effectively. The administrators of the site have the authority to:

- Ban, warn producers
- Feature producers
- Mark instrumentals HOT so that they can be displayed on the HOT INSTRUMENTALS list
- Delete instrumental; a notification email will be sent to the producer
- Have access to view all the customer details
- Have access to inspect the site's activities such as how many producers, customers, instrumentals and unique site visitors it has
- Have access to email all producers and customers through a mass email system
- Have access to resolve all the customer issues, handle producers payments and some other settings on the site such as instrumental upload limit

The following figure illustrates the administrator control panel of the site after a successful administrator login.

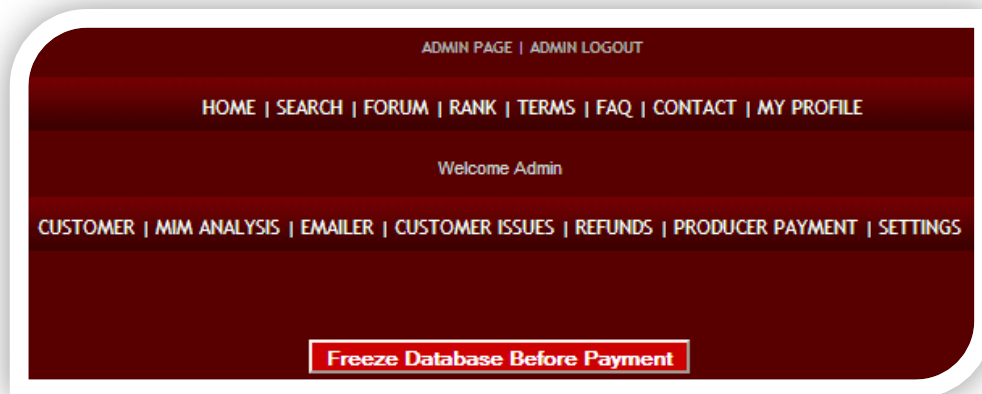


Figure 23. Screen shot of the administrator control panel as of December 2010.

The 'CUSTOMER' page displays all the customer details of the site such as first name, last name, address etc.

The 'MIM ANALYSIS' page provides the statistics of the site on such entities as number of producers, customers, instrumentals, unique site visitors, forums, replies, verified purchases, contacts, unresolved customer issues, unpaid producer payments, total and net profit of the site.

The 'EMAILER' page is used to notify either the producers or the customers of any public notices.

The 'CUSTOMER ISSUES' page displays all unresolved customer payments.

The 'REFUNDS' page displays results issued to be refund from the 'CUSTOMER ISSUES' page. The administrator issues a refund if a customer payment can't be resolved.

The 'PRODUCER PAYMENT' page displays all the details of producers with their sale. Once an admin confirms the payment, the 'SALE' page of the producer will mark it 'Confirmed'. The default value is 'Pending'.

The 'SETTINGS' page is used to edit the instrumental upload limit of producers and also enter a new percentage commission of the site if necessary.



Figure 24. Screen shot of the front page as of December 2010.

The figure above shows the first page a visitor will see on the site [www.MyInstrumentalMusic.com](http://www.MyInstrumentalMusic.com).

## 7 Conclusion

The purpose of this project was to look through how the social media impacts the music business and how it can be implemented online using the web technologies available to win a worldwide attention and recognition. In terms of similarities and differences between the many social-media systems that implement the concept of music business, I find that they share common features. This analysis has helped me in extracting and exploiting information on how the social members are interacting with each other and apply it in this project using the Zend Framework. The project has taken me two months to complete and I can say the goals have been achieved successfully.

The rise in software development of virtual studios has brought about increased home based music producers. Those who acquired this technology will create a high quality recording and can achieve a moderate level of success by exposing their work to the public. This project is about closing the gap holding music producers and artists apart by promoting trust, inspiration and encouragement.

The importance of social-media systems in today's music industry is so significant. The Web houses many types of social-media that offer opportunity for social-networking among music producers and artists. "Some artists find the concept of the internet hard to adapt to; however, as they are forced into the mould of technology modern artists tend to embrace the internet as a friend rather than a foe. They view it as a 'creative and inspiration-enhancing workspace where they can communicate, collaborate, and promote their work' – Mary Madden (Research Specialist) in her project 'Artists, Musicians and the Internet'" [26].

Search Engine Optimization (SEO) has been given a higher priority while designing the site for the purpose of driving more traffic by improving its ranking among the top search engines such as Google. The higher the traffic the better a producer is exposed for more sales. The more the sales the more the site profits from the commission earned. Satisfying the needs of both the producer and customer is the goal of the site.

MyInstrumentalMusic.com hasn't yet been uploaded to a server but I have already registered for the domain and redirect all the incoming requests to point to my home based local server. The site will be launched online soon. However, I have observed the site had more than 200 unique visitors mostly from U.S.A, Russia, and Europe. Surprisingly, there were two producers that were registered and upload their instrumentals on the site. Google Analytics which is a free powerful service by Google has been implemented in this project. This service provides the detailed statistics about the site visitors.

MyInstrumentalMusic.com's social-media techniques are dynamic and will continually develop in the future in accordance with the ways that people will interact among each other. A system of global conversation among social networks has been possible with the Web and the systems created. I hope the site will benefit from the ultimate usage of the systems and will look forward to innovations and exploration of ways of optimizing the benefits of the technology.

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