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Improving Data Efficiency Using Content Management System

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by

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Abstract

This project has been carried out to identify major problems in a website like look and feel of the web pages, branding qualities, website search engine compatibility and identifying/tracking the status of the pages. To achieve this, Responsive Web Design (RWD) concepts, Web Analytics, HTML (Hyper Text Markup Language) tags are implemented for sophisticated performance and adaptability. It's very essential to have a well-organized and dynamic website. Website should be more professional to gain the fruitful outcomes. Website related content was updated dynamically through admin console using Content Management System (CMS). Admin / content manager / targeted preferred credential users could more effectively update the content via this Content Management System (CMS) web tool and was very easy to maintain huge content in a very effective way. There are many ways to achieve this, have many content driven tools and web-pages which do this job without any extra effort. The major benefit of this tool was even a non-technical person could easily update or manage the webpage without any technical training.

In today's market, most of the data is written and deployed using small / medium form factors like mobiles or tablet devices. Users easily update the data while on the go. The content of the website could be effortlessly managed even by a non-technical person quickly and easily without any complicated programming. The website automatically spreads to fit mobiles, tablets and any browser windows using CMS. Using Agile Methodology, the project quality was improved in most effective way. Data was collected and analyzed using different tools and techniques.

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Chapter I: Introduction

Introduction

A Content Management System (CMS) is an application which allows to publish, manage, edit, delete and modify content in a very effective and dynamic way. This system also organizes the content in a very easy way where end user can access and operate very easily without prior knowledge on this system. Through this system editor has ability to post articles/web pages using any desktop systems and also by using small devices like mobile devices and tablets.

CMS often used for running a web blog, a website, news blogs etc., and this system usually allows to manage the entire workflow of a website like creating web pages, web galleries, shopping cart applications, etc.

Initially, website had a simple design without following much standards as per branding. Client has approached on improving the website and migrate the same to separate CMS site. For this initially, design document was prepared which includes on where the website was lacking and how to improve existing website with branding standards, suggested some proactive innovative ideas like establishing a presence of business in social media (by including social media plugins), enhance sales by adding Ecommerce pages in the website, improve search engine visibility, making entire website compatible with various device environments like mobiles and tablets. Proposed all these features in a document and started developing web pages based on Client’s feedback.

Problem Statement

This extensive project was done in order to identify major problems in a website like look and feel of the web pages, branding qualities, website search engine compatibility and identifying/tracking the status of the pages. Responsive Web Design (RWD) concepts, Web Analytics, HTML (Hyper Text Markup Language) tags were implemented for sophisticated performance and adaptability.

Nature and Significance of the Problem

A. Earlier before CMS, to update any webpage of a website, admin of the site used to manually connect to the server using File Transfer Protocol (FTP) tool, download the file which needs to be updated then upload it back via the same FTP tool to check the updates. This pertains to be a very long process and it was not secure to manually update the file.

Content management system (CMS) avoids this long process of updating a simple section or page of a website without using Integrated Development Environment (IDE) or FTP tool, updates can be done via admin console (Dashboard) of the CMS.

Tools used here are WordPress and Joomla.

B. Previously, website pages were only compatible with desktop machines and was not compatible with other form factors (devices) like tablets, mobiles and wearable devices.

RWD (Responsive Web Design) concepts were applied to make a webpage compatible with other form factors. Also accessibility concepts and website search engine compatibility concepts were implemented.

Other tools used here are media queries in CSS file or built-in libraries.

C. Before there was no such process to track user activities and errors in the page which lags the quality of the pages. Majorly disabled people could not easily navigate the website.

Web Analytics standards was used in order to track the activities of the user.

Other tools used here are Google Analytics (Website Metrics).

Objective of the Project

The main objective of this project:

1. Use RWD concepts to make a webpage compatible with other devices.
2. Apply Web Analytics standards to track the errors and user activities.
3. Implement accessibility concepts.
4. Make website search engine compatible.

Project Questions

1. How much time was saved in order to update the page using CMS?
2. How RWD helped in increasing the site-traffic?
3. How can admin track user's activities like when & where and how long user viewed a particular page and also the number of pages viewed by the user?

Limitations of the Project

Though the full website pages are automated / updated using CMS concept, there was lot of maintenance required to maintain the website stable and up to date. Admin need to take care of all the servers manually through the hosting services and make sure all the servers are up and running without any malware attacks. As this project mainly involves e-commerce functionality admin of the website need to continuously check whether the e-commerce page (Shopping Cart Page) is up and running, as lot of transaction might be going on the products which are displayed in the website.

Continuous monitoring was required, if any malware attacks the system then admin should have a periodic backup of files to restore back to the original state. Definite measures should be taken care round the clock.

As users access the website on the go through mobile devices, the site should be compatible to work seamlessly even in lower bandwidth connection. Admin should track on how many transactions are happening and through which platform–for all these features there are many third-party software which helps in these type of scenarios.

Maintaining good performance in terms of rendering of pages usually called as page speed is the another key concept. Web developers should develop/build a page in such a way like it should pass performance test on rendering of a page. Usually a page should render in no more than 10 seconds, if the rendering of the pages causes

above 10 seconds–then its developers and management responsibility on what part of the page it was taking time to load the page.

User experience (UX) department need to make sure all the web pages are according to the company's branding standards, even if one web page in the whole site is not maintained or adhere to the existing company’s branding standards then it might cause an impact to the customer thinking the current page is not consistent with the others or this page does not belongs to the current website as the page branding standards are not up to mark.

Definition of Terms

Content Management System (CMS): Through central system of the admin console all the content can be maintained and updated accordingly, this application allows publishing, editing, deleting and maintaining content from a central location UI interface.

HTML: HTML stands for Hypertext Markup Language, is a language for describing web documents called as web pages.

- A markup language is a set of markup tags
- HTML documents are described by HTML tags
- Each HTML tag describes different document content
- HTML lets to format text, add graphics, create links, input forms, frames and tables, etc., and save it all in a text file that any browser can read and display.

CSS: CSS stands for Cascading Style Sheets, is a simple mechanism for adding styles to web documents. CSS helps html elements to render on screen, on paper or in other media, it describes the presentation of an HTML (or XML) document.

Bootstrap: Bootstrap is the most popular HTML, CSS, and JS framework for developing responsive, mobile first projects on the web which helps to develop responsive web pages compatible across all the major devices like tablet, mobile and desktop devices. This helps user to easily access the web pages in small and compatible devices.

JavaScript: JavaScript is a programming language of HTML and Web, this language is used to make web page more interactive, like showing/hiding an element in html. It runs on user's computer and does not require constant download from the website.

JQuery: jQuery is a fast, small and feature-rich JavaScript library. It makes things like HTML document traversal and manipulation, event handling, animation and Ajax much simpler with an easy-to-use API that works across a multitude of browsers. With a combination of versatility and extensibility, jQuery has changed the way that millions of people write JavaScript.

Google Analytics: Google Analytics is a web tool where admin of a website can systematically compute analysis of data or statistics. This tool helps website administrator to improve performance across the sites, apps and offline marketing.

Google’s analytics solutions can help everyone to turn customer insights into action for business.

WordPress, Joomla: Using WordPress/Joomla, user can create a powerful, reliable and simple website in minutes with existing templates which are available. This comes with customized widgets which can be included in the webpage. User has full provision to customize the look and feel of the web pages.

Wordpress is developed by wordpress.org which is a Content Management System application, which allows all sort of content management. Through this application, admin of the site can easily update, manipulate, delete existing content and allow new content to publish. Through this, site admin can create or customize existing web template to a new one.

Responsive Web Design (RWD): Responsive Web Design is an approach to make web pages accessible across wide range of devices. This approach helps users to resize and scale a web page in all form factors which includes desktops, laptops, tablets and mobile devices. RWD web page has a structure of either fluid or grid, and has very flexible images / icons which are compatible across all the devices. Media queries are used in this pattern to achieve responsiveness.

Summary

The main focus of this chapter was on the project introduction, identified the main reason for conducting the project, importance of the problem and its usefulness, objective of the project, questions based on the study which were answered after the project completion. Project drawbacks, terms used in this study and the

corresponding definitions. The following chapter explains in detail about the background related to the problem and literature review of the project.

Chapter II: Background and Review of Literature

Introduction

This chapter gives a detailed description of the background related to the problem. Also focuses on reviewing the literature related to the problem and the methodologies used in solving the problem based on the articles from some journals and findings related to the same area of study.

Background Related to the Problem

Many marketing and IT corporate websites are managed through Content Management System (CMS) system. Most of the top blogs use CMS as mainstream in updating website content dynamically. Through this content management system, users store and manage data very easily, most of the enterprise content has version control facility through this content can be replaced or managed very effectively. Most of the Content Management Systems include web-based publishing, respective data can be published from any device, easily managed through mobile app also, not only data most of the digital assets can also be stored / manipulated using CMS system and store the same in secured location either in hard drive or web based cloud environment.

The main focus of this project was to enhance the data efficiency using CMS for easy navigation, branding standards, more dynamic and easy access of the content. In today's market, most of the data was written and deployed using small / medium form factors like mobiles or tablet devices. Users easily update the data while on the go. The content of the website could be effortlessly managed even by a

non-technical person quickly and easily without any complicated programming. The website automatically spreads to fit mobiles, tablets and any browser windows using CMS.

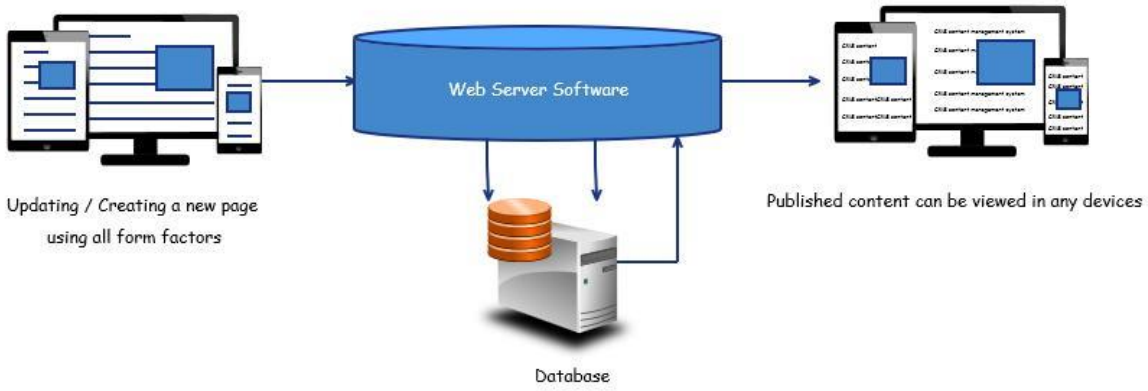

Figure 1: Updating Content through Various Devices

Also CMS has an enhanced feature of searching for any related information by search engine without any difficulty. Using the Agile Methodology, the project quality was improved in most effective way. Data was collected and analyzed using different tools and techniques.

Literature Related to the Problem

Initially this study started with a review of the existing research papers from different organizations on Content Management System and Responsive Web Design. Also gathered the relevant information from various articles and Internet search engine “Google”.

As the amount of content increased, and web-based technologies developed, it became possible to automate certain aspects of the web page development/ maintenance process. This is the key goal of content management systems. They

support, by automation, the efficient and effective delivery of content via the Internet (Browning & Lowndes, 2001).

Responsive Web Design (RWD) is–as described by Rachel Shilcock–“at its best when it's device agnostic; where not aiming to design for particular resolutions or sizes, such as for iPhone or iPad sizes only. Instead one should be aiming to design with the content and design in mind and how this content flows and adapts to the various environments it might be seen or used in” (Shillcock, 2013).

In the CMS product marketplace there is a tendency for those new to the technology to lump all CMSs together. In some comparative reviews of CMSs, products with widely different origins, functionality and goals, often because not enough information about the system is readily available (Doyle, 2000; Vidgen, Goodwin, & Barnes, 2001).

One source (Taylor, 2013) cites that RWD has a positive effect on a website’s Search Engine Optimization (SEO) due the consolidation of content from two separate URLs into one. Combining both the desktop URL and the mobile ‘m-dot’ link means that Google does not have to crawl and index two instances of the same content. This consolidation also makes it easier to share web pages and links, as there is no differences between a mobile version of a website and a desktop version. An example given of this is when a user shares a mobile optimized web page to a friend on Facebook who then opens the link on a desktop. That friend would view the page in the stripped down, mobile version of the page, with a less than optimal user experience (Taylor, 2013). Of course this would not happen with a responsive

webpage as both views are the same HTML and the page would simply adapt to the viewport that it was being viewed on. With the recommendations from Taylor matching the results generated by Google, which are collected and generated by their analytics tools, the development of mobile-friendly websites has a direct positive impact on search engine optimization.

The concept of RWD was written by Ethan Marcotte in A List Apart Website. In that article he was mentioning on how a web page is compatible across all devices. He also adds saying like Web Design is not only of adjusting a web page in all screen resolutions and automatically resizable images, but rather about a whole new way of design.

Web analytics data is not only limited in the breadth of the website covered but also in the information it presents about user actions. Analytics data displays the 'when' and 'what' of web visits, but is of limited value when answering 'how' and 'why' questions about customers' site use (Weischedel & Huizingh, 2006).

Literature Related to the Methodology

The methodological approach used in this project was Agile Methodology for software development. Agile Model is a combination of iterative and incremental process model where each iteration has cross functional teams working concurrently on numerous fields like planning, requirements analysis, design, coding, unit testing and acceptance testing. Until the project completes, this development process builds each module adding functionalities every few weeks depends on the requirements. Figure 2 explains the life cycle of Agile Methodology.

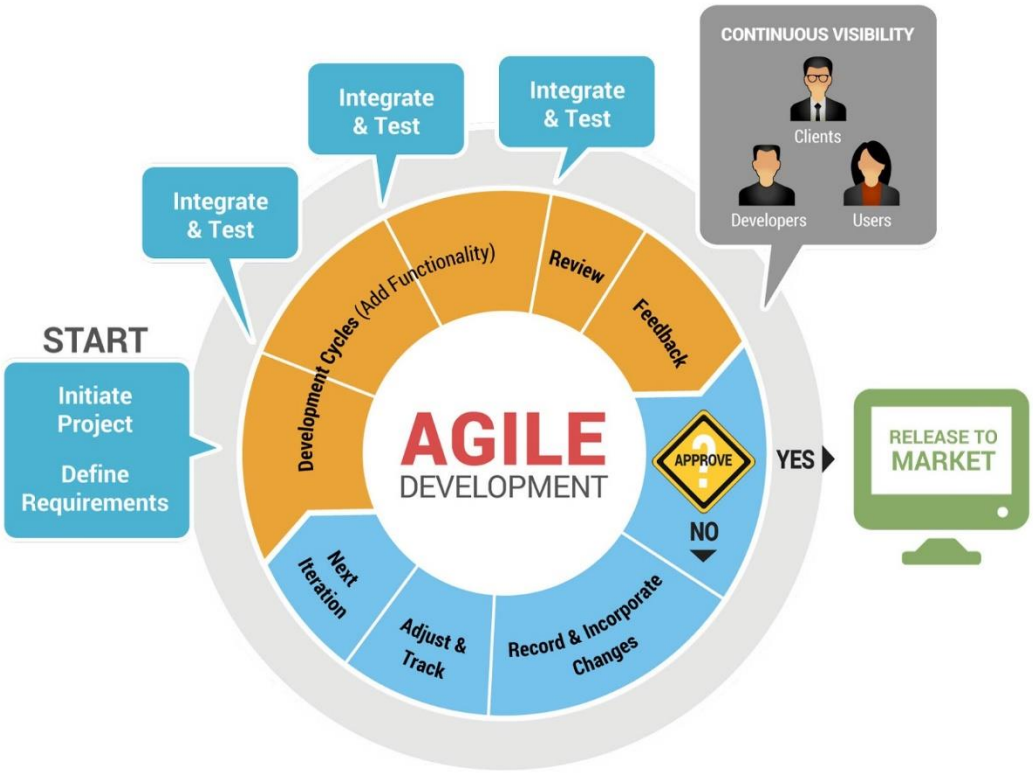

Figure 2: Agile Lifecycle

An important focus of agile software development methods is ‘responding to changes’ (Highsmith & Fowler, 2001) or ‘embracing change’ (Beck, 1999). Agile projects are often marked by high degree and frequency of changes in requirements at various stages of the project. Theoretically, customers can request changes in requirements at any time. In Scrum projects, changes are allowed to be introduced any time before the sprint begins (Schwaber & Beedle, 2002). Such changes can be even more frequent if the customer is co-located with the development team such as the on-site customer in XP (Beck, 1999).

Beck (2007) seems to suggest that well-written code is its own documentation such that code should be so clearly and well-written that it should not require any

extra documentation in the traditional sense. Jeffries (2010) supports adding comments to clarify code and considers unit tests and acceptance tests as executable forms of documentation. Documentation on agile projects is often seen as secondary to code and as a means to support communication (Kajko-Mattsson, 2008).

Henderson-Sellers and Serour (2005) says agility involves both the ability to adapt to different changes and to refine and fine-tune development processes as needed. Lee and Xia (2010) define software development agility “as the software team's capability to efficiently and effectively respond to and incorporate user requirement changes during the project life cycle”.

Summary

This chapter concentrated on background related to the problem in detail. Described the articles that focuses on the similar problem and also explained the literature review related to the problem and methodology. In the following chapter, reader will have a clear understanding about the project framework, data collection, analysis and duration of the project.

Chapter III: Methodology

Introduction

In this chapter, reader can predict framework of the study like providing a justification or explanation on using a particular approach for the project. Also focuses towards the description on data collection, tools and techniques used to analyze the data and duration of the project.

Design of the Study

Requirements gathering: Initially, to implement this project gathered required technical documents, walkthrough on the working of the website, its features (a section/widget looks like) and other enhancements like appending latest technologies (adding social networking plugins into the site which helps readers to share a good quality content of a webpage) from the client on the existing website. Had enough meetings in gathering information in the form of word document or in the format client had, the document explained each and every concept on why they want to have a specific feature on a required page only.

Analysis: On what the client provided, requirement documents were analyzed. Had enough calls to understand the requirements in implementing required features in the existing website. Suggested some ideas on how to easily improve respective feature using lightweight components. In most of the cases, created a work-flow (called as prototypes) and presented it to client in the form of image mockups which are designed using Photoshop tool.

Architecture: Once the analysis was done, the next role was to come up with an architecture pertaining to features which has been discussed in analysis phase. For this, Microsoft Visio was used which helped client to understand the flow of the functionality. By this representation client understood about the process and how data stored in database.

Development and unit testing: With all the documents and designs completed, developed modules as suggested by the client. For every bi-weekly status was delivered on how the module was going on and reported the road-blocks if any. Used to have WebEx sessions to showcase the work which was done, got feedback from client instantly for any changes on current module. For development various languages, libraries and tools are used which were helpful in the web project like HTML5, CSS, JavaScript, jQuery, Bootstrap, Dreamweaver, Photoshop, WordPress, etc. Client has shared necessary credentials of the project, this helped deploying pages in stage environment of the website server. Once deployment into stage has been done, client looks at the module and informs for any changes in the respective module.

Once the module has been completed, next stage was to unit test the module. If any bugs/errors are found, those changes are deployed after fixing them in the stage environment. Bug fixing was the most important task, which was cross checked whether the fix to that issue does not impact other modules. For mobile development of this project, client provided various devices which they need the application to be compatible with. While development, various devices are plugged-in on to the

development system and tested it accordingly. For debugging, various screen emulators are used. Used Mac machines for easy debugging android and iOS devices.

Figure 3: Integrating Social Media Plugins in a Website

Adding social media plugins into content blog / websites, helped the content on the website to be streamed to many socialized websites which acts like a marketing tool to popularize web content effectively. These plugins were added manually through CMS or installed through CMS webpage plugins. Most of the social media websites are available in the form of web-plugins which are easily plugged into website CMS.

In most of the CMS templates, all built-in plugins are available which provides a number that helps an admin to identify which content on a page or article on a page is most famous, with this knowledge website's admin can improve content in those areas or either come up with those categories of articles. Through social media plugins either an article can be posted right-away or can schedule an article when to post on particular social website. This website uses Shareaholic wordpress plugin which inserts in all respective pages.

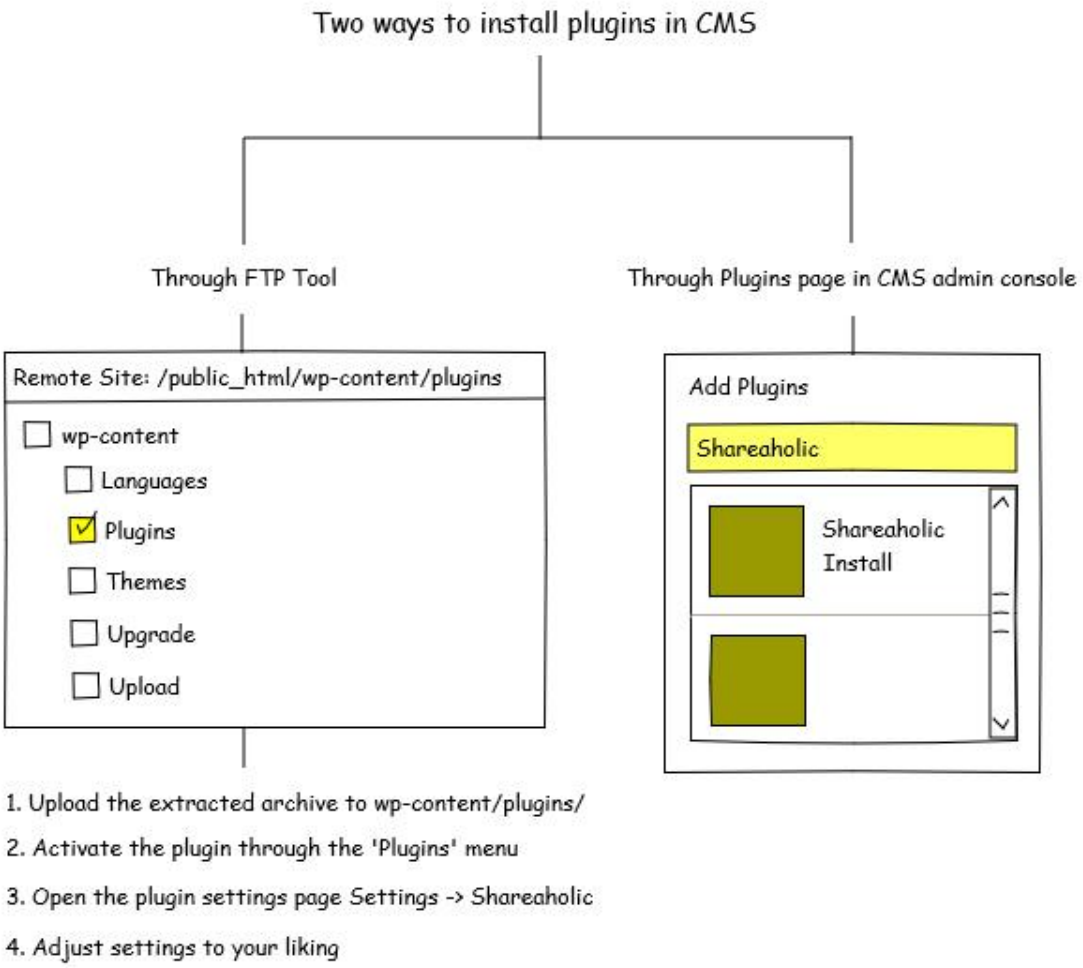

Figure 4: Procedure to Install Plugins

Setup to convert visitors to prospects: Converting visitors to dedicated customers by viewing a website, this was achieved through various elements which can convert a website visitor into a lead. Some of the elements includes Call-to-action item, creating a relevant landing page, creating a free outlet form, creating a customized thank you page, including a personalized email page.

All these above process helps to make visitors to come back to the web page again and again, in this way an admin or web site owner have dedicated readers and get the feedback. Figure 5 explains one of the process.

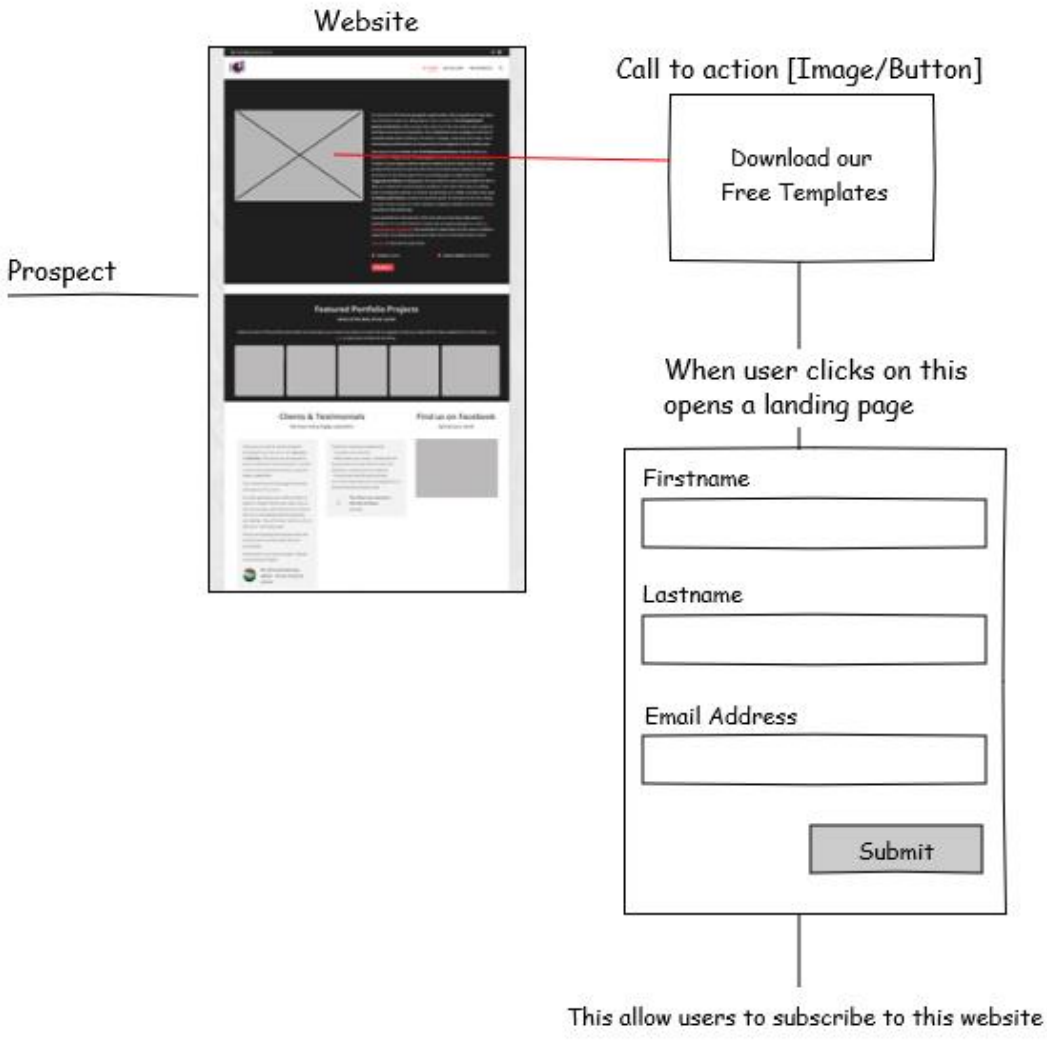

Figure 5: Call to Action

Website should be mobile friendly: A website should be mobile friendly so that user can access or browse through the entire website very easily without any difficulty. CMS was used to achieve this feature to make visitors to come back more often to the website. In CMS system, there are many options to achieve this either

can use built-in templates which automatically converts the layouts including slide bar sections, navigations, content area, etc., into a more readable format in mobile or tablet devices this concept or technique is known as Responsive Web Design (RWD).

Menu Links (navigation) help users to navigate through the entire site easily. Navigation is the important element in the website development. So, while building a website developers needs to do some analysis on how to represent the links in different environments and need to concentrate on how effectively it should be represented in all compatibility devices like in mobiles, tablets and desktops.

Whole App Testing: After completing development phase and when app was in stage environment, end-to-end testing of the application was done manually, including various mobile and tablet devices. Issues are tracked using QC Tool and resolved issues are deployed in stage environment. Once the user acceptance testing has been done from client end, sign-off meeting was scheduled for Go No-Go of the modules, after getting the sign-off from client the live environment deployment was finalized.

Website Performance: Website performance also known as website optimization is the process of improving the speed of a webpage. Website performance plays important role in increasing the visitors to stay long time on a web page, this also increase the productivity of web page. While building a web page, developers used some important concepts to improve the speed for example reducing images on a web page, using awesome font styles, using sprite concept

while including icons on a webpage, etc., have many website performances tools to optimize the speed of a webpage and check the errors and improve the quality of the webpage.

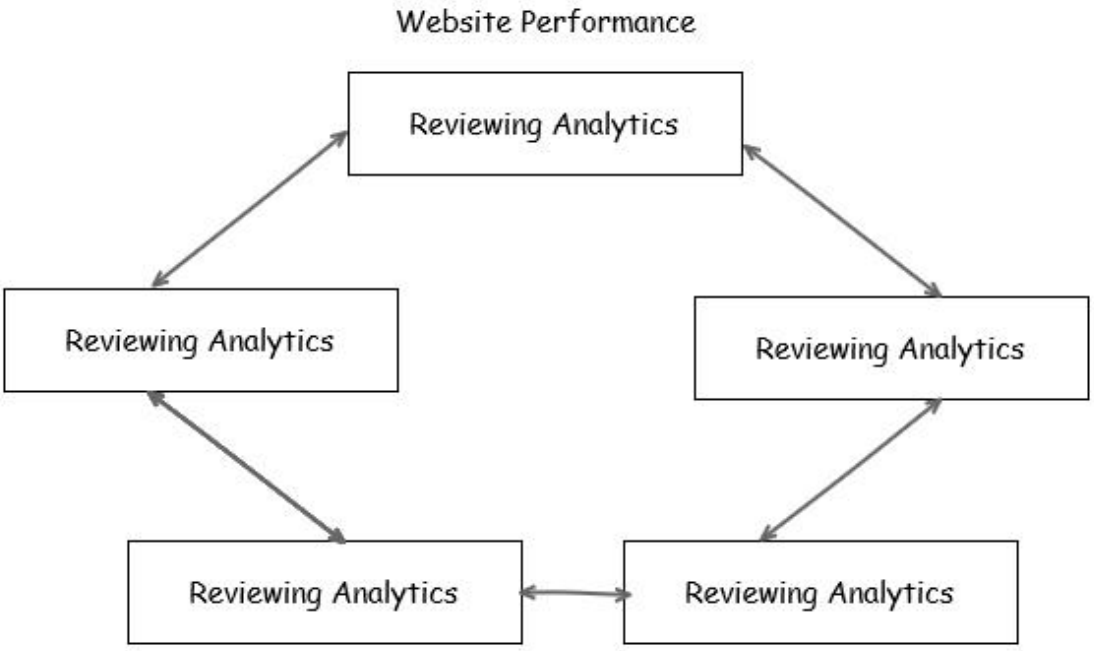

Figure 6: Structure of Website Performance

Data Collection

Data collection is the most important feature in this project. It is the process of collecting useful data which is stored in a database. Here, most of the data was hosted in MYSQL database which was treated as a most secure database to store the entire data which has been written by Admin / Web Content writers. The stored data can be called or retrieved via most of the defined user interfaces, with this user interface (UI) can retrieve particular data seamlessly and in a most secure way with some of the database plugins.

This project used MySQL as a database for storing data, it is a database mostly used for web as it is an open-source relational database management system (RDBMS). This runs on a server and used to store, retrieve, update and delete data. Many tools can be used as an IDE to achieve above scenarios. This acts like a standard SQL for the web. All the data in the database are stored in tables (which comprises rows and columns).

Advantages of using MySQL:

- *Easy to install*: MySQL is very easy to install in any platform, implementation and execution of queries is very simple. Most of the third-party tools support MySQL as its database.
- *Open-Source*: MySQL is an open-source relational database management system [RDBMS] this can be downloaded from MySQL website.
- *It's Secure:* MySQL includes a solid state security which does not allow to access unknown users, all the passwords were encrypted.
- *Fast and Accurate:* MySQL database is fast and accurate in executing sql statements to retrieve and store data. All kind of manipulations can be done using MySQL statements–these statements are simple SQL statements which can be executed effectively based on that data can be retrieved in the format based on the requirement.
- *Scalability:* Almost each and every data can be stored in MySQL it has more capacity than any other database.

- *Runs on any OS (Operating System):* MySQL runs on any platform of operating systems including Microsoft Operating System and Mac Operating System. Below are some of the screenshots on how to access MySQL database.

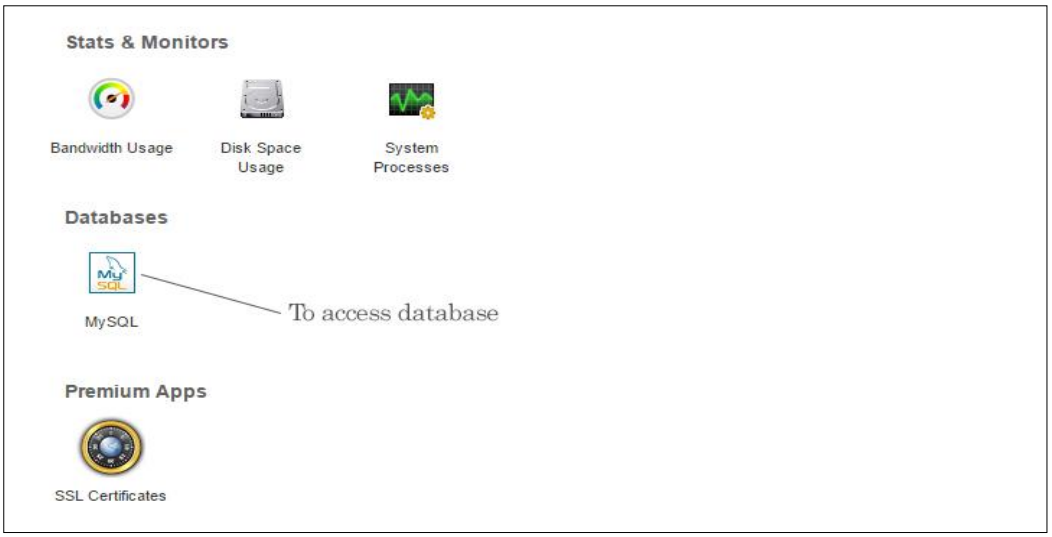

Figure 7: Hosting Panel–Database App

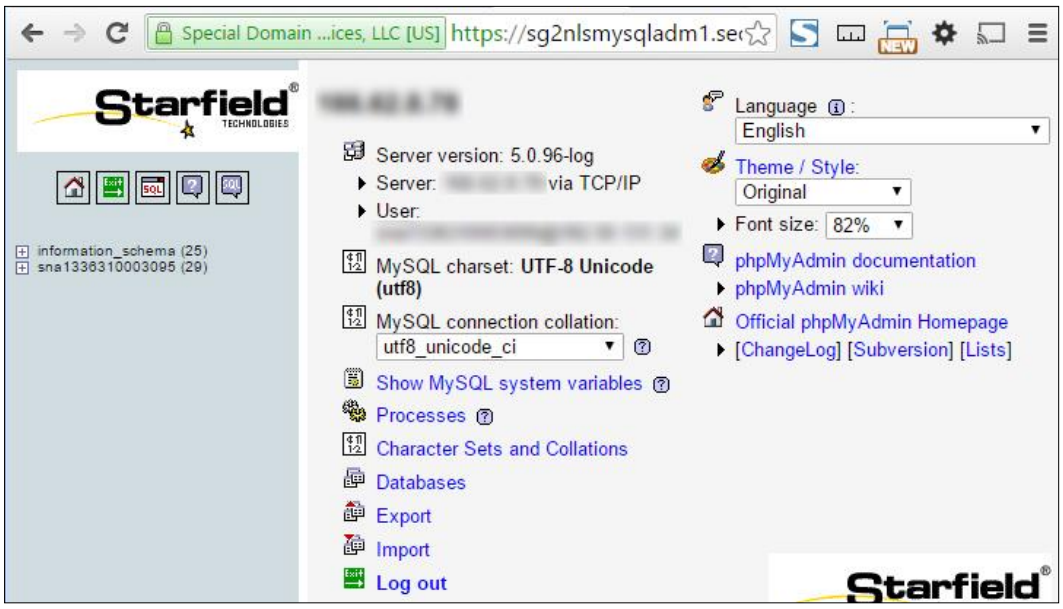

Figure 8: MySQL Admin Panel

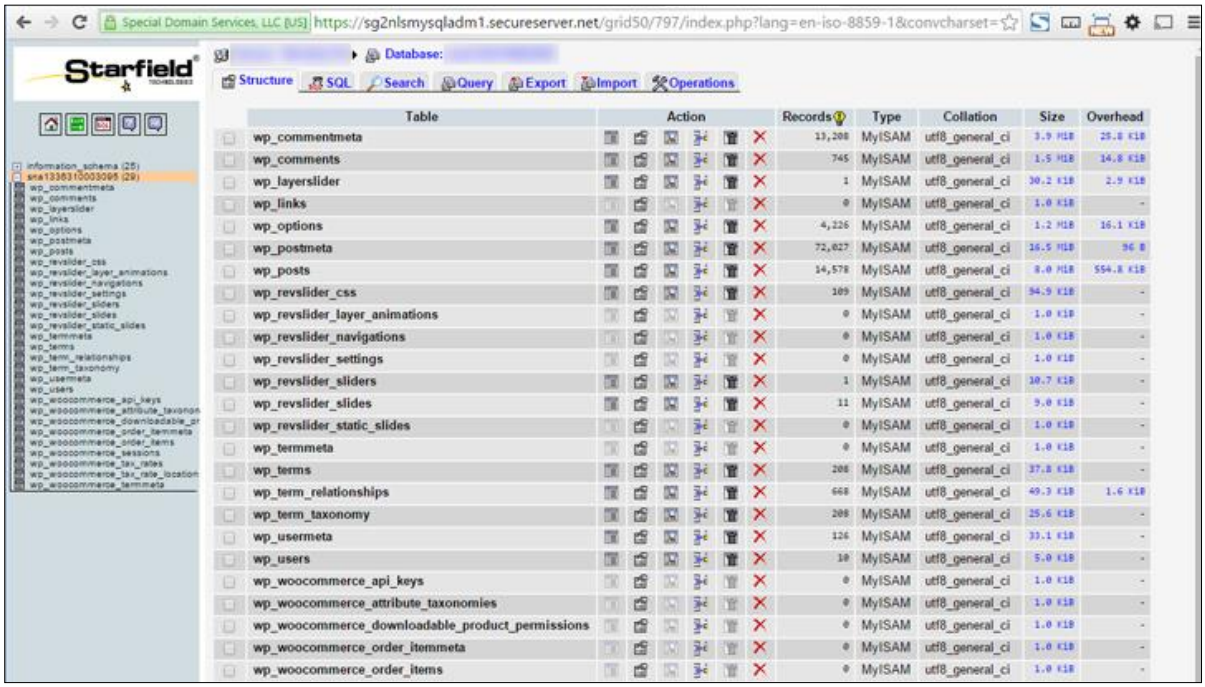

Figure 9: Wordpress Table Structure

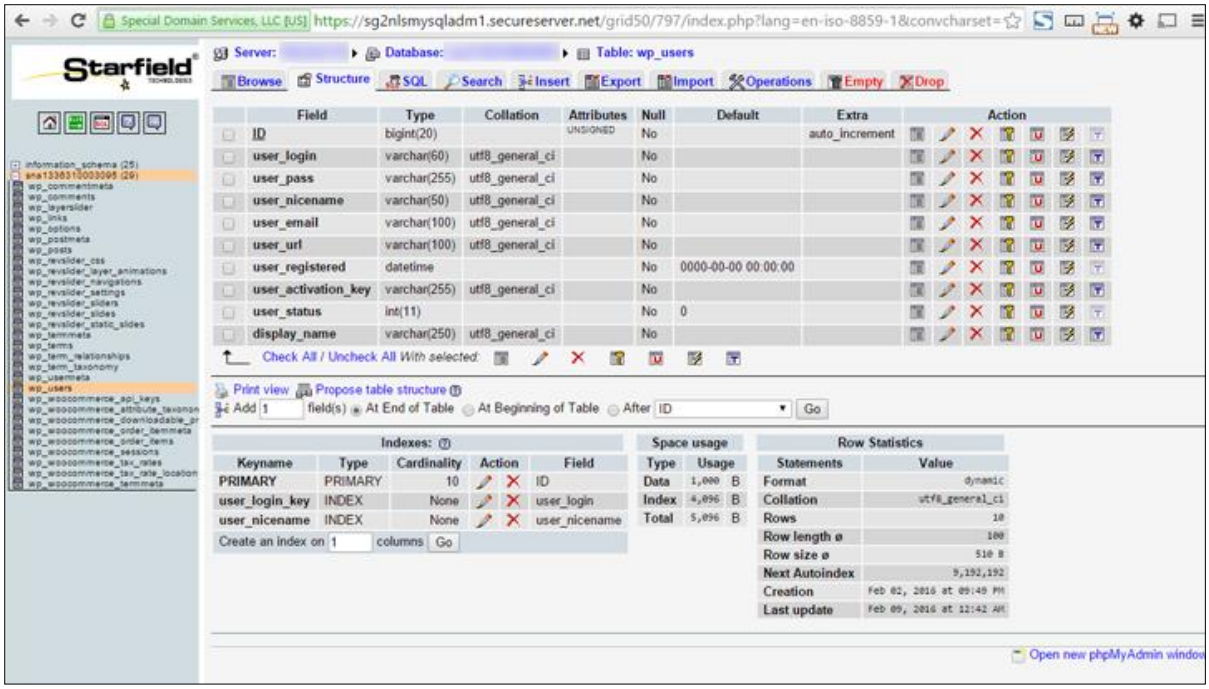

Figure 10: Database Users

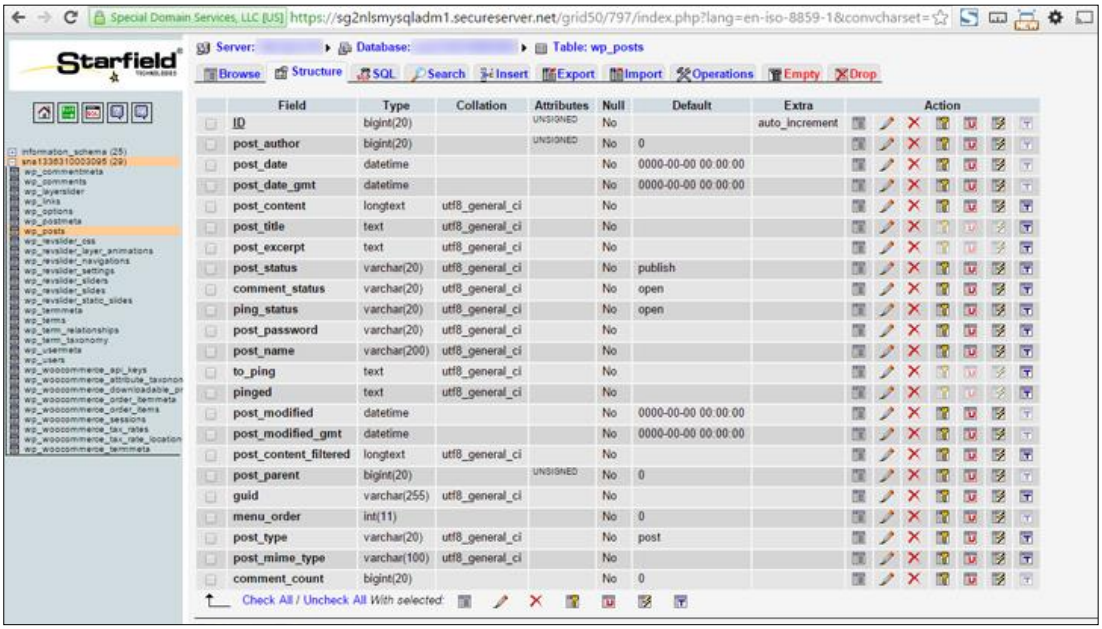

Figure 11: Website Post Database Structure

Data Analysis

In this process, the given data was evaluated analytically and logically with some analysis tools. Through this analysis tools, each and every component was examined properly and consolidated together to check the drawbacks in the published content. This process acts like an analyst which helped the present website to grow and get web traffic through various web channels. There are many approaches and methods of data analysis, most of them includes Data Mining, Business Intelligence, Text Analytics, Data Dissemination and Data Visualization.

Data mining in this project most of the data stories are built from small sets of data methods which helped the website to maintain standard quality code in all aspects.

Business Intelligence is collection of tools where these tools helps to convert raw data into most valuable and useful information to maintain the website. The functions of these technologies are website analytics, business process management, predictive and prescriptive analytics.

Text Analysis also called as text data mining, is the process of getting high-quality information from written text in the website.

Data dissemination is the process of distributing the data to the user in a format which is more precise for the readers to know about the updated content in the website.

In the present project readers gets an email on the updates which has been done, have an automatic email sender once any new page or album has been updated. This was handled by a third party tool which automatically execute an email to all the readers who were subscribed to the website.

Project Timeline

The duration of this project was 6 months in which all the modules were implemented and tested the application with respective tools.

The various stages of the timeline have been tabulated below.

Description	Duration
Initial Contact	December, 2014
Planning	December, 2014
Content	January, 2015
Design	January, 2015 – February, 2015
Development	February, 2015 – April, 2015
Testing	April, 2015
Stage Environment Deployment	May, 2015
Live Environment Launch	May, 2015
Support	May,2015

Summary

An extensive study was done in this chapter on framework of the project, data collection and utilization, tools and techniques used to analyze the data. Focused on the timeline of the project which contains project planning and process in much deeper level. The following chapter allows reader to have a precise understanding on presenting the data collected and interpretation on the analysis.

Chapter IV: Data Presentation and Analysis

Introduction

Chapter IV focuses on the presentation of the data collected, approach used for analysis the data and also the interpretation behind the analysis.

Data Presentation

In the project implementation phase, data that was collected in the database will be executed through respective MySQL queries and the result was represented as a webpage or in the form of Navigation. Figure 12 demonstrates various tables involved in this project. Some of the tables place very important role in retrieving and presenting the same in the page.

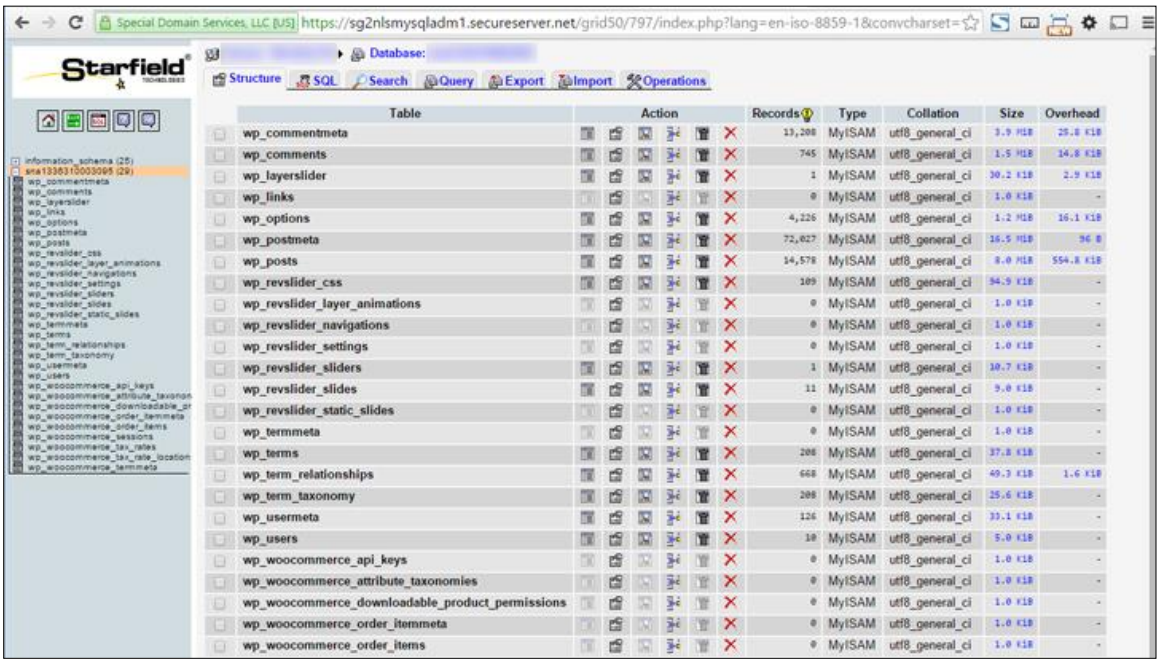

Figure 12: Wordpress CMS Tables

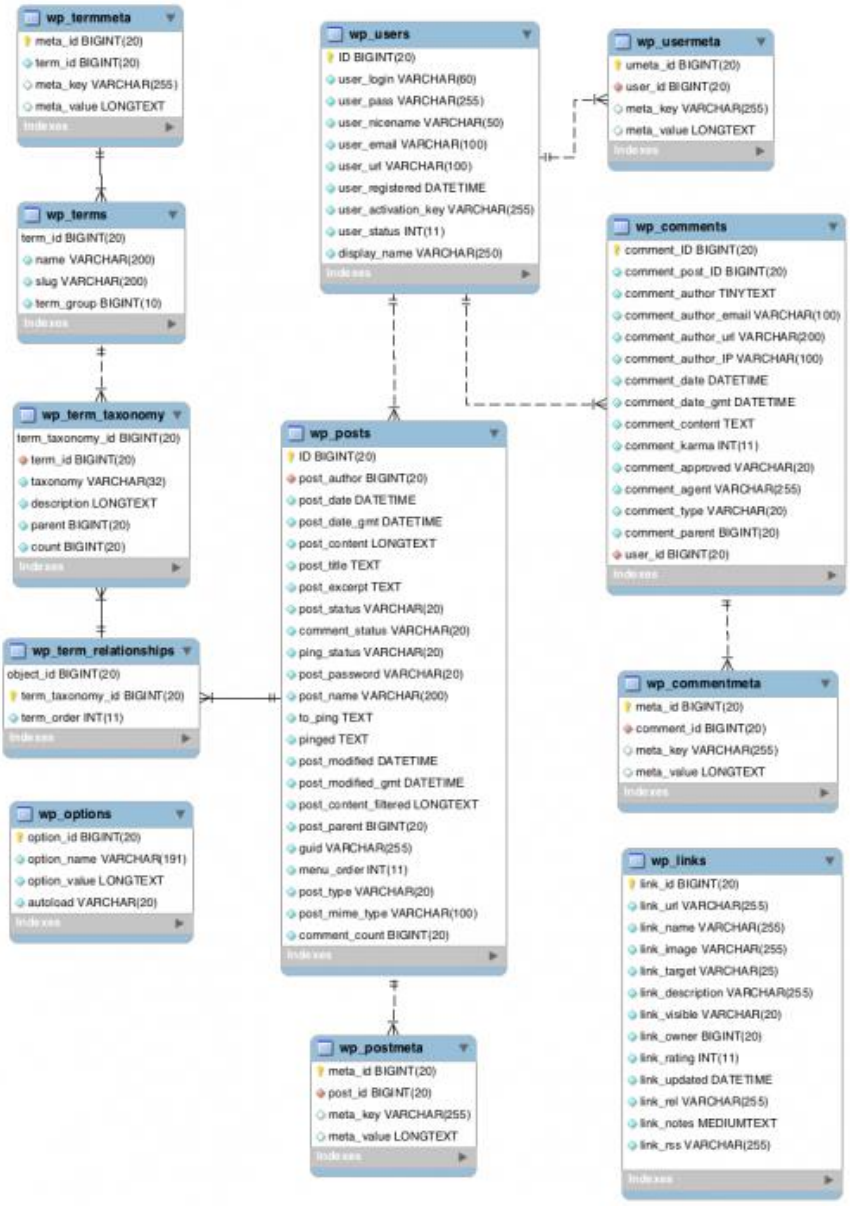

Figure 13: Database Diagram with Various Tables in CMS

wp_comments: All the user's comments within the website is stored in this table. Some of the comments which are spams are not stored in this database–all spams can be filtered using a plugin which helps to quarantine those and can delete the same.

In *wp_comments* table, some of the important fields includes:

comment_ID, which is an auto increment integer field which helps to find out particular users comments.

comment_author_email, which stores the email of the author which helps the admin to communicate with the user.

comment_date, which stores the date when the comment is entered.

Table 1: Data Fields of wp_comments Table

Field	Type
comment_ID	bigint(20) unsigned
comment_post_ID	bigint(20) unsigned
comment_author	Tinytext
comment_author_email	varchar(100)
comment_author_url	varchar(200)
comment_author_IP	varchar(100)
comment_date	Datetime
comment_date_gmt	Datetime
comment_content	Text
comment_karma	int(11)
comment_approved	varchar(20)
comment_agent	varchar(255)
comment_type	varchar(20)
comment_parent	bigint(20) unsigned
user_id	bigint(20) unsigned

wp_posts: This is a very important table were all the posts in the website are stored in this table. All the pages and menu navigations are also stored in this table. Almost all the posts are stored in this table and these are retrieved and rendered into the page.

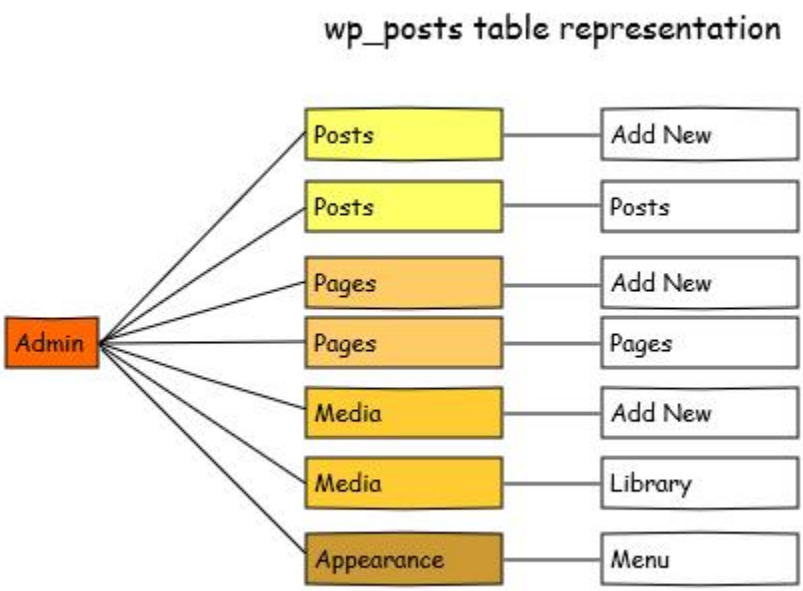

Figure 14: wp_posts Table Structure

wp_posts table got many fields, out of which some of the important fields are:

ID: Holds unique integer value of auto increment. This is an important field by which admin can identify the posts accordingly in the website.

post_content: The entire content related to the post is stored in this field which has a long text as data-type value.

Table 2: Data Types of wp_posts Table

Field	Type
ID	bigint(20) unsigned
post_author	bigint(20) unsigned
post_date	Datetime
post_date_gmt	Datetime
post_content	Longtext
post_title	Text
post_excerpt	Text
post_status	varchar(20)
comment_status	varchar(20)
ping_status	varchar(20)
post_password	varchar(20)
post_name	varchar(200)
to_ping	text
pinged	text
post_modified	datetime
post_modified_gmt	datetime
post_content_filtered	longtext
post_parent	bigint(20) unsigned
guid	varchar(255)
menu_order	int(11)
post_type	varchar(20)
post_mime_type	varchar(100)
comment_count	bigint(20)

Data Analysis

Web Analytics is the process of collecting and reporting of data to the admin about the issues and it is a process of improving those areas and optimize them accordingly. Through graphical representation it provides data from which location a particular page has been viewed. Through this web traffic can be measured and can

be identified some of the areas where it should be improved. This can be used as a tool to improve the effectiveness of a website.

In this project Google Analytics code snippet has been added on all web pages of the site, which help to get the data from where the page has been downloaded and viewed details accordingly. To achieve this need to have an account with Google and get registered with Analytics tools. Once after getting credentials, login to the Google Analytics website. In getting those web traffic details accurately, initially have to register the domain name and subdomain names accordingly. Google Analytics is also a WordPress plugin which can be directly installed on to the template. Updating necessary details are very simple in Google Analytics.

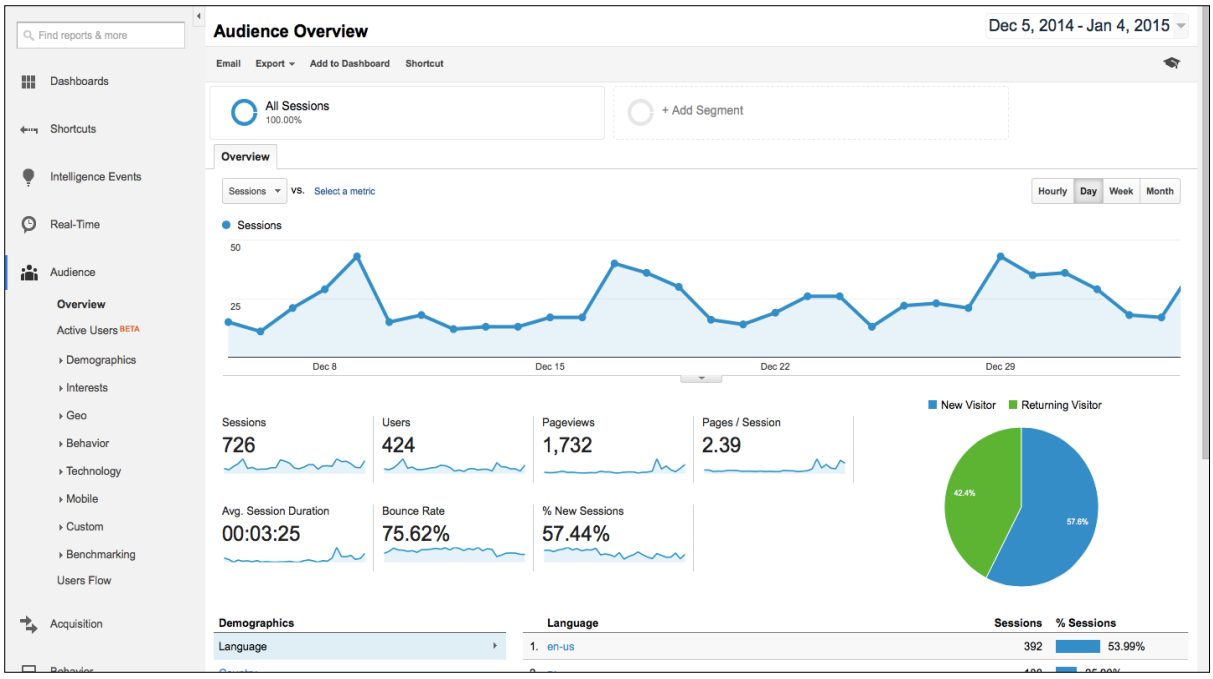

Figure 15: Google Analytics Dashboard

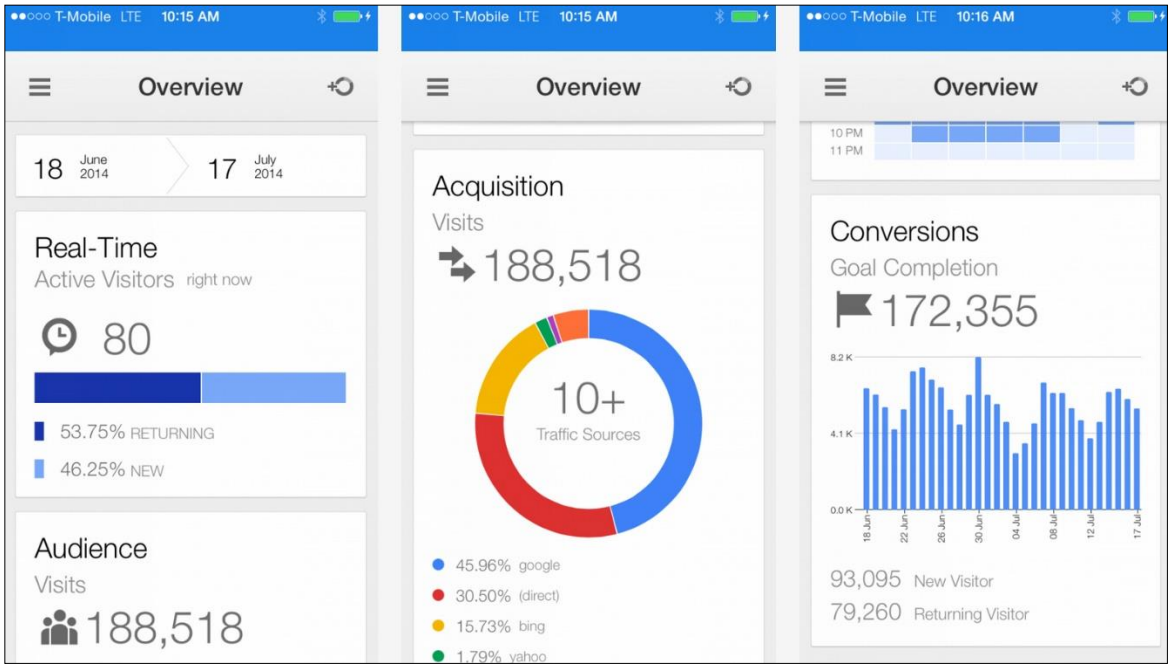

Figure 16: Google Analytics in iOS App

Summary

This chapter detailed on the actual data which was collected and approach used in analysis of the data. Next chapter illustrates the results, answers to the research questions, conclusions based on the results and recommendations.

Chapter V: Results, Conclusion, and Recommendations

Introduction

This chapter focuses on the achieved results of the project, answers to the project question. Also explains the conclusion from the results. Based on the results and conclusion recommendations are provided.

Results

The main focus of this project was to enhance the data efficiency using content management system which was accomplished successfully. Website related content was updated dynamically through admin console of the website using Content Management System. Through central system of the admin console all the content are maintained and updated accordingly, this application allows publishing, editing, deleting and maintaining content from a central location UI interface. Used RWD concepts to make a webpage compatible with other devices, applied Web Analytics standards to track the errors and user activities, made website search engine compatible and implemented accessibility concepts in this extensive study.

Research Questions–Answered

1. **How much time was saved in order to update the page using CMS?**

Eighty percent of the utilization time was reduced from actual, as using CMS everything was automated. Avoids all the long process of updating a simple section or page and also reduced the volume of the resources.

2. **How RWD (Responsive web design) helped in increasing the site-traffic?**

RWD concepts played a major role to improve site traffic as well as quality of the web pages. User can access the web page using different form factors like tablets and smart-phone mobile devices and update the data while on the go. RWD web page has a structure of either fluid or grid, and has very flexible images / icons which are compatible across all the devices. Media queries are used in this pattern to achieve responsiveness.

3. **How can admin track user's activities like when & where and how long user viewed a particular page and also the number of pages viewed by the user?**

In order to get users access logs, most of the website used Analytics tool Google Analytics. Admin can clearly track the activities on when & where and how long user was on that particular page, and in tracking user number of pages viewed. This helped web admin whether to improve the web page depending on user's activities on the page.

Conclusion

After developing this project through CMS (Content Management System) most of the manual content update has been reduced. Everything was handled through admin console of a website. Using admin console, all data content was updated very easily and more efficiently. Based on the final results of this project, it has been easy to manipulate, fast updates, easy database recovery, maintain easy

database backups, through some of the plugins updating menu navigation made easy, most percent of the work was done using a mobile device and also maintained the branding standards of a website. Through Web Analytics, admin can identify and rectify the problem in the website, in this way website performance was increased. Through RWD (Responsive Web Design) concept, all the web pages in a website was accessed in all major devices like desktops, tablets and mobiles of any different sizes.

Recommendations

Although after putting lot of efforts to complete this project, identified some negative areas where it needs more attention to cover those areas. Have a plan to implement those changes in next phase of the project.

1. Need to implement automated process of checking the server periodically without doing any manual process.
2. Implementing a native app from the web application, in this way users will be notified with updates on push of a button.
3. Improve more on web analytics, which helps to identify any issues with the pages and rectify it accordingly.
4. Need to implement a dynamic image composer which helps admin to just upload an image and it automatically crops and saves the same with different sizes.
5. Need to implement a feature where the system automatically takes backups of all the files periodically.

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