TOPCI DISCOVERY USING PROBABILISTIC MODELS TO DETERMINE DOMAINS IN THE PHILIPPINE TRAIN LAW IMPLEMENTATION

An Undergraduate Thesis Presented
to the Faculty of Computer Science
and Information Technology Department
BICOL UNIVERSITY COLLEGE OF SCIENCE
Legazpi City

In Partial Fulfillment of the
Requirements for the Degree of
BACHELOR OF SCIENCE IN COMPUTER SCIENCE

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Republic of the Philippines
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RECOMMENDATION FOR THE ORAL DEFENSE

The undergraduate thesis entitled, **"TOPIC DISCOVERY USING PROBABILISTIC MODELS TO DETERMINE DOMAINS IN THE PHILIPPINE TRAIN LAW IMPLEMENTATION"**, prepared and submitted by **CARL ANDRE B. BONGALOS, JIREH C. BONO, JASPER C. CERDINA** AND **FRENZ RAVEN CRUZ**, in partial fulfillment of the requirements for the degree BACHELOR OF SCIENCE IN COMPUTER SCIENCE, is hereby submitted to the thesis committee for oral examination.

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In partial fulfillment of the requirements for the degree Bachelor of Science in Information Technology, this undergraduate thesis entitled, "**TOPIC DISCOVERY USING PROBABILISTIC MODELS TO DETERMINE DOMAINS IN THE PHILIPPINE TRAIN LAW IMPLEMENTATION**", prepared and submitted by **CARL ANDRE B. BONGALOS, JIREH C. BONO, JASPER C. CERDINA** AND **FRENZ RAVEN CRUZ**, is hereby recommended for Oral Examination.

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J. J. S. B.

K. M. M.

C. R. P

ABSTRACT

CARL ANDRE B. BONGALOS, JIREH C. BONO, JASPER C. CERDINA AND **FRENZ RAVEN CRUZ,** "TOPIC DISCOVERY USING PROBABILISTIC MODELS TO DETERMINE DOMAINS IN THE PHILIPPINE TRAIN LAW IMPLEMENTATION" (Unpublished Undergraduate Thesis, Bicol University College of Science, Legazpi City, April 2019)

The developed system intends to make the transactions of Bicol Regional Blood Center (BRBC) more convenient, accurate and efficient. The main functions of this system are blood inventory and monitoring, online application/donor recruitment, scheduling of mobile blood donation activity, online order/request of blood products by the blood stations from the Bicol Regional Blood Center and report generation. The study adopted the developmental method of research and used Systems Development Life Cycle.

Bicol Regional Blood Center tested the developed system and made a positive feedback on the functionality program in relation to their major transactions. The representative from BRBC recognized the system as a user-friendly plan but made some recommendations on the security aspect. The developed system complied with the requirements of Bicol Regional Blood Center. It is recommended that the system should be implemented considering the benefits BRBC, its clients and licensed hospitals will get.

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CHAPTER 1
INTRODUCTION

Introduction

A few decades ago, most of the works were done manually. Because of the willingness to make those works easier, man has tried many ways to make those things happen. This is when technology starts to become more advanced as time goes by. Things like automation of work are becoming more in demand to companies and agencies, may it be private or public. Information technology has helped many people in terms of storing, retrieving, transmitting information, and in communicating. Today, people are still looking for ways and inventing things that will benefit those in the future generation and for the advancement in the field of information technology.

One of the advancement of technology is the Android–a Linux-based operating system designed primarily for touchscreen mobile devices such as smartphones and tablet computers. This open source code and permissive licensing allows the software to be freely modified and distributed by device manufactures, wireless carries and enthusiast developers. Such factor has contributed towards making Android–the world's most widely used smartphone platform—and the software of choice for technology companies who require low-cost, customizable, lightweight operating system for high tech devices without developing one from scratch.

Game development is a creative method or process that combines computer programming with animation, graphics, sounds within a certain period of time to develop an interactive game through the computer. These interactive games can be a means of entertaining ourselves and is popular for both children and adults.

Computer simulation has become a useful part of modeling many natural systems in physics, chemistry and biology, and human systems in economics and social science (the computational sociology) as well as in engineering to gain insight into the operation of those systems. A good example of the usefulness of using computers to simulate can be found in the field of network traffic simulation. In such simulations, the model behaviour will change each simulation according to the set of initial parameters assumed for the environment.

Rubik's Cube is a 3-D combination puzzle invented in 1974 by Hungarian sculptor and professor of architecture Ernő Rubik. It is widely considered to be the world's best-selling toy. In a classic Rubik's Cube, each of the six faces is covered by nine stickers, each of one of six solid colours (traditionally white, red, blue, orange, green, and yellow, where white is opposite yellow, blue is opposite green, and orange is opposite red, and the red, white and blue are arranged in that order in a clockwise arrangement). An internal pivot mechanism enables each face to turn independently, thus mixing up the colours. For the puzzle to be solved, each face must be returned to consisting of one colour. Similar puzzles have now been produced with various numbers of sides, dimensions, and stickers, not all of

them by Rubik.

The proposed study will focus on the usage of an artificial intelligence that can solve the 3x3x3 Rubik's Cube. The Android device may visualize the arrangement of colors of the cube via user input. After the device imaged the cube, it will then try to solve it by implementing a solution through a simulation of the Rubik's Cube that will help users ease the difficulty of solving the puzzle game.

Significance of the Research

Playing computer games are good recreational activity but not all could enhance player's strategic thinking. Deflexion game enhances player's strategic thinking while having fun. This study is directed to create a 3D deflexion game that could be played in a LAN which is beneficial to:

Rubik's Cube Enthusiasts. This application will be a way of connecting those people who love the cube to the new technology and engage them in a way that is exciting and new.

Mobile Application Aficionado. Definitely one of the apps that the Android people will surely want to have on their collection.

Android Developer. This will serve as a basis for other Android Developers to learn something from.

Researchers. The researchers can learn immensely on the development

of this application. This may be used as a stepping stone to aim for the job that the researchers certainly want.

Future Researcher. This will be of great motivation to the future researchers / neophyte inventors for them to pursue their ideas no matter how intimidating it may sound.

Objectives of the Project

The main objective of this research is to develop an Android application that can generate solution for a regular 3x3x3 Rubik's Cube. Specifically it attempted to answer the following objectives:

1. To construct a GUI that simulates a blank cube and let the user fill up the face of each cubelet manually which will be capable of:
    a. providing step by step instruction to solve the cube;
    b. provide game elements such as animations, sounds, and rotation option for the cube;
    c. allow game saving;
2. To create an artificial intelligence that will apply the Two-Phase Algorithm to find one of the most efficient ways to solve the cube;
3. To measure and assess the Two-Phase Algorithm in the implementation of the Robik's Cube solver.

Scope and Limitations of the Project

On our input page, the GUI will simulate a ”blank cube” where-in the user will fill up the face of the cubelets to represent the real cube that they have. To fill up the face of the cubelets, the user will have to select the appropriate color in the color palette and apply it to specific cubelets. Each colors on the palette must only be used eight times.

One thing to note in each face of the cube is that the center colors–that color determines the face of the cube–are already fixed in place and immovable. That is to say that the face which has the white center and the color on it will be the White Face. For better orientation, the White Face's top center color must be the color Blue, Red Face is White, Orange Face is White, Yellow Face is Blue, Green Face is White, and Blue Face is White. We will also have a random button to randomize the content of the cube.

The researcher will include animation and rotation of the cube in the solution window so that the users will find it easy to follow the steps to be taken to solve the cube. The proponents will create an Artificial Intelligence using Kociemba's Two-Phase Algorithm that is specifically created for solving the 3x3x3 Cube. The algorithm solves the Cube in to steps. In phase 1, the algorithm looks for maneuvers which will transform a scrambled cube to G1. That is, the orientations of corners and edges have to be constrained and the edges of the Up and Downslice have to be transferred into that slice. In phase 2 we restore the

cube. There are many different possibilities for maneuvers in phase 1. The algorithm tries different phase 1 maneuvers to find a most possible short overall solution.

Definition of Terms

The following terms related to the research are defined operationally for better understanding:

Android - A Linux-based operating system designed primarily for touchscreen mobile devices such as smartphones and tablet computers.

Rubik's Cube - A 3-D combination puzzle invented in 1974 by Hungarian sculptor and professor of architecture Ernő Rubik. Originally called the "Magic Cube".

Puzzle - is a problem or enigma that tests the ingenuity of the solver. In a basic puzzle, one is intended to put together pieces in a logical way in order to come up with the desired solution. Puzzles are often contrived as a form of entertainment, but they can also stem from serious mathematical or logistical problems — in such cases, their successful resolution can be a significant contribution to mathematical research.

Application - also known as application software or an app, is computer software designed to help the user to perform specific tasks.

CHAPTER 2
RELATED LITERATURE AND STUDIES

Technical Background

Rubik's Cube

Rubik's Cube is a 3-D combination puzzle invented in 1974 by Hungarian sculptor and professor of architecture Ernő Rubik. Originally called the "Magic Cube", the puzzle was licensed by Rubik to be sold by Ideal Toy Corp. It is widely considered to be the world's best-selling toy (Field, 2005).

In a classic Rubik's Cube, each of the six faces is covered by nine stickers, each of one of six solid colours (traditionally white, red, blue, orange, green, and yellow, where white is opposite yellow, blue is opposite green, and orange is opposite red, and the red, white and blue are arranged in that order in a clockwise arrangement). An internal pivot mechanism enables each face to turn independently, thus mixing up the colours. For the puzzle to be solved, each face must be returned to consisting of one colour. Similar puzzles have now been produced with various numbers of sides, dimensions, and stickers, not all of them by Rubik.

Artificial intelligence (AI) is technology and a branch of computer science that studies and develops intelligent machines and software. Major AI researchers and textbooks define the field as "the study and design of intelligent agents", where an intelligent agent is a system that perceives its environment and takes actions

that maximize its chances of success. John McCarthy, who coined the term in 1955, defines it as ”the science and engineering of making intelligent machines”.

The central problems (or goals) of AI research include reasoning, knowledge, planning, learning, communication, perception and the ability to move and manipulate objects. General intelligence (or ”strong AI”) is still among the field’s long term goals. Currently popular approaches include statistical methods, computational intelligence and traditional symbolic AI. There are an enormous number of tools used in AI, including versions of search and mathematical optimization, logic, methods based on probability and economics, and many others.

Synthesis

The previous reviewed literature and studies from both foreign and local authors were collected to relate their significance with the work of the present researcher. Resources that have been gathered revealed issues and facts that made ideas clearer in the present study.

It has been found out that the study of P. Anupriya and S. Karpagavalli that using an inventory management system to monitor and track stock for an organization, made transactions more efficient. Furthermore, the study of Ostrowski provided a real time and accurate actual count of stocks on hand. The proposed study will include all features stated in the related literature and studies and additionally will integrate a notification features that can automatically notify if

any transactions have been made.

CHAPTER 3

METHODOLOGY

Research Methodology

The software development methodology to be utilized in the study is Extreme Programming (XP). It is a software development methodology that provides values and principles to guide the team behavior and improves the quality of the results of the study.

The researchers used this methodology because it is a pragmatic approach to program development that emphasizes results first and takes an incremental, get-something-started approach to building the product, using continual testing and revision.

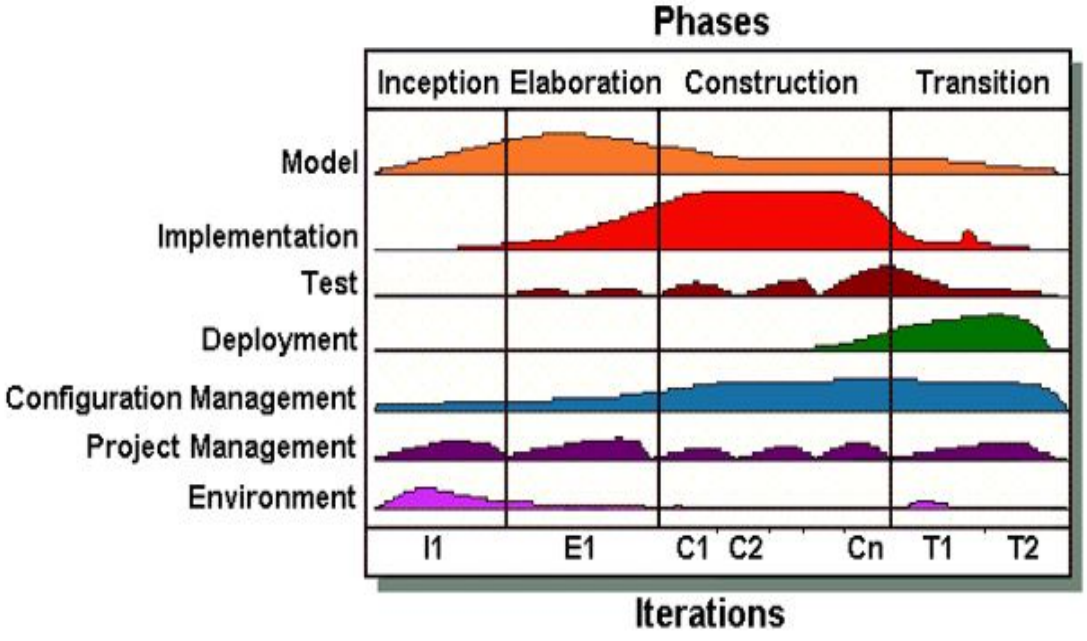

Figure 1
Rational Unified Process

Phase 1: Inception Phase

The Inception phase is where the researchers get familiarity with the project goal and scope. It helps determine the project feasibility, what customer wants, and how the researchers will get into more resource consumable phase.

The researchers planned to integrate GetOldTweets in the system for the collection of data. To make sense of the collected data, topic modelling should be done. For the topic modelling, the researchers integrated Mallet. To analyze the data, visualization is needed. To visualize the generated topic models, the researchers planned to use GraphStream.

Phase 2: Elaboration Phase

This phase is one of the crucial parts in the development of the study since collecting the most significant requirements for the system takes place. In this phase, the researchers should be able to define and baseline the architecture of the system in order to provide a stable basis for the bulk of the design and implementation effort in the Construction Phase.

This is where the researchers determine the requirements of the proposed system. This can be presented by the various modules/features based on your presented objectives.

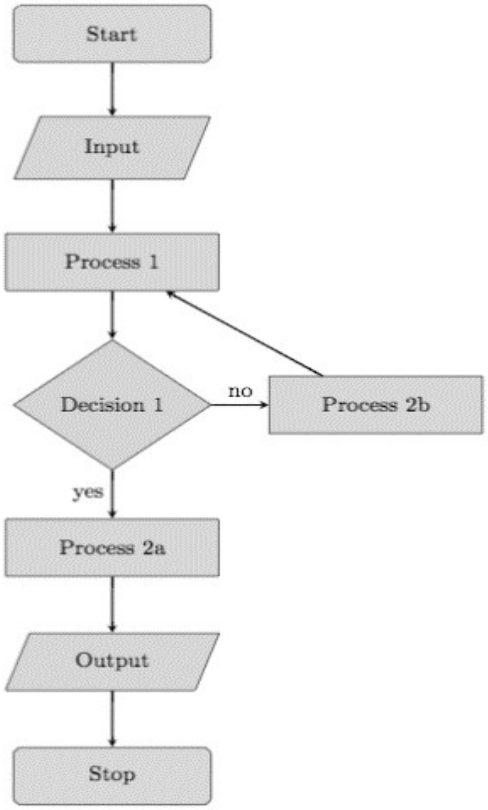

Figure 2
Flowchart

Phase 3: Construction Phase

The Construction Phase is about cost-efficient development of a complete product and operational version of the system that can be deployed in the user community. It is where the researchers develop a complete product that is ready for transition to its community.

The researchers translated both the initial logical and physical designs to actual system development. The Java programming language was used by the researchers in the development of the system and tools were utilized to accomplish goals. The researchers used tools to accomplish our goals. For the

data gathering, we used GetOldTweets1 an unofficial Java library for the Twitter 20 API and we used MAchine Learning for LanguagE Toolkit or MALLET2 for the topic modelling. MALLET is a Java-based package for statistical natural language processing, document classification, clustering, topic modelling, information extraction, and other machine learning applications to text. For the visualization, the researchers used GraphStream3, it is a tool for generating graphs, links and networks. We also used jFreeCharts for the visualization of the frequency of the words.

Design of Software

Software design is the process of transforming user requirements into appropriate abstracts which helps the researchers in designing, coding and implementing the developed software.

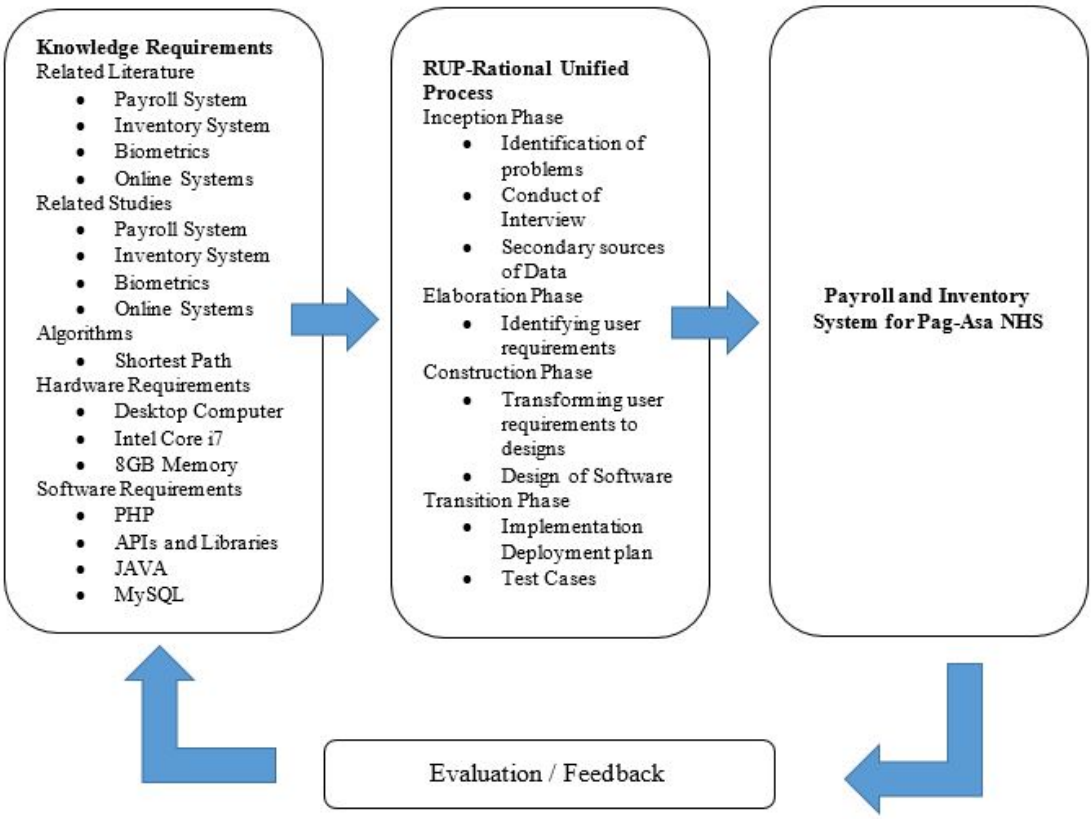

Figure 3
Conceptual Framework

Phase 4: Transition Phase

The purpose of the transition phase is to transition the software product to the user community. In this phase the researchers validate the new system against user expectations.

The researchers prepared test cases to ensure that the developed system requirements were met. . .

Table 1
Software Requirements

Component	Minimum	Suggested
Browser	Google Chrome	Google Chrome
Apache, MySQL and PHP	Version 5	Version 5.5 or latest

Table 2
Hardware Requirements

Component	Minimum	Suggested
Disk Space	10GB	30GB
Memory Requirement	At least 512 MB of Random Access Memory (RAM)	1GB of RAM
Processor	Intel or AMD Processor, at least 1.06 GHz	Intel or AMD Processor, 1.7 GHz

Every computer system has requirements in terms of Software and Hardware used for better implementation. In this case, the researchers listed in the table above the required software and hardware to be used in the proposed system.

CHAPTER 4
RESULTS AND DISCUSSION

This chapter presents the results and analysis of findings made in the conduct of the study. (Objective 1) This includes discussion of the developed Topic Modelling Tool that can collect, pre-process and generates topic models. (Objective 2) The Latent Dirichlet Allocation algorithm used to generate topic models, and (Objective 3) the extent of correctness of the generated topic models based on its topic coherence.

Features of the Develop NLP Tool / Game / Application

Uploading of Data. Data can be uploaded in the main interface window where the upload tab is located as shown in the figure below. The system accepts .txt data file as well as multiple .txt files placed in a folder. It follows mallet syntax for importing documents, import-dir command for multiple .txt files and import-file command for individual .txt file.

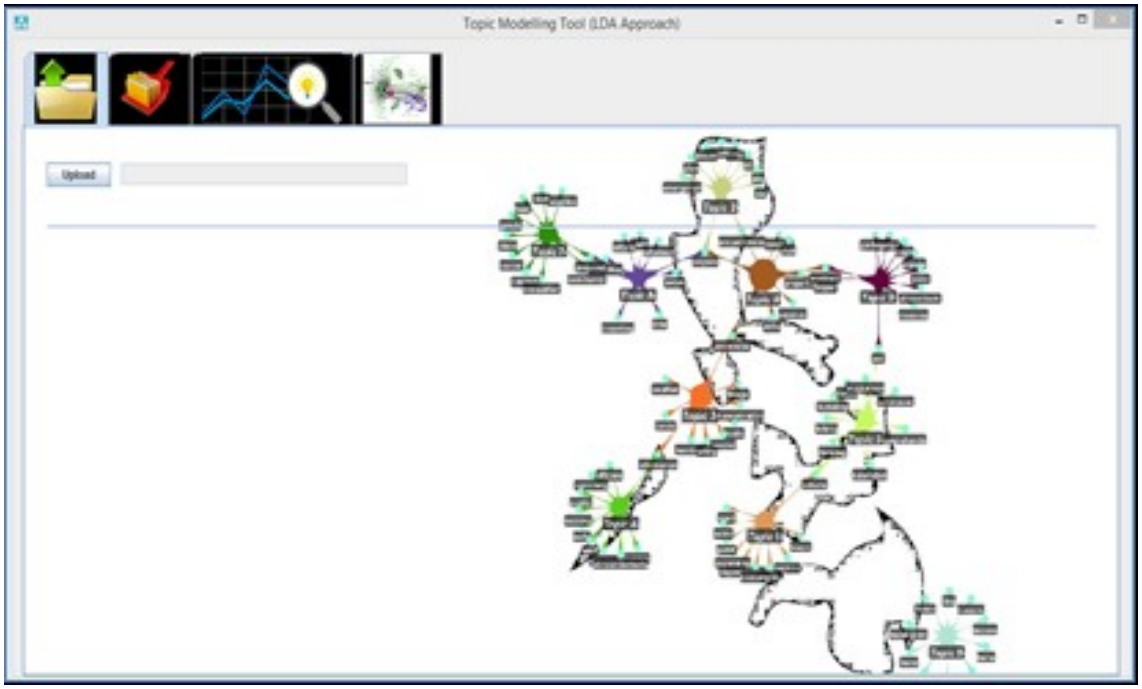

Figure 4
Main Interface with the Upload Tab Window

Pre-processing of Data. In the clean data tab shown in figure 2, the system included the default English Mallet stopwords to be deleted form the uploaded dataset. It allows user to view the default Mallet English stopwords, upload additional stopwords in .txt files, as well as create a new stoplist. Users can also add word or words that will automatically be added to the existing uploaded or created stoplists.

Lastly, from the uploaded, created or added words in the list, users can also delete word or words by highlighting or selecting them. These cleaning options can assure that the topic model to be generated will be more appropriate.

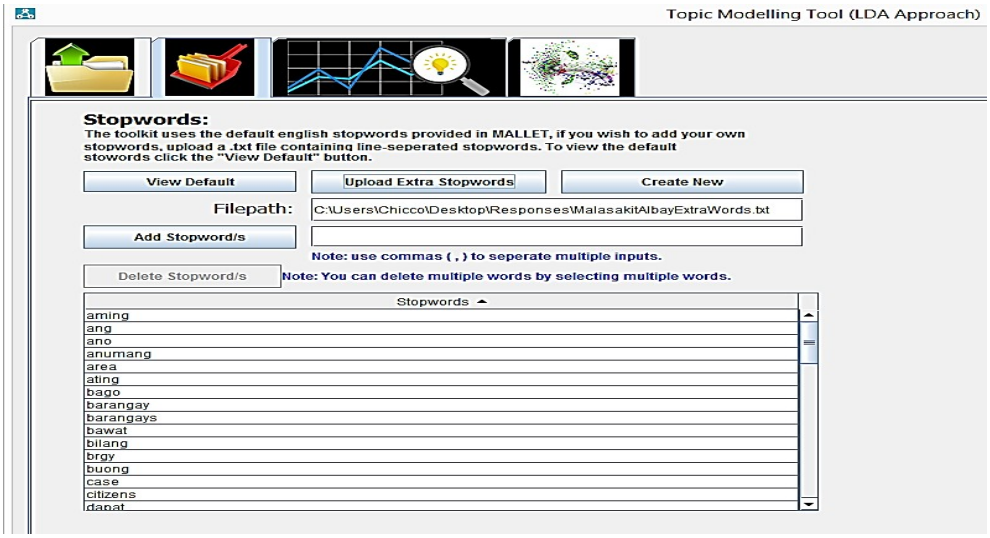

Figure 5
Stopwords Options

Processing of Data. Processing of the cleaned data sets starts with the click of the run button, the system then displays the required parameters in order for it to generate a topic model. The following parameters as shown in figure 3 are required to generate a topic model. Number of topic indicates the number of topic models the user wants to generate. Number of iterations normally starts from 50 to 500, up-to 10,000. Iteration depends on the size of the data sets.

The smaller the datasets, low iteration should be sensible. The number of words indicates the words per topic, optimization interval assigns the occurrence value based on the Latent Dirichlet Allocation (LDA), and the model name is the created file of the generated topic model. Clicking the start button will begin the processing to generate topic model with the given parameters.

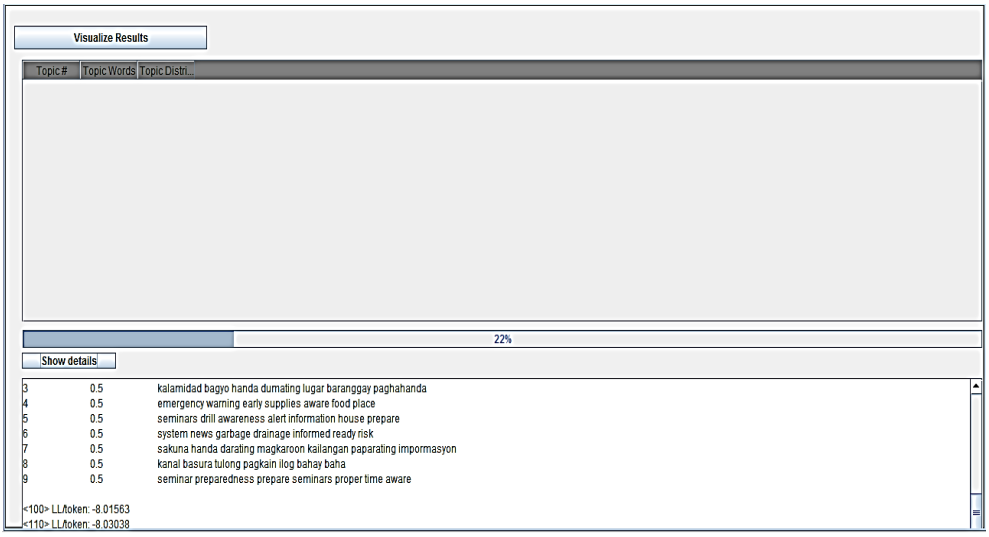

Figure 6
Processing for Topic Modeling

Game Modes. The Segregation Game is a 2D swipe-and-shoot game developed for android in order to teach the users how waste segregation is properly done. The game has two modes, the Player vs. A.I. mode in which the player will play against an A.I. opponent in easy, medium or hard difficulty, and the Player vs. Player mode in which the player will play against another player in a local area network or WLAN.

Figure 7
The Segregation Game's Main Menu and Game Modes

Difficulty Levels. There are three difficulty levels in the game, the "easy" difficulty in which the opponent taps the screen in a slow pace (3 seconds), the "normal" difficulty in which the A.I. taps the screen in a faster pace (1.5 seconds) and the "hard" difficulty in which the A.I. taps the screen in the fastest pace (1 second).

The "Trashclopedia". The "Trashclopedia" has three parts as seen in figure 5, the "Trash Talk", the definition of terms regarding waste segregation, the "Trivia" has useful facts for the user's knowledge and enjoyment, and the "Classification", the classification of the in-game objects that are classified into biodegradable and non-biodegradable.

Figure 8
The Trashclopedia

Latent Dirichlet Allocation (LDA) Algorithm used to appropriately categorize similar groups of data. In natural language processing, is a generative model that allows sets of observations to be explained by unobserved groups that explain why some parts of the data are similar. Using a plate notation to represent the Latent Dirichlet Allocation (LDA) approach, the dependencies among the many variables can be captured concisely. Figure 6 represents the following: The boxes are “plates” representing replicates; the outer plate represents documents, while the inner plate represents the repeated choice of topics and words within a document. M denotes the number of documents, N the number of words in a document.

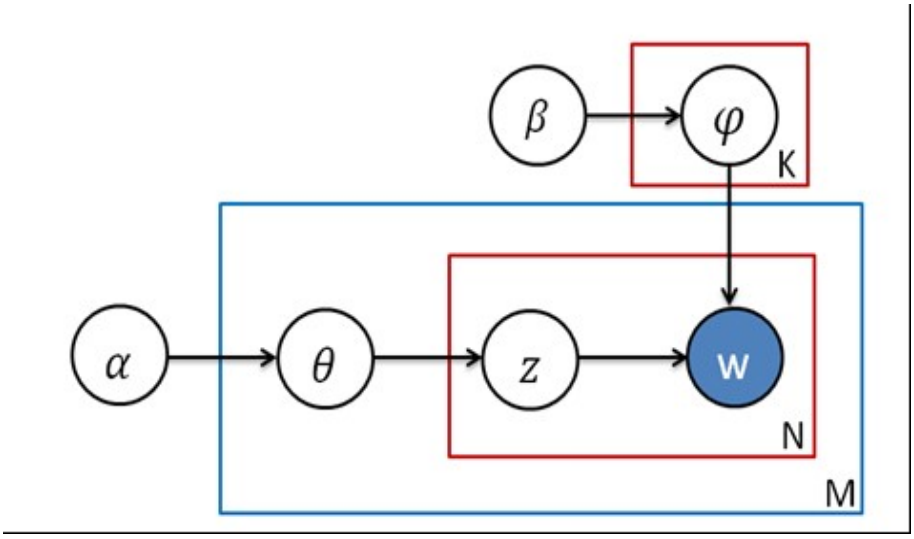

Figure 9
Plate notation for LDA with Dirichlet-distributed topic-word

Where:

(alpha) is the parameter of the Dirichlet prior on the per-document topic distributions;

(beta) is the parameter of the Dirichlet prior on the per-topic word distribution;

(theta)M is the topic distribution for document M;

(phi)K is the word distribution for topic K;

Zmn is the topic for the n-th word in document M; and

Wmn is the specific word.

Algorithm used for the Developed System / Application to achieve the necessary functions or output/s of the study.

Latent Dirichlet Allocation (LDA) assumes documents are produced from a mixture of topics, these topics then generate words based on their probability distribution. Given a dataset of documents, LDA backtracks and tries to figure out what topics would create those documents. LDA is a matrix factorization technique. In vector space, any corpus can be represented as a document-term matrix.

Parameters of Latent Dirichlet Allocaton (LDA). Parameters are vital in the correctness of the generation of models in topic modeling. The following are the LDA parameters:

Alpha and Beta. Alpha and Beta hyper-parameters are the key parameters of LDA where alpha represents document-topic density and Beta represents topic-word density. Higher the value of alpha, documents are composed of more topics and lower the value of alpha, documents contain fewer topics. On the other hand, higher the beta, topics are composed of a large number of words in the corpus, and with the lower value of beta, they are composed of few words.

Number of Topics. These are the number of topics to be extracted from the corpus. Researchers have developed approaches to obtain an optimal number of topics by using Kullback Leibler Divergence Score.

Number of Topic Terms. The number of terms composed in a single topic

where generally is determined according to the requirement. If the problem statement talks about extracting themes or concepts, it is recommended to choose a higher number, if problem statement talks about extracting features or terms, a low number is recommended.

Number of Iterations / passes. The maximum number of iterations allowed to LDA algorithm for convergence.

Djikstra's algorithm to compute the distances between nodes. The Djikstra's algorithm computes the distances between nodes as shown in figure 7. It gets the values of the designated paths and it computes the distances between the indexes which are represented as nodes in the map. The researchers plotted the nodes in each path through the x and y coordinates of the image. The nodes are called in the algorithm to determine the point of origin and the destination and to display the paths.

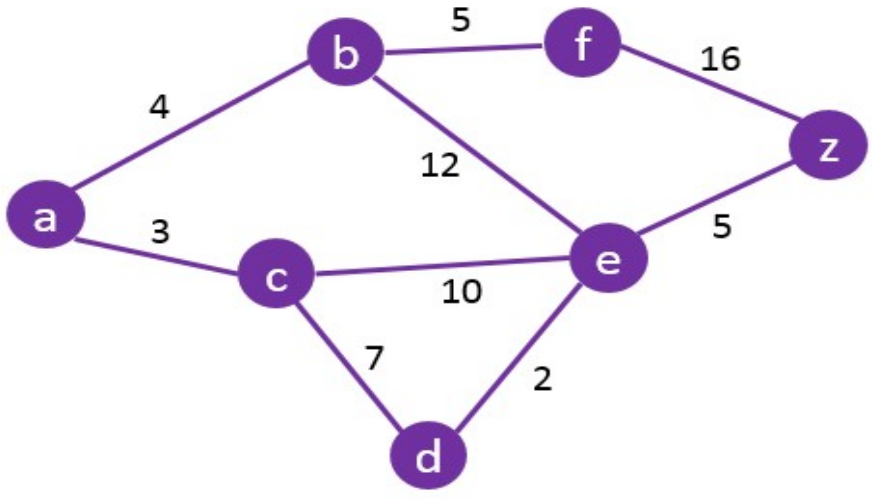

Figure 10
Shortest Path using Djiktra Algorithm

Application of Recurrent Neural Network Algorithm in Disaster Management. Recurrent neural network, shown in figure 8 is a type of ANN, where it takes input not just the current example they see, but also what they have perceived previously in time. It has recurrent means of interpreting and assessing the current information being processed. RNN can utilize distributed representations of words by first converting the tokens comprising each text into vectors, which form a matrix. Networks main advantage resides in their ability to deal with sequential data. The prediction by the network at time-step T is influenced by the one it made at time-step T – 1.This chapter presents the results and analysis of findings made in the conduct of the study. (Objective 1) This includes discussion of the developed Topic Modelling Tool that can collect, pre-process and generates topic models. (Objective 2) The Latent Dirichlet Allocation algorithm used to generate topic models, and (Objective 3) the extent of correctness of the generated topic models based on its topic coherence.

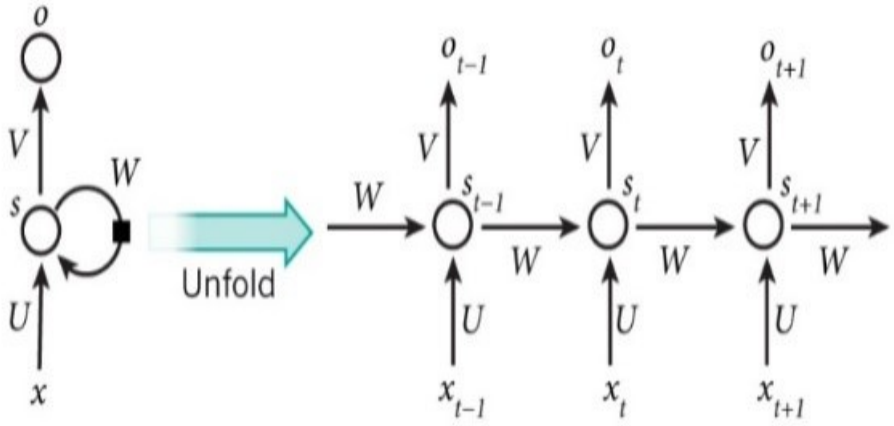

Figure 11
Recurrent Neural Network

Extent of correctness of the generated topic models based on its topic coherence

Evaluating the Topic Models through Human Judgment. The generated topic models can be measured by evaluating the performance of the Latent Dirichlet Allocation (LDA). Evaluating the LDA can be done using human judgments to examine the topics. This may involve identifying semantic coherent topics and measuring if topic model's association agrees with human topic associations for a dataset.

One method of measuring its correctness is by comparing the directly annotated topic assignments based on its top-N words and validate if these annotations agree with the human judgment.

Model Precision. Model precision was used to measure the correctness of the generated topic model against manually annotated models. It is the number of agreements between humans and the model divided by the total number of judgments. Table 1 presents the results to measure the correctness of the generated topic model against the manually annotated ones. Test 1 returned 100% precision, test 2 with 83% precision and test 3 returned an 85% precision. In summary, the average precision rated 87% denoting that the manual annotations of the generated topic models agreed with the human judgments. The respondents view on the topics marked with "No Label" disagreed to their judgment implying that there could be themes assigned. These were true enough

because finding shows that the topics have coherent aspects but words were evenly distributed indicating possible assignments of multiple labels.

Table 3
Precision Results

TEST	Parameters	Topics	Labels	Agree	Disagree
1	5 topics, 10 words, 500 iterations	0	Education and Training	10	0
		1	Early Warning	10	0
		2	Relief Operation	10	0
		3	Prevention and Mitigation	10	0
		4	Prevention and Mitigation	10	0
		Precision		**100%**	**0%**
2	10 topics, 10 words, 500 iterations	0	Education and Training	10	0
		1	Education and Training	10	0
		2	Early Warning	10	0
		3	Relief Operation	10	0
		4	No Label	3	7
		5	No Label	4	6
		6	Relief Operation	8	2
		7	Communication and Coordination	9	1
		8	Prevention and Mitigation	10	0
		9	Prevention and Mitigation	10	0
		Precision		84%	**16%**
3	15 topics, 10 words, 500 iterations	0	Education and Training	10	0
		1	Prevention and Mitigation	9	1
		2	Relief Operation	9	1
		3	No Label	3	7
		4	Prevention and Mitigation	10	0
		5	Early Warning	10	0
		6	Education and Training	10	0
		7	Early Warning	9	1
		8	Relief Operation	10	0
		9	Communication and Coordination	10	0
		10	Prevention and Mitigation	9	1
		11	No Label	6	4
		12	Prevention and Mitigation	9	1
		13	Relief Operation	9	1
		14	Prevention and Mitigation	10	0
		Precision		**89%**	**11%**

Performance Evaluation of the Classification Models using accuracy, precision F measures and recall metrics.

Performance Evaluation. Performance of the classification models were described by the confusion matrices which were used to properly present the classified data. The classifier configuration that obtained the best accuracy was selected to be used in developing the DRM e-Participatory toolkit qualitative response classification system. The average accuracy, precision, recall were computed to give overall assessment of the effectiveness of the classification across the defined categories for the DRM qualitative responses.

Accuracy measured the effectiveness of the classifier in terms of detections in agreement with the actual classifications. Formula 1 shows the formula on determining the accuracy of the model.

Formula 1. *Accuracy*

$$Accuracy = \frac{No.ofCorrectlyClassifiedResponses}{Totalno.ofQualitativeResponses} \quad (1)$$

On the other hand, precision measured the exactness of a classifier and considers false detection. A higher precision means less false positives, while a lower precision means more false positives. Formula 2 shows how precision is computed.

Formula 2. *Precision*

$$Precision = \frac{TruePositives}{Truepositives + Falsepositives} \tag{2}$$

Recall measures the completeness, or sensitivity, of the classifier. Higher recall means less false negatives, while lower recall means more false negatives.

Formula 3. *Recall*

$$Recall = \frac{TruePositives}{Truepositives + Falsenegatives} \tag{3}$$

The last metric, which is F-measure is computed using the formula shown below. It is the weighted harmonic mean of precision and recall and its main advantage is it is able to rate a system with one unique rating.

Formula 4. *F-measure*

$$F - measure = \frac{2 * precision * recall}{precision + recall} \tag{4}$$

Results of Experiments. The performance of the classification models were determined by the standard metrics discussed in the previous section. Metric scores of regular and bidirectional neural networks are shown in table 2. It is observed that the two RNN algorithms produced closed evaluation results where Bidirectional RNN obtained accuracy rate of 81.67%, 81.17 precision, 81.67% recall and 80.81% f-measure against performance evaluation result of

regular RNN where is obtained 81.25% accuracy, 80.84% precision, 81.25% recall and 80.25% f-measure.

Table 4
Summary of Precision Results

Standard Metric	**Regular RNN**	**Bidirectional RNN**
Accuracy	81.25%	**81.67%**
Precision	80.84%	**81.17%**
Recall	81.25%	**81.67%**
F-measure	80.25%	**80.81%**

CHAPTER 5
SUMMARY, FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

This chapter presents the Summary of Findings, Conclusions, and Recommendations of the study Topic Modelling on Mayon Volcano Tweets using Latent Dirichlet Allocation (LDA).

Summary of Findings and Accomplishments

Based on the objectives of the study, the following results were accomplished:

1. **The Develop Tool/Application/System.** **Sample 1.** Integrating game elements in the developed 2 dimensional Digital Netiquette Gamification for android was able to capture users' interests and increase their awareness about sensitive issues such as digital netiquette.

   Sample 2. The developed topic modeling tool was able to collect, pre-process, generate topic models as well as visualize these models that provided the unique meaning of the collected dataset.

   Sample 3. Utilizing online open-source dataset using getold tweets was able to produce enough data to generate appropriate models. A total of 38,888 tweets consisting of specified keywords and date were successfully collected.

2. **The algorithm used for the Developed System / Application to achieve the necessary functions or output/s of the study.** **Sample 1.** Utilizing the

Iterative Dichotomiser 3 (ID3) Algorithm through the incorporation of a decision tree and reward system was able to evaluate users' learning progress.

Sample 2. The Latent Dirichlet Allocation Algorithm was able to generate topic models by appropriately categorizing similar groups of data in a datasets to determine similar topics from the collected disaster-related responses.

Sample 3. The Standard and Bidirectional Recurrent Neural Network was effective in terms of classifying typhoon related corpus and was able to generate relevant models.

3. **Assessing the users' knowledge through pre and post evaluation test / Extent of correctness of the generated topic models based on its topic coherence / Performance Evaluation of the Classification Models using accuracy, precision F measures and recall metrics.**

   Sample 1. The pre-evaluation and post-evaluation test was able to assess the users' knowledge learned as applied in the real-situational scenarios before and after using the gamification.

   Sample 2. Manual evaluation through human judgment was used to manually evaluate topic models by ranking topic significance as well as topic to words similarity. This provided a more inclusive result of the true quality of the different topic models.

   Sample 3. The performance of the classification models were determined

by the standard metrics. It was observed that the two RNN algorithms produced closed evaluation results where Bidirectional RNN obtained accuracy rate of 81.67%, 81.17 precision, 81.67% recall and 80.81% f-measure against performance evaluation result of regular RNN where is obtained 81.25% accuracy, 80.84% precision, 81.25% recall and 80.25% f-measure.

Conclusions

Based from the findings, the researchers came up with the following conclusions:

1. **Sample 1** Integrating game elements such as trophies, badges, power ups, sounds and animation in the developed gamification increased the interests of users to use the application.

   Sample 2. The features of the proposed system can easily upload datasets to be cleaned, analyzed, processed in-order to generate appropriate topic models as well as visually present the topic models to better present and appreciate the generated results.

   Sample 3. Integrating the collection, pre-processing, generation of models, visualizing as well as evaluating the models in the developed tool provided an easier methods of Classifying datasets.

2. **Sample 1.** Using a Decision Tree which utilizes the Iterative Dichotomiser 3 (ID3) Algorithm provided a real scenario based decision making application

that measures users' progress based on the provided storyline.

Sample 2. The Latent Dirichlet Allocation (LDA) algorithm was able to generate topic models by appropriately categorizing similar groups of data in a datasets to determine similar topics from the collected disaster-related responses.

Sample 3. The process of classification of Typhoon Yolanda related tweets with relatively high accuracy was made possible using the sequential process of standard and bidirectional Recurrent Neural Networks (RNN) and their powerful architecture which remembers the past and future context of data.

3. **Sample 1.** The pre-evaluation and post-evaluation tests was able to determine whether the user gained knowledge in proper computer etiquette before and after using the application.

   Sample 2. The use of both standard and bidirectional recurrent neural network algorithms in sentiment analysis were effective since it was able to achieve scores higher than 80% in all evaluation metrics.

   Sample 3. The result of the evaluation on the extent of correctness of the generated topic models based on the top-N words using model precision yielded 87% mean denoting that the manual annotations of the generated topic models agreed with the human judgments.

Recommendations

On the basis of the conclusions, the researchers come up with several recommendations.

1. Other features, modules of the develop system / application / tool / datasets
2. Include other possible algorithms, comparison of algorithms, other methods
3. Other test metrics, higher / better models, better results

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APPENDICES

Appendix A

Letters and Appointment

BICOL UNIVERSITY
COLLEGE OF SCIENCE
Computer Science and Information Technology Department
Legazpi City

APPOINTMENT OF CAPSTONE PROJECT 2 EVALUATORS

January 09, 2016

Chairman:**MR. DAVIE B. BALMADRID**
Member:**MS. LEA D. AUSTERO**
Member:**MR. RODEL N. NAZ**

You are hereby appointed to constitute the Capstone Project Panel as indicated above to evaluate the research work of **Mr. James R. Basanta, Mr. Zion J. Camba, Mr. Christian Ray C. Frecia** and **Mr. John Paul P. Pelaez** who will work on the topic, "Web-based Personnel Profiling, property inventory and records management system for the provincial government services office of Albay", which is scheduled for its Final Defense on January 12, 2019 at 8:00-9:00 am in CSB2 Room 105. As member of the panel you are asked to:

1) Appraise the validity and acceptability of the thesis work in terms of its scholarly quality, correctness of the facts and claims contained therein; and completeness as to its basic components.
2) Make sure that all the suggestions are judiciously incorporated.
3) Evaluate the research report based on adopted.
4) Provide ample time to her advisee in relation to the thesis work.
5) Orient the advisee on what might/will transpire in the defense session and
6) Be physically present during the oral defense.

You shall be entitled to an honorarium as chairman and as member of the panel, as per Board Resolution No. 093, s 2006.

Very truly yours,

JOCELYN E. SERRANO, M.Sc.
Dean, College of Science

Conforme:

MR. ARIS J. ORDOÑES
Chairman

MS. LEA D. AUSTERO
Member

MR. RODEL N. NAZ
Member

BICOL UNIVERSITY
COLLEGE OF SCIENCE
Computer Science and Information Technology Department
Legazpi City

APPOINTMENT OF CAPSTONE PROJECT 2 EVALUATOR

January 09, 2016

MR. DAVIE BALMADRID
Professor
College of Science
Legazpi City

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6) Be physically present during the oral defense.

You shall be entitled to an honorarium as member of the panel, as per Board Resolution No. 093, s 2006.

Very truly yours,

JOCELYN E. SERRANO, M.Sc.
Dean, College of Science

Conforme:

MR. DAVIE BALMADRID
Chairman of the Panel

BICOL UNIVERSITY
COLLEGE OF SCIENCE
Computer Science and Information Technology Department
Legazpi City

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JOCELYN E. SERRANO, M.Sc.
Dean, College of Science

Conforme:

MS. LEA D. AUSTERO
Member of the Panel

BICOL UNIVERSITY
COLLEGE OF SCIENCE
Computer Science and Information Technology Department
Legazpi City

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College of Science
Legazpi City

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Very truly yours,

JOCELYN E. SERRANO, M.Sc.
Dean, College of Science

Conforme:

MR. RODEL N. NAZ
Member of the Panel

BICOL UNIVERSITY
COLLEGE OF SCIENCE
Computer Science and Information Technology Department
Legazpi City

APPOINTMENT OF CAPSTONE PROJECT 2 PROGRAMMING ADVISER

January 9, 2016

MR. CHRISTIAN Y. SY
Professor
College of Science
Legazpi City

You are hereby appointed to act as PROGRAMMING ADVISER of **Mr. James R. Basanta, Mr. Zion J. Camba, Mr. Christian Ray C. Frecia** and **Mr. John Paul P. Pelaez** who will work on the topic, "Web-based Personnel Profiling, property inventory and records management system for the provincial government services office of Albay", which is scheduled for its Final Defense on January 12, 2019 at 8:00-9:00 am in CSB2 Room 105.

As an adviser, you shall perform the following tasks:

1) Check the format of the manuscript.
2) Provide the general editing of thesis work.
3) Attend defense session of the advisees and record suggestions and recommendations at the panel.
4) Orient the advisee on what might/will transpire in the defense session.
5) Be physically present during the oral defense.

This designation shall be entitled to a professional fee as authorized under Board Resolution No. 093, s 2006.

Very truly yours,

JOCELYN E. SERRANO, M.Sc.
Dean, College of Science

Conforme:

MR. CHRISTIAN Y. SY
Programming Adviser

BICOL UNIVERSITY
College of Science
Legazpi City
Computer Science and Information Technology Department
Legazpi City

APPOINTMENT OF CAPSTONE PROJECT 1 CONTENT ADVISER

January 9, 2016

MS. MARY JOY P. CANON
Professor
College of Science
Legazpi City

You are hereby appointed to act as PROGRAMMING ADVISER of **Mr. James R. Basanta, Mr. Zion J. Camba, Mr. Christian Ray C. Frecia** and **Mr. John Paul P. Pelaez** who will work on the topic, "Web-based Personnel Profiling, property inventory and records management system for the provincial government services office of Albay", which is scheduled for its Final Defense on January 12, 2019 at 8:00-9:00 am in CSB2 Room 105

As an adviser, you shall perform the following tasks:

1) Check the format of the manuscript.
2) Provide the general editing of thesis work.
3) Attend defense session of the advisees and record suggestions and recommendations at the panel.
4) Orient the advisee on what might/will transpire in the defense session.
5) Be physically present during the oral defense.

This designation shall be entitled to a professional fee as authorized under Board Resolution No. 093, s 2006.

Very truly yours,

JOCELYN E. SERRANO, M.Sc.
Dean, College of Science

Conforme:

MS. MARY JOY P. CANON
Content Adviser

Appendix B

Interview Questionnaires

Bicol University College of Science
CS/IT Department
480-6482

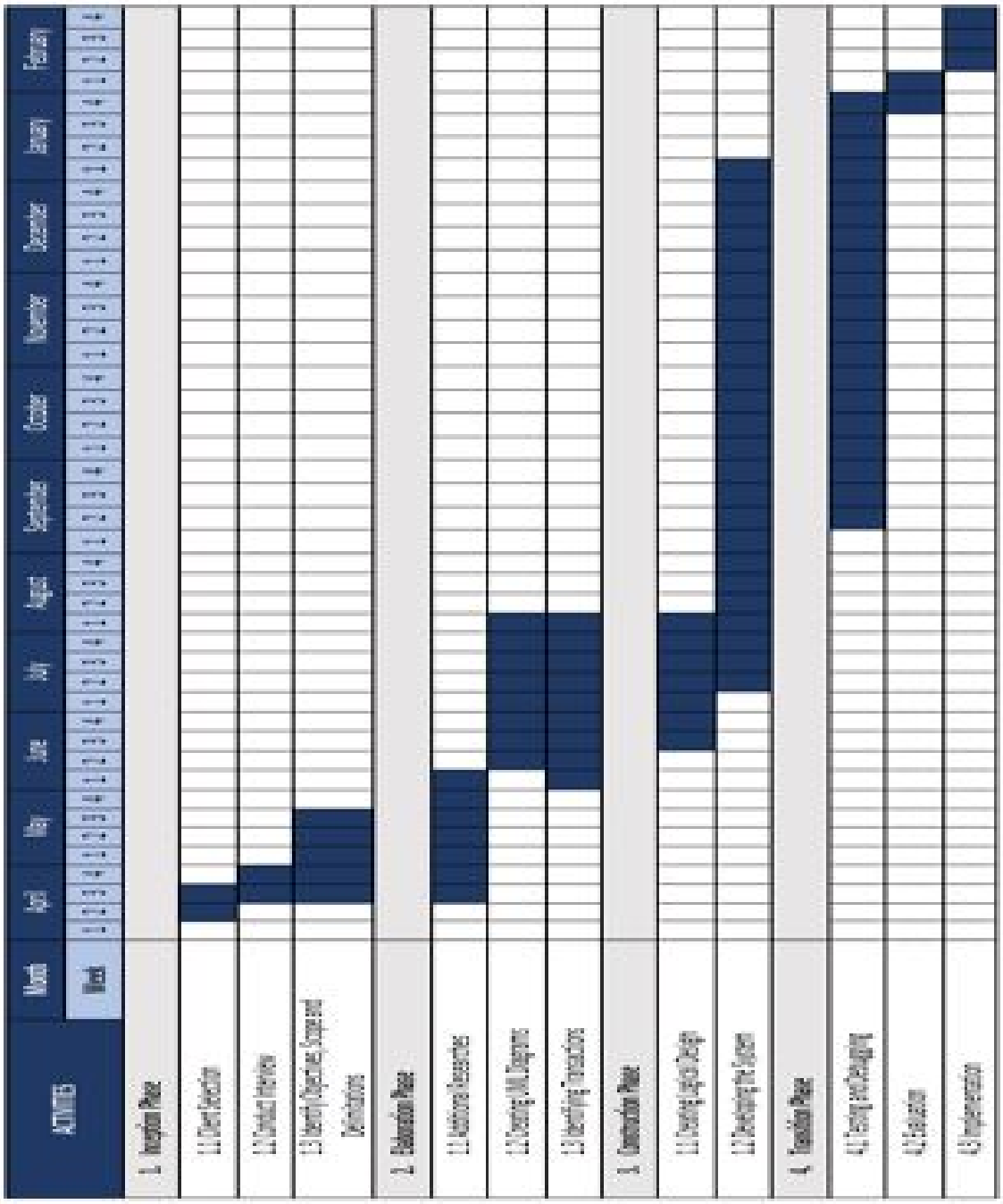
Interview Guide Questionnaires

1. What are the mandates of your organization, your mission and vision?
2. Does your organization experience problems specifically in your operations?
   (Ask them to elaborate on this/these)
3. What is the organization's current position or viewpoint on this problem?
4. What priority actions does the organization place on solving this problem?
5. Would your organization be interested if we assisted in resolving these problems?
6. Would your organization be interested if we develop a system that can be of assistance in your day to day activity so as to minimize or resolve the stated problems?
7. What factors must be taken into consideration in addressing this problem? (E.g., availability of resources/equipments, features of the system, security issues, end users, etc.)
8. Would you consider absorbing us for our on-the-job (OJT) training to ensure full development of the system?

Appendix C

Software Project Management Plan

Gantt Chart/PERT



Appendix D

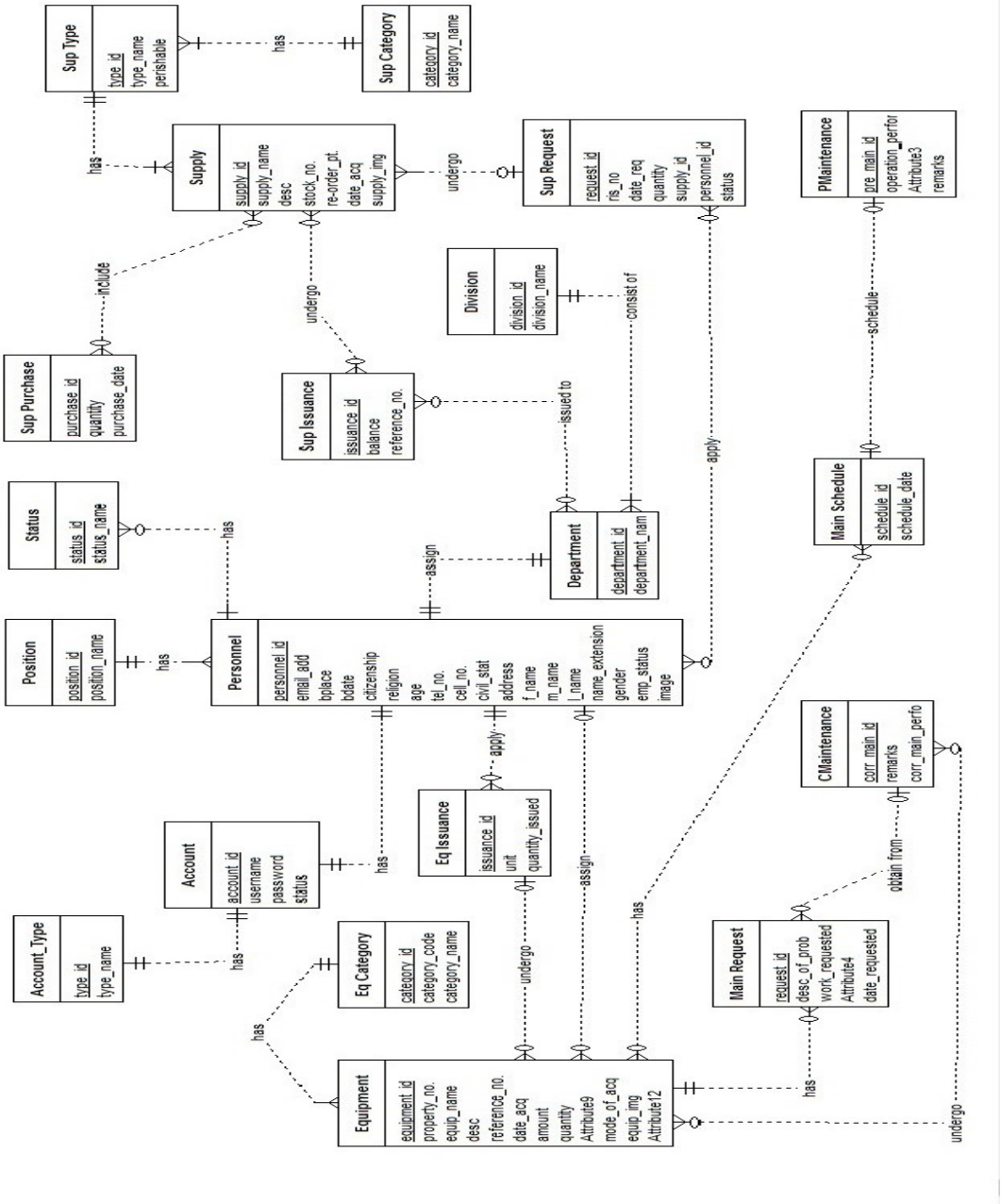
Individual Tasking Table

	Activity	Description	Person Responsible
1	Data Gathering	Interview with the CSC IT Dept. head	All Members
2	Chapter 1 of Research Paper	Introduction, Objectives, Scope and Delimitations	Ciara Peñarubia
3	Chapter 2 of Research Paper	Related Literature and Studies	Ciara Peñarubia
4	2nd Data Gathering	For sample forms and additional information	All members
5	Database Design	Database design	Klarenz Monreal
6	User Stories	Create user stories/ requirements	Jasper Jules Balbuena
7	Chapter 3 of Research Paper	Research Design and Methodology	Jasper Jules Balbuena
8	Diagrams	Including Use Case and DFD	All Members
9	Revise Chapter 2	Revise chapter 2	Ciara Peñarubia

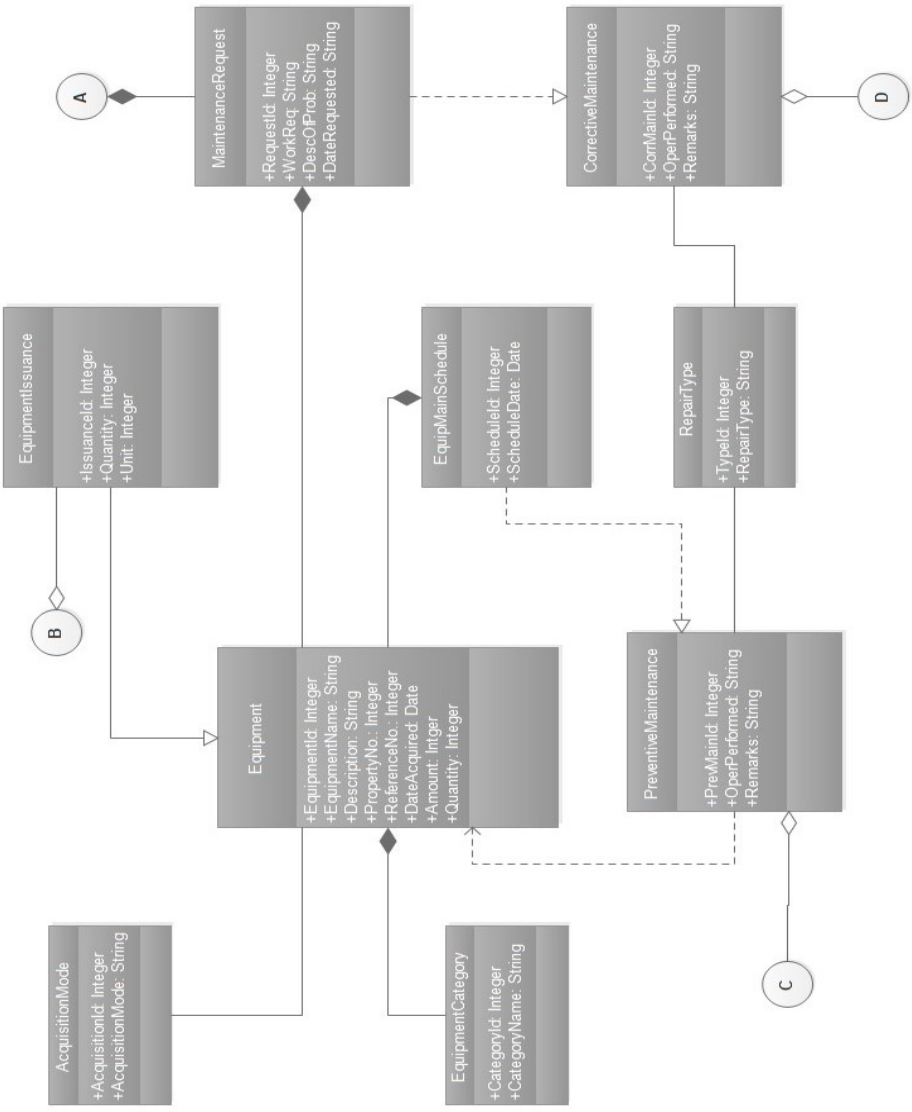
Appendix E

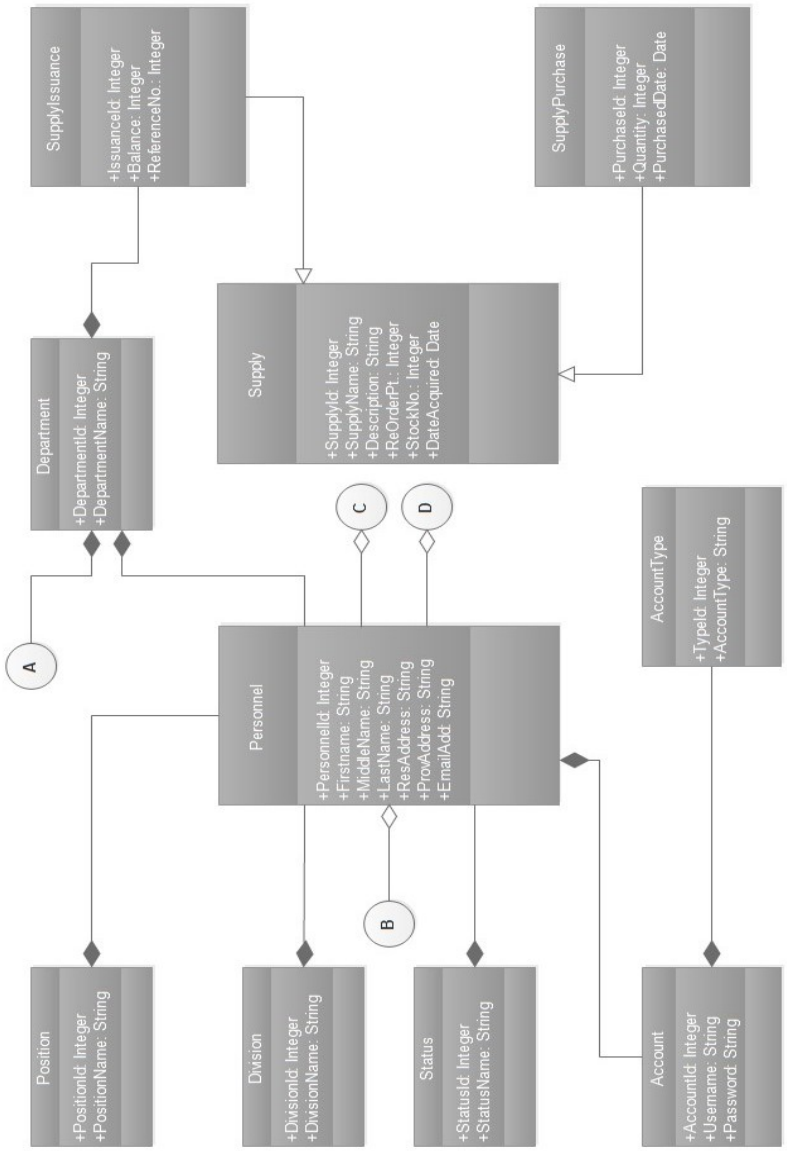
Diagrams

Entity Relationship Diagram



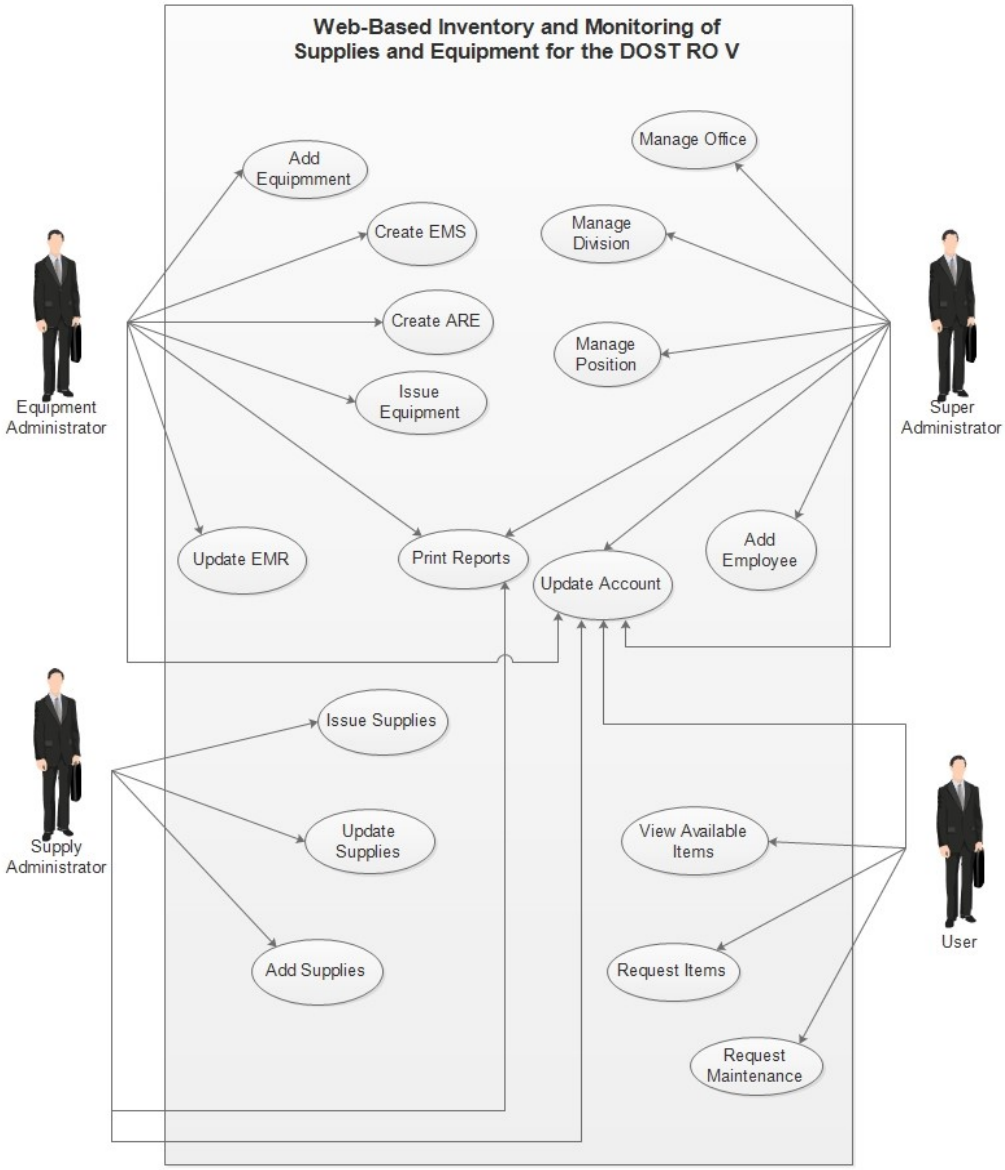
Class Diagram





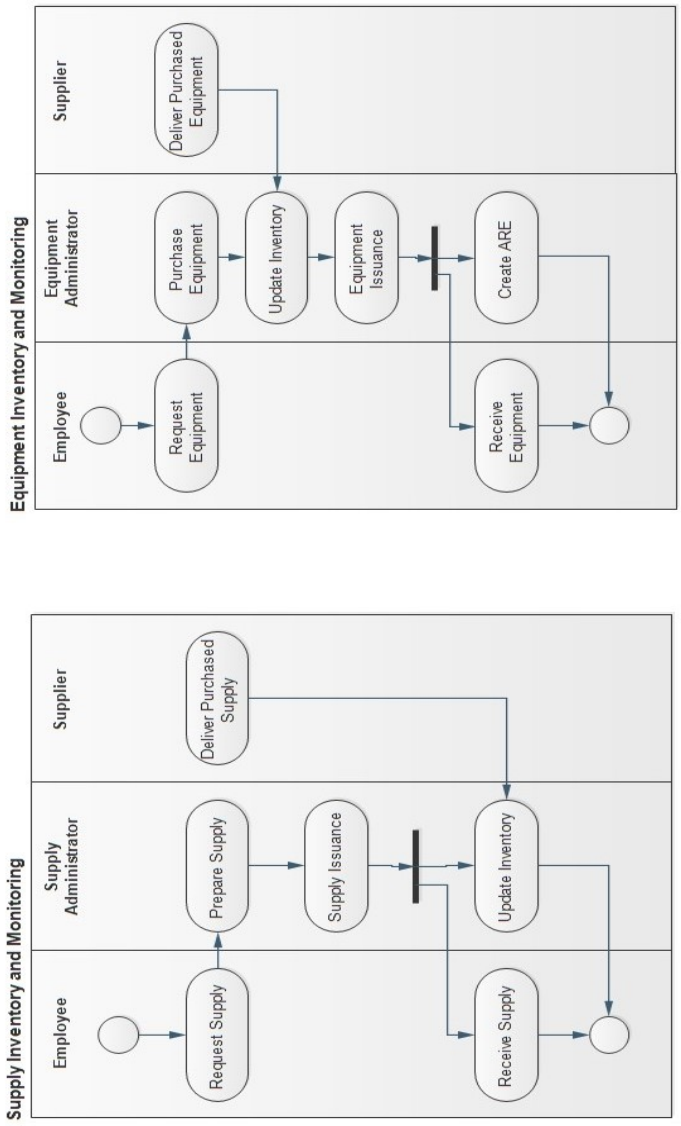
CLASS DIAGRAM

Use Case Diagram

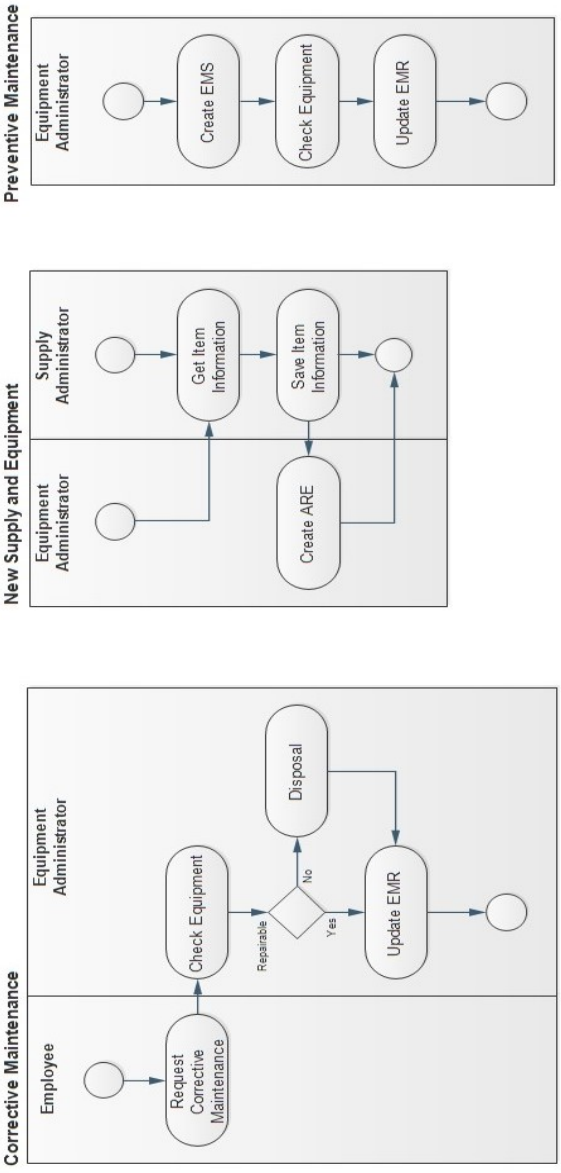


USE CASE DIAGRAM

Activity Diagram



ACTIVITY DIAGRAM

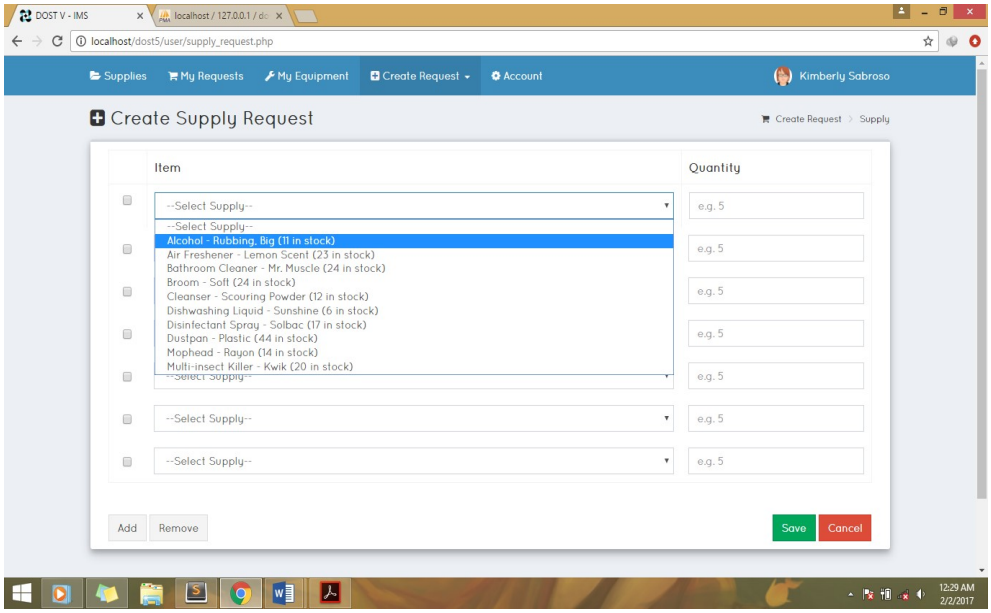


ACTIVITY DIAGRAM

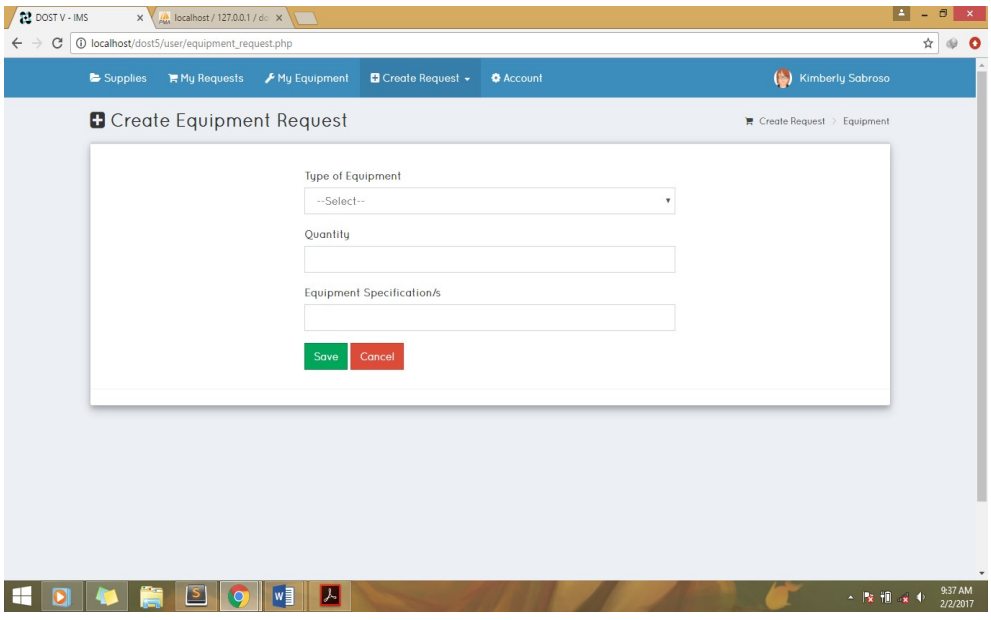
User Interface Design

User Interface Design

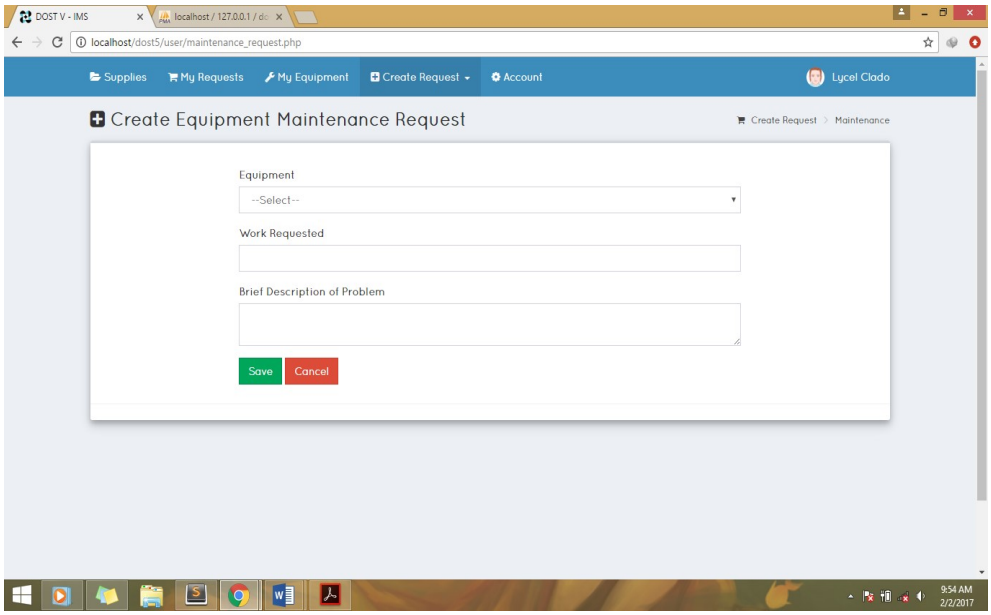
User



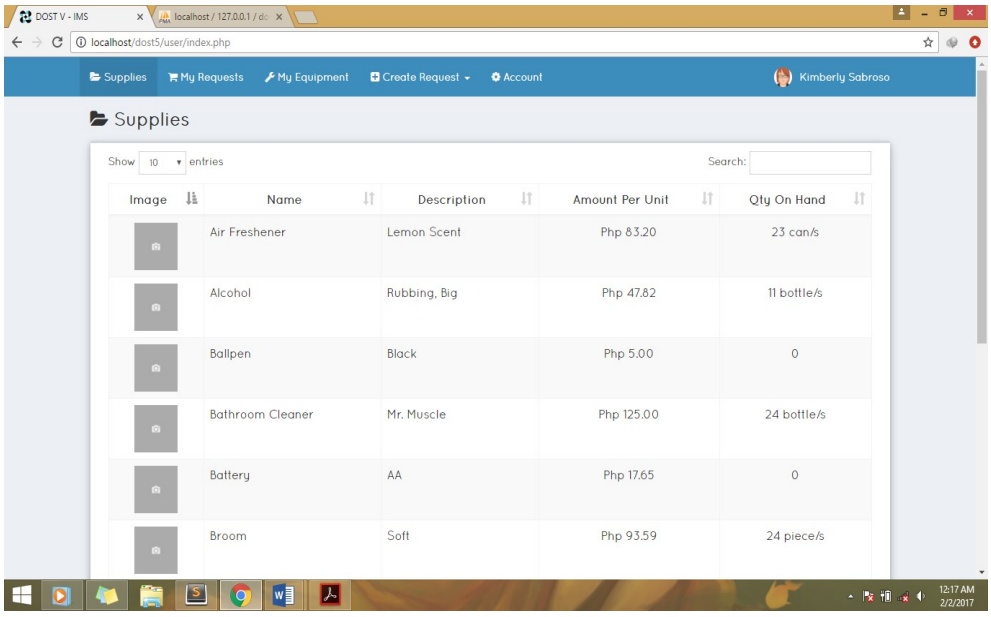
Creating Request for Supply



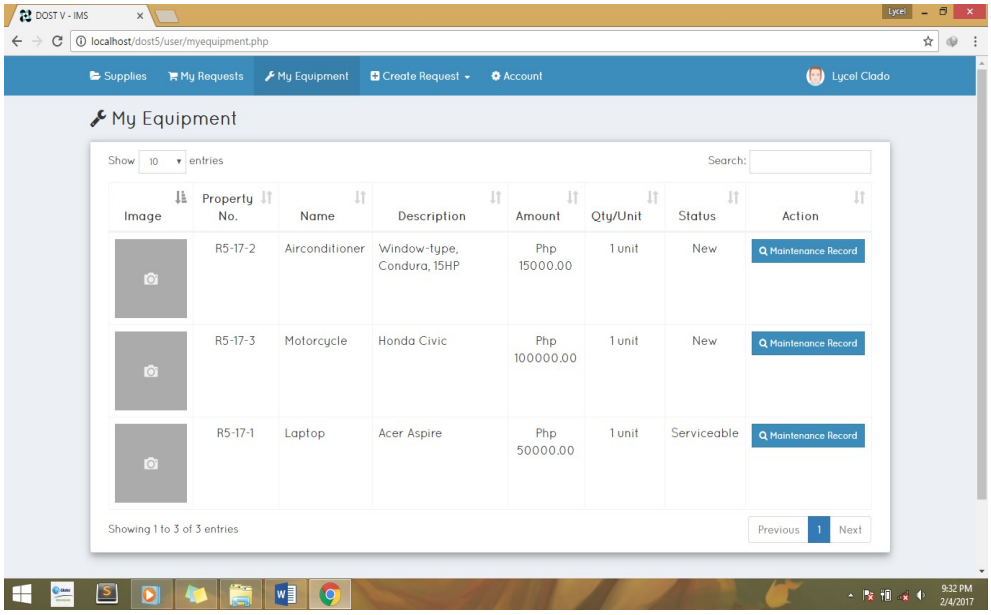
Creating Request for Equipment



Creating Request for Maintenance

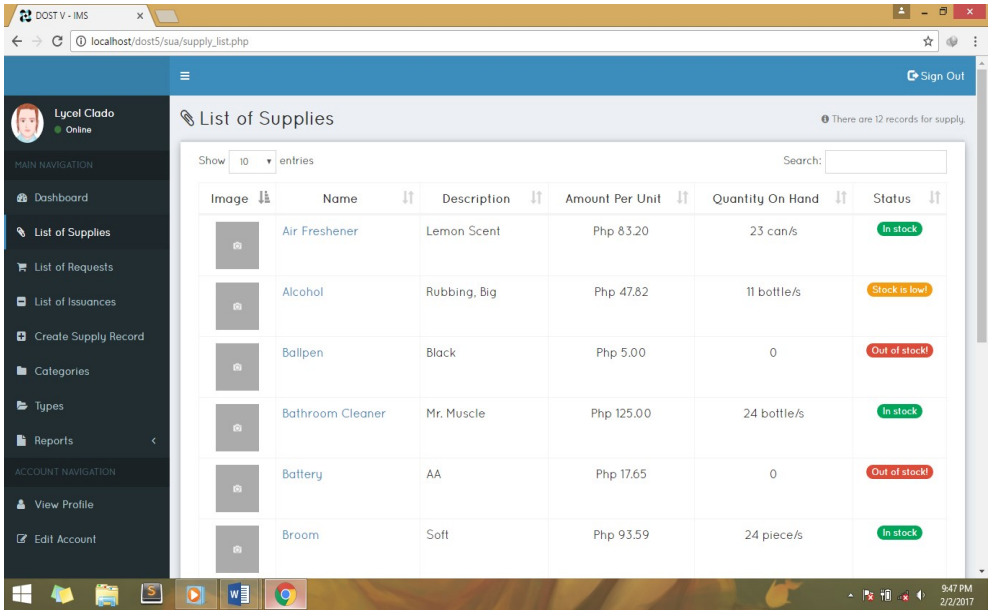


List of Supplies

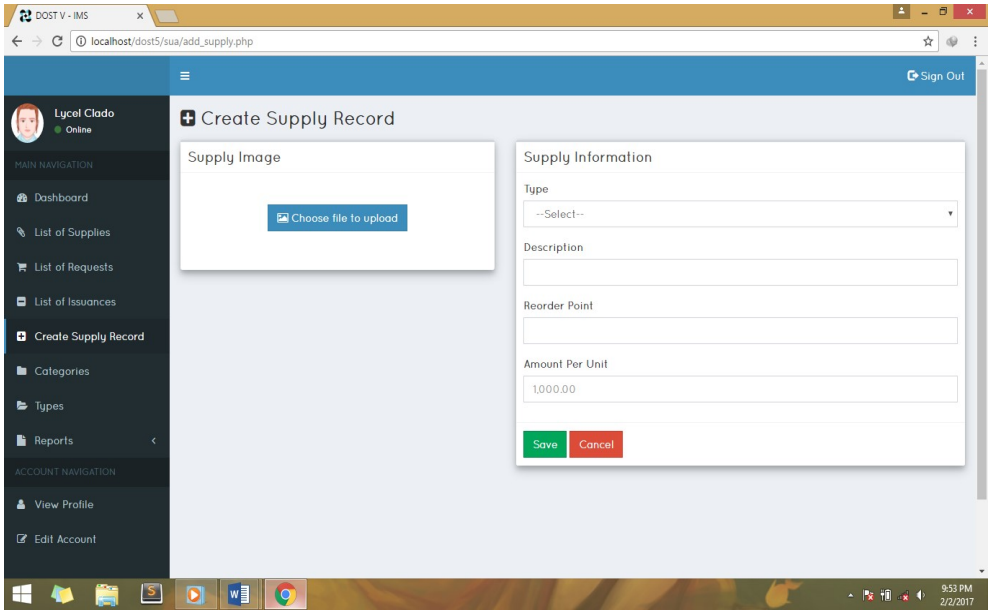


List of Assigned Supplies

Supply Administrator

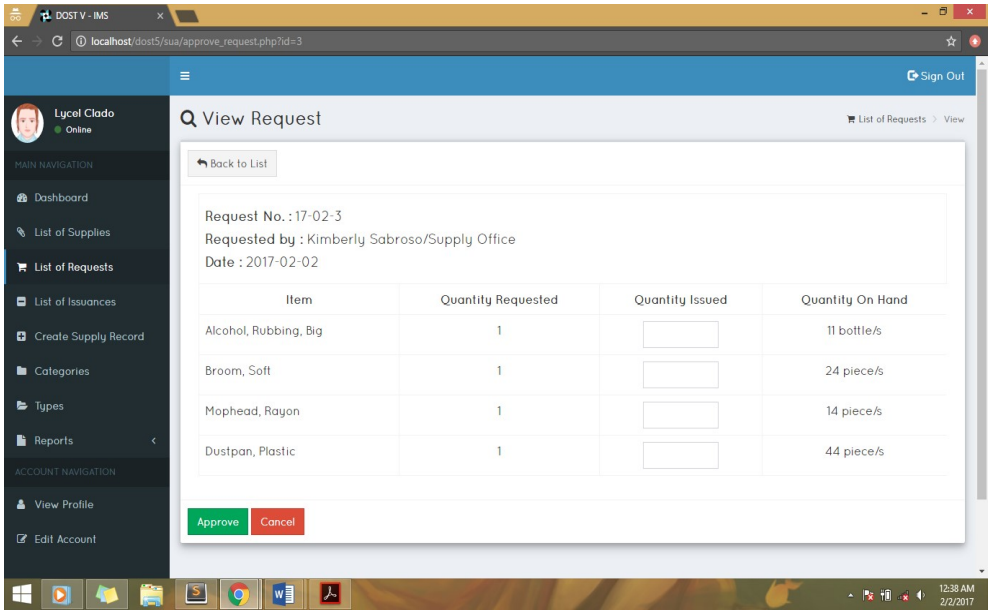


List of Supplies



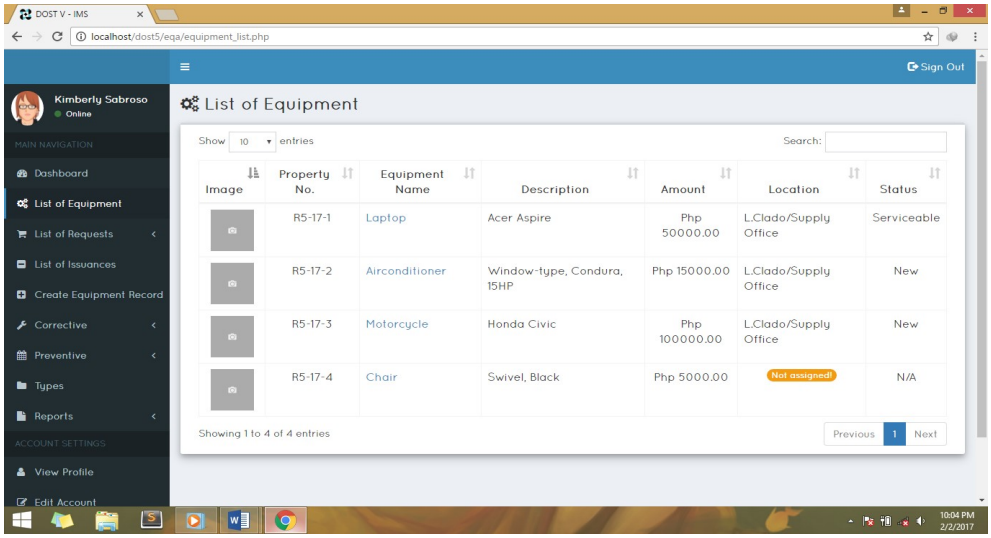
Creating Supply Record

Adding Purchase Record

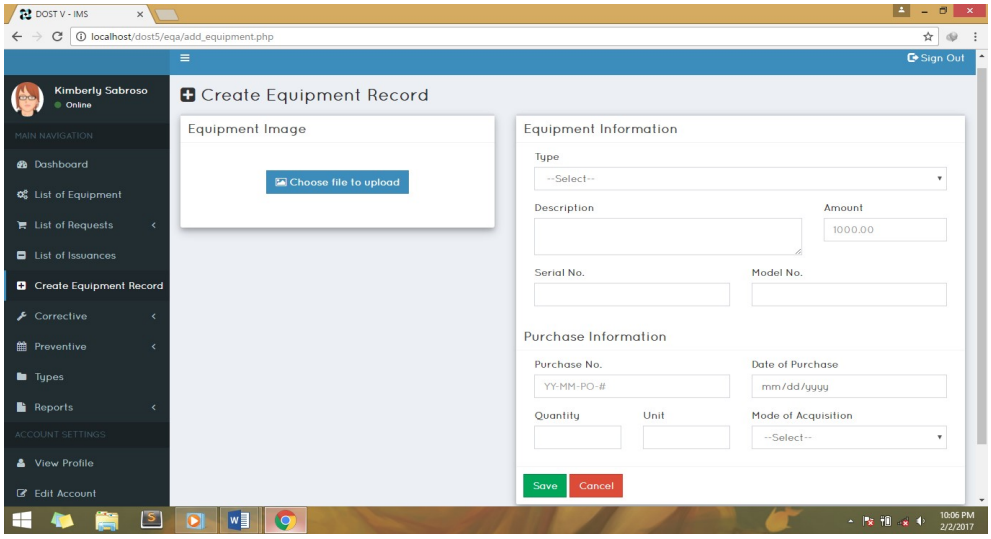


Approving Request for Supplies

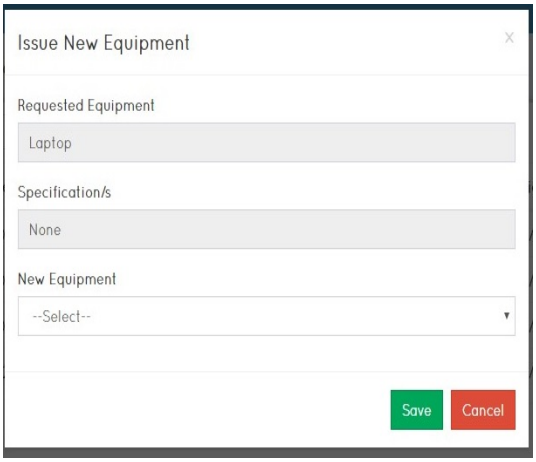
Equipment Administrator



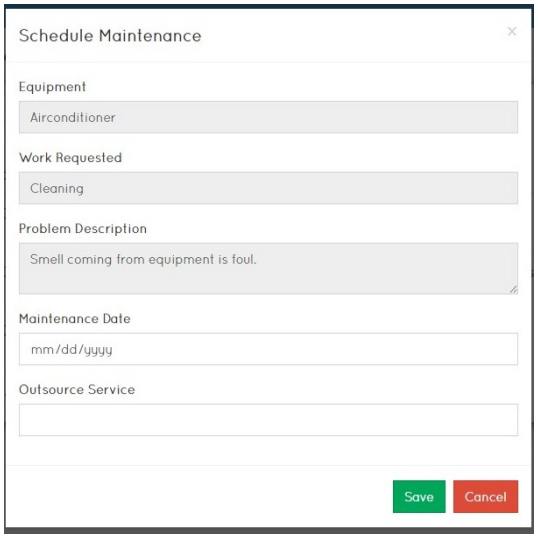
List of Equipment



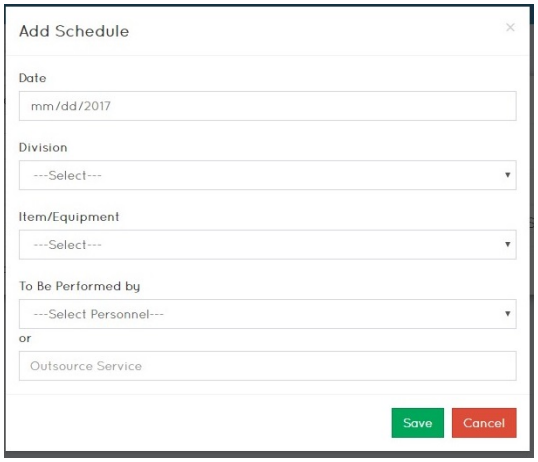
Creating Equipment Record



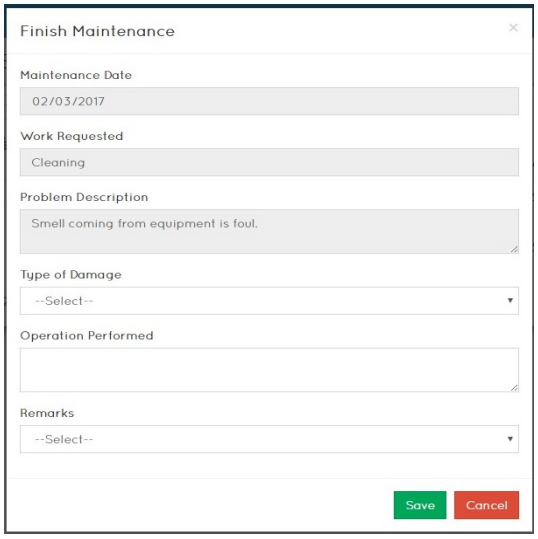
Issuing of Equipment



Scheduling of Request for Maintenance

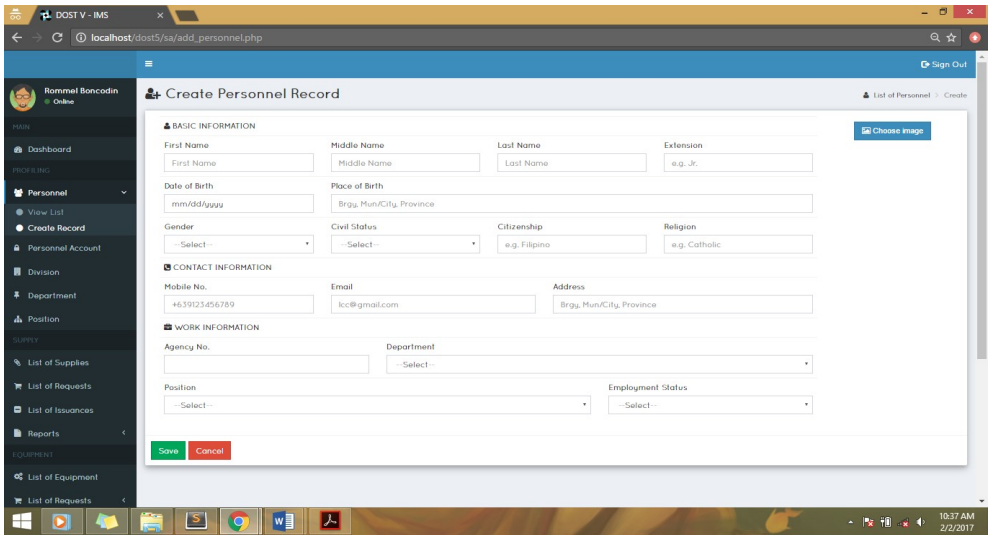


Scheduling of Preventive Maintenance

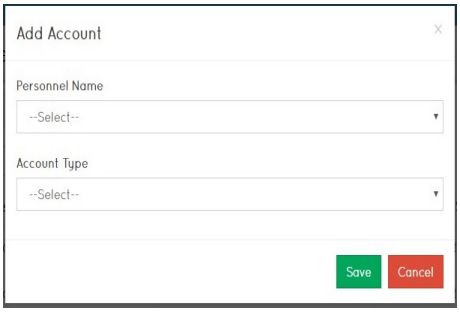


Updating Maintenance Record

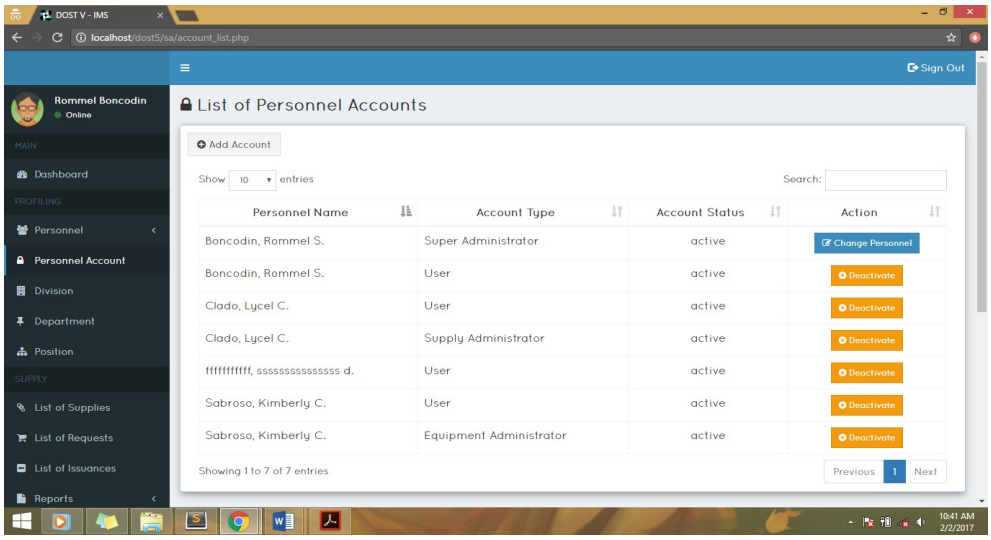
Super Administrator



Creating Employee Record

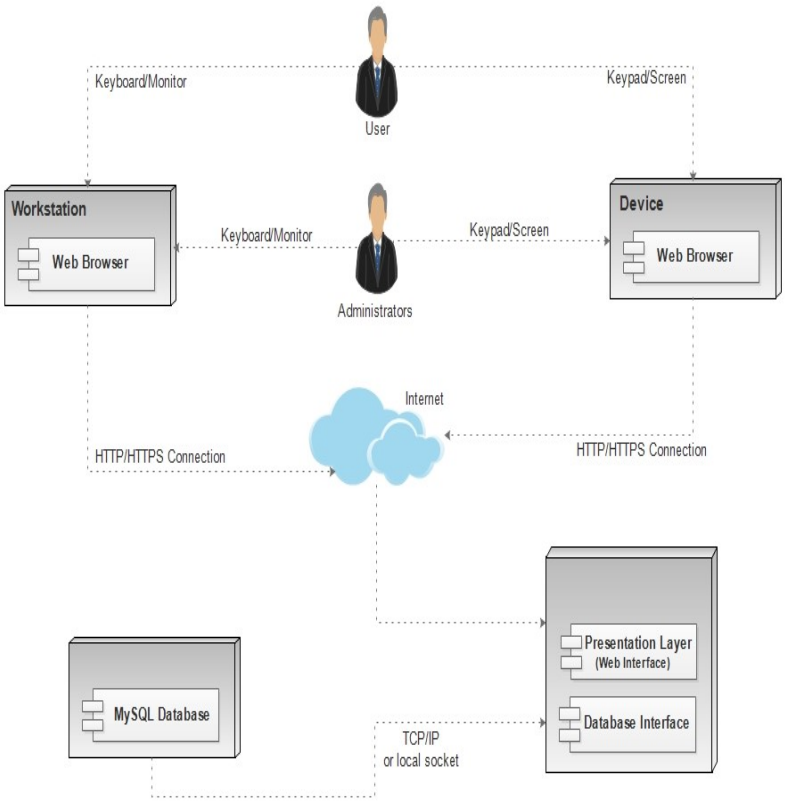


Adding Account



Activating/Deactivating Accounts

Deployment Diagram



DEPLOYMENT DIAGRAM

Appendix F

Description of Components

Module	Features
Personnel Information System	Adding and updating of employee information
	Leave and Pass Slip Applications
	Generation of Personnel Data Sheet
Attendance Monitoring System	Editing of employee's attendance records
	Computation for late, under time and absences
	Leave Credits Computation
	Generation of Daily Time Record and Summary of Attendance
Payroll System	Updating of Deduction Table
	Salary Computation
	Generation of Payslip and Payroll

Appendix G

Test Cases

Test Case ID	Test Scenario	Test Steps	Test Data	Actual Results
TCID001	Check Login with valid Data	1 Go to link. 2 Enter UserID. 3 Enter password. 4 Click Submit.	Userid = admin1234 Password = passadmin1234	User was able to Login into application
TCID002	Check Login with valid Data	1 Go to link. 2 Enter UserID. 3 Enter password. 4 Click Submit.	Userid = admin1234 Password = passadmin1234	User was able to Login into application

Appendix H

Test Documentation

Pictures During Actual Testing

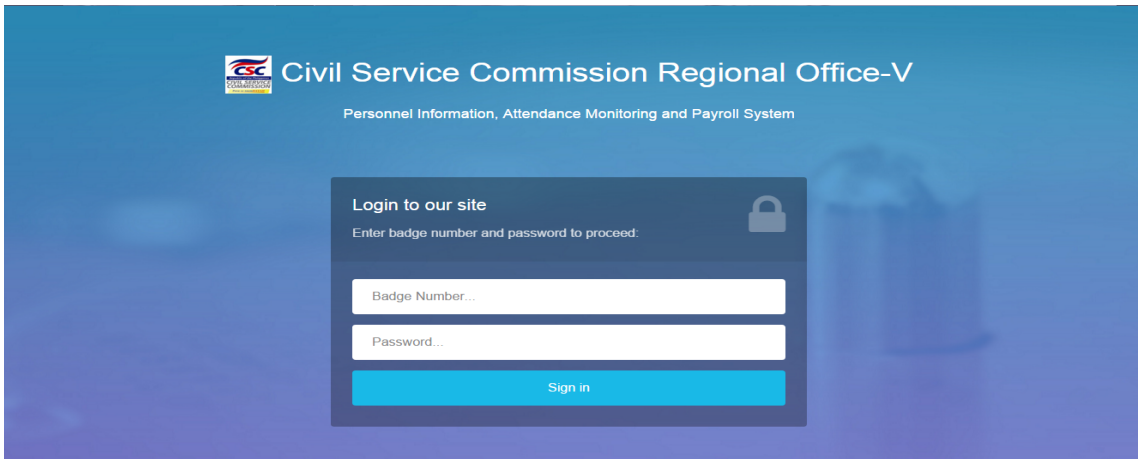
Appendix I

User's Manual

Accesing the System

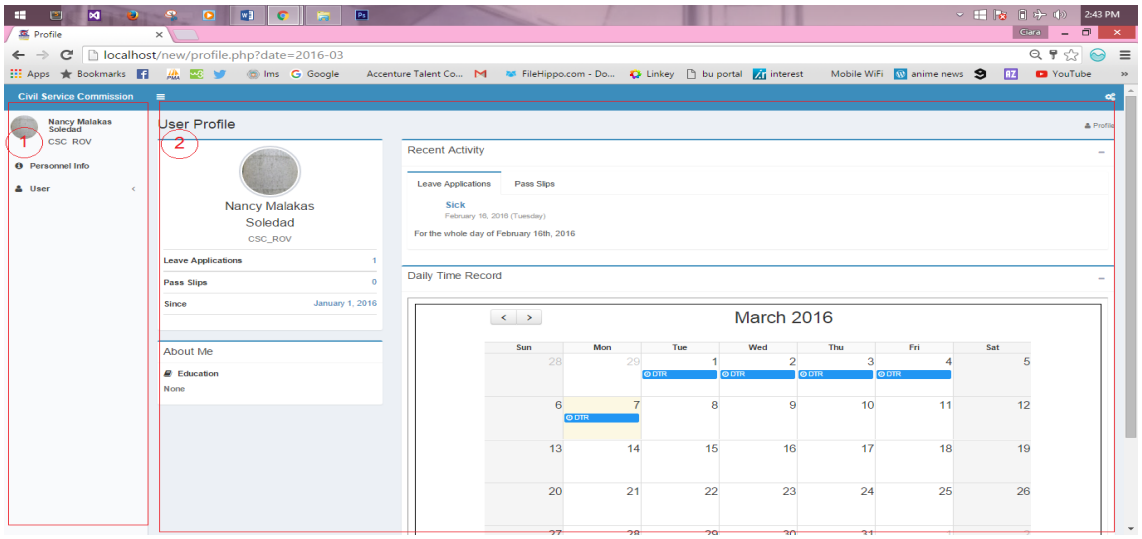
1. Install Xampp version 5 or latest
2. Run Apache and MySQL
3. Go to localhost/new

Loggin In



Ask for your badge number from the Admin, the default password is ”password”.

Profile

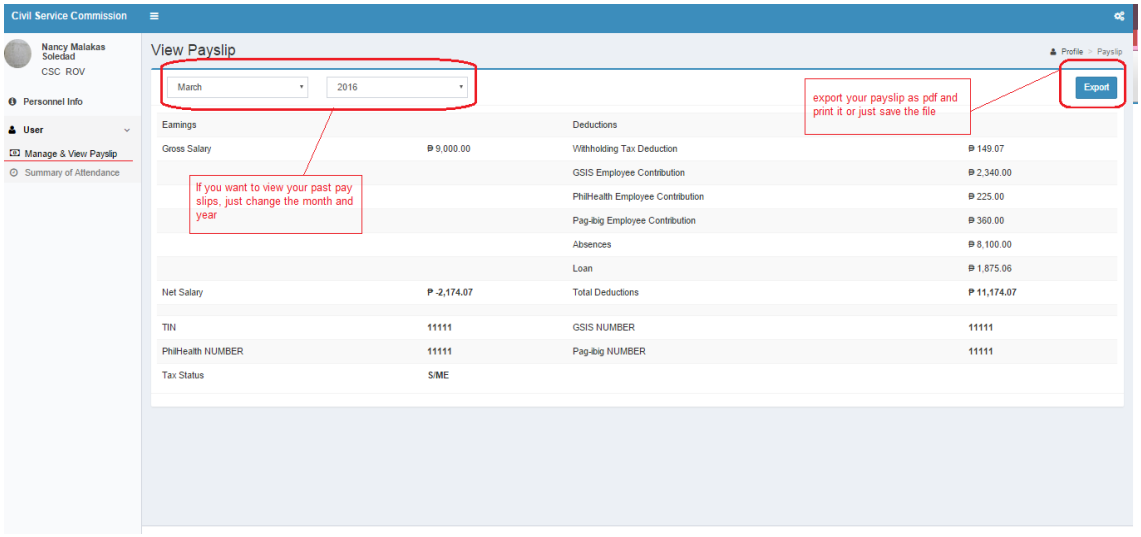


Shown in your profile are 2 panes. The **left pane** contains all the features or functions you are allowed to do. The **main pane** contains your personal details, list of all your filed applications and a calendar.

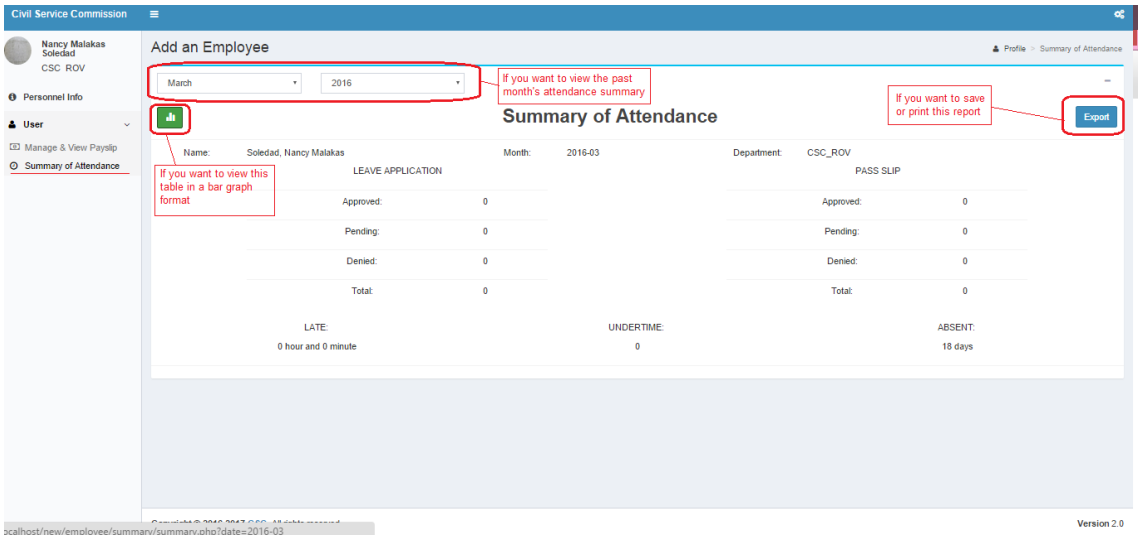
1. Left Pane

User (This option is available to all users)

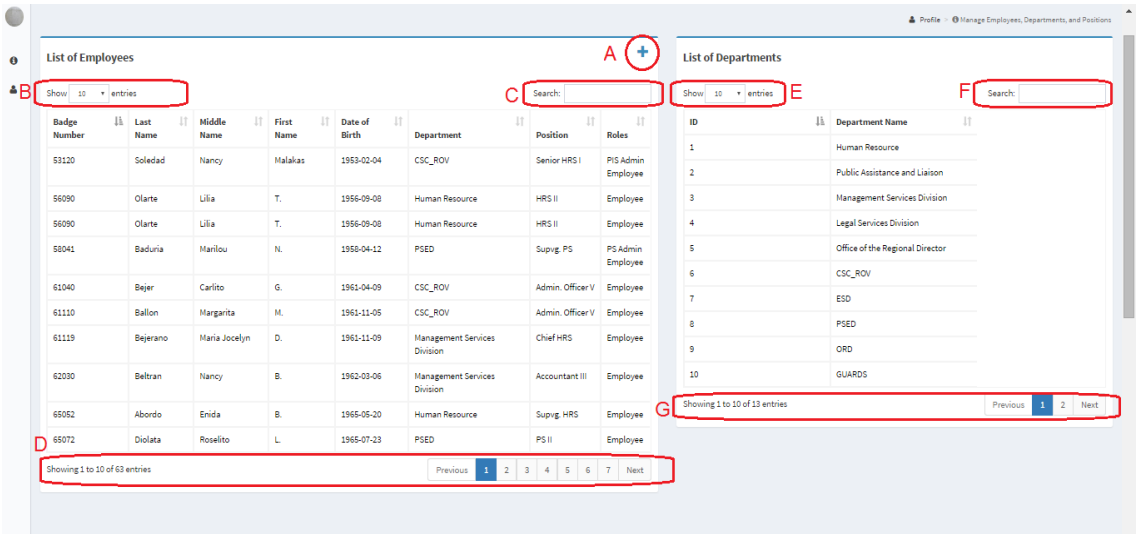
- Manage and View Payslip – You can view this month's Payslip or select which month's Payslip you want to view.



- Summary of Attendance - you can view the summary of your attendance, the total late, undertime and absences for the month.



Personnel Information (Only available for Personnel Information Admins and Superadmin)



- List of Employees

A. Add an Employee - click the “+” button on the upper right corner. A window will appear where you can enter basic information about the employee

B. Show - Click the arrow down button beside the number and choose how many entries you want to view.

C. Search - On the textfield type the keyword. It will find the keyword in al the columns.

D. Number of Entries and Pages - Shown is the number of entries shown and the total number of entries. The number of pages is also shown, click the page number to view the entries on that page.

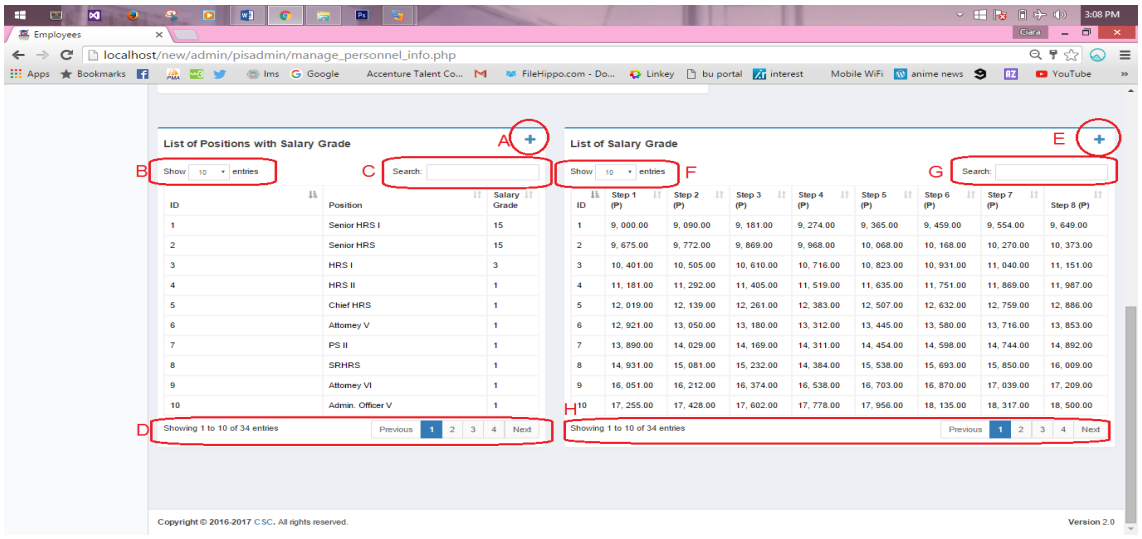
- List of Departments

E. Show - Click the arrow down button beside the number and choose how many entries you want to view.

F. Search - On the textfield type the keyword. It will find the keyword in al the columns.

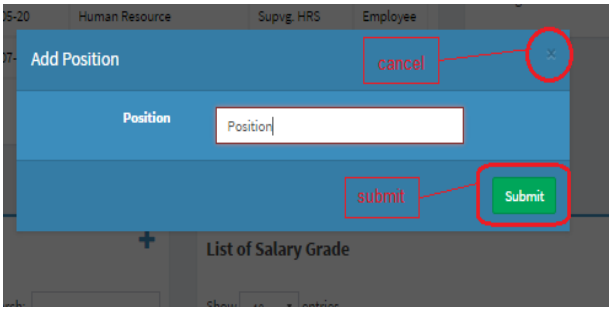
G. Number of Entries and Pages - Shown is the number of entries shown

and the total number of entries. The number of pages is also shown, click the page number to view the entries on that page.



- List of Positions with Salary Grade

A. Add - click the “+” button on the upper right corner. A window will appear where you can enter the position name , the default salary grade is 1. you can edit it later.



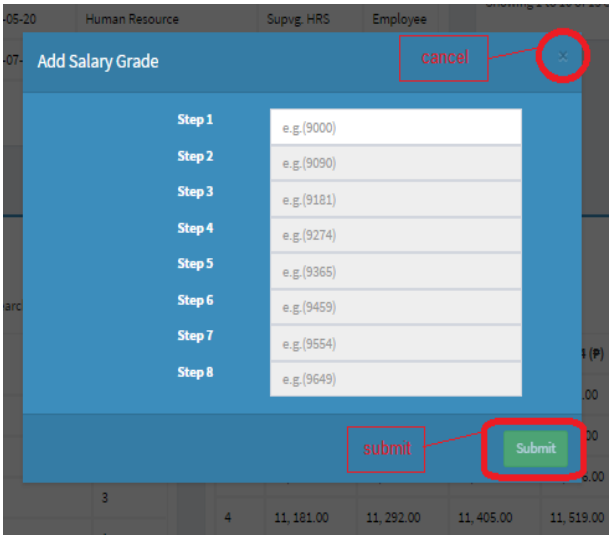
B. Show - Click the arrow down button beside the number and choose how many entries you want to view.

C. Search - On the textfield type the keyword. It will find the keyword in al the columns.

D. Number of Entries and Pages - Shown is the number of entries shown and the total number of entries. The number of pages is also shown, click the page number to view the entries on that page.

- List of Salary Grade

E. Add - click the “+” button on the upper right corner. A window will appear where you can enter the amount for the 8 steps



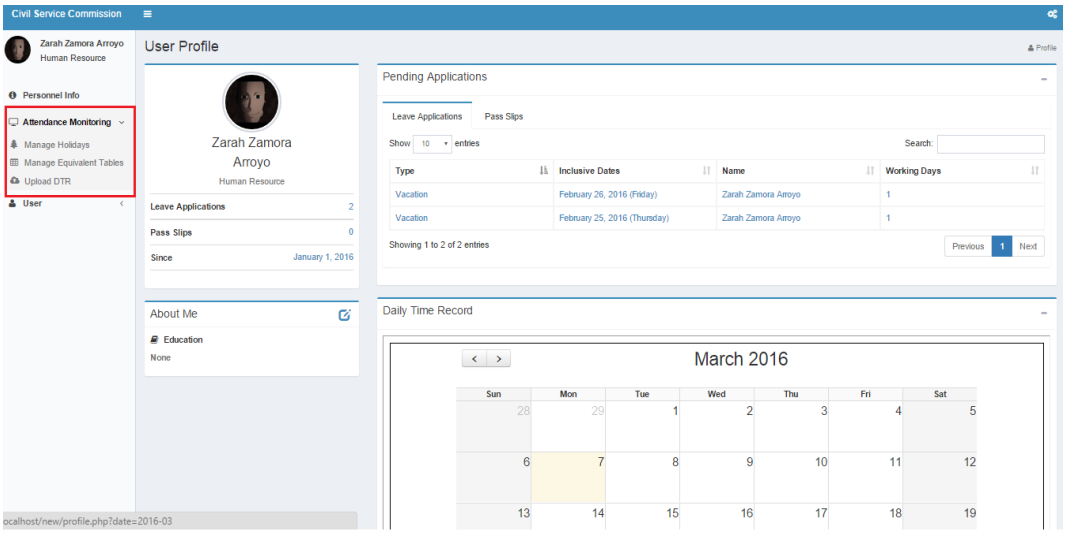
F. Show - Click the arrow down button beside the number and choose how many entries you want to view.

G. Search - On the textfield type the keyword. It will find the keyword in al the columns.

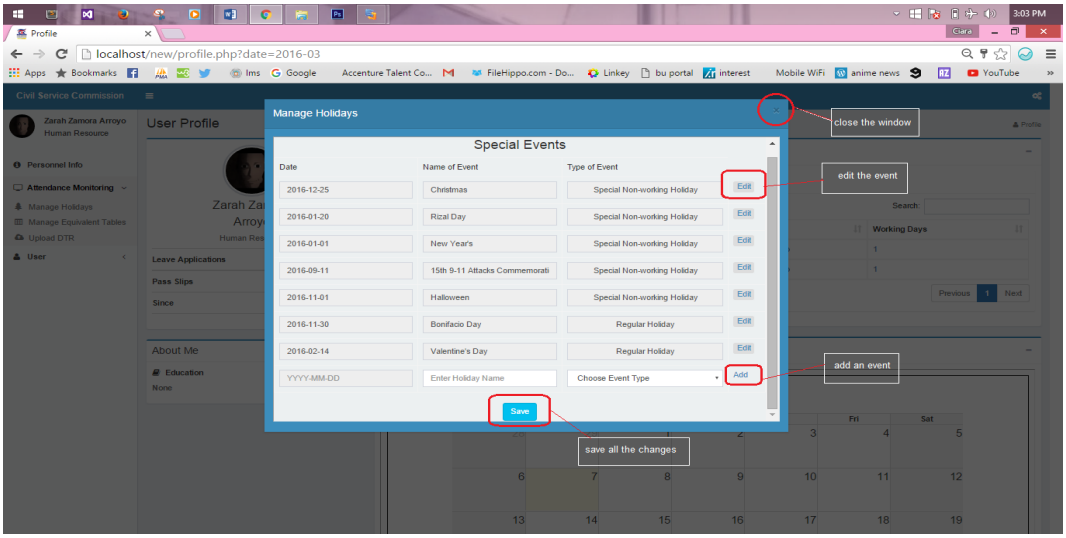
H. Number of Entries and Pages - Shown is the number of entries shown

and the total number of entries. The number of pages is also shown, click the page number to view the entries on that page.

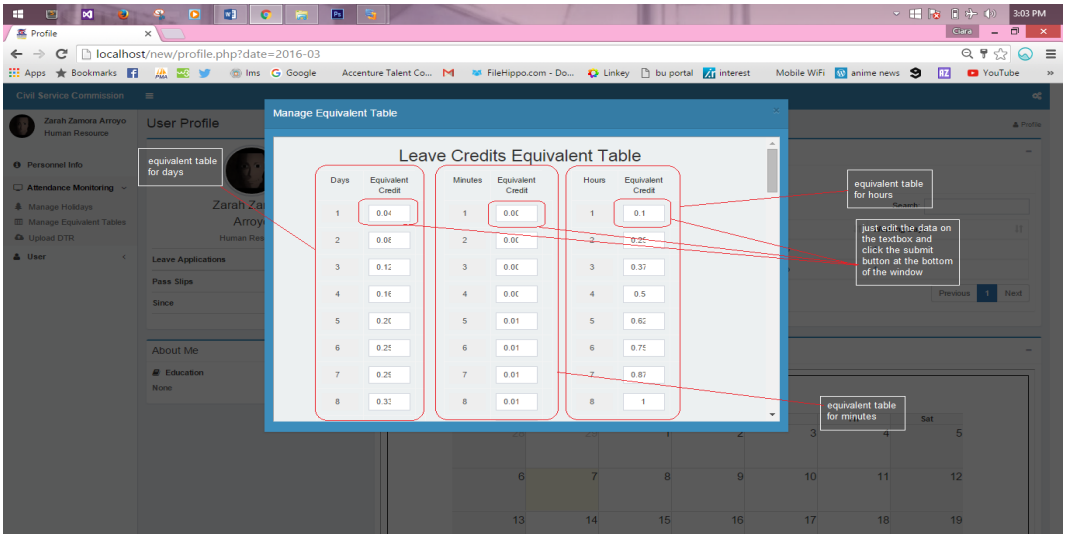
Attendance Monitoring (Available to Attendance Monitoring System Admins and Superadmin only)



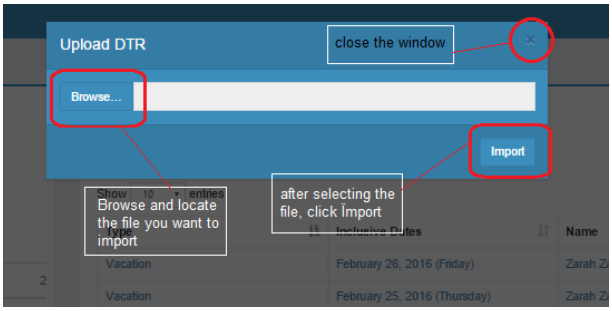
A. Manage Holidays -Add or Edit the holidays and Special Events.



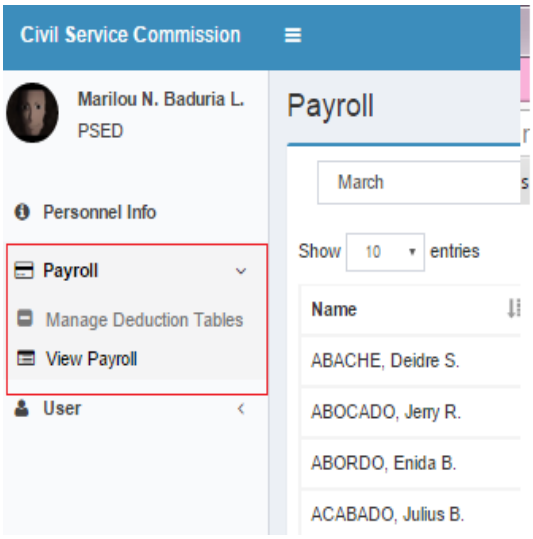
B. Manage Equivalent Tables – Edit the Equivalent table for Leave Credits.



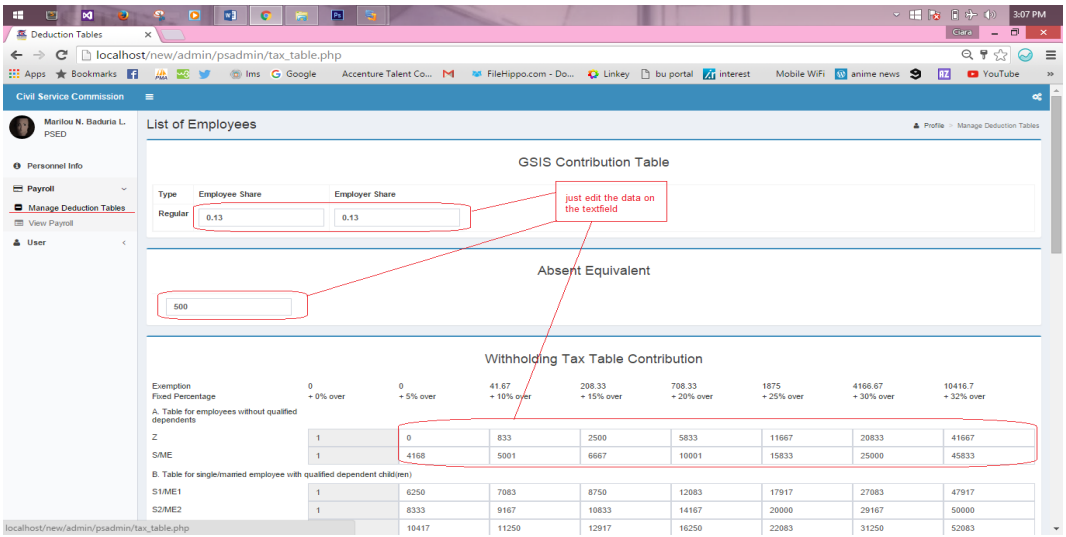
C. Upload DTR – this option is for uploading the CSV file from the Biometrics.



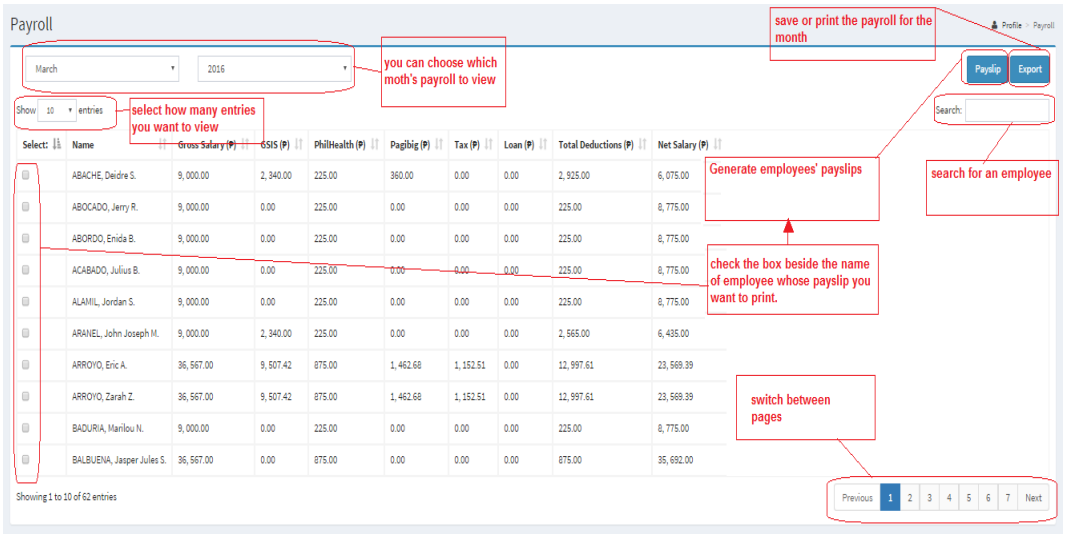
Payroll (Available to Payroll System Admins and Superadmin only)



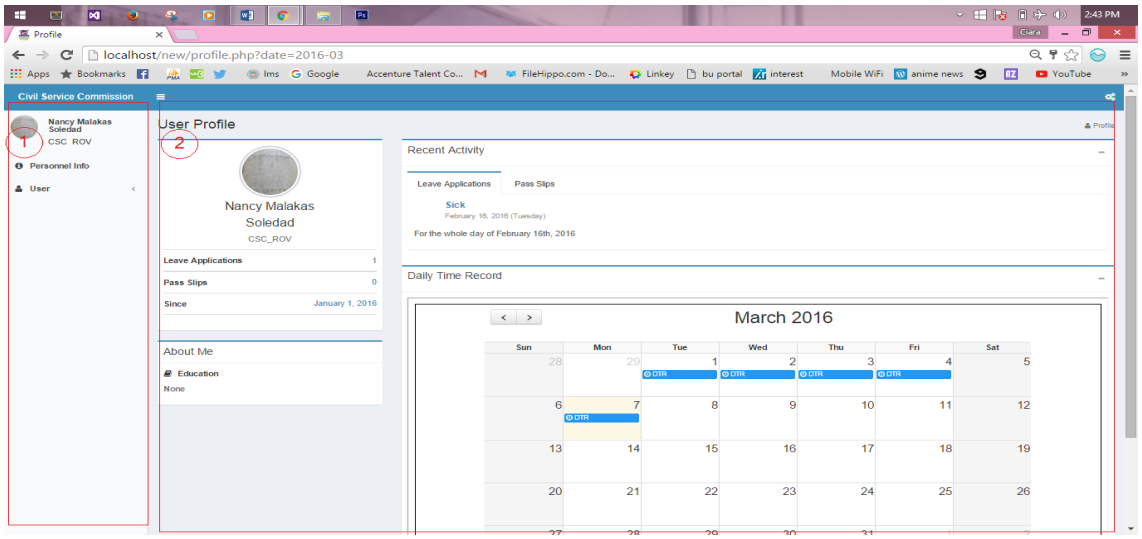
A. Manage Deduction Tables – Manage the deduction tables for PAG-IBIG, PhilHealth, Tax and GSIS.



B. View Payroll - View the Payroll which contains a list of employees with their gross pay, deductions and net pay.


Payroll
Profile > Payroll
March
2016
you can choose which moth's payroll to view
save or print the payroll for the month
Payslip
Export
Show 10 entries
select how many entries you want to view
Search:
search for an employee
Select:
Name
Gross Salary (₱)
GSIS (₱)
PhilHealth (₱)
Pagibig (₱)
Tax (₱)
Loan (₱)
Total Deductions (₱)
Net Salary (₱)
ABACHE, Deidre S. 9,000.00 2,340.00 225.00 360.00 0.00 0.00 2,925.00 6,075.00
ABOCADO, Jerry R. 9,000.00 0.00 225.00 0.00 0.00 0.00 225.00 8,775.00
ABORDO, Enida B. 9,000.00 0.00 225.00 0.00 0.00 0.00 225.00 8,775.00
ACABADO, Julius B. 9,000.00 0.00 225.00 0.00 0.00 0.00 225.00 8,775.00
ALAMIL, Jordan S. 9,000.00 0.00 225.00 0.00 0.00 0.00 225.00 8,775.00
ARANEL, John Joseph M. 9,000.00 2,340.00 225.00 0.00 0.00 0.00 2,565.00 6,435.00
ARROYO, Eric A. 36,567.00 9,507.42 875.00 1,462.68 1,152.51 0.00 12,997.61 23,569.39
ARROYO, Zarah Z. 36,567.00 9,507.42 875.00 1,462.68 1,152.51 0.00 12,997.61 23,569.39
BADURIA, Marilou N. 9,000.00 0.00 225.00 0.00 0.00 0.00 225.00 8,775.00
BALBUENA, Jasper Jules S. 36,567.00 0.00 875.00 0.00 0.00 0.00 875.00 35,692.00
Generate employees' payslips
check the box beside the name of employee whose payslip you want to print.
switch between pages
Showing 1 to 10 of 62 entries
Previous 1 2 3 4 5 6 7 Next

2. Main Pane

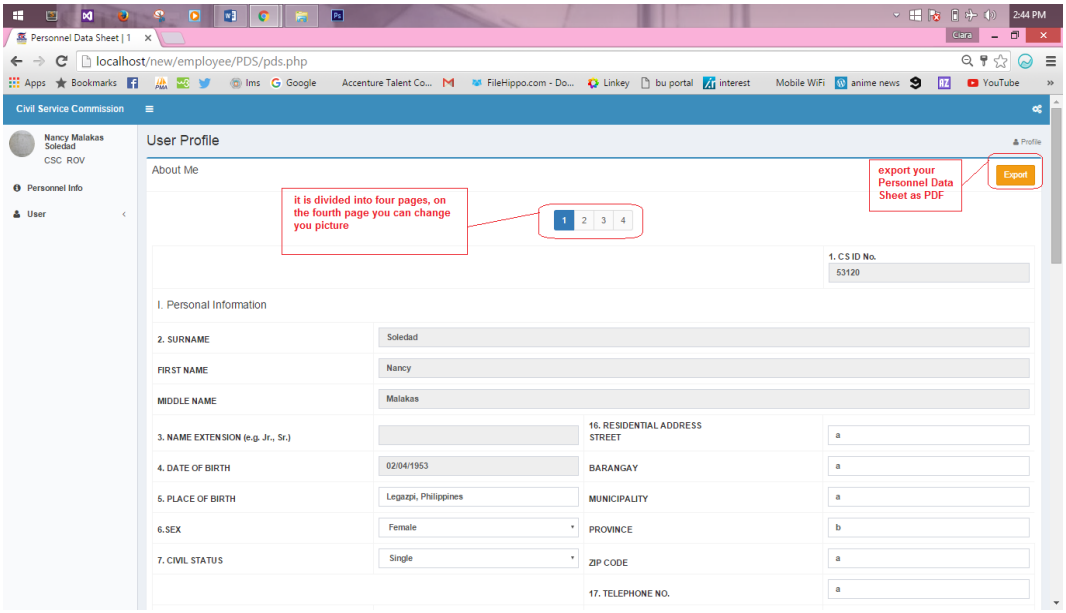


A. Recent Activity

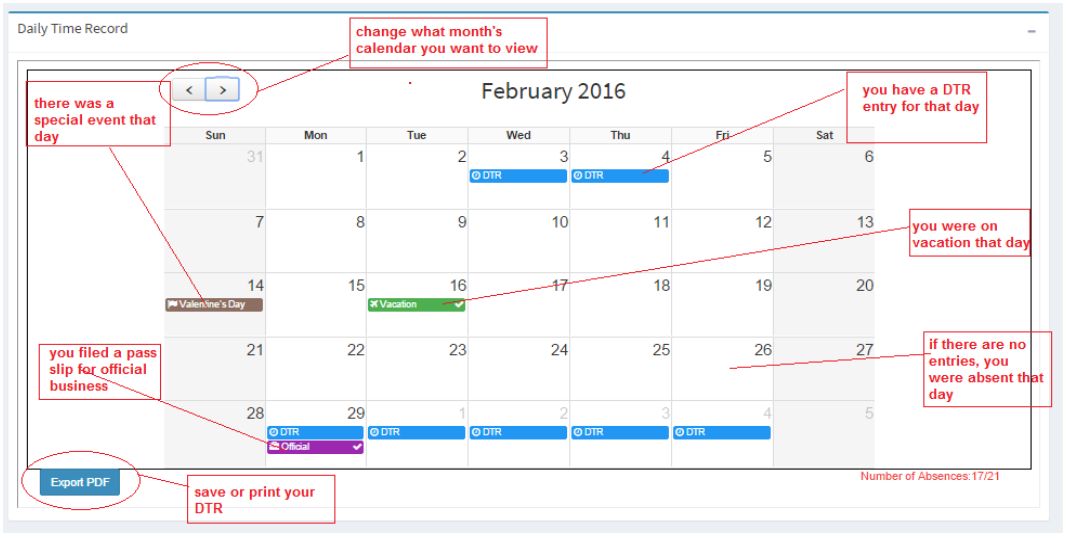
- For Users: Contains two tabs: Leave Applications, which shows a list of your filed Leave application; Pass Slips, shows a list of pass slips you filed.
- For Attendance Monitoring Admins and Super Admin: Contains two tabs: Leave Applications, which shows a list of all filed Leave applications for approval; Pass Slips, shows a list of pass slips filed for your approval.

- Edit Personnel Data Sheet -

  Enter all your Data, to save the data click the “Submit” button.

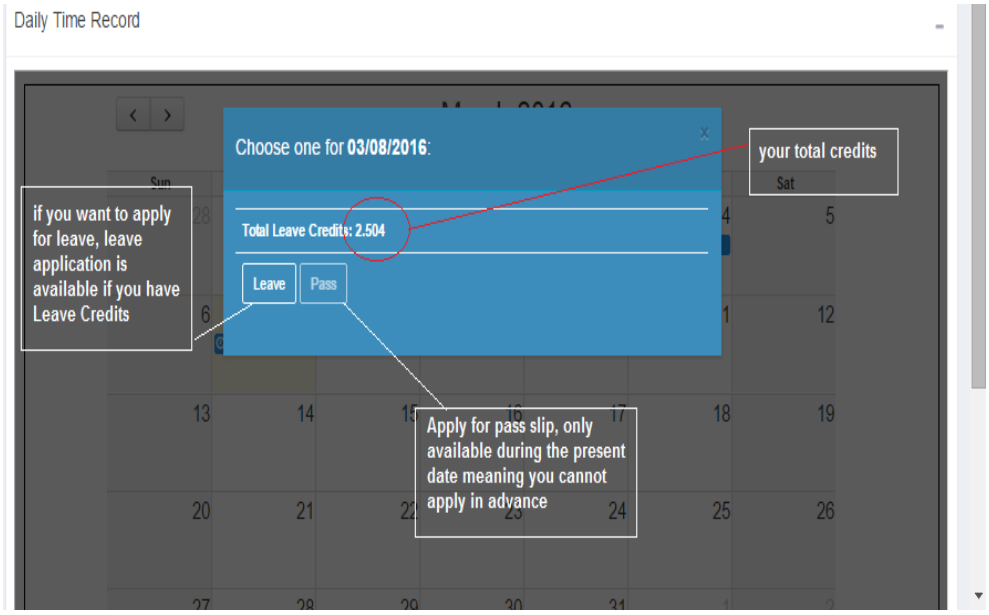


- Calendar -



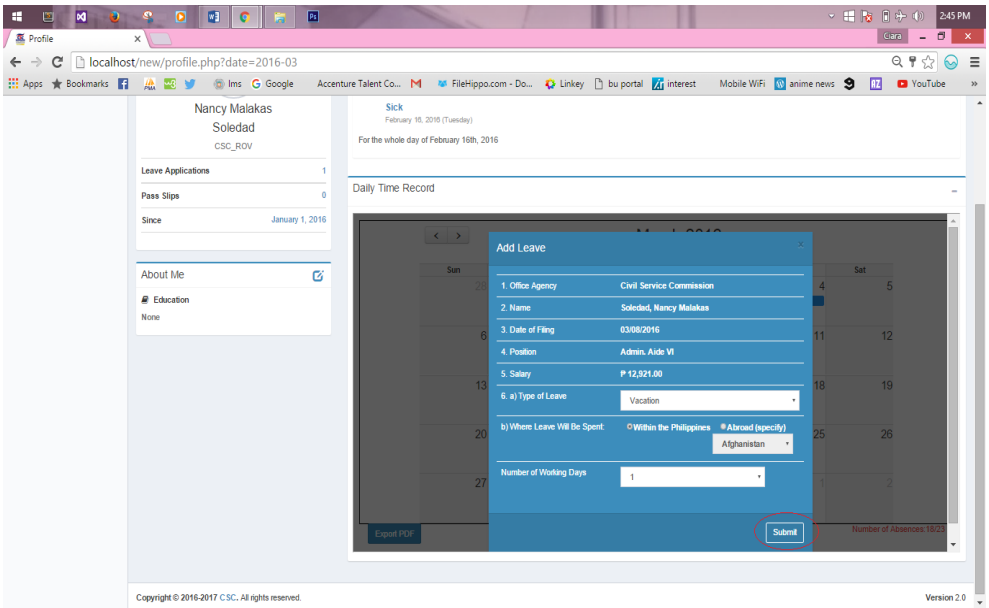
– Check Leave Credits -

To check you leave credits, just click any date on the calendar.



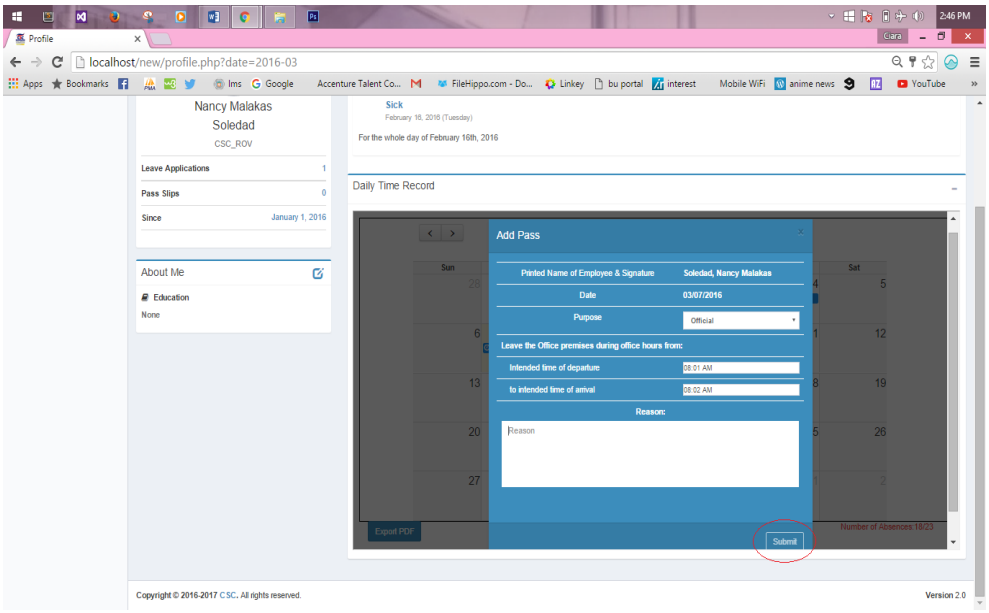
– Apply for Leave -

To apply for Leave, click any date on the calendar and click the “Leave” button. A window will appear where you can enter all your leave details, click the “Submit” button for your application to filed.

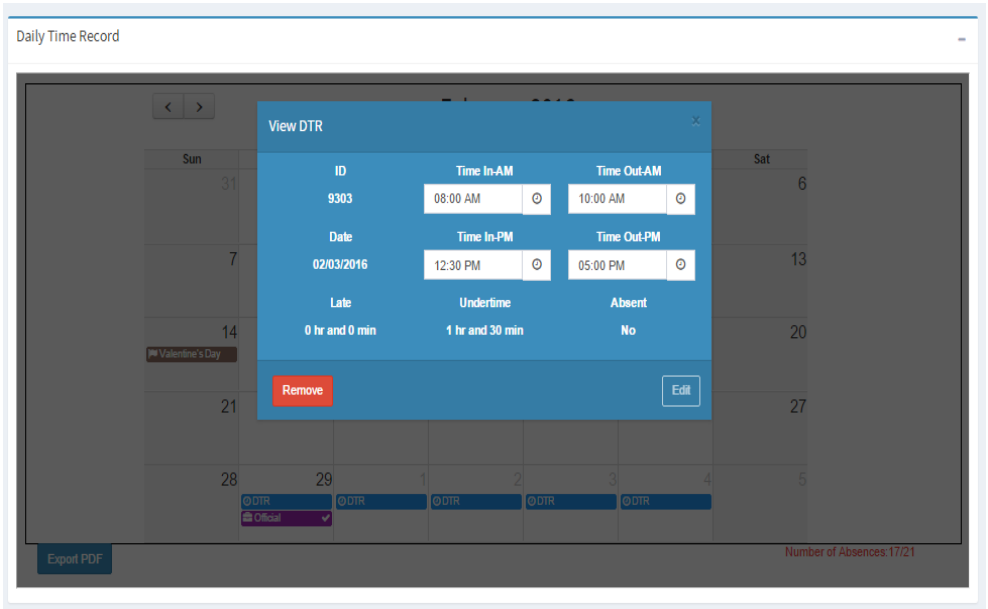


– Apply for Pass Slip -

To apply for Pass Slips, click any date on the calendar and click the “Pass” button. A window will appear where you can enter all your pass slip details, click the “Submit” button for your application to filed.



– View Daily Time Record



Appendix J

Source Codes

Listing 1
Getting of Daily Time Record.

```
//getDTR.php
<?php
require $_SERVER['DOCUMENT_ROOT']
."/new/requirements.php";
if (isset($_GET['id'])) {
$events = [];
$dtr_dates = [];
$leave_dates = [];

$query = $handler->prepare(
"SELECT `dtr_id`, `date`,
`timein_am`,
`timeout_am`, timein_pm`,
`timeout_pm`,
`late`, `undertime`, `absent`
FROM `dtr_entry`
WHERE `badge_no` = :badge_no ");

$query->bindValue
(':badge_no', $_GET['id']);
$query->execute();

if( $query->rowCount() ) {
$row = $query->fetchAll
(PDO::FETCH_ASSOC);

foreach($row as $key => $value){
$dtr_dates[$value
['date']]['dtr_id']
= $value['dtr_id'];
$dtr_dates[$value
['date']]['date']
= $value['date'];
$dtr_dates[$value
['date']]['timein_am']
= $value['timein_am'];

$dtr_dates[$value
['date']]['timeout_am']
= $value['timeout_am'];
$dtr_dates[$value
['date']]['timein_pm']
= $value['timein_pm'];
$dtr_dates[$value
['date']]['timeout_pm']
= $value['timeout_pm'];
$dtr_dates[$value
['date']]['late']
= $value['late'];
$dtr_dates[$value
['date']]['undertime']
= $value['undertime'];
$dtr_dates[$value
['date']]['absent']
= $value['absent'];
}
}
else {
$dtr_dates = [];
}

$query = $handler->prepare(
"SELECT la.`leave_id`,
la.`leave_date`
FROM `leave_app` AS la
WHERE `badge_no` = :badge_no
AND `leave_status` = 1 ");
$query->bindValue
(':badge_no', $_GET['id']);
$query->execute();

if( $query->rowCount() ) {
while( $row = $query->fetch
(PDO::FETCH_ASSOC) ) {
if( strpos($row
['leave_date'], ',')
!== false ) {
// If explodable $leave_date
// = explode
// (',', $row['leave_date']);
foreach( $leave_date as $i ) {
array_push($leave_dates, $i);
}
}
else { // If not
//foreach(
// $dtr_dates as
// $key => $value){
if( $key ==
$row['leave_date'] ) {
unset($dtr_dates[$key]);
}
}
}
}
}
foreach( $dtr_dates as
$key => $value ) {
$events[] = array
('type' => 'dtr',
'title'=> 'DTR',
'start'=> $value['date'],
'end'=> date('Y-m-d', strtotime
($value['date'].' +1 day')),
'id'=> $value['dtr_id'],
'timein_am'=>
        $value['timein_am'],
'timeout_am'=>
        $value['timeout_am'],
'timein_pm'=>
        $value['timein_pm'],
'timeout_pm'=>
```

```
        $value['timeout_pm'],
'late'=>
        $value['late'],
'undertime'=>
        $value['undertime'],
'absent'
        => $value['absent']
);
}
echo json_encode($events);
}
?>
```

Listing 2

Getting and Displaying of Leave Application.

```
//get_Leave.php
<?php
require $_SERVER['DOCUMENT_ROOT']
."/new/requirements.php";
if (isset($_GET['id'])) {
$query = $handler->prepare(
"SELECT la.`leave_id`,
la.`date_of_filing`,
la.`working_days`,
la.`vl_location`,
la.`sl_hospital_type`,
la.`sl_hospital_name`,
la.`leave_date`,
lt.`leave_disc`,
la.`leave_status`
FROM `leave_app` AS la
LEFT OUTER JOIN `leave_type`
AS lt
ON la.`leave_type`
= lt.`leave_type`
WHERE `badge_no` = :badge_no");
$query->bindValue(
':badge_no', $_GET['id']);
$query->execute();
$events = [];
while ($row =
        $query->fetch
        (PDO::FETCH_ASSOC)) {
switch ($row['leave_disc'])
{ // color
case 'vacation':
        $color = '#4CAF50';
        break;
case 'sick':
        $color = '#CDDC39';
        break;
case 'maternity':
$color = '#F06292';
break;
case 'paternity':
$color = '#3F51B5';
break;
case 'special_privilege':
$color = '#B71C1C';
break;
}
$date = explode
(',', $row['leave_date']);
foreach ($date as $i){
        $events[] = array (
'id'=> $row['leave_id'],
'type'  => 'leave',
'title' => ucfirst(
        $row['leave_disc']),
'color' => $color,
'start'=> $i,
'end'=> date('Y-m-d',
        strtotime($i . ' +1 day')),
'leave_type'=>
ucwords($row['leave_disc']),
'date_of_filing'
=> $row['date_of_filing'],
'working_days'
=>$row['working_days'],
'vl_location'
=> $row['vl_location'],
'sl_hospital_type'
=> $row['sl_hospital_type'],
'sl_hospital_name'
=> $row['sl_hospital_name'],
'leave_status'
=> $row['leave_status'] );
}
}
echo json_encode($events);
}
?>
```

Listing 3

Getting and Displaying of Pass Slip Application.

```
//Get_Pass.php
<?php
require $_SERVER['DOCUMENT_ROOT']
."/new/requirements.php";
if (isset($_GET['id'])) {
$query = $handler->prepare(
"SELECT `pass_slip_id`,
`date`, `departure`,
`arrival`, `purpose`,
`reason`, `pass_status`
FROM `pass_slip`
WHERE `badge_no` = :badge_no");
$query->bindValue(
':badge_no', $_GET['id']);
$query->execute();
$events = [];

while ($row =
$query->fetch(
PDO::FETCH_ASSOC)) {
switch ($row['purpose']) {
// color
case 0:
        $color = '#9C27B0';
        $title = 'Official';
        break;
case 1:
        $color = '#FF9800';
```

```
        $title = 'Personal';
        break;
}
        $events[] = array(
'id' => $row['pass_slip_id'],
'type'=> 'pass',
'title' => $title,
'color'=> $color,
'start'=> $row['date'],
'end'=> date('Y-m-d', strtotime
  ($row['date'].' +1 day')),
'departure'=> $row['departure'],
'arrival'=> $row['arrival'],
'reason'=> $row['reason'],
'purpose'=> $row['purpose'],
'pass_status' => $row[
        'pass_status']);
        }
echo json_encode($events);
}
?>
```

Listing 4

Checking of changes if there was any changes made in the system.

```
//Check_changes.php
<?php
require $_SERVER['DOCUMENT_ROOT']
."/new/requirements.php";
if( isset($_GET['id']) ) {
$query = $handler->prepare("
SELECT * FROM `dlp_checker`
WHERE `badge_no` = badge_no
AND `e_status` = 1");
$query->bindValue(
        ':badge_no', $_GET['id']);
$query->execute();
$rc = $query->rowCount();
        if( $query->rowCount() ){
$query = $handler->prepare(
        "UPDATE `dlp_checker`
        SET `e_status` = 0
WHERE `badge_no` = :badge_no");
$query->bindValue(
  ':badge_no', $_GET['id']);
$query->execute();
}
echo json_encode($rc);
}
 ?>
```

Listing 5

Leave Credits computation.

```
//Leave_Credits.php
// DTR
$query = $handler->prepare("
SELECT dtr_ed_id,
timein_am_edit,
timeout_am_edit,
timein_pm_edit,
timeout_pm_edit, date
FROM dtr_edit
WHERE badge_no = ? ");
$query->execute(array(
  $_SESSION["user_session"]));

if( $query->rowCount() ){
$dtr = $query->fetchAll(
  PDO::FETCH_ASSOC);
}

$year = array();
$month = array();

if( !empty($dtr) ){
foreach( $dtr as
  $key => $value ) {
if(!in_array(date("Y",
  strtotime($value["date"])),
  $year)) {
$year[] = date("Y",
  strtotime($value
    ["date"]));
}
if(!in_array(date("F",
  strtotime($value["date"])),
  $month)) {
$month[date("m",
  strtotime($value["date"]))]
= date("F", strtotime($value
  ["date"]));
}
}
}
$query = $handler->prepare("
SELECT *
FROM `leave_credits`
WHERE emp_no = ?
");
$query->execute(array(
  $_SESSION['user_session']));

if( $query->rowCount() ){
$row = $query->fetch(
  PDO::FETCH_ASSOC);
$current_lc = $row['total_lc'];
}

function converter($seconds){
global $handler;

$hours = floor
 ($seconds / (60 * 60));
$minutes = floor
 ($seconds % (60 * 60) / 60);

$query = $handler->prepare("
SELECT `credit_equi_h`
FROM `leave_equi_hrs`
WHERE `hrs_id` = :hours
");
$query->bindValue(
  ':hours', $hours);
$query->execute();
$row = $query->fetch(
```

```
  PDO::FETCH_ASSOC);

$total_lc = $row[
  'credit_equi_h'];

$query = $handler->prepare("
SELECT `credit_equi_m`
FROM `leave_equi_mins`
WHERE `min_id` = :minutes
");
$query->bindValue(
  ':minutes', $minutes);
$query->execute();
$row = $query->fetch(
  PDO::FETCH_ASSOC);

$total_lc += $row[
  'credit_equi_m'];

return $total_lc;
}

// If `last_added`
// date is equal to
// current date or has passed
if( date('Y-m', strtotime(
  $row['last_added'])) < date(
  'Y-m') ) {
$previous_month = date('Y-m',
 strtotime('-1 month'));
$query = $handler->prepare("
SELECT SUM( late ) as late,
SUM(undertime) as undertime
FROM `dtr_entry`
WHERE badge_no = :badge_no
AND date LIKE '$previous_month%'
");
$query->bindValue('
  :badge_no', $_SESSION[
    'user_session']);
$query->execute();

$row = $query->fetch(
  PDO::FETCH_ASSOC);

$late = $row['late'];
$undertime = $row['undertime'];

$credits = 1.25 - converter(
  $late + $undertime);

$query = $handler->prepare("
UPDATE `leave_credits`
SET total_lc = ?,
`last_added` = ?
WHERE `emp_no` = ?
");
$query->execute(array(
  $current_lc + $credits,
  date('Y-m-d'), $_SESSION[
    'user_session']));
}
else if( date('Y-m', strtotime(
  $row['last_added'])) > date(
  'Y-m') ) {
$previous_month = date('Y-m',
  strtotime('-1 month'));
$query = $handler->prepare("
SELECT SUM( `late` )
as late, SUM( `undertime` )
as undertime
FROM `dtr_entry`
WHERE `badge_no` = :badge_no
AND `date` LIKE '$previous_month%'
");
$query->bindValue(
  ':badge_no', $_SESSION['
    user_session']);
$query->execute();

$row = $query->fetch(
  PDO::FETCH_ASSOC);

$late = $row['late'];
$undertime = $row['undertime'];

$credits = 1.25 - converter(
  $late + $undertime);

$query = $handler->prepare("
UPDATE `leave_credits`
SET `total_lc` = ?,
`last_added` = ?
WHERE `emp_no` = ?
");
$query->execute(array(
  $current_lc - $credits, date(
    'Y-m-d'), $_SESSION['
    user_session']));
}
$query->execute();

if( date('Y-m-t') == date(
  'Y-m-d') ) {
if( $row['last_added'] !=
  date('Y-m-d') ) {
$date = date('Y-m');
$holidays = 0;
// get Holidays
$query = $handler->prepare("
SELECT `e_date`
FROM `special_event`
WHERE `e_date` LIKE '$date%'
");
$query->execute();

$holiday_count = 0;
if( $query->rowCount() ) {
$holidays = $query->fetchAll(
  PDO::FETCH_ASSOC);
foreach( $holidays
  as $key => $value ) {
  if( date('w', strtotime($value
    ['e_date'])) != 0 && date(
    'w', strtotime($value['
      e_date']))
    != 6 )
{ $holiday_count++; }
```

```
}
}

// Absences
$day_count = 0;

$query = $handler->prepare("
SELECT COUNT(*) as present
FROM `dtr_entry`
WHERE `date` LIKE '$date%'
AND badge_no = :badge_no
");
$query->bindValue('
  :badge_no', $_SESSION[
    'user_session']);
$query->execute();
$dates = $query->fetch(
  PDO::FETCH_ASSOC);

$month = date('m', strtotime($date));
$year = date('Y', strtotime($date));
$day_count = 0;

for ($i=1; $i <= date('t', strtotime(
  $date)); $i++) {
$timestamp = mktime(0, 0, 0, $month,
  $i, $year);

if(date('n', $timestamp) == $month){
  $day = date('N', $timestamp);

  if( $day == 1 || $day <= 5 ) {
    //$days[$day][] = date('j',
    //$timestamp);
    $day_count++;
  }
}
}

$day_count -= $dates['present']
 + $holiday_count;

$query = $handler->prepare("
  UPDATE `leave_credits`
  SET `total_lc` = ?,
  `last_added` = ?
  WHERE `emp_no` = ?
");
$query->execute(array(
  $current_lc - $day_count,
   date('Y-m-d'),
  $_SESSION['user_session']));
}
}
```

Listing 6

Add Employee contains basic information in creating a new account.

```
//Add_Employee.php
<?php
require $_SERVER['DOCUMENT_ROOT']
.'/new/requirements.php';

if( !empty($_POST) ) {
$id = explode("-", $_POST[
        "date_birth"]);
$badge_no = $id[0][2]
.$id[0][3]; // Year
$badge_no .= $id[1][0]
. $id[1][1]; // Month
$badge_no .= $id[2][0];// Day

$query = $handler->prepare("
SELECT *
FROM employee
WHERE Badge_no = ?");
$query->execute(array(
        $badge_no));

if( $query->rowCount() ){
$flag = 0;
while( $flag == 0 ) {
$query = $handler->prepare("
SELECT * FROM employee
WHERE Badge_no = ?");
$query->execute(array(
        $badge_no));
if( $query->rowCount() ){
$badge_no++;
} {
else {
$flag = 1;
}
}
}

try {
$handler->beginTransaction();
// Employee
$query = $handler->prepare("
INSERT INTO `employee`(
        `Badge_no`, `fname`,
        `mname`, `lname`,
        `name_extension`, `sex`,
        `date_birth`,
        `position`, `department`,
         `start_employment`)
VALUES(:badge_no, :fname,
        :mname, :lname,
        :name_extension, :sex,
        :date_birth, :position,
        :department,
        :start_employment) ");
$query->bindValue("
        :badge_no", $badge_no);
$query->bindValue("
        :fname", $_POST["
                 fname"]);
$query->bindValue("
        :mname", $_POST["
                 mname"]);
$query->bindValue("
        :lname", $_POST["
                 lname"]);
$query->bindValue("
```

```
        :name_extension", $_POST["
        name_extension"]);
$query->bindValue("
        :sex", $_POST["sex"]);
$query->bindValue("
        :date_birth", $_POST["
                date_birth"]);
$query->bindValue("
        :position", $_POST["
                position"]);
$query->bindValue("
        :department", $_POST["
                department"]);
$query->bindValue("
        :start_employment",
        $_POST["
        start_employment"]);
$query->execute();

// Emp account
$query = $handler->prepare("
INSERT INTO `emp_account`(
        `emp_id`,
        `is_superadmin`,
         `is_pisadmin`,
         `is_amsadmin`,
          `is_psadmin`)
VALUES(:emp_id,
        :is_superadmin,
        :is_pisadmin,
        :is_amsadmin,
        :is_psadmin) ");
$query->bindValue("
        :emp_id", $badge_no);
$query->bindValue("
        :is_superadmin", 0);
$query->bindValue("
        :is_pisadmin", 0);
$query->bindValue("
        :is_amsadmin", 0);
$query->bindValue("
        :is_psadmin", 0);
$query->execute();

// Leave credits
$query = $handler->prepare("
INSERT INTO `leave_credits`(
        `total_lc`, `emp_no`,
        `last_added`)
VALUES(1.25, :badge_no, :date) ");
$query->bindValue('
        :badge_no', $badge_no);
$query->bindValue('
        :date', date('Y-m-d'));
$query->execute();

// Emp Card
$query = $handler->prepare("
INSERT INTO `emp_card`(`CS_id`,
 `badge_no`)
VALUES(:badge_no, :badge_no) ");
$query->bindValue(':
        badge_no', $badge_no);
$query->execute();
```

```
/* Basic Salary
$query = $handler->prepare("
INSERT INTO `pay_payroll`(`
employee_no_id`, )
");*/

// Emp Address

$query = $handler->prepare("
INSERT INTO `emp_address`(`
         add_street`,
         `add_brgy`,
          `add_muni`,
          `add_province`,
           `zip_code`, `tel_no`,
           `badge_no`,
           `address_type`)
VALUES(NULL, NULL, NULL, NULL,
 NULL, NULL, :badge_no,
 'residential') ");
$query->bindValue('
        :badge_no', $badge_no);
$query->execute();

$query = $handler->prepare("
INSERT INTO `emp_address`(
        `add_street`, `add_brgy`,
         `add_muni`,
         `add_province`,
          `zip_code`, `tel_no`,
          `badge_no`,
          `address_type`)
VALUES(NULL, NULL, NULL, NULL,
 NULL, NULL, :badge_no,
 'residential') ");
$query->bindValue('
        :badge_no', $badge_no);
$query->execute();

// Leave Credits
$query = $handler->prepare("
INSERT INTO `leave_credits`(`
        total_lc`, `emp_no`,
        `last_added`)
VALUES(1.25, :badge_no,
        :date) ");
$query->bindValue('
        :badge_no', $badge_no);
$query->bindValue('
        :date', date('Y-m-d'));

// Change History
$query = $handler->prepare("
INSERT INTO `change_history`(
        `date`, `badge_no`,
        `position_id`,
        `admin_badge_no`)
VALUES(:date, :badge_no,
        :position_id,
        :admin_badge_no) ");
$query->bindValue('
        :date', date('Y-m-d'));
$query->bindValue('
```

```
        :badge_no', $badge_no);
$query->bindValue('
        :position_id', $_POST['
                position']);
$query->bindValue('
        :admin_badge_no', $_SESSION
                user_session']);
$query->execute();

$handler->commit();

// If successful, reload page
header("Location: ". $directory
        . "admin/pisadmin/
        manage_personnel_info.php
        #employees_box");
} catch (Exception $e) {
echo json_encode($e);
$handler->rollBack();
}
}
```

Listing 7

Assign Roles to an employee to become an admin or from admin to become an employee.

```
//Assigns_Roles.php
<?php
require $_SERVER[
        'DOCUMENT_ROOT']
.'/new/requirements.php';

if( !isset($_POST) ) {
header("Location: " .
        $directory .
        "index.php");
}

try {
$handler->beginTransaction();
$badge_no = '';
$pisadmin = 0;
$amsadmin = 0;
$psadmin = 0;

$badge_no = $_POST['badge_no']
 ? $_POST['badge_no'] : '';
$pisadmin = isset($_POST[
        'roles']) ? in_array(
    'pisadmin', $_POST[
        'roles']) ? 1 : 0 : 0;
$amsadmin = isset($_POST[
        'roles']) ? in_array(
    'amsadmin', $_POST[
        'roles']) ? 1 : 0 : 0;
$psadmin = isset($_POST[
        'roles']) ? in_array(
        'psadmin', $_POST[
        'roles']) ? 1 : 0 : 0;

$query = $handler->prepare("
UPDATE `emp_account`
SET `is_pisadmin` = :pisadmin,
 `is_amsadmin` = :amsadmin,
  `is_psadmin` = :psadmin
WHERE `emp_id` = :badge_no ");
$query->bindValue(
':pisadmin', $pisadmin);
$query->bindValue(
  ':amsadmin', $amsadmin);
$query->bindValue(
  ':psadmin', $psadmin);
$query->bindValue(
  ':badge_no', $badge_no);
$query->execute();

$handler->commit();

//echo json_encode(array(
//$pisadmin, $amsadmin,
//$psadmin));
echo json_encode(array(
"success" => true
));
} catch (Exception $e) {
$e->rollBack();
echo json_encode($e);
}
```

Listing 8

Getting of employee data for Payroll.

```
//Get_employee_data_for_
//Payroll.php
class EmployeeData {
public $name, $basic_salary,
 $gsis_contri,
 $pagibig_contri,
 $philhealth_contri,
 $total_tax,
 $total_deductions,
  $total_earnings, $absent,
   $d_loan, $handler;
public function __construct(){
$now = new DateTime(
        $_GET['date']);
$month_year = date(
        'Y-m', strtotime($_GET[
                'date']));
$this->handler = new PDO(
        'mysql:host=localhost;
        dbname=csc_rov', 'root',
         'csc13');
$this->handler->setAttribute(
        PDO::ATTR_ERRMODE,
        PDO::ERRMODE_EXCEPTION);

// Name
$this->name = strtoupper(
        $this->lname).', '
  .$this->fname. ' '
  .$this->mname[0]. '.';

// Basic Salary
$this->ch_date = new DateTime(
        $this->ch_date);
```

```
$years = ($now->diff(
        $this->ch_date)
  ->format('%Y'));
$months = ($now->diff(
        $this->ch_date)
  ->format('%m'));
/*$years = ($now->format(
'Y') - $this->ch_date
->format('Y'));
$month = ($now->format(
'm') - $this->ch_date
->format('m'));*/

if ($years == 0) {
$this->basic_salary
= $this->step1;
}
else if (($years > 0
        AND $years <= 3)) {
/* If the difference is
not greater or equal to
3 years, use the existing */
$this->basic_salary =
$years == 3 ? $months >= 0
 ? $this->step2 : 0 :
 $this->step1;
}
else if ($years > 3
        AND $years <= 6) {
$this->basic_salary =
$years == 6 ? $months >= 0
 ? $this->step3 : 0 :
 $this->step2;
}
else if ($years > 6
        AND $years <= 9) {
$this->basic_salary =
$years == 9 ? $months >= 0
 ? $this->step4 : 0 :
  $this->step3;
}
else if ($years > 9
        AND $years <= 12) {
$this->basic_salary =
$years == 12 ? $months >= 0
 ? $this->step5 : 0 :
  $this->step4;
}
else if ($years > 12
        AND $years <= 15) {
$this->basic_salary =
 $years == 15 ? $months >= 0
  ? $this->step6 : 0 :
   $this->step5;
}
else if ($years > 15
 AND $years <= 18) {
$this->basic_salary =
$years == 18 ? $months >= 0
 ? $this->step7 : 0 :
  $this->step6;
}
else if ($years > 18
        AND $years <= 21) {
$this->basic_salary =
 $years == 21 ? $months >= 0
  ? $this->step8 : 0 :
   $this->step7;
}
else if ($years > 21) {
$this->basic_salary =
 $this->step8;
}

// GSIS
$this->gsis_contri = (
        $this->basic_salary *
         $this->g_emp_share) +
          ($this->basic_salary *
           $this->g_empr_share);

// PAGIBIG
$this->pagibig_contri = (
        $this->basic_salary *
         $this->p_emp_share) +
          ($this->basic_salary *
           $this->p_empr_share);

// PHILHEALTH
$query = $this->handler->
prepare("
SELECT `total_monthly_prem`
FROM `pay_philhealth_table`
WHERE `salary_range_from` <=
:salary
AND `salary_range_to` >=
:salary ");
$query->bindValue(
        ':salary',
         $this->basic_salary);
$query->execute();
$row = $query->fetch(
        PDO::FETCH_ASSOC);

$this->philhealth_contri =
 $row['total_monthly_prem'];

// DEPENDENCIES LOL
$query = $this->handler->prepare("
SELECT * FROM `emp_child`
WHERE `emp_id` = :badge_no ");
$query->execute(array(
        'badge_no'=>$this->
        Badge_no));

if ($query->rowCount() > 0) {
$dependent = 0;
while ($child = $query->
        fetch(PDO::FETCH_ASSOC)) {
$birthday = new DateTime(
        $child['child_bday']);
$age = $now->diff($birthday);
if ($age->format('%Y') <= 21) {
$dependent += 1;
}
}
if( $dependent >= 4 ) {
$dependent = 4;
```

```
}
}
else {
$dependent = 0;
}
if ($dependent == 0) {
$e_tax_type = 2;
}
else if ($dependent == 1) {
$e_tax_type = 3;
}
else if ($dependent == 2) {
$e_tax_type = 4;
}
else if ($dependent == 3) {
$e_tax_type = 5;
}
else if ($dependent >= 4) {
$e_tax_type = 6;
}

$taxable =
 $this->basic_salary -
 ($this->gsis_contri +
  $this->pagibig_contri +
   $this->philhealth_contri) +
    ((50000 * $dependent)
     / 12 );
$holidays = 0;
// get Holidays
$query = $this->handler->
prepare("
SELECT `e_date`
FROM `special_event`
WHERE `e_date`
LIKE '$month_year%' ");
$query->execute();
$holiday_count = 0;


if( $query->rowCount() ) {
$holidays = $query->fetchAll(
        PDO::FETCH_ASSOC);
foreach( $holidays
        as $key => $value ) {
if( date('w', strtotime($value[
        'e_date'])) != 0 &&
        date('w',
         strtotime($value[
                'e_date']))
                 != 6 ) {
$holiday_count++;
}
}
}

// Absences
$day_count = 0;

$query = $this->handler->
prepare("
SELECT COUNT(*) as present
FROM `dtr_entry`
WHERE `date` LIKE '$month_year%'
AND badge_no = :badge_no ");
$query->bindValue(':badge_no',
        $this->Badge_no);
$query->execute();
$dates = $query->fetch(
        PDO::FETCH_ASSOC);

$month = date('m', strtotime(
        $month_year));
$year = date('Y', strtotime(
        $month_year));
$day_count = 0;

for ($i=1; $i <= date('t',
 strtotime($month_year));
  $i++) {
$timestamp = mktime(0, 0, 0,
 $month, $i, $year);
if(date('n', $timestamp) ==
 $month) {
$day = date('N', $timestamp);
if( $day == 1 || $day <= 5 ) {
//$days[$day][] = date('j',
// $timestamp);
$day_count++;
}
}
}
$day_count -=
 $dates['present']
 + $holiday_count;

// COMPARING TAX
$query = $this->handler->
prepare("
SELECT MAX(`salary_base`)
 AS salary_base
FROM `pay_tax_salarybase`
 as pts,
 `pay_emp_tax_type` as pett,
  `emp_card` as ec
WHERE pts.`tax_table_id` =
 pett.`type`
AND pett.`tin` = ec.`tin`
AND pts.`salary_base` <=
 :taxable
AND ec.`badge_no` =
 :badge_no");
$query->bindValue('
        :taxable', $taxable);
$query->bindValue('
        :badge_no',
         $this->Badge_no);
// $query->execute(array('
//taxable'=>$taxable,
// 'badge_no'=>
// $this->Badge_no));
$query->execute();
$row = $query->fetch(
        PDO::FETCH_ASSOC);
$salary_base = $row[
        'salary_base'];

// COMPUTED TAX
```

```
$ctax = $taxable -
 $salary_base;

// WITHOLDING TAX
$query = $this->handler->
prepare("
SELECT fixed_deduction,
 fixed_per, tax_rate
FROM pay_tax_rates ptr,
 pay_tax_salarybase pts
WHERE pts.salary_base = ?
 AND ptr.tax_rate_id =
  pts.tax_rate ");
$query->execute(array(
        $salary_base));
$row = $query->fetch(
        PDO::FETCH_ASSOC);

//echo $this->Badge_no .
// $row['fixed_per'] . ' ' .
// $row['fixed_deduction'] .
//'<br>';

$this->total_tax = (
 $row['fixed_deduction']
  + ($ctax * $row['
        fixed_per']) );


// Absent Amount
$this->absent = $day_count
 * ($this->basic_salary
  / 20);

$this->total_deductions =
 $this->total_tax +
  $this->gsis_contri +
   $this->pagibig_contri +
    $this->philhealth_contri
     + $this->absent;

// LOAN
$query = $this->handler->
prepare("
SELECT *
FROM `payroll_loan_deduc`
WHERE `badge_no` =
:badge_no ");
$query->execute(array(
        'badge_no'=>$this->
         Badge_no));

$this->d_loan = 0;
while ($row = $query->fetch(
        PDO::FETCH_ASSOC)) {
if ($row['interest_type']
 == 0) {
$months = $row[
        'duration'];
}
else {
$months = $row[
        'duration'] * 12;
}
$start = new DateTime(
        $row['start_date']);
$end = $start->add(
        new DateInterval('P'.
                $months.'M'));
$end->format('Y-m-d');

if ($now < $end) {
$this->d_loan = ((int)$row[
        'total_amount'] + ((int)
        $row['total_amount'] *
         (float)$row[
                'interest_rate'
                ]))
                 / $months;
// $this->total_deductions
// += $d_loan;
}
}
$this->total_earnings =
 $this->basic_salary -
  $this->total_deductions;
}
}
```

CURRICULUM VITAE

CURRICULUM VITAE

PERSONAL INFORMATION

- **Name:** Zenica B. Torre
- **Age:** 18
- **Gender:** Female
- **Birth Date**: December 6, 1998
- **Address:** Brgy. 13 Bacacay, Albay
- **Civil Status:** Single
- **Citizenship:** Filipino
- **Religion:** Roman Catholic
- **Parents:**
- **Email:** torrezenica@gmail.com

EDUCATIONAL BACKGROUND

- **Tertiary Education**
  - School: Bicol University College of Science
  - Address: Rizal St. Legazpi City, Albay
  - Academic Program: Bachelor of Science in Information Technology
  - Duration: 2012-2016
- **Secondary Education**
  - School: Bicol University High School Department
  - Address: Rizal St. Legazpi City, Albay
  - Duration: 2008-2012
- **Elementary Education**
  - School: Bicol University Integrated Laboratory School
  - Address: Rizal St. Legazpi City, Albay
  - Duration: 2002-2008

CURRICULUM VITAE

PERSONAL INFORMATION

- **Name:** Jhona Jane B. Francisco
- **Age:** 18
- **Gender:** Female
- **Birth Date**: December 6, 1998
- **Address:** Brgy. 13 Bacacay, Albay
- **Civil Status:** Single
- **Citizenship:** Filipino
- **Religion:** Roman Catholic
- **Parents:**
- **Email:** torrezenica@gmail.com

EDUCATIONAL BACKGROUND

- **Tertiary Education**
  - School: Bicol University College of Science
  - Address: Rizal St. Legazpi City, Albay
  - Academic Program: Bachelor of Science in Information Technology
  - Duration: 2012-2016
- **Secondary Education**
  - School: Bicol University High School Department
  - Address: Rizal St. Legazpi City, Albay
  - Duration: 2008-2012
- **Elementary Education**
  - School: Bicol University Integrated Laboratory School
  - Address: Rizal St. Legazpi City, Albay
  - Duration: 2002-2008

CURRICULUM VITAE

PERSONAL INFORMATION

- **Name:** Kianne Marie T. Paguntalan
- **Age:** 18
- **Gender:** Female
- **Birth Date**: December 6, 1998
- **Address:** Brgy. 13 Bacacay, Albay
- **Civil Status:** Single
- **Citizenship:** Filipino
- **Religion:** Roman Catholic
- **Parents:**
- **Email:** torrezenica@gmail.com

EDUCATIONAL BACKGROUND

- **Tertiary Education**
  - School: Bicol University College of Science
  - Address: Rizal St. Legazpi City, Albay
  - Academic Program: Bachelor of Science in Information Technology
  - Duration: 2012-2016
- **Secondary Education**
  - School: Bicol University High School Department
  - Address: Rizal St. Legazpi City, Albay
  - Duration: 2008-2012
- **Elementary Education**
  - School: Bicol University Integrated Laboratory School
  - Address: Rizal St. Legazpi City, Albay
  - Duration: 2002-2008