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WEB-BASED TRANSACTION MANAGEMENT SYSTEM FOR THE OFFICE OF STUDENT ORGANIZATIONS OF THE BULACAN STATE UNIVERSITY

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Abstract

This study was conducted with focus on describing the functional requirements taking place in the Office of Student Organizations of the Bulacan State University and integrate these requirements as features in the development of a web – based transaction management system. This system covers transactions in the office like renewal of commitment, activity proposals, file organization, information dissemination, schedule of activities and news, events and announcements administration. This study also focused in determining the laws, policies and rules needed to be considered in managing student activities to ensure the safety and security of the students during an activity. This study was evaluated using black – box software testing method using twelve (12) test cases to ensure a comprehensive and bug – free system.

The researcher conducted observation, interviews and surveys to acquire the objectives of this study. The methodology utilized in this study was descriptive developmental approach since the researcher aims to describe the processes happening in the Office of Student Organizations. Developmental approach was also used as the methodology of the researcher in the development of the web – based transaction management system that aims to hasten and improve the transactions processed by the office. The researcher used the software development life cycle agile model which requires the researcher to develop different versions of the system until the desired functionality of the client was met. Thus, providing a close communication between the researcher, office head, organization leaders and staff.

Observation, interviews and surveys were conducted and successfully determined the functional requirements of the office that served as a guide in the areas to be given focus in the development of

the web-based transaction management system. The system passed all the 12 test – cases which signify the capability of the system to hasten and improve the transactions happening in the Office of Student Organizations of the Bulacan State University.

Introduction

Computer applications, internet usage and electronic gadgets were updating on a daily basis and no wonder that technology has influenced and has greatly simplified almost every aspect of a person's life. There were numerous advantages of what technology can do to the society and how people became dependent on it. Thus, having computers in the workplace has enabled various businesses to be more efficient and productive at the same time. Moreover, these computers contributed greatly in creating businesses that were flexible through the use of computers, there will be a cut down on the employees working time. For instance, the person in charge does not have to write everything down nor use a typewriter, but instead, that person will do the task with the aid of computer. The increase in the usage of computers prove that computers have affected every aspect of every person's life and became one of the necessities to get through in life (Computers in Your Life, 2017).

In today's generation, people are living in an information age which is highly dependent upon digital information. Every type of job relies upon getting and collecting information – using it, managing it, and imparting information to others. Computers allow individuals to process and store data efficiently. Having a website makes the job very easy for people to find and read about an existing company, what does that company do and answer bunch of questions that people have on that particular company. By having these kind of websites, people were able to find information of the company when people look up for it through a search engine.

According to American Records Management Association International (2017), record management is the professional practice of managing the records of an organization throughout their life cycle - from the time they are created up to their eventual disposal. Managing paper works is an arduous job like for example, in a record-keeping office, time is very important. It also requires the office to store the processed paper for additional purposes. Manual ways of managing records are subjected to some risks because it is time-consuming in terms of recording and storing data. If some records are lost, the person-in-charge cannot retrieve it in case of unexpected calamity.

The Office of Student Organizations (BuSU - OSO), which was founded in the year 2011, is an office in Bulacan State University which caters hundreds of recognized organizations. Each organization inside the university, including the other organizations on satellite campuses is composed from hundreds to thousands of students. Currently, there are one hundred twenty-seven (127) recognized organizations in Bulacan State University. These organizations are categorized into three types: college-based organization, university-wide organization, and campus-based organization. Each organization is represented by officers who are responsible for the renewing of commitment of the organization, proposing activities, and submitting requirements required by the office. The office distributes application form for the organization who wants to apply or renew, submit event proposals and financial reports. After completing the requirements, the students will submit it to the office for evaluation and approval purposes. The director has the authority to approve any project proposal of each organization.

This process requires a lot of effort of concerned students to go back and forth to the main campus to acquire, submit and follow-up the results of the requirements.

Another process of the office is to disseminate information regarding important meetings, events and announcements. This is usually done by sending text messages to each organization presidents. The messages were not properly distributed due to numerous organizations, changing of contact numbers, spending money for the load used for sending and varying communication networks.

Student organization officers are not well informed regarding the schedule of activities of the office and other student organizations as well. There are times that a particular activity was already done before they knew it apparently, there is a difficulty in terms of dissemination of the office's schedule of activities. In line with this, the office needs to provide a summary of the schedule of activities in a calendar format to keep the students updated with the office's activities.

With these observations, the researcher realized the importance of developing a web-based application system to help the office to make available downloadable forms, keep track records of recognized organizations, monitor requirements submitted by the organization, approve and disapprove documents, disseminate information through SMS capability and display events using online calendar of events.

Statement of the Problem

The general problem of the study was: How could a web-based transaction management system be developed in improving the transaction management of the Office of Student Organizations in Bulacan State University?

Specifically, the study sought answers to the following questions:

1. How may the existing management system of the Office of Student Organizations be described in terms of the following:
 - 1.1 renewal of commitment
 - 1.2 activity proposals
 - 1.3 file organization
 - 1.4 information dissemination
 - 1.5 schedule of activities, and
 - 1.6 news, events and announcements administration?
3. What laws, policies and rules are needed to be considered in managing student activities?
4. How may the functional requirements of the Office of Student Organizations be integrated as features in the design and development of a web-based management system?
5. How may the web-based transaction management system be evaluated using black-box testing?

Methods

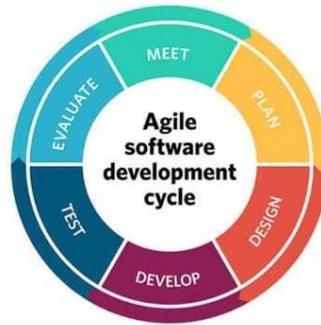
The researcher utilized the descriptive developmental methodology of research in this study which the researcher believes is deemed applicable in developing BuLSU OSO web-based transaction management system. A descriptive method is applicable to this study since the nature of general objective of this research aims to describe the different transactions in BuLSU OSO.

Deutsch (2017) describes the descriptive research as the most effective method to studies that aims to gather additional information, learning more about an area of interest or becoming more familiar with a topic. To become familiar with the transactions in BuLSU OSO the researcher needs to conduct preliminary observation about the current state of the office's everyday transactions. The researcher also needs to engage more in interviews to gather adequate information regarding the flow of transactions in the office.

On the other hand, a developmental research is a method to which a researcher will study a process systematically, develop and evaluate processes that must meet the criteria for consistency and effectiveness. Likewise, the researcher opts to deliver an innovative way to change the state the transactions in BuLSU OSO. Once the researcher is knowledgeable about the transactions in the office - which is the result of the descriptive method, the researcher can adapt the developmental research since this study must offer solution to improve management of the BuLSU OSO through the development of a web-based system. This study also monitored the change in the status of the transaction management of BuLSU OSO by collecting data at specific points in time which were used as a basis of comparison and analysis due to the implementation of the web – based system.

The system was developed by preparing preliminary version of features to be integrated in the system. Since the researcher works in Bulacan State University, the communication to BuLSU OSO staff is not an issue and there was a close participation of the client in the development of the system through consultation and frequent checking. The preliminary version of the features was tested by the BuLSU OSO staff and continuously tested until the desired feature was accomplished. In line with this, the researcher adapted the software development life cycle agile model that focuses on process adaptability and customer satisfaction. A working software product was delivered quickly since it is separated into small incremental builds in iterations which time span is from to three weeks. Every iteration conducts planning, requirement analysis, designing, coding, and testing.

Figure 2 illustrates the software development life cycle – agile model based on the manifesto for agile software development. It is composed of the different phases of software development life cycle done in an agile approach which are plan, design, develop, test, evaluate and meet. These phases were performed by the researcher in developing the web – based transaction management system. All the phases were performed with a number of iterations and these phases will be repeated until the desired functionality and output of the system were accomplished.



1 - Figure 1. The Agile Model (Manifesto for Agile Software Development, 2001)

Plan. This is the initial stage of software development where the researcher will define the problem and the possible solution to the problem will be determined. To define the problem, the researcher will observe the transactions in the office and will conduct interviews utilizing the interview guide attached as appendix D to the BuSU OSO staff. In this stage, the prioritization of possible solution that the client needs as observed by the researcher will be scheduled. After the data gathering included in the initial phase, the enumeration of the features of the system will take place. The researcher will discover essential features of the system to build the possible solution. The researcher will make use of the data gathered in the planning stage to weigh if a certain feature is not needed to be able to save time and effort in developing it.

Design. The objective of this phase is to design the solution system which includes the outline of the web – based management system, user-interface and program flow. The researcher will make the system design interactive and user – friendly so that the users will be able to use it effectively. The database design or the storage of information entered by the users will also be defined in this phase. Database design must be normalized to build a comprehensive storage because a good system starts with a good database design. Since the researcher will use the agile method of software development, the system and database designs must be flexible enough to cater changes that might happen as suggested by the client.

Develop. When the system requirements are designed properly, and the requirements are listed accordingly, the coding process is more efficient. This phase is the start of building the functional requirements of the system enumerated in requirements analysis phase using various scripting technologies in web development mentioned in the related literature (Chapter 2) of this study. The researcher must be able to deliver it according to the time frame stated in the iteration. This phase will recur in case the system design changes.

Test. This phase aims to identify errors and discover enhancements for the system which requires the possible users of the system to intervene. The system will be accessed by visiting a link which will be provided by the researcher.

Evaluate. The system will undergo to a black – box testing wherein the researcher will prepare test cases to be rated by the evaluators of the system regarding the behavior of the system. Through this phase, the researcher will monitor the performance of the system to check if the proposed solution meets the project objectives.

Meet. This is the phase wherein the client and the researcher meet to discuss about the web-based transaction management development progress. It helps the researcher see some discrepancies to revise the system depending on the needs of the client. This phase recurred a number of time until the desired output was accomplished.

Population and Sample of the Study

Primarily, the system will serve as a tool in improving the transaction management of BuLSU OSO and is aimed at the convenience of BuLSU students who are members and president of a fully recognized organization. In order to test the technical aspects of the system, it will be evaluated by a number of IT professionals of BuLSU including Information Technology Instructors and Software Engineers who work in the industry.

Table 1 shows the distribution of respondents of this study.

Table 1

Respondents of the Study

Respondents	Frequency	Percentage
1. BuLSU Student Organization Members	60	60%
2. BuLSU Student Organization Presidents	30	30%
3. IT Professionals of BuLSU and Software Engineers	10	10%
Total	100	100%

The system needs to be evaluated by the respondents mentioned above to determine whether the system meets the study's objectives. Sixty (60) student organization members are chosen because the system will provide indispensable information regarding the office and upcoming activities in which the primary involved are the students. Next is thirty (30) organization presidents which are the ones who will directly use the system since the presidents are in charged in submission of the requirements for every transaction in the BuLSU OSO such as renewal of commitment, activity proposals, financial and accomplishment reports. On the other hand, the system demands to be evaluated by ten (10) Information Technology Professionals due to the expertise of these individuals in handling new technologies. The researcher believes that the experience gained in working in the industry and academe is a great help in giving recommendations for the improvement of the system.

Research Instruments

Every system must be evaluated based on its behavior from how it interacts with the user to gather data up to the provision of the user's desired output. In line with this, the researcher decided to make use of black – box testing as an instrument to evaluate the functionality of the system which is commonly referred to as "Behavioral Testing". Since 75% of the respondents of this study do not have any

knowledge regarding the internal structure of how the system was developed, the system will be tested entirely on the functional requirements as perceived by the user's experience in using the system.

Once the system features are done, the test cases will be formulated together with the documentation that specifies the inputs, preconditions, execution steps and expected output. The remarks of the evaluator determining if the system passed or failed the test case will be filled out once the evaluator is done testing the system feature, the test case must be effective enough to determine system failures and covers almost all the functional requirements of the system. Upon developing the research instrument of this study, the researcher believes that it is important to have a detailed study of the system by providing dry run through inputs of sample data and gathering all the possible scenarios that might break the system. It is also important that the test cases will be written in simple language and non – technical terms for the convenience of non – IT evaluators.

A test case template includes the following parameters namely, Test Case ID which refers to the type of system that is currently under test and standard rules must be followed depending on the type of case and version number. Next is the Test Case Name followed by the test case description that explains the summary of what the test case is going to do. Another parameter is the pre-conditions which are processes or phases that must be satisfied prior to the execution of the test case then followed by the execution steps to be performed to get the desired results. Expected results are the desired outcomes from the execution steps performed, next is the actual result column where the actual outcome is written, the evaluators need to write “as expected” if the result matches the given expected result otherwise, the exact result is needed to be mentioned. Status column is where the actual result must be marked as passed, failed, not tested, not applicable and cannot be tested. Lastly, the comments section is for the additional information that the evaluator wishes to provide. The researcher believes that by using test cases based on black – box testing will uncover the defects in the software and improve the functionalities of the system.

A questionnaire was devised to answer the problem stated in the specific problem number one (1). The questionnaire was comprised of the common transactions taking place in the daily operations of the BuISU - OSO which were rated based on the impact of using the developed system. This questionnaire also addressed the general problem of this study since the researcher aims to prove that a web-based management system really improved the transaction management in BuISU – OSO compared to the office's current process.

Results and Discussion

1. The Existing Management System of the Office of Student Organizations

The existing management system of the Office of Student Organizations was described in a process diagram shown in figure 3 and successfully described each processes by conducting a survey for each transaction.

Renewal of Commitment. A survey was conducted to determine the existing management system of BuISU – OSO, the researcher used the Likert Scale to compute the mean, five (5) is the highest and one (1) is the lowest. Renewal of Commitment was rated 1.73 which is equivalent to “fair”. This includes the

lack of a good mechanism to acquire and submit requirements needed to perform the renewal of commitment of student organizations.

Activiy Proposals. This transaction is almost the same with the processes performed in the renewal of commitment including the acquisition and submission of forms. This transaction was rated 1.72 which is equivalent to “fair”. The office head realized the difficulty in the office in terms of the verification of the documents manually and is overwhelmed with bulk loads of papers stored inside the office.

File Organization. The researcher promoted the importance of paperless transaction in the office after getting the rate of 1.52 which is equivalent to “fair” in file organization. The office head agreed to implement a paperless transactions to diminish papers to be stored inside the office.

Information Dissemination. Urgent announcement of information cannot fully reach it’s target recipients. There are times that an event was already finished before a student knows about it’s details. Information dissemination of the office was rated as 2.37 which is equivalent to “fair”.

Schedule of Activities. This transaction was rated as 2.60 which is equivalent to “good”. The calendar of activities can be seen inside the office so that students can see it. This is updated by the office secretary from where it displays the name, date, and time of the event. However, the secretary cannot display the entire acitivites for there are lots of activities that is being proposed by the recognized student organizations. Thus, the researcher aims to improve this process.

News, Events and Announcements Administration. A rate of 2.31 which is equivalent to “fair” described the process of administration of important news, events and announcements of the office. The office staff find it hard to prepare materials to announce important matters happening in the office as well as modifying details and canceling events.

Most of the criteria were rated as “FAIR” thus, the researcher focused to improve the following areas such as renewal of commitment, activity proposals, file organization, information dissemination and news, events and announcements administration.

2. Laws, Policies and Rules Needed to be Considered in Managing Student Activities

The laws, policies and rules to be considered in managing student off – campus activities was determined by relying to the CHED Memorandum Order No. 63 Series of 2017 entitled “Policies and Guidelines on Local Off – Campus Activities” attached as appendix F in this document.

CMO No. 63 Series of 2017 requires the following: CHED endorsement which signifies the approval and support of CHED to a particular activity; in case of the mobility of students, the office ensures valid documents pertaining to the registration, insurance and license to ensure it’s roadworthiness; a notarized parent consent form must be submitted when the activity will be conducted outside the province of Bulacan; Lastly, a medical certificate should be submitted if the students will participate in international events.

3. Design and Development of a Web-Based Management System

The functional requirements of the web – based transaction management system were derived from the difficulties found as the result of the survey conducted by the researcher. Software development tools were maximized to develop the functionalities of the system. The developed system aims to improve the

everyday transaction management of the office of student organizations. The system helps to easily disseminate **sample forms** and letters that will serve as a requirement for a transaction. Online submission of documents in pdf file is also integrated to diminish the effort of going back and forth to the office which benefits specially the organizations that reside in satellite campuses.

The web-based transaction management system helps the office head and staff in monitoring the status of an ongoing transaction like renewal of commitment and activity proposals. Checking of submitted documents can be done online which diminishes bulk loads of paper inside the office. Moreover, the office staff and the office head can ask for the revision of documents immediately which utilizes the time to spent in waiting for the results. The system helps the office head to easily monitor the schedule of activities of the office and all of the student organizations.

The web-based management system makes it easier to disseminate information since the system provided a dynamic content management system that can accept, update, delete and enable or disable news and announcements. The distribution of urgent information such as emergency meetings and announcements can be done conveniently by using the SMS and web – messaging feature of the website.

The system provided a comprehensive PDF generator which serves as the aide in filling-out forms necessary for transactions in the office. PDF generator is one of the useful feature of the web-based management system since it covers all the necessary forms to be submitted in the office which is tailored upon the required fields to fill-out. In terms of dissemination of documents, a student doesn't need to visit the office physically to acquire the needed form, every form was provided in the website which can be downloaded by just one click.

The administrator has full access to the system including the banners or images displayed in the homepage of the website which is useful for distributing useful information in an innovative way. Since the system can be accessed online, the office head and staff can monitor the transactions anytime and anywhere provided that there is an internet connection. The members of the organization and anyone who visits the website will be aware of the upcoming events of the office by just looking in upcoming events section in the website's homepage. It promotes the student's awareness of the educational activities that is essential in an individual's growth and to maximize the full potential of being an active member of an organization.

4. Evaluating the Web-Based Transaction Management System Using Black-Box Testing

The Black Box Testing method of evaluating the system was the most suitable software testing method. The researcher formulated twelve (12) Test Cases that were found to be effective in finding system errors that really helps the researcher to ensure a bug free system. The results of all the test cases conducted were marked as "PASSED".

Conclusion

In view of the findings mentioned above, a conclusion was drawn as a response to the assumption of the study.

The researcher therefore conclude that the developed Web-based Transaction Management System hastened and improved the daily transactions taking place in the Office of Student Organizations

of Bulacan State University. This served as a tool to perform renewal of commitment of student organizations in a paper-less manner and eliminated tons of papers stored in the office. The developed system hastened the activity proposal process by providing immediate results upon the submission of the documents.

The system can detect the conflict of schedules being proposed by the student leader in terms of date, time, venue and organizations. The system successfully provided a calendar of events based on the approved activities and events provided by the office of student organizations. Thus, diminishing the time spent in preparing notes to be pinned in the calendar of events inside the office.

The students saved time and money because the system provided downloadable forms that requires the student name and student number of bonifide students of Bulacan State University. and disseminated information in a timely manner. The system also promoted the awareness of the students regarding the latest events, news and announcements happening in the office.

Recommendations

In light of the findings and conclusion of the study, the following recommendations were drawn and can be used by future researchers who want to develop a similar kind of study:

1. Web-based transaction management system must include forums for student organizations that can be used in decision-making of the office.
2. Make it possible for the student organization leaders and members to send messages to the office head to provide additional convenience in communication.
3. Provide a gallery of pictures or reviews about an event that will be uploaded by the students to ensure the interactivity of the website.
4. Design a project management system that monitors the preparation of an approved or upcoming activity proposal.
5. Provide a link at the Bulacan State University Official Website that will redirect to the homepage of Office of Student Organizations web-based transaction management system.

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