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Running head: DATABASE MANAGEMENT SYSTEM FOR BYUH NAPELA

CENTER



DATABASE MANAGEMENT SYSTEM FOR BYUH JONATHAN NAPELA CENTER

A graduate project submitted to Dakota State University in partial fulfillment of the requirements for the degree of

Master of Science

in

Information Systems

August, 2017

By

Olivia K. F. Moleni

Project Committee:

Dr. Ronghua Shan Dr. Christopher J. Olson Dr. Stephen Krebsbach



PROJECT APPROVAL FORM

We certify that we have read this project and that, in our opinion, it is satisfactory in scope and quality as a project for the degree of Master of Science in Information Systems.

Student Name: Olivia K. F. Moleni

Master's Project Title: <u>DATABASE MANAGEMENT SYSTEM FOR BYUH</u> JONATHAN NAPELA CENTER

Faculty supervisor: Date: 8/23/2017

Committee member: Date:

u Olson Committee member: U Date: 8/23/2017

ABSTRACT

The purpose of this project is to build a database management system (DBMS) for the Jonathan Napela Center department. The Napela Center is a department for students who are majoring or minoring in Hawaiian Studies and/or Pacific Island Studies. Currently the Napela Center uses Microsoft Excel as their DBMS to store and track both current and past student information. Unfortunately, this system hasn't been working well for them due to unreliable information, limited user access and sometime can get too complex with too much data. So the director of the department decided to seek for another system.

This paper will examine the process of building a new DBMS for the Napela Center using XAMPP as the web server, phpMyAdmin as the web application and Drupal 7 as the content management system (CMS). I chose the XAMPP (Cross-Platform (X), Apache (A), MariaDB (M), PHP (P) and Perl (P)) because it seemed to be the "ideal tool for students developing and testing applications in PHP and MySQL" (Dvorski, 2007). I chose phpMyAdmin because Delisle (2009) considered PhpMyAdmin as one of the most prominent free open source application that provides a dynamic graphical interface for executing MySQL. And last but not the least, I chose Drupal 7 because it is the standard CMS that BYU Hawaii uses for their website.

Keywords: database management system (DBMS), XAMPP, phpMyAdmin, content management system (CMS), web-based database (WBDB)

DECLARATION

I hereby certify that this project constitutes my own product, that where the language of others is set forth, quotation marks so indicate, and that appropriate credit is given where I have used the language, ideas, expressions or writings of another.

I declare that the project describes original work that has not previously been presented for the award of any other degree of any institution.

Signed,

oleni

Olivia Moleni

TABLE OF CONTENTS

DATABASE MANAGEMENT SYSTEM FOR BYUH JONATHAN	N NAPELA CENTERI
PROJECT APPROVAL FORM	Ш
ABSTRACT	
DECLARATION	IV
TABLE OF CONTENTS	V
LIST OF TABLES	VII
LIST OF FIGURES	VIII
CHAPTER ONE: INTRODUCTION	
BACKGROUND OF THE PROBLEM	
STATEMENT OF THE PROBLEM	11
OBJECTIVES OF THE PROJECT	
CHAPTER TWO: LITERATURE REVIEW	
CHAPTER THREE: SYSTEM DESIGN	
RESEARCH METHODOLOGY	
REQUIREMENTS ANALYSIS	
DESIGNING THE WBDB	
DATABASE DEFINITION	19
DATABASE PROCESSING FLOW CHART	
BUILDING OF THE DBMS	21
SELECTING THE WEB SERVER	
SELECTING THE WEB APPLICATION	
SELECTING THE CONTENT MANAGEMENT SYSTEM (CMS)	
SYSTEM REQUIREMENTS:	24
Hardware Recommendations	
Database Requirements	
CHAPTER FOUR: CASE STUDY	25
IMPLEMENTATION	
INSTALLING THE XAMPP WEB SERVER	
STEP 1: INSTALL THE XAMPP	
CONTINUE TO CONFIGURE PHPMYADMIN AND DRUPAL 7	

STEP 2: DOWNLOAD AND EXTRACT DRUPAL	
STEP 3: CREATE THE DATABASE	
STEP 4: RUN THE INSTALLATION SCRIPT	
STEP 5: SETTING UP CRON	
STEP 6: CONFIGURE CLEAN URLS	
CREATING CONTENTS	45
CREATING VIEWS	46
DEBUGGING AND TESTING	46
First Objective: Reduce the number of errors	
Second Objective: To maintain (enter, update, and delete) data	
Third Objective: To perform searches	51
Fourth Objective: To track the status	
Fifth Objective: To report	
Sixth Objective: To ensure the data is safe	55
CHAPTER FIVE: CONCLUSIONS	
REFERENCES	60
APPENDICES	63
APPENDIX A: USERS' MANUAL	63
WORK BREAKDOWN STRUCTURE	63
Requirements Analysis	63
Design	
Implementation	64
Maintenance	64
GANTT CHART	64
APPENDIX B: SYSTEM TECHNICAL DOCUMENTATION	65
MONITORING AND MAINTAINING THE DATABASE SYSTEM	65
ADDING NEW CONTENTS AND/OR NODES AND VIEWS	67
Making changes and removing the contents and/or nodes and views	
CREATING ACCOUNTS	
CREATING TAXONOMY	79

LIST OF TABLES

Table 1. Top 10 Database Management System	14
Table 2. Advance Search from the Napela Center DBMS	16
Table 3. Course Content	
Table 4. Course View sort by the semester 2171	
Table 5. Successful data entry	
Table 6. Duplicated data entry	
Table 7. Select the content to be changed	49
Table 8. Check the field to be change	49
Table 9. Confirm the changes	50
Table 10. Result of the changes made	50
Table 11. Adding Filter Criteria	
Table 12. Search in Enrollment View	52
Table 13. Student View Search	53
Table 14. Student Result	53
Table 15. Students that have graduated	
Table 16. Exporting report to CSV file	55
Table 17. Result of exported CSV file report	55
Table 18. Add Role	
Table 19. Create Accounts	
Table 20. Nodeaccess	

LIST OF FIGURES

Figure 1. Number of Systems per Category	5
Figure 2. Ranking Scores per Category in percent 15	5
Figure 3. Schema diagram for the Napela Center Database)
Figure 4. Database Design for the Napela Center)
Figure 5. Database Processing Flow Chart	1
Figure 6. Access the Apache website:	3
Figure 7. Download link for XAMPP)
Figure 8. Opening the XAMPP installer file)
Figure 9. Setup XAMPP 30)
Figure 10. Setup the XAMPP installation folder)
Figure 11. Select XAMPP Components	1
Figure 12. XAMPP ready to install	1
Figure 13. XAMPP installation in progress	2
Figure 14. Unpackaging XAMPP files	2
Figure 15. Setup XAMPP Windows Security firewall	3
Figure 16. XAMPP installation completed	3
Figure 17: Select the XAMPP Language	1
Figure 18: Start the Apache and MySQL on XAMPP	1
Figure 19: Test Apache and MySQL	5
Figure 20: phpMyAdmin Confirmation	5
Figure 21: Open a web browser and enter "localhost"	5
Figure 22: Next download and extract Drupal	5
Figure 23: Download "Drupal Core 7.54"	7
Figure 24: Save the Drupal 7 zip file	7
Figure 25: Sign in to phpMyAdmin as the root user	3
Figure 26: Select "User Account", and then "Add user"	3
Figure 27: Fill out the login information)

Figure 28: Select COLLATION utf8_unicode_ci	
Figure 29: A confirmation message will show	
Figure 30: Point the browser to the site	
Figure 31: Keep the Drupal default language	
Figure 32: Fill out the database information	
Figure 33: Let the installation complete.	
Figure 34: Configure the site	
Figure 35: Drupal Installation complete	
Figure 36: Visit the site	
Figure 37: Setting up Cron	
Figure 38: Clean URLs in Drupal	
Figure 39: Use update.php	65
Figure 40: DB Update completed	66
Figure 41: After update, select the Administration link	66
Figure 42: Run Cron	67
Figure 43: Select Structure	
Figure 44: Creating a new Content Type	69
Figure 45: Adding a new View	
Figure 46: Filling out a Content Type template	
Figure 47: Filling out a View template	
Figure 48: Result of a Content Type	
Figure 49: Result of a View	
Figure 50: Views Operations	
Figure 51: Content Types Operations	
Figure 52: Select Administration>People	76
Figure 53: Select Add user	
Figure 54: Fill out the information	
Figure 56: Creating Taxonomy	
Figure 57: Backup and Migrate	
Figure 58: Quick Backup	80
Figure 59: Prompt you to save file	

CHAPTER ONE: INTRODUCTION

Database Management System for BYUH Jonathan Napela Center

Background of the Problem

Jonathan Napela Center for Hawaiian and Pacific Islands Studies is a very small department at the Brigham Young University- Hawaii, with six instructors for Hawaiian Studies and five for Pacific Islands Studies. This department does not have that many students but when it comes to analyzing student information for decision making, they run into some duplication errors and inconsistent values. When the director of the department requests for status and history of current and past student information, it takes weeks for the secretary to get that report done. First, she has to collect data from three different departments: Institutional Research, Alumni and Academic Advising. Second, she has to sort each report and select only what they need for the report. Third, if the information she receives is outdated she has to look elsewhere for the updated information, which happens all the time. Fourth, she has to input and compile all required information into a Microsoft Excel Spreadsheet then run the report requested by the Director.

According to the Director, he has been searching for solutions in other academic departments and have found that they use database to maintain student information. It is then he decided that he needs a database for his department. He could have easily just use what the other departments were using but his needs were different compared to other departments. He started searching for someone to build one for them since they are not familiar with technology. When I heard about his concern through a friend, I decided to approach him and find out if he had found someone to help them. After meeting with the Director and the secretary for the first time, they offered me to work on this database project. As I conversed with the Director for more information about the project, I learned that the department has an existing website: <u>http://culturesandlanguages.byuh.edu/</u> which he would like this database linked into it. I also discovered that this website is built on a Drupal content management system (CMS) framework. This gave me the idea that the department will need an online collaborating tool that can take data, sort it and give users ease of access from anywhere with the ability to display data via the web. Therefore, client installation will not be necessary because users will only need a web browser. It will be an easy cross-platform usage with simplified security. Updates will be done live behind the scene and many users can access it at the same time.

Since the university has a strict budget and it is already using Drupal, I decided to follow the same standard and use Drupal as my framework. Drupal requires a familiar understanding of HTML, CSS and PHP. With that being said, I was able to learn the basic of these languages when I enrolled in INFS 736 and 730 and therefore want to put it to practice. Drupal is free, more secure, improved performance and dynamic. There are many ways to create a database in Drupal but in my case I will be creating the database and user using phpMyAdmin which I also learned in INFS 730.

Statement of the problem

The main problem in this process is having to repeat the same thing over and over whenever there is a student status or history report requested from the Director. They do not have any system where it stores all this information and be able to retrieve or update them when the student enrolls, graduate or drop out. Another problem that arises, is when the secretary manually inputs data to the spreadsheet in which sometime runs into duplication; such as student ID number, courses and other errors; such as missing data. This department is in need of a system that could maintain student information and keep track of current and past students as well as preparing for future students. They will also need training for the new system.

Objectives of the project

The main purpose of this web-based database (WBDB) is to help the Jonathan Napela Center, obtain accurate student status and history information that will allow them to make better decisions for the department's progression. With that being said, the objectives of this project are to:

- Reduce the number of errors in data entry.
- To maintain (enter, update, and delete) data on current and past students information.
- To perform searches on students by major, minor, terms, graduation date, GPA and so forth.
- To track the status of current, graduated and dropout students.
- To report on current, graduated and dropout student status and history.
- And to ensure the data is safe and secure in accordance to the Family Educational Rights and Privacy Act (FERPA) of students.

CHAPTER TWO: LITERATURE REVIEW

Database Management Systems has been around since the 1960s but "the need to store and sort data is much older" (Kopal, 2015). In 1964, Charles W. Bachman designed the very first database management system (DBMS) at General Electric and named it the Integrated Data Store (IDS). "It formed the basis for the network data model, which was standardized by the Conference on Data Systems Languages (CODASYL) and strongly influenced database systems through the 1960s" (Ramakrishnan & Gehrke, 2000). In 1973, Bachman was awarded as the first recipient of ACM's Turing Award for his achievement in the database field. On February 2015, U.S. President Barack Obama awarded Bachman with the "National Medal of Technology and Innovation for fundamental inventions in database management, transaction processing, and software engineering, for his work designing the first computer database" (Kugler, 2015). Not long after the IDS was launched, IBM developed the second DBMS in the late 1960s and called it the Information Management System (IMS). "IMS formed the basis for an alternative data representation framework called the hierarchical data model" (Ramakrishnan & Gehrke, 2000). A couple of years later, Edgar F. Codd published an article in which he introduced a new data representation framework called the relational data model (Codd 1970). In this model, Codd recommended that all data in a database should be define in tables with columns and rows, which he called relations. This new framework became a rival to IDS and IMS which then became the dominant DBMS in the 1980s. In 1981, Codd won the Turing Award for his seminal work (Ramakrishnan & Gehrke, 2000).

Over the years, more data models were designed such as Object-relational DBMS (ORDBMS), Object-oriented DBMS (OODBMS) and so forth (Danielsen, 1998). Not only the data models spawn so quickly, DBMS expanded as well. According to the DB-Engines Ranking (2017), there are about 330 DBMS that are currently available today. The top 10 are listed in the table below.

Rank	DBMS	Score	Changes
1.	Oracle	1367.88	-7.00
2.	MySQL	1340.30	-8.81
3.	Microsoft SQL Server	1225.47	-0.52
4.	PostgreSQL	369.76	+ 0.32
5.	MongoDB	330.50	-2.27
6.	DB2	197.47	+ 6.22
7.	Microsoft Access	127.03	+ 0.90
8.	Cassandra	126.72	+ 2.60
9.	Redis	121.90	+ 0.38
10.	Elasticsearch	117.65	+ 1.67
Copyr	ight © August 2017 DB	-Engines.c	:om

Table 1. Top 10 Database Management System

Note: The data are adapted from DB-Engines Ranking. (2017, July 31). Retrieved August 02, 2017, from <u>https://db-engines.com/en/ranking</u> Provided by Solid IT.

Out of the top ten database management systems, six of them uses Relational DBMS. These six are Oracle, MySQL, Microsoft SQL Server, PostgreSQL, DB2 and Microsoft Access. DB-Engines also showed two pie-charts with number of systems per database model category and ranking scores in each category (DB-Engines Ranking, 2017). The following figures indicate that the Relational DBMS still dominates in today's database management systems.

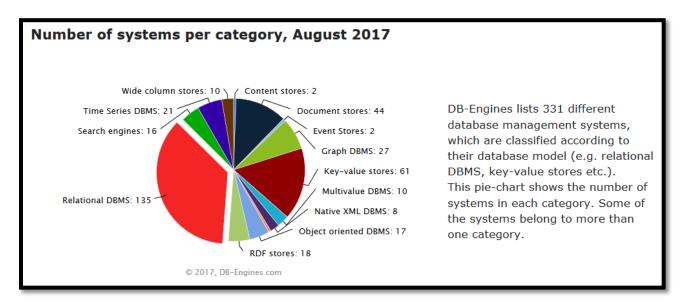


Figure 1. Number of Systems per Category. Adapted from DB-Engines Ranking. (2017, July 31). Retrieved August 02, 2017, from <u>https://db-engines.com/en/ranking</u> Provided by Solid IT.

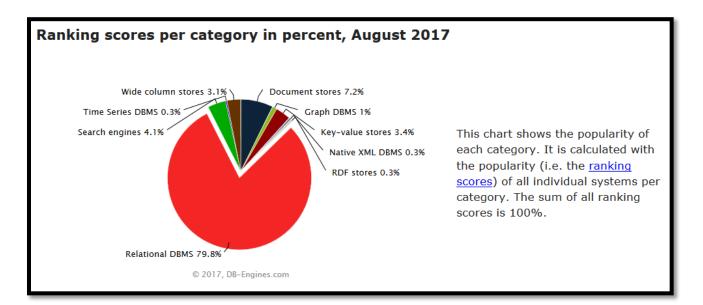


Figure 2. Ranking Scores per Category in percent. Adapted from DB-Engines Ranking. (2017, July 31). Retrieved August 02, 2017, from <u>https://db-engines.com/en/ranking</u> Provided by Solid IT.

As for this project, I decided to build a web-based database (WBDB), even though Microsoft Access and Excel has been the most common data management system, used by academic departments in Brigham Young University-Hawaii for data storage. They would use Excel to run statistical analyses, summarizing data by using pivot tables or perform simple data visualizations and creating ad-hoc reporting. However, sorting and manually updating data or trying to maintain multiple data users will not work for Excel. They would use Access to perform manual data entry, run basic query, combine multiple data sets and use recurrent data reporting. But it doesn't do well with summarizing or analyzing existing data sets. "While each tool has its own strengths and limitations, one isn't necessarily better than the other. Choosing the right tool is a matter of understanding your needs." (Staff, 2016)

I chose web-based database (WBDB) because of its reputation in database applications. I learned that WBDB is recognized for the following reasons:

- "Ease of use: point and click simplicity
- Accessibility: securely accessible from anywhere
- Lower total cost of ownership: to secure, scale, deploy and maintain" (LightSpoke, 2003).

Although "most databases in use nowadays are relational databases, client/server databases are the basis for WBDBs" (Moghaddam, 2009). I like that WBDB allows easy cross-platform usage on any operating system with simplified security. I admire its functions to do advance search and allow users to be specific. The following table shows this type of search interface:

Table 2. Advance Search from the Napela Center DBMS

Program View				
Student ID	Program		Program Code - Any - 💌	
	Total Cre	lits		
			Apply	
	And			
Operations				
- Choose an operation - 💌	Execute			
📄 StudentID Prog	ramCode	ProgramName		TotalCredits
M	IHWST	Minor Hawaiian Studies		59.00
H	NSTBA	Hawaiian Studies B.A.		109.50
E HI	NSTBA	Hawaiian Studies B.A.		0.00
M	IHWST	Minor Hawaiian Studies		163.00
M	IHWST	Minor Hawaiian Studies		60.00
E H	NSTBA	Hawaiian Studies B.A.		23.00
P. P.	AISBA	Pacific Islands Studies B.A.		35.00
H	NSTBA	Hawaiian Studies B.A.		47.00
N N	IIPAIS	Minor Pacific Islands Studies		96.00
P	AISBA	Pacific Islands Studies B.A.		91.00
		I 2 next⇒ last.»		

And last but not the least, I value how updates are done live behind the scene and many users can access it at the same time.

CHAPTER THREE: SYSTEM DESIGN

Research Methodology

There are many ways to collect information and data for the intent of making better decision and setting up future goals. Some may use interviews, surveys, publication research and many more. For this specific database management project, all data were received in an excel spreadsheet given to me from Institutional Research, Alumni and Academic Advising departments. These departments use online DBMS which allows them to run reports and export them to CSV files.

Requirements Analysis

As mentioned before, I met with the department director and the secretary to discuss the problem that they were having with the current system. Based on the director's description, they were using Microsoft Excel to run the reports that they needed for analyzing student information. The problem they were facing with this system, is data duplication, incomplete data information and taking at least two to three weeks to get the report done. The director also mentioned that other academic departments were using Microsoft Access to manage their student information. He asked if I could build one for them. I suggested to them using a web-based database (WBDB) system instead. I explained the benefits that the WBDB offers such as easy to use, securely accessible from anywhere, does advance search, cost less and so forth. The director was interested so was the rest of the team for the new system to be a web-based database system. Therefore, the plan began and the system was designed and implemented.

Designing the WBDB

The Napela Center database system is designed to have four tables. The first table is called "Program" for the list of programs available in the Napela Center. The second table is called "Student" which has personal information about the student. The third table is called "Enrollment" for tracking students that are enrolled in the department programs each semester. And last but not the least a table called "Course" for all students that are registered in the courses offered by the department.

Database Definition

Below is the list of fields that are associated with each table follow by the design of the database. Each table has their own primary key (PK) and foreign key (FK).

Program Table consist of the following fields: StudentID (PK), ProgramCode (PK), ProgramName,

TotalCredits, ProgramNote.

Student Table consist of the following fields: StudentID (PK), ProgramCode (FK), LastName,

FirstName, Gender, DOB, Email, Status, City, State, GraduationSem, Career and StudentNote.

Enrollment Table consist of the following fields: StudentID (FK), ProgramCode (FK), CourseCode

(PK), Semester (PK), EnrollmentLevel, SemCredits and EnrollmentNote.

Course Table consist of the following fields: CourseCode (PK), StudentID (FK), ProgramCode

(FK), Semester (FK), CourseName, CourseCredits and CourseGrade.

PROGRAM <u>StudentID</u>	ProgramCode	ProgramName	TotalCredits	ProgramNote							
STUDENT											
StudentID	ProgramCode	LastName	FirstName	Gender	DOB	Email	Status C	City State	GraduationSer	n Career	StudentNote
ENROLLMENT											
StudentID	<u>ProgramCode</u>	CourseCode	Semester	EnrollmentLevel	SemCredits	EnrollmentNote]				
<u>StudentID</u> COURSE	ProgramCode	<u>CourseCode</u>	<u>Semester</u>	EnrollmentLevel	SemCredits	EnrollmentNote]				
	<u>ProgramCode</u> CourseCode	<u>CourseCode</u> ProgramCode	<u>Semester</u> Semester		SemCredits CourseCredits	1]				

Figure 3. Schema diagram for the Napela Center Database.

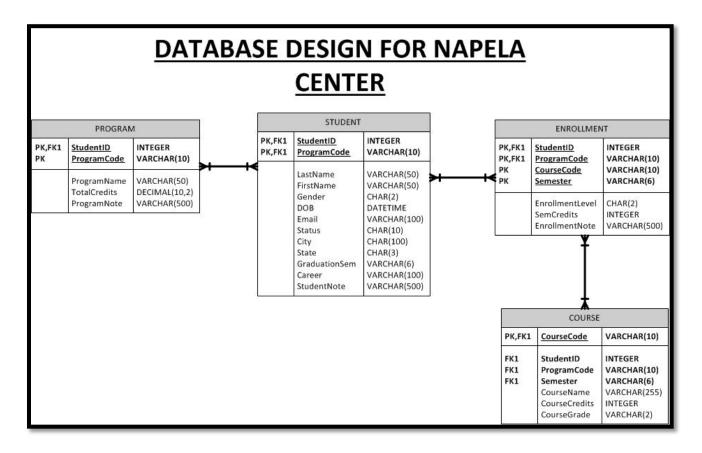


Figure 4. Database Design for the Napela Center

Database Processing Flow Chart

The process of this database is as follow:

- 1. The worker collects excel spreadsheet with student data information in it.
- 2. The worker will input those information into the database.
- 3. When the director needs a report, he will inform the worker what requirements he needs in the report.
- 4. The worker will select those fields using the advance search and run a query.
- 5. Once the report is generated, the worker can export that data to either a .csv, .xls or .doc

depending on director's request.

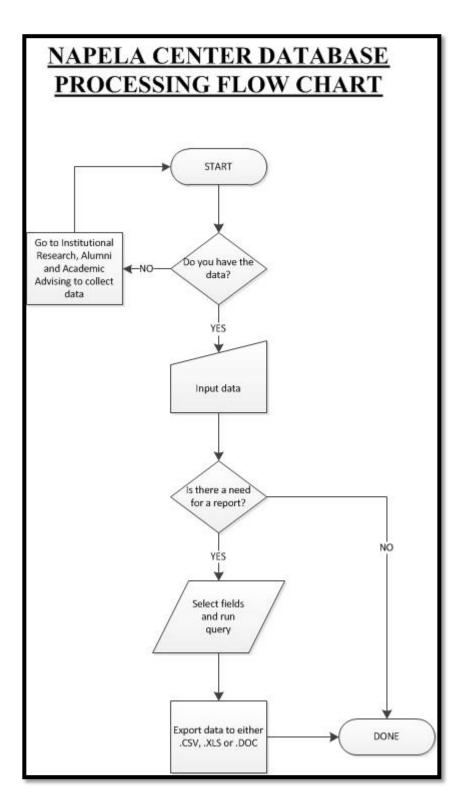


Figure 5. Database Processing Flow Chart

Building of the DBMS

I plan to build this web-based database (WBDB) in a way that is user friendly and easy to maintain. This database will allow the administrator to store, retrieve, update, and delete student

information when necessary. Overall, this simple information management application will allow the department to manage related data more efficiently and in return use it for referencing, reporting, and analysis. With that being said, I will need to have a web server, web application and a content management system in order to complete this project.

Selecting the Web Server

According to Schroeder, Goddard & Ramamurthy (2000), "The exponential growth of the Internet, coupled with the increasing popularity of dynamically generated content on the World Wide Web, has created the need for more and faster Web servers...." In an article written by Robin Muilwijk (2016), he thinks that the Apache HTTP Server is by far the most popular web server. With that being in mind, I chose to use XAMPP which stands for Cross-Platform (X), Apache (A), MariaDB (M), PHP (P) and Perl (P). "XAMPP is a small and light Apache distribution containing the most common web development technologies in a single package. Its contents, small size, and portability make it the ideal tool for students developing and testing applications in PHP and MySQL" (Dvorski, 2007). Not only it is an ideal tool for developing and testing applications, there were other people who would use it for their web-based projects. Walia & Gill (2004) used the XAMPP for building their Student Record Management System (SRMS). De Miguel-Bilbao, Aguirre, Lopez Iturri, Azpilicueta, Roldan, Falcone & Ramos, (2015) used the XAMPP for evaluating electromagnetic interference and exposure assessment based on WiFi devices. And last but not the least, Kassim, Mazlan, Zaini & Salleh (2012) used the XAMPP to build a web-based student attendance system.

Selecting the Web Application

In the field of computing, a web application is considered as a client-server software application in which the client runs in a web browser. According to Elbaum, Karre and Rothermel, "web applications have become critical components of the global information infrastructure, and it is important that they be validated to ensure their reliability" (Elbaum et al., 2003). Selecting one is not an easy task, but I will try my best to choose one that is reliable. There are a few web application written for the management of website databases. Such application include: Web browser-based control panel (such as "CPanel" or "Plesk"), phpMyAdmin, creating the database directly and so forth. With this project, I chose to use phpMyAdmin for the following reasons. Delisle (2009) considered PhpMyAdmin as one of the most prominent free open source application that provides a dynamic graphical interface for executing MySQL. "Bringing a web interface to MySQL has made phpMyAdmin an indispensable tool for MySQL and web developers" (Delisle, 2009). Rosie (2014) defined PhpMyAdmin as a user-friendly interface that performs most of the MySQL functions and has the capability to alter, import and export data.

Selecting the Content Management System (CMS)

Nurminen, Wikman, Kokkinen, Muilu and Gronhdm (2008) states the function of a content management system is to protect the code of a web site and allow the developers to develop and maintain the site with high level graphical user interface. As for this project, I decided to use Drupal 7. There are many reasons for this but here are a few of them. Drupal 7 is the standard platform that Brigham Young University-Hawaii uses for all department websites that are linked on the campus web page. Drupal also enable users to update their web pages without technical knowledge and ensure that it fits their organization's workflow (Patel, Rathod and Prajapati, 2011). Drupal is a dynamic platform and it will grow as your need expands. In an article wrote by Glen Stansberry (2009), Drupal is known for their many modules that can add lots of interesting features like forums, user blogs, profiles and so forth. One of Drupal's most popular feature is the Taxonomy module which allows for multiple levels and types of categories for content types (Stansberry 2009). And last but not the least, I like Drupal because of its many plugins.

SYSTEM REQUIREMENTS:

Hardware Recommendations

- 3 GHz Processor
- 2 GB RAM
- DISK SPACE: 60 MB is needed for a website with many contributed modules and themes installed. However, a minimum of 80GB or more for the database, base installation, files uploaded by the users, backups and other files.
- 1024 x 768 Resolution Monitor
- Minimum 56 Kbps connection speed Web Server Requirements
- Apache, Nginx, Microsoft IIS or any other web server with proper PHP support.

Database Requirements

- Drupal 7:
 - o MySQL 5.0.15/MariaDB 5.1.44/Percona Server 5.1.70 or higher with PDO,
 - PostgreSQL 8.3 or higher with PDO,
 - SQLite 3.3.7 or higher
 - o PHP 5.2.5 or higher (5.4 or higher recommended). Browser Requirements
- Internet Explorer 6.x and later
- Firefox 5.x and later
- Opera 12 and later
- Safari 5.x and later
- Google Chrome

Known Issues: IE8 and older has a problem with loading more than 31 style sheets, a situation that may be encountered if you are using a contributed theme or number of contributed modules. An acceptable workaround is to enable CSS aggregation (Drupal Association, 2001).

CHAPTER FOUR: CASE STUDY

Implementation

This involves the process of building the web server - XAMPP, application server - phpMyAdmin and the content management system – Drupal 7. As mentioned before, Drupal 7 has so many module that you can download from drupal.org and use it for building the website. The hard part of this is finding the right module that will fit your needs. For this project I have downloaded so many and did testing to see which will meet the objective of this project. In the end, I found the following modules to be more qualified for this project. I downloaded backup_migrate, chart, ckeditor, ctools, entity, nodeaccess, token_custom, unique_field, views, views_bulk_operations, views_data_export, views_distinct and so forth. Each module plays an important role on the website which will be explained later.

I will also include creating the website contents, views and populating it with data for testing. Creating the contents can be as simple as you want or complicated if you are familiar with Drupal 7. In my case, I will keep it simple. There are two types of content, "Basic Page" and "Article". For this project I will use the "Basic Page". It is important that you create the contents before the views. Once you create all the contents you need, then you will have to start filling out your contents with data before you can create your views. "Views" is a powerful module that allows administrators and site designers to create, manage and display lists of content. For example, the two tables below presents the "Course Content" and the "Course View".

Table 3. Course Content

Create Course ⊛	RVII
Home » Add content	
StudentID *	
CourseCode *	
- Select a value -	
CourseName *	
- Select a value -	
- None -	•
Semester * - Select a value -	
CourseGrade	
- None - 💌	
CourseCredits *	
CourseNote *	

Table 4. Course View sort by the semester 2171.

Course V	View						
Student ID		- An	se Name Course Code y - • - Any - • seGrade	e Semeste 2171	r •	0	
Course Credits Apply							
Operations							
- Choose an	operation -	- Execut	e				
Chudant	C	Courses			C	Course	
ID Student	Course Code	Course Name	Course Desc	Semester	Course Grade	Course Credits	
	006413	PMGT 499	PUBLIC MANAGEMENT	2171	в	3	
	006411	PMGT 300	PUBLIC POLICY	2171	C-	3	
	006481	IT 240	WEB DESIGN	2171	F	3	
	006699	ICS 151	CULTURAL STUDIES THEORY	2171	С	2	
	002334	ICS 261	CULTURES OF OCEANIA	2171	А	3	
	006442	CIS 101	BEGINNING PROGRAMMING	2171	в	3	
	001172	GEOG 471	GEOGRAPHY OF THE PACIFIC	2171	C-	3	
	006731	PAIS 300	FRAMING CULTURES MOANA NUI	2171	A	3	
	003584	PAIS 390R	SPECIAL TOPICS	2171	B+	3	
	003548	PAIS 105	INTRO TO PACIFIC ISLANDS	2171	A	3	
CSV XLS DOC			1 2 next> last»				

Installing the XAMPP Web Server

STEP 1: INSTALL THE XAMPP



Figure 6. Access the Apache website: <u>https://www.apachefriends.org. To download the</u> <u>installer.</u>

	Annala Estado					
	Apache Friends	Download	Add-ons	Hosting C	Community A	bout
	Download	d				
	KAMPP is an easy to install A	pache distributio	n containing	g MariaDB, P	HP, and Perl.	Just
C	download and start the installe	er. It's that easy.				
	townload and start the installe		5.6.30), 7.0.15	8 7.1.1	
), 7.0.15	8 7.1.1 Size	
	Version	Windows	sum), 7.0.15 Download (32	Size	•
	Version What 5.6.30 / PHP 5.6.30 What 7.0.15 / PHP 7.0.15 What	Windows Check	sum sha1		Size 2 bit) 109 Mb	

Figure 7. Download link for XAMPP.

Opening xampp-win32-5.6.30-0-VC11-installer.exe	
You have chosen to open:	
xampp-win32-5.6.30-0-VC11-installer.exe	
which is: Binary File (110 MB)	
from: https://downloadsapachefriends.global.ssl.fastly.net	
Would you like to save this file?	
Save File Canc	el

Figure 8. Opening the XAMPP installer file. Save the file and run it.

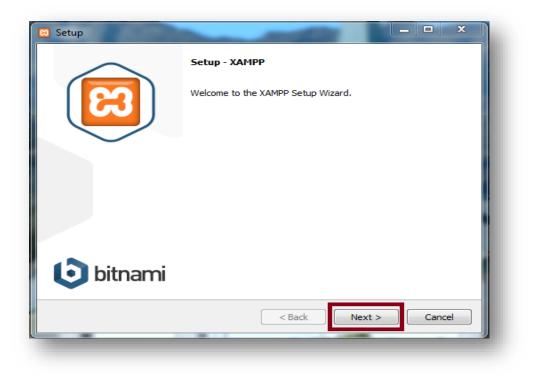


Figure 9. Setup XAMPP - Accept all default settings.

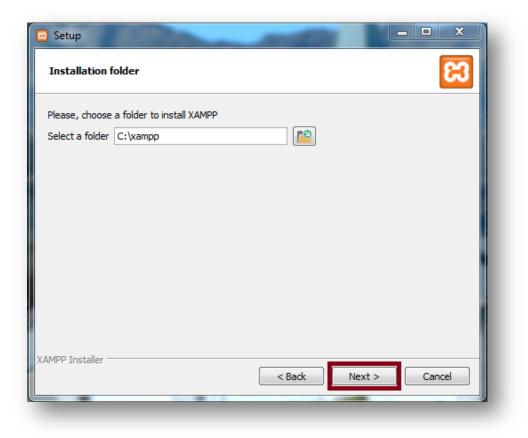


Figure 10. Setup the XAMPP installation folder. Click Next.

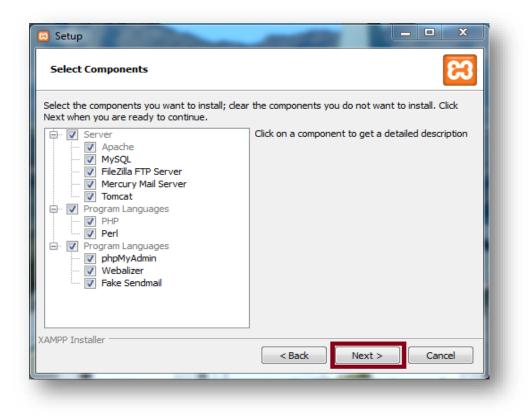


Figure 11. Select XAMPP Components. Click Next

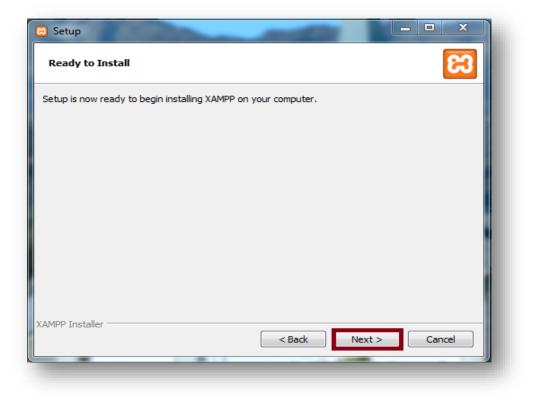


Figure 12. XAMPP ready to install. Click Next

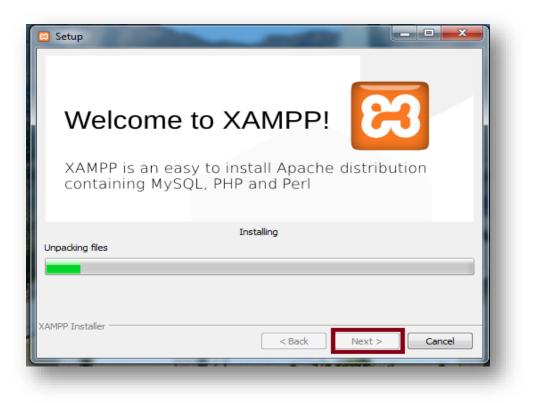


Figure 13. XAMPP installation in progress. Click Next.

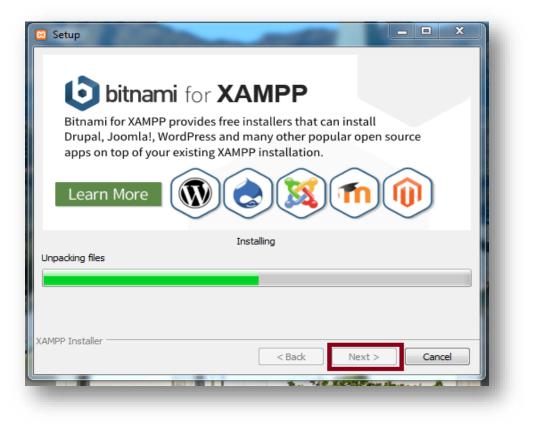


Figure 14. Unpackaging XAMPP files. Click Next

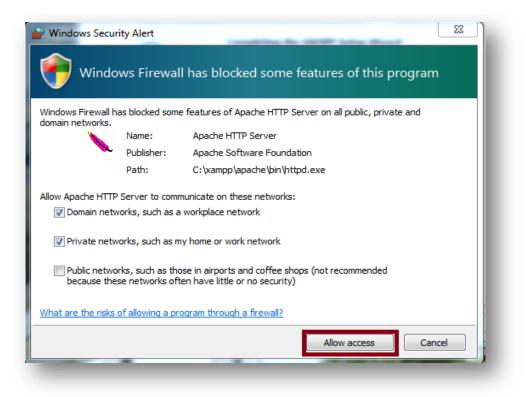


Figure 15. Setup XAMPP Windows Security firewall. Allow Access

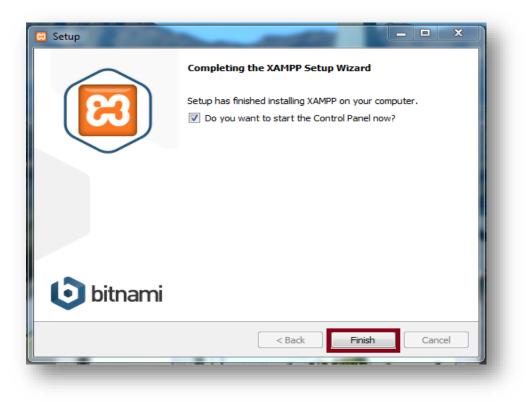


Figure 16. XAMPP installation completed. Click Finish

D
Save Save

Continue to Configure phpMyAdmin and Drupal 7

Figure 17: Select the XAMPP Language.

🙁 XAMPP Contr	rol Panel v3.2.2	[Compiled: Nov 12th	2015]				- O X
8	XAMPP Control Panel v3.2.2						Je Config
Modules Service Mo	dule PID(s) Port(s)	Actions				Netstat
Ap	ache		Start	Admin	Config	Logs	Shell
My	SQL		Start	Admin	Config	Logs	Explorer
File	eZilla		Start	Admin	Config	Logs	Services
Mer	rcury		Start	Admin	Config	Logs	😡 Help
Тог	mcat		Start	Admin	Config	Logs	Quit
5:50:56 PM [r 5:50:56 PM [r 5:50:56 PM [r 5:50:56 PM [r 5:50:58 PM [r 5:50:58 PM [r 5:50:58 PM [r	main] ab main] XA main] Ch main] All main] Init main] Sta	ere will be a security di but running this applica MPP Installation Direc ecking for prerequisite prerequisites found ializing Modules arting Check-Timer ntrol Panel Ready	ation with ad tory: "c:\xar	ministrator r			E T

Figure 18: Start the Apache and MySQL on XAMPP

Service	Module	PID(s)						
			Port(s)	Actions				Netstat
	Apache	6500 7396	80, 443	Stop	Admin	Config	Logs	Shell
	MySQL	7756	3306	Stop	Admin	Config	Logs	Explorer
	FileZilla			Start	Admin	Config	Logs	Services
	Mercury			Start	Admin	Config	Logs	😡 Help
	Tomcat			Start	Admin	Config	Logs	Quit
1:23:28 A 1:23:28 A 1:23:28 A 1:24:19 A 1:24:19 A 1:24:19 A 1:24:20 A	M [main] M [main]	All prerequisites Initializing Modu Starting Check- Control Panel R Attempting to st Status change of Attempting to st Status change of	iles Timer eady tart Apache detected: n tart MySQI	unning L app				E

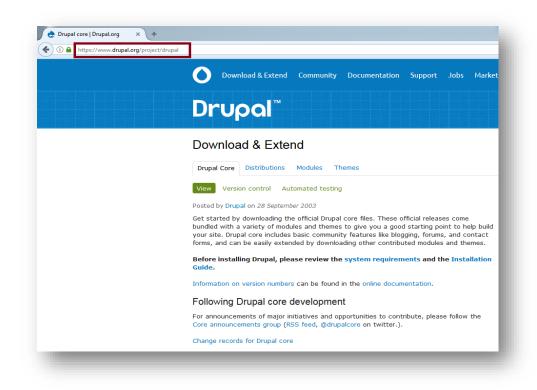
Figure 19: Test Apache and MySQL in XAMPP by pressing the "Admin" button.

php MyAdmin	👝 🗊 Server: 127 0 0 1
<u>Ω 51 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 </u>	🔋 Databases 🗐 SQL 🐁 Status 🖭 User accounts 🚍 Export 🙀 Import 🤌 Settings 🖳 Replication
cent Favorites 📄 📾	General settings
₀ New ⊙ information_schema ⊙ mysql ⊙ performance_schema	Server connection collation : utf8mb4_unicode_ci
) phpmyadmin	Appearance settings
in test	Language : English
	Font size: 82%
	<i> [™]</i> More settings

Figure 20: phpMyAdmin Confirmation.



Figure 21: Open a web browser and enter "localhost" on your address bar. If you are redirected to a page like the picture above then the installation was completed.



STEP 2: DOWNLOAD AND EXTRACT DRUPAL

Figure 22: Next download and extract Drupal from their website. Go to the website: <u>https://www.drupal.org/project/drupal.</u>

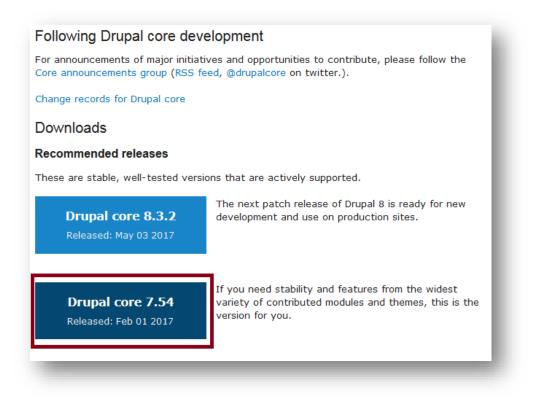


Figure 23: Download "Drupal Core 7.54"

Opening drupal-7.54.zip
You have chosen to open:
🚮 drupal-7.54.zip
which is: Compressed (zipped) Folder (3.6 MB)
from: https://ftp.drupal.org
What should Firefox do with this file?
Open with Windows Explorer (default)
Save File
Do this <u>a</u> utomatically for files like this from now on.
OK
· //

Figure 24: Save the Drupal 7 zip file and extract it after.

STEP 3: CREATE THE DATABASE

(i localhost/phpmyadmin/	
php <mark>MyAdmin</mark> ☆ॿ๏ो⇔s	- Server: 127.0.0.1
Recent Favorites	General settings
New 	Server connection collation @: utf8mb4_unicode_ci
performance_schema phpmyadmin test	Appearance settings
	Language : English
	Font size: 82%
	John Sizer Conversion of the settings

Figure 25: Sign in to phpMyAdmin as the root user.

php MyAdmin		Databases	SQL	🚯 Stat	us 🔳 User accounts 📕 Exp	out 6	🛶 Import 🥜 Settings	Replication
hecent Favorites		ser accounts	_	User gro			🖶 import 🥜 Settings	w Replication
	U	ser acc	ounts	overv	iew			
phpmyadmin test		A user acco	unt allowing a	any user from	n localhost to connect is present. This	s will pre	event other users from connecti	ng if the host part
		User name	Host name	Password	Global privileges 💿 User group	Grant	Action	
		Any	%	No	USAGE	No	🐉 Edit privileges 拱 Export	
		Any	localhost	No	USAGE	No	🐉 Edit privileges 🔜 Export	
		pma	localhost	No	USAGE	No	🐉 Edit privileges 🔜 Export	
		root	127.0.0.1	No	ALL PRIVILEGES	Yes	🐉 Edit privileges 🔜 Export	
		root	::1	No	ALL PRIVILEGES	Yes	🐉 Edit privileges 拱 Export	
		root	localhost	No	ALL PRIVILEGES	Yes	🐉 Edit privileges 🔜 Export	
	t	Check	call With	selected:	📰 Export			
	Г	Add user	account					

Figure 26: Select "User Account", and then "Add user".

- h - Mu A dimin	← 📑 Server: 127.0.0.1
php MyAdmin	Databases SQL SQL Status User accounts Export Hoppot Settings
<u>≙ ≣ 0 0 </u> # ¢	U Databases E SQL 🐚 Status 🥶 Oser accounts 🖦 Export 🛶 Import 🥜 Settings
ecent Favorites	Add user account
Rew	
	Login Information
mysql	
. performance_schema	Use text field:
phpmyadmin	
∟_ test	Host name: Local Icale Icale
	Password:
	Use text field:
	Re-type:
	Authentication Plugin Native MySQL authentication
	Generate password:
	Generate
	Database for user account
	Create database with same name and grant all privileges.
	Grant all privileges on wildcard name (username_%).

Figure 27: Fill out the login information

Database comment	Create table
	Name:
	napelacenterdb
	Number of columns:
	4
Go	Go
	Go
napelacenterdb	utf8mb4_unicode_ci
Structure only	
 Structure and data Data only 	
	Go
CREATE DATABASE before copying	
Add DROP TABLE / DROP VIEW	
-	
Add constraints	
_	
 ✔ Add constraints ✔ Adjust privileges Witch to copied database 	

Figure 28: Select COLLATION utf8_unicode_ci then clicked GO.

(c) tocalhose propring administrativer_	privileges.php?adduser:1&token	:0f1d56b50cd0cb97f5dbd8181339367d		C Q Search
phpMyAdmin	- Server 127 0.0 1			
요 희 오 이 아 오	Databases State	2L 🖺 Status 👘 User accounts	🔜 Export 🔛 Import 🥜 S	Settings 📱 Replication 💿 Variables 🔳 C
- ao	You have added a new	user.		
o New information_schema mysql napelacenterdb	MAN CONNECTIONS PER HO	terdb'§'lossibost' IDENTIFIED VIA my UR O MAN UPCATES PER MOUR O MAN USES Ibost';GRANT ALL PRIVILEGES ON "nape	CONNECTIONS OFCREATE DATABASE	',GDANT UEAGE ON +.* TO 'napelscenterdb'9'local% If NOT EXISTS 'napelscenterdb',GBANT ALL FOIVIL erdb'8'localhost';
performance_schema	Global Database	Change password Login Informati	n	
	Global privileges	Check all are expressed in English	✓ Administration	Resource limits
	🗹 Data	C Subcore		
	I SELECT	CREATE	GRANT	Note: Setting these options to 0 (zero) removes the limit.
	V SELECT	V CREATE V ALTER	V SUPER	Note: Setting Hese options to 0 (pero) removes the limit.
	I SELECT	V CREATE V ALTER V INDEX	V SUPER	мах дижаткя риа ноца 0
	V SELECT V INSERT V UPDATE	V CREATE V ALTER	V SUPER	
	V SELECT V INSERT V UPDATE V DELETE	V CREATE V ALTER V INDEX V DROP	V SUPER V PROCESS V RELOAD	мах дижаткя риа ноца 0
	V SELECT V INSERT V UPDATE V DELETE	CREATE ALTER ALTER DIDEX DEOP CREATE TEMPORARY TABLES	 Ø SUPER Ø PROCEES Ø SHUTDONN 	мах среднее ред носл 0 (2) мах среднее ред носл 0 (2) мах совнестное зед носл 0 (2)
	V SELECT V INSERT V UPDATE V DELETE	Image: Clearte Image: C	V SUPER V PROCESS V RELOAD V SHUTDONN V SHUTDONN	MAX QUERIES DER MODE 0 1
	V SELECT V INSERT V UPDATE V DELETE	V CREATE ALTER V INDEX V CREATE TEMPORARY TABLES V SHOW VIEW V CREATE ROUTINE	Y SUFER Y PROCESS Y RELOAD Y SHOTDOWN Y SHOT DOWN Y SHOW DATABASES Y LOCK TABLES	мах среднее ред носл 0 (2) мах среднее ред носл 0 (2) мах совнестное зед носл 0 (2)
	V SELECT V INSERT V UPDATE V DELETE	Y CREATE Y INDEX Y INDEX Y CREATE TEMPORARY TABLES Y CREATE ROOTINE Y CREATE ROOTINE Y ALTER ROOTINE	Image: State State Image: State State Image: State State <	мах среднее ред носл 0 (2) мах среднее ред носл 0 (2) мах совнестное зед носл 0 (2)

Figure 29: A confirmation message will show with the database being created.

STEP 4: RUN THE INSTALLATION SCRIPT

Select an installation	n profilo
Sciect an installation	n prome
	 Standard Install with commonly used features pre-configured.
	Minimal Start with only a few modules enabled.
 Choose profile Choose language 	Save and continue
Verify requirements	
Set up database	
Install profile	
Configure site	
Finished	

Figure 30: Point the browser to the site: <u>http://localhost/napelacenterdb/</u> and make sure the profile selected is "standard".

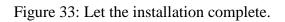
Choose language	
	english (built-in)
	Learn how to install Drupal in other language
	Save and continue
✓ Choose profile	
Choose language	
Verify requirements	
Set up database	
Install profile	
Configure site	
Finished	

Figure 31: Keep the Drupal default language and continue.

	Database type *			
	MySQL, MariaDB, or equivalent			
	© SQLite			
6	The type of database your Drupal data will be stored in.			
Choose profile	Database name *			
napelacenterdb				
Choose language The name of the database your Drupal data will be stored in. It must exist on your server before Drupal can be installed.				
Set up database	Database username *			
Install profile	napelacenterdb			
instan prome				
Configure site	Database password			
Finished	•••••			
	▼ ADVANCED OPTIONS			
	These options are only necessary for some sites. If you're not sure what you			
	should enter here, leave the default settings or check with your hosting provider.			
	Database host *			
	localhost			
	If your database is located on a different server, change this.			
	Database port			
	If your database server is listening to a non-standard port, enter its number.			

Figure 32: Fill out the database information.

Installing Drupal	Completed 28 of 28. Installed <i>Standard</i> module.	100%
 ✓ Choose profile ✓ Choose language 		
✓ Verify requirements		
🖌 Set up database		
Install profile		
Configure site		
Finished		



	SITE INFORMATION					
	Site name *					
9	Jonathan Napela Center					
oose profile	Site e-mail address *					
	napelacenter@byuh.edu					
oose language		registration information, will be sent from this address. Use ite's domain to help prevent these e-mails from being				
rify requirements	flagged as spam.					
t up database						
stall profile	SITE MAINTENANCE ACCO	NINE				
nfigure site	SITE MAINTENANCE ACCO	JUNI				
iningure site	Username *					
ished	admin					
	Spaces are allowed; punctua underscores.	tion is not allowed except for periods, hyphens, and				
	E-mail address *					
	napelacenter@byuh.edu					
	Password *					
	••••••	Password strength: Strong				
	Confirm norrowood *					
	Confirm password *	Passwords match: yes				
	••••••	rassionas materi. Jes				

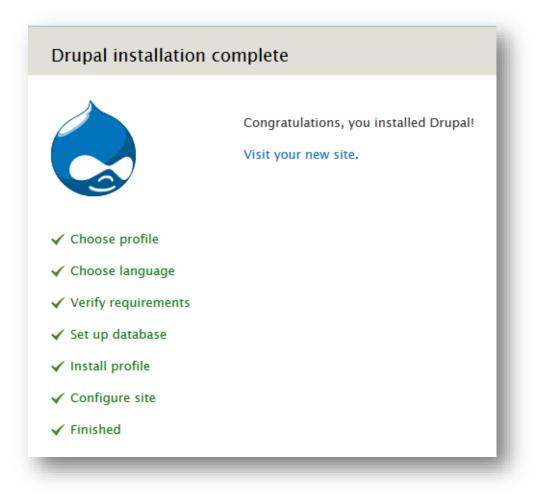


Figure 35: Drupal Installation complete.



Figure 36: Visit the site

STEP 5: SETTING UP CRON

"Setting up cron is an important step in the installation of the website and assists in the maintenance of the site's assets for search results, checking for updates to Drupal core and modules, and removing temporary files" (Overview, 2016). In my case I decided to use the "automated cron", which is a configuration that is built-in the system. It is located in the following path: Administration>Configuration>System>Cron.

SYSTEM		
>	Site information Change site name, e-mail address, slogan, default front page, and number of posts per page, error pages.	
>	Actions Manage the actions defined for your site.	
	Cron Manage automatic site maintenance tasks.	

Figure 37: Setting up Cron

STEP 6: CONFIGURE CLEAN URLS

It is important to have a clean URL because not only it "is less intimidating to a human

user but when people look at it then they can get an idea of what the page is about" (Hochman,

2016). Again, I used the built-in configuration which is located in the following path:

Administer > Configuration > Search and metadata > Clean URLs

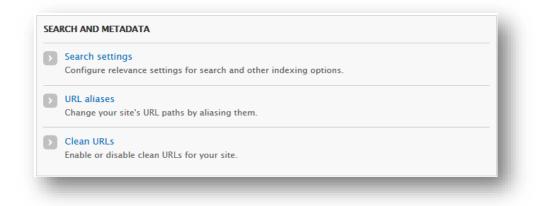


Figure 38: Clean URLs in Drupal.

Creating Contents

In MS Access you normally create tables and fields but in Drupal 7 they call it contents and nodes. To create contents in Drupal 7, you must login as an administrator and do the following: STEP1: You follow this path: Administration>Structure>Content Types.

STEP 2: "Add content type" and fill out the template. In my case, I only fill out the "Name",

"Description" and "Title Field Label".

STEP 3: In the "Publishing options" I select "Published" only. Then "Display Settings", I kept it checked so I know who makes the changes. And last but not the least I turn off Comment Settings because I don't want anyone to make any comments and then "Save Content type". STEP 4: I go back to the content type I just created and "Add new field" or "Add existing field". Since this will be my first content, I will stick to "Add new field". But later on when I add more content type I can use "Add existing field" instead of new. I can also edit or delete any label that I don't want to appear in my content type. For this project, I deleted the label called "Body" and then add my new fields.

STEP 5: Make sure you select a field type for each field and save the content.

STEP 6: Start populating the content with data.

Creating Views

To create views in Drupal 7, you must login as an administrator and do the following:

STEP 1: You follow this path: Administration>Structure>Views.

STEP 2: "Add new view" and fill out the template. For this project I only filled out the view name and change the display format to table. Then select "Continue and edit"

STEP 3: Select the fields/nodes you want to show up in the view.

STEP 4: You can add some fields/nodes to the filter criteria which allows you sort the fields.

STEP 5: Select Page>Settings>Access. This is where you give access restriction as to who can access the views.

STEP 6: Select Pager>Use pager. You can identify how many items that should be display. The default is 10,

Debugging and Testing

Once all the contents and views are created and populated, it is time to do the testing to see if the database meets the objectives of this project.

First Objective: Reduce the number of errors in data entry. With the help of the "Unique Field" module, it prevents multiple nodes from having the same value in a certain field. It is like selecting specific node to be the primary key in each content. The next two tables shows when entered data is successful or duplicated.

• Program Hawaiian Studie	s has been created.
Home Navigation	Hawaiian Studies View Edit Grant Submitted by admin on Mon, 08/07/2017 - 23:53
 Add content Course View Enrollment View Program View Student View 	ProgramName: Hawaiian Studies B.A. ProgramCode: HWSTBA TotalCredits:
	50.00 StudentID: 2042816

Table 6. Duplicated data entry

Create Program
Home » Add content
This form requires that the fields ProgramName, ProgramCode, StudentID are a unique combination. The specified values are already used. Matches are found in the following content: SO
Click here to bypass this check and resubmit.
StudentID * 2061161
ProgramCode * MIHWST
ProgramName * Minor Hawaiian Studies
TotalCredits * 59
ProgramNote * Minor Hawaiian Studies

Second Objective: To maintain (enter, update, and delete) data on current and past students information. "Views_bulk_operations (VBO)" module enables changes to be done for each content. VBO allows bulk operations such as delete or modify entity values to be executed on the displayed rows. VBO does these operations by showing a checkbox in front of each node and adding a select box containing operations that can be applied. The next four tables shows this operation.

Enrollment Vie	W			¢.√
Student ID	Semester		t Level Program	Code Semester
	Semester	Credits		
	And		Apply	
Operations				
- Choose an operation -	Execute			
- Choose an operation - Delete item				
Modify entity values	gram Code	Semester	Sem Credits	EnrollmentLevel
[Publish content	MIHWST	2165	16	SO
Unpublish content	HWSTBA	2173	14	SR
	HWSTBA	2173	14	FR
	MIHWST	2165	12	SR
	MIHWST	2171	15	JR
☑ 1119421	HWSTBA	2171	12	FR
	PAISBA	2173	12	SO
	HWSTBA	2165	15	SO

Table 7. Select the content to be changed.

Table 8. Check the field to be change and enter the value.

Enrollm	ent View				
StudentID	ProgramCode	Semester	DateEnrolled	SemCredits	EnrollmentLevel
SemCredits]				
Next Canc	el				

Table 9. Confirm the changes.

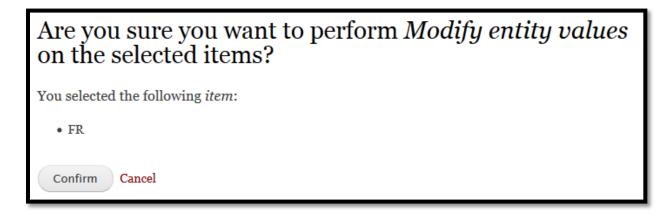


Table 10. Result of the changes made.

Performed Modify entity value	alues on 1 item.				
Home					
٩	Enrollm	ent View			
Navigation	Student ID	Semester - Any -		t Level Program	Code Semester
 Add content Course View Enrollment View Program View Student View 		Semester And	Credits	Apply	
	Operations - Choose an	operation - 💌 Execute			
	Student	ID Program Code	Semester	Sem Credits	EnrollmentLevel
		MIHWST	2165	16	SO
		HWSTBA	2173	14	SR
		HWSTBA	2173	14	FR
		MIHWST	2165	12	SR
		MIHWST	2171	15	JR
	1119421	I HWSTBA	2171	16	FR

Third Objective: To perform searches on students by major, minor, terms, graduation date, GPA and so forth, the "Filter Criteria" in Views will allow you to perform these searches. All you need to do is go to the Structure>Views>Select the view you want to sort and then under "Filter Criteria" you can add all the nodes you want to sort. You can also re-arrange those nodes to the order you want it to appear on the page. The next two tables demonstrate how they are done.

Table 11. Adding Filter Criteria

Enrollment (Content) 💿
Home » Administration » Structure » Views
Modify the display(s) of your view below or add new displays.
Displays
Page Data export Data export 2 Data export 3 + Add
▼ Page details
Display name: Page
TITLE
Title: Enrollment View
FORMAT
Format: Table Settings
FIELDS Add 💌
Bulk operations: Content (Enrollment Content)
Content: StudentID (Student ID)
Content: ProgramCode (Program Code)
Content: Semester (Semester)
Content: SemCredits (Sem Credits)
Content: EnrollmentLevel (EnrollmentLevel)
FILTER CRITERIA Add
Content: Published (Yes) And/Or, Rearrange
Content: Type (= Enrollment)
Content: StudentID (exposed)
Content: Semester (exposed) Settings
Content: EnrollmentLevel (exposed) Settings
Content: ProgramCode (exposed) Settings
Content: Semester (exposed) Settings
Content: SemCredits (exposed)

Table 12. S	Search in	Enrollment	View for	students	who ar	re majoring	in Hawaiian	Studies and
are freshm	en as leve	el of entry.						

Enrollment V	'iew			
Student ID	Semester - Any - Semester And	▼ FR ▼	t Level Program HWSTBA	
Operations				
- Choose an operation	n - 🔻 Execute			
Student ID	Program Code	Semester	Sem Credits	EnrollmentLevel
	HWSTBA	2173	14	FR
	HWSTBA	2171	12	FR
CSV XLS DOC				

Fourth Objective: To track the status of current, graduated and dropout students. This can be done through the Student view. There is a status search criteria that allows you to search for those that are enrolled, graduated or dropout. The next table will demonstrate it.

Student View			¢
Student ID Apply	Program Code Gender - Any - - Any - - Any - - Graduation Semester	Status - Any - ▼ - Any - Dropped Out Enrolled Graduated	State - Any - V
oerations Choose an operation –	Execute		

Table 14. Student Result of those that have graduated.

Student	View								
Student ID Program Code Gender Status State - Any - - Any - Craduated - Any - Graduation Semester 0									
Apply									
Operations									
- Choose ar	n operation -	Execute							
Student								Graduation	Program
ID ID	Last Name	First Name	Gender	Email	City	State	Status	Semester	Code
	Tuiasosopo	Pearl	F	pearltuiasosopo@yahoo.com	Vaitogi Village	AS	Graduated	2165	MIPAIS
	Tasi	Talileleia	F	leyah.table107@gmail.com	Tafuna	AS	Graduated	2171	MIPAIS
	Ulugia	Suelaki	М	suelakiulugia@hotmail.com	Apia	WS	Graduated	2165	MIPAIS
	Ngirchemat	Garlyn	F	ngirchematga@ldsmail.net	Koror	PW	Graduated	2163	MIPAIS
	Watson	Ashley	F	ashleywats8@gmail.com	Kula	н	Graduated	2171	MIHWST
	Murray	Kuliaikananikamah'oikapo'aimok	F	koffee_22@yahoo.com	Lahaina	HI	Graduated	2163	MIPAIS
	Ramasima	Asenaca Delaibatiki	F	sota_mosimosi@yahoo.com	Nausori	FJ	Graduated	2171	MIPAIS
	Scoville	Malia	F	kiakaha.malia@gmail.com	Sandy	UT	Graduated	2165	MIHWST
	Drake	Aaron	М	bolopintado@gmail.com	Wailua	HI	Graduated	2171	PAISBA
	Lemalu	Faasipa	F	sipastephanie92@gmail.com	Apia	WS	Graduated	2163	PAISBA
CSV XLS DOC		1 2 next >	last »						

Fifth Objective: To report on current, graduated and dropout student status and history, the "views_data_export" module allows me to export large amount of data from views. There are a few file format available but for this project I will export data to CSV, XLS and DOC. Exporting a report will be demonstrated in the next three tables.

Student	Student View								
Student ID Program Code Gender Status State - Any - - Any - Graduated - Any - - Any -									
Apply									
Operations									
- Choose ar	operation -	Execute							
_									
Student ID	Last Name	First Name	Gender	Email	City	State	Status	Graduation Semester	Program Code
	Tuiasosopo	Pearl	F	pearltuiasosopo@yahoo.com	Vaitogi Village	AS	Graduated	2165	MIPAIS
	Tasi	Talileleia	F	leyah.table107@gmail.com	Tafuna	AS	Graduated	2171	MIPAIS
	Ulugia	Suelaki	М	suelakiulugia@hotmail.com	Apia	WS	Graduated	2165	MIPAIS
	Ngirchemat	Garlyn	F	ngirchematga@ldsmail.net	Koror	PW	Graduated	2163	MIPAIS
	Watson	Ashley	F	ashleywats8@gmail.com	Kula	н	Graduated	2171	MIHWST
	Murray	Kuliaikananikamah'oikapo'aimok	F	koffee_22@yahoo.com	Lahaina	н	Graduated	2163	MIPAIS
	Ramasima	Asenaca Delaibatiki	F	sota_mosimosi@yahoo.com	Nausori	FJ	Graduated	2171	MIPAIS
	Scoville	Malia	F	kiakaha.malia@gmail.com	Sandy	UT	Graduated	2165	MIHWST
	Drake	Aaron	М	bolopintado@gmail.com	Wailua	н	Graduated	2171	PAISBA
	Lemalu	Faasipa	F	sipastephanie92@gmail.com	Apia	WS	Graduated	2163	PAISBA
CSV XLS DOC	3	1 2 next >	last »						

Table 15. Students that have graduated from this department.

Table 16. Exporting report to CSV file.

Opening student_infor	mation.csv					
You have chosen to	open:					
student_infor	student_information.csv					
which is: Microsoft Excel Comma Separated Values File (1.2 KB) from: http://localhost						
What should Firefor	x do with this file?					
Open with	Microsoft Excel (default)					
Save File						
🔲 Do this <u>a</u> uto	matically for files like this from now on.					
	OK Cancel					

Table 17. Result of exported CSV file report which you can choose the location to save it in.

В	С	D	E	F	G	н	I	J	К
Student ID	Last Name	First Name	Gender	Email	City	State	Status	Graduation Semester	Program Code
	Tuiasosopo	Pearl	F	pearltuiasosopo@yahoo.com	Vaitogi Village	AS	Graduated	2165	MIPAIS
	Tasi	Talileleia	F	leyah.table107@gmail.com	Tafuna	AS	Graduated	2171	MIPAIS
	Ulugia	Suelaki	М	suelakiulugia@hotmail.com	Apia	WS	Graduated	2165	MIPAIS
	Ngirchemat	Garlyn	F	ngirchematga@ldsmail.net	Koror	PW	Graduated	2163	MIPAIS
	Watson	Ashley	F	ashleywats8@gmail.com	Kula	HI	Graduated	2171	MIHWST
	Murray	Kuliaikananikamah'oikapo'aimok	F	koffee_22@yahoo.com	Lahaina	HI	Graduated	2163	MIPAIS
	Ramasima	Asenaca Delaibatiki	F	sota_mosimosi@yahoo.com	Nausori	FJ	Graduated	2171	MIPAIS
	Scoville	Malia	F	kiakaha.malia@gmail.com	Sandy	UT	Graduated	2165	MIHWST
	Drake	Aaron	М	bolopintado@gmail.com	Wailua	HI	Graduated	2171	PAISBA
	Lemalu	Faasipa	F	sipastephanie92@gmail.com	Apia	WS	Graduated	2163	PAISBA

Sixth Objective: To ensure the data is safe and secure in accordance to the Family Educational Rights and Privacy Act (FERPA) of students. According to Chen & Zhao (2012), "It is well-known that cloud computing has many potential advantages and many enterprise applications and data are migrating to public or hybrid cloud". However, data security and privacy protection is still an issue with cloud computing (Chen & Zhao, 2012). One of the many benefits that Drupal has is that it allows you to create new accounts with different level of permissions and roles. Before I created any account access to this website, I created two roles. According to Drupal (2001), "Roles allow you to fine tune the security and administration of Drupal. A role defines a group of users that have certain privileges. Examples of roles are: anonymous user, authenticated user, administrator and so forth. To create or edit a role you need to go to the following path: People>Permissions tab>Roles tab. I added "staff" and "technician" roles. Then I created two accounts, "napela_student" with "staff" role and napela_web" with "technician" role.

Table 18. Add Role.

People ⊛	RVII Jonathan Na	oela Center		UST PERMISSION
Home + Administration + People + Perm	lissions			Permissions Roles
	urity and administration of Drupal. A role defines a group of users that h order of the roles on your site. It is recommended to order your roles fro			derator, administrator and so on. In this
By default, Drupal comes with two u	iser roles:			
	d for users that don't have a user account or that are not authenticated.			
 Authenticated user: this role is an 	utomatically granted to all logged in users.			Show row weights
NAME		OPERATIONS		
+ anonymous user (locked)			edit permissions	
+ authenticated user (locked)			edit permissions	
🕂 administrator		edit role	edit permissions	
+ staff		edit role	edit permissions	
🕂 technician		edit role	edit permissions	
	Add role			
Save order				

Table 19. Create Accounts.

eople ⊚	RV	Jonathan Nape	la Center		LIST PERMISS
Nome + Administration					
+ Add user					
SHOW ONLY USERS WHERE					
role any	Filter				
permission any					
status any					
UPDATE OPTIONS					
UPDATE OPTIONS Unblock the selected users	Update				
	Update STATUS	ROLES	MEMBER FOR		OPERATIONS
Unblock the selected users		ROLES	MEMALIN FOR 3 weeks 5 days	LAST ACCESS never	OPERATIONS edit
Unblock the selected users	STATUS	ROLES • technician	and the second second		L de la constante
Unblock the selected users USERNAME test	STATUS blocked	10.8255	3 weeks 5 days	never	edit

As for the "staff" role, I gave it the permission to create and edit nodes. For the "technician" role, I gave the same permission as the "staff" plus the following permissions: Backup and Migrate, Taxonomy and Webform. "Backup-migrate" module allows you to back up your database and restore them whenever you need to. "Taxonomy" module gives your site organizational keywords such as categories, tags or metadata. It allows you to connect, relate and classify your website's content (Drupal, 2001). "Webform" module allows you to create forms and surveys in Drupal.

"Nodeaccess" module grants view, edit and delete access to each node. "Users with the 'grant node permissions' permission will have a grant tag on node pages with allows them to grant access to that node by user or role. Administrators can set default access controls per content type" (Drupal Association, 2001). To access this you follow this path: Administration>Configuration>Nodeaccess. Not only this website is locked down to specific user and permissions, once deploy on campus, it can only be accessed through the BYUH network.

Table 20. Nodeaccess

odeaccess 💿	RVII Jonathan	Napela Genter		
torne + Administration + Configuration + Prople				
Give node grants priority				
If you are only using this access control module, you can a	safely ignore this. If you are using multip	ole access control modules, and you want the gra	its given on individual nodes to override any	grants given by other modules, you should check this box.
f Preserve hidden grants	120000000000000000000000000000000000000			
If you check this box, any hidden grants are preserved when you save g	rants. Otherwore all grants users are not allowed t	o vew or edit are revised on save.		
ALLOWED GRANTS				
ALLOWED ROLES				
ARTICLE				
COURSE				
Show grant tab for this node type				
ROLE		VIEW	EDIT	DELETE
anonymous user		10	13	8
authenticated user		12	6	1
administrator		10	8	10
staff		12	E	E
technician		12		E
AUTHOR SETTINGS		VIEW	EDIT	DELETE
Node author		10	83	6
The settings selected for the node author will define what permission	s the node author has. This cannot be changed s	on individual node grama.		
BASIC PAGE				
+ PROGRAM				

CHAPTER FIVE: CONCLUSIONS

"Today, more than at any previous time, the success of an organization depends on its ability to acquire accurate and timely data about its operations, to manage this data effectively, and to use it to analyze and guide its activities" (Ramakrishnan & Gehrke, 2000).

I strongly agree with Ramakrishnan & Gehrke because at the end of this project, I have learned the importance of a database management system (DBMS). I learned that a DBMS can manage data more efficiently and at the same time allow users to perform multiple tasks with ease. I am also aware that security has always been a great concern for any information that is accessed on the web. And maybe sometime the reliability on the internet can be slow or the web application can face unpredictable and potentially enormous peak loads and so forth. Although, Web Based Database has its flaws and limitation, I still think that its benefits will help the Napela Center more compared to their current system.

I was able to build the DBMS for the Napela Center and it wasn't easy but it was worth it. With this new system in place, Napela Center will be able to accomplish a lot of things such as reduce data duplication, maintain student information, perform student searches, track student status, export data report and knowing that their data will be safe. Not only that this database can be accessed with proper login but it can only be accessed internally through the BYUH network and not off campus. This DBMS has met the objectives that has been underlined for this project as explained in the debugging and testing stage. I think that this will fit the Napela Center because there will be no need for specialized HTML knowledge or expertise to change or update the website. The maintenance of this database can be done by anyone in the Napela Center that is willing to learn. This person can be trained. For future studies, I think that the need for DBMS will always be there. The only thing I am not sure of is whether Oracle/SQL Server will still be the leading database application like today. However, the future of DBMS will always be radiant due to the high demand of capturing data for research, analysis and decision making.

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APPENDICES

APPENDIX A: USERS' MANUAL

Most of the changes to the website will be mainly done in the Structure tab. If there will be any updates made on the Structure tab, it will be most likely the Content Types, Views and Taxonomy. In Taxonomy, you can "Add vocabulary" or edit them through the operations made available for each vocabulary. Most of the nodes I created in the contents that has drop down features are created in Taxonomy. There are some vocabulary tag that you might want to update regularly such as State Tag, Course Name Tag, Course Code Tag and Semester Tag and so forth.

WORK BREAKDOWN STRUCTURE

Requirements Analysis

- Meet with department and those involve in the project.
- Learn the current system.
- Understand the problem to be solved.
- Requirements and expectations of the users are collected and analyzed.
- With collected requirements, new system need to be understood.

Design

- Design a schema diagram for the database.
- Database Design
- Database Processing Flow Chart

Implementation

- Creating Database definitions
- Testing the System
- Developing operational procedures and documentation
- Training the users
- Populating the Database.

Maintenance

- Monitoring and maintaining the database system
- Adding new contents and/or nodes and views
- Making changes to the contents and/or nodes and views
- Remove existing contents and/or nodes and views
- Creating accounts

GANTT CHART

G	ANTT CHART											
<u>u</u> ,												
REC	QUIREMENTS ANALYSI	s										
					Au, 870							
10	Task Norric	Searc	7263	Guration								
1	Meet with department and these involve in the project	8/1/2006	8/11/2016	206								
2	Learn the current system.	\$/1/2006	8/3/2016	36								
3	Understand the problem to be solved.	8/1/2006	6/2/2016	34								
4	Requirements and expectations of the user: are callected and analyzed.	R/1/2006	8/11/2016	306								
5	With collected requirements, new system needs to be understood.	8/1/3066	8/12/2016	206								
DES	SIGN											
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2	Design a schema diagram for the database.	\$/\$/2006	5/35/2016	100								
-	Dutabase Design	8/16/2016	8/28/2015	306								
3	Outabase Processing Flow Chart	9/19/2016	5/23/2016	54								
ім	PLEMENTATION											
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IM ®	PLEMENTATION	Start	Takés	Gunation	Image: 100 and	× • × × × × × × ×		8 8 8 8 8 8 8 8 8 8 8	1 1 1 1 1 1 1 1 1 1	Abr 1 00 10 22 20 10 10	NU 1 <u>1</u> <u>3</u> <u>3</u> <u>8</u> <u>7</u> <u>8</u>	0 0 3 8 0 3 9 8 8
n		Start 1/16/201/	7949 2/24/2017	Gunation 30d		r t t t r r r n n		8 8 8 8 9 8 8 9 8		9 10 11 12 12 12 12 12 1	NU 1 U M M K X M	N N N N N N N N
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APPENDIX B: SYSTEM TECHNICAL DOCUMENTATION

Monitoring and maintaining the database system

There are times when the database needs to be updated. There are two ways to do it. First, you can type on the URL //localhost/napelacenterdb/update.php and then it will run the update for you. Just follow the instruction on the screen.

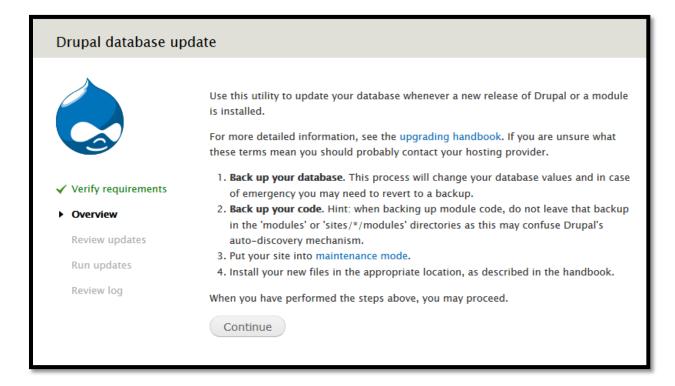


Figure 39: Use update.php to update the website.

Drupal database upo	late
	 No pending updates. A Before you run any database updates, make sure you have a backup of your database. Use Backup and Migrate to create that backup now.
✓ Verify requirements✓ Overview	 Front page Administration pages
Review updates	
Run updates	
Review log	

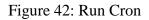
Figure 40: DB Update completed

Home Admi	inistration o
_	
	Dashboard
	View and customize your dashboard.
	Content
	Administer content and comments.
	Structure
	Administer blocks, content types, menus, etc.
	Appearance
	Select and configure your themes.
	People
	Manage user accounts, roles, and permissions.
	Modules
	Extend site functionality.
	Configuration
	Administer settings.

Figure 41: After update, select the Administration link. Should be something like this.

The second option is that you can run the Cron manually. You can do this by following this path: Administration>Configuration>System>Cron. Currently, I set the Cron to run every 3 hours.

Cron
Home » Administration » Configuration » System
Cron takes care of running periodic tasks like checking for updates and indexing content for search.
Run cron
Last run: 2 min 38 sec ago. To run cron from outside the site, go to http://localhost/napelacenterdb/cron.php?cron_key=EbXiJG2upEqT1IAh4Pv9JCgKrx92u1oDA-A4ISXIMyA
Run cron every
3 hours 💌
More information about setting up scheduled tasks can be found by reading the cron tutorial on drupal.org.
Save configuration



Adding new contents and/or nodes and views

Adding a new content or view has been discussed earlier in this paper. However, I will only

show some figures here as to what it looks like on the website.

Stru	cture
Hom	e » Administration
>	Blocks Configure what block content appears in your site's sidebars and other regions.
>	Bulk Exporter Bulk-export multiple CTools-handled data objects to code.
	Content types Manage content types, including default status, front page promotion, comment settings, etc.
	Custom tokens Administrate custom tokens.
	Menus Add new menus to your site, edit existing menus, and rename and reorganize menu links.
	Taxonomy Manage tagging, categorization, and classification of your content.
	Views Manage customized lists of content.

Figure 43: Select Structure and then you can decide if you want to create "Content types" or

"Views".

Content types ●
Home » Administration » Structure
+ Add content type
NAME
Article (Machine name: article) Use <i>articles</i> for time-sensitive content like news, press releases or blog posts.
Basic page (Machine name: page) Use <i>basic pages</i> for your static content, such as an 'About us' page.
Course (Machine name: course) List of courses available in the department.
Enrollment (Machine name: studentenrollment) It is the current semester and course in which the student is being enrolled in.
Program (Machine name: program) List of Programs available in the department.
Student (Machine name: student) Basic information about the student.
Webform (Machine name: webform) Create a new form or questionnaire accessible to users. Submission results and s

Figure 44: Creating a new Content Type.

Vie	ws ⊝	RVII Jonathan Napela Ce	enter
Hor	ne » Administration » Structure		
+ /	Add new view 🔸 Add view from temp	plate + Import	
Sea	arch	Reset	
Filt	All tags 💌 All displays 💌	All types All storage All statu	us 🔻
V	IEW NAME	DESCRIPTION	TAG
D	Course View Displays: <i>Block, Data export, Page</i> n database Type: Content	List of Courses	default
D	nrollment Displays: <i>Data export, Page</i> n database Type: Content	List of students enrolled in each semester.	default
D	ront page Displays: <i>Feed, Page</i> n code Type: Content	Emulates the default Drupal front page; you may set the default home page path to this view to make it your front page.	default
D	r ogram View Displays: <i>Data export, Page</i> n database Type: Content	List of Programs enrolled	default
D	tudent Information Displays: <i>Data export, Page</i> n database Type: Content	Information about the student.	default

Figure 45: Adding a new View

	RVII Jor
Home » Administration » Structure » Content t	ypes
Name *	
Course	Machine name: course [Edit]
The human-readable name of this content	type. This text will be displayed as part of the
Description	
List of courses available in the department.	
Describe this content type. The text will be	e displayed on the Add new content page.
Submission form settings	Title field label *
CourseNote	
	CourseNote
Publishing options	
Published	
	Preview before submitting
Display settings	Disabled
Display author and date information.	Ū.
	Optional
Comment settings	
Closed, Threading , 50 comments per page	Required
hear	
Menu settings	
	Explanation or submission guideline
Unique Field restrictions	
onque riela restrictions	
W-16	
Webform	
Disabled	
	This text will be displayed at the top of t
	This text will be displayed at the top of t
	This text will be displayed at the top of t
	This text will be displayed at the top of t
Save content type Delete	This text will be displayed at the top of t

Figure 46: Filling out a Content Type template.

Add new view ⊛	RVII Jonathan Napela Cente	er
Home » Administration » Structure » Views		
View name *		
Description		
Show Content -	of type All tagged with	sorted by Newest first 💌
 Create a page Page title Path http://localhost/napelacenterdb/ Display format Unformatted list of teasers Items to display 10 Use a pager Create a menu link Include an RSS feed 	▼ with links (allow users to add comments, etc.) ▼ without comments ▼	
Create a block		
Save & exit Continue & edi	t Cancel	

Figure 47: Filling out a View template.

Create Course	\odot	RVII
Home » Add content		
StudentID *		
CourseCode * - Select a value -		
CourseName *		
CourseDesc	•	
Semester * - Select a value -		
CourseGrade - None - ▼		
CourseCredits *		
CourseNote *		

Figure 48: Result of a Content Type.

Course View						
Student ID		Cours - Any	e Name Course Code	e Semeste - Any -		
		Cours	eGrade			
						0
Course Credits	i -					
		Арр	ly			
Operations						
- Choose an	operation -	▼ Execute				
- choose an	operation -	LACCUR				
Student ID	Course Code	Course Name	Course Desc	Semester	Course Grade	Course Credits
	006605	PMGT 360	DISASTER MANAGEMENT	2165	В-	3
	006604	PMGT 350	CRISIS MANAGEMENT	2173		3
	006413	PMGT 499	PUBLIC MANAGEMENT	2171	В	3
	006411	PMGT 300	PUBLIC POLICY	2171	C-	3
	006481	IT 240	WEB DESIGN	2171	F	3
	006700	ICS 150	INTRODUCTORY SEMINAR	2173		1
	006699	ICS 151	CULTURAL STUDIES THEORY	2171	с	2
	002334	ICS 261	CULTURES OF OCEANIA	2171	А	3
	003396	EXS 185	FOLK DANCE OF THE PACIFIC	2165	B-	1
	001286	EXS 183	BEGINNING HULA	2173		1
		1	2 3 4 5 next> la	ist »		

Figure 49: Result of a View

Making changes and removing the contents and/or nodes and views

In Drupal 7, making changes and removing a content type or view is very simple. All you need to do is go to Structure>View or Content Types and you will see a set of operations available for you to select. These sets of operation has "edit" and "delete" made available for you to use.

Views 💿	RVII Jonathan Napela (Center			LIST SETTINGS
Home - Administration - Structure					
+ Add new view + Add view from temp	plate + Import				
Search	Reset				
Filter All tags 👻 All displays 💌	All types All storage All storage	atus 💌			
VIEW NAME	DESCRIPTION	TAG	PATH	OPERATIONS	
Course View Displays: <i>Block, Data export, Page</i> In database Type: Content	List of Courses	default	/course-view, /course_csv, /course_xis, /course_doc	Edit * Disable Delete Clone	
Enrollment Displays: <i>Data export, Page</i> In database Type: Content	List of students enrolled in each semester.	default	/enrollment_view, /enrollment_cva, /enrollment_da, /enrollment_doc	Export	
Front page Displays: Feed, Page In code Type: Content	Emulates the default Drupal front page; you may set the default home page path to this view to make it your front page.	default	/frontpage, /rs.s.ml	(fdn +	
Program View Displays: Data export, Page In database Type: Content	List of Programs enrolled	default	/program-view, /program_csv, /program_xls, /program_doc	fan 🔹	

Figure 50: Views Operations

me » Administration » Structure				
+ Add content type				
VAME	OPERAT	rions		
Maticle Otadone name anicia Jue amotes for time-sensitive content like news, press releases or blog posts.	edit	manage fields	manage display	delete
Resic page Machine name sagel	edit."	manage fields	manage display	delete
Course (Machine name course) List of courses available in the department.	edit	manage fields	manage display	delete
Intollment (Madvie name studentervillment) I is the current semester and course in which the student is being enrolled in.	edit	manage fields	manage display	delete
Program Okalive sawe program) List of Programs available in the department.	eda	manage fields	manage display	delete
Student Machine name student Easic information about the student.	edit	manage fields	manage display	delete
Webform (Machine name: webform)	edit	manage fields	manage display	delete

Figure 51: Content Types Operations

Creating accounts

Creating a new user account has been introduced in the testing and debugging stage. To accomplish this task you must go to Administration>People>Add User.

Adn	ninistration \odot
Hom	ie
	Dashboard
	View and customize your dashboard.
	Content
	Administer content and comments.
	Structure
	Administer blocks, content types, menus, etc.
	Appearance
	Select and configure your themes.
	People
	Manage user accounts, roles, and permissions.
	Modules
	Extend site functionality.
	Configuration
	Administer settings.
	Reports
	View reports, updates, and errors.
	Help
	Reference for usage, configuration, and modules.

Figure 52: Select Administration>People

People ⊙		RVII	Jonathan Napela Cer
Home » Administration			
+ Add user			
SHOW ONLY USERS	WHERE		
role	any	▼ Filter	
permission	any	•	
status	any	•	
UPDATE OPTIONS	users	Update	
USERNAME		STATUS	ROLES
test		blocked	
napela_web		active	• technician
napela_student		active	• staff
🔲 admin		active	• administrator

Figure 53: Select Add user.

People
Home » Administration » People
This web page allows administrators to register new users. Users' e-mail addresses and usernames must be unique.
Username *
Spaces are allowed; punctuation is not allowed except for periods, hyphens, apostrophes, and underscores.
E-mail address *
A valid e-mail address. All e-mails from the system will be sent to this address. The e-mail address is not made publ
Password * Password strength:
Confirm password *
Provide a password for the new account in both fields.
Status
Blocked
Active
Roles
✓ authenticated user
administrator
staff
🔲 technician
Notify user of new account
Create new account

Figure 54: Fill out the information and select the type of Roles that will be assigned to the user.

Creating Taxonomy

To create a new Taxonomy you have to go to Structure>Taxonomy. In there you can "Add vocabulary" or edit existing vocabulary.

	VII Jonathan Napela Center		
me > Administration > Structure			
xonomy is for categorizing content. Terms are grouped into vo	cabularies. For example, a vocabulary called "Fruit" would contain the terms "Apple" an	5 "Banana".	
+ Add vocabulary			
	V-months in the second s		Show now weig
VOCABULARY NAME	OPERATIONS	2	102
	edit vocabulary	list terms	add terms
+ CourseDescTag	edit vocabulary	list terms	add terms
4 CourseNameTag	edit vocabulary	list serms	add terms
÷ EnrollmentLevelTag	effit vocabulary	list terms	add terms
÷ GenderTag	edit vocabulary	list terms	add terms
- GradeTag	edit vocabulary	list terms	add terms
+ ProgramCodeTag	edit vocabulary	list terms	add terms
÷ ProgramHoursTag	edit vocabulary	list terms	add terms
- ProgramNameTag	edit vocabulary	list terms	add terms
+ SemesterTag	edit vocabulary	list terms	add terms
+ StateTag	edit vocabulary	list terms	add terms
+ StatusTag	edit vocabulary	list terms	add terms
÷ Tags	edit vocabulary	list terms	add terms

Figure 56: Creating Taxonomy

Backup and Migrate

It is important to back up the database every so often. To do this you can go to

Administration>Configuration>Backup and Migrate.

e descriptions	
EOPLE	SYSTEM
Account settings Configure default behavior of users, including registration requirements, e-mails, fields, and user pictures.	Site information Change site name, e-mail address, slogan, default front page, and number of posts per page, error pages.
Nodeaccess Change default settings for the Nodeaccess module.	Actions Manage the actions defined for your site.
IP address blocking Manage blocked IP addresses.	Backup and Migrate Backup/restore your database and files or migrate data to or from another Drupal site.
	Cron Manage automatic site maintenance tasks.

Figure 57: Backup and Migrate

	Quick Be	ckup Ad	vanced Backup

Figure 58: Quick Backup but you also have a choice to do just the DB or the entire Site.

Opening JonathanNapelaCenter-2017-08-08T10-57-34.sitearchi	ve.tar.gz
You have chosen to open:	
JonathanNapelaCenter-2017-08-08T10-57-34.sitearc	hive.tar.gz
which is: gzip (6.6 MB)	
from: http://localhost	
What should Firefox do with this file?	
Open with Browse	
Save File	
Do this <u>a</u> utomatically for files like this from now on.	
ОК	Cancel

Figure 59: Prompt you to save file.