Implementation of a project management module for the AS / 400 system.

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Abstract—over time the use of information technology has been increasing and taking a major role in technological field. It’s applied commonly in business and labor fields that require project management practices, this paper show the main items to develop a project management module for AS/400 system using one methodology that implies requirements engineering, diagrams design ,implementation and software testing.

Index Terms—software development, as400, business technologies

I. INTRODUCTION

The project management in the companies had become in an administrative practice that in order to offer necessary options to achieve an expected result under specific conditions, it is why the software for project management has become a tool of high utilization since in this way is possible make a planning resources and tasks, programming, logistics and coordination of staff for the sole purpose of seeing the expected results of a project. But although it has an app versatile capable of storing all information with relation a project, also is necessary have the factor of analysis and decision making because it is a project manager who determines the positive or negative balance of this[2].

Agree with the portal web4leads, in the may occur two different scenarios, on the one hand the project manager determines the dates and milestones to comply within a project and then, He doesn't make tracking and review the task nor to the deliverables so clearly, it can become in a problem in the final stages of project; on the other hand the management of project is totally restrictive in much of the activities and that show that it is moving in slow motion , which also presents a risk regarding dates the project. After presenting these scenarios it is clear that there must be a balance between functionality of software for the making of decisions and future actions that management of projects takes on any project. Therefore, this project needs the analysis and development of an application about an AS / 400 system for managing projects that have modules Monitoring of proposals, quotations, contracts, approvals, activities and calculation of profit and loss.

II. METHODOLOGY

Development applicative in a system AS/400 it was made in first instance the functional specification document the functional specification document, design proposals were presented for its approval and once approved entity relation model is performed to start the development of the system, for each module implemented it is performed the technical documentation, user manual, once finish development, it is performed unit tests and integral.

III. REQUIREMENT ENGINEERING

The functional requirements intended to establish characteristics which should have the module project management, specifying in this way all the items and functionalities which the system should have to comply with all the necessities in order to exercise a project.

A. Purpose

Communicate the functional requirements that are contemplated in the development of the Software.

B. Scope

The name which will identify the software is: Project management module of software for AS/400

C. Requirements engineering.

For requirements engineering were conducted interviews and were investigated by documentation of projects completed, it was this way as concluded that the module project management have to with 8 submodules which are the main axis of this software, between some submodules stand the staff administration, assurance quality, project management, consultations of loss, profit per projects, among others. As good practice in the development in the engineer of requirements was designed a template to register all requirements, application functionalities, in the table you can see the format of the functional requirements.

<table>
<thead>
<tr>
<th>Identifier:</th>
<th>Name:</th>
<th>Requirements:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actor:</td>
<td>Development priority</td>
<td></td>
</tr>
<tr>
<td>Description:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In the space of identifier will be stored the code which will identifies the requirements, in the case of this development RF is the code used followed by a consecutive to control all functional requirements, the space of name is intended to stock the name of functional requirement, the space of requirement indicates the code of other requisite associated, the actors are those profiles or people who will be involved in the use of requirements, the priority of the development is a value which indicating how important of that requirement over others, the requirements with high priorities are in general the greatest impact for the deal, the description as the name indicates is a summary of that requirement, the entries are the planned value, that the actor writes or knowns for work with the functionality, the departures are the expected result after that the program make a specific task, handling abnormal situations helps to the developer to know how and what controls and exceptions have to make in the system in case of an entry or departure not contemplated. With this format now you can make the design and development of the modules planned.

D. Submodules of Projects

The purpose of this submodule is can create, modify, consult and delete projects which the company is involved, this is the first step in the project management and also in software of project management because any task or activity must be associated with a current project.

E. Submodules of Human Resources.

As fundamental part of any project the human resource have to intervene in some part, of this way that submodule is used to create, modify, consult and delete all internal or external people who are associated with a project.

F. Submodule of control of activities

In this submodule will be created and fill all necessary activities and task to complete each project, within the template is included the estimated and real dates to calculate the time and the cost spent on each project.

G. Submodule of quality assurance

The quality assurance is a very important submodule, if in the course of the project is necessary some development of software, within this submodule is possible evaluate the development made per some programmer of software also assigning it a value as in quality of the development.

H. Submodule of Quality Control

Same way that in the Submodule of quality assurance within this formulary can fill information in terms of quality, security, integrity, among other errors on each software development done, this task is performed by a development leader who in his expert judgment awarded this rating.

I. Submodule of lessons learned

Each project completed, has areas for improvement and points to strengthen, this submodule it allows fill out this information so it can be taken in future projects.

J. Submodule of programs

For software development projects this submodule is a vital support because it allows take control over information on all programs carried out and then use these data for assessments of quality assurance and quality control.

K. Submodule of profit and loss

This submodule provides a financial summary and a calculation of estimate time based on all tasks and activities created within the system per project.

IV. DESIGN

For develop the design and development of the app, this section presents different diagrams made to understand the use and operation of the module of management software projects, among them, were necessary the use case diagram, deployment diagram, sequence diagram and an entity relation model, diagrams were adjusted more than once until it found one model that comply fully with all planted functional and specific requirements since engineering of requirements to this point.

A. Use case diagrams

These diagrams show the interaction between users and the system or in this case with each sub-module, the following figure is the use case diagram designed for authentication and profiling within the AS400 system.
Within the AS400 system each time a user authenticates the system is responsible for granting the necessary privileges of each user depending on the configuration for each one, this is an important point because the project management module to perform actions such as deleting or create according to the profile running this option.

In the software design were these early diagrams developed to understand the use of options in different menu. Likewise each diagram has a fact sheet where it appears recorded information for each use case, they were also designed all diagrams use case for each existing sub-module in the system with options such as create, delete and modify.

**B. Sequence Diagram**

The sequence diagrams let to visualize the flow of actions that can be performed, these were designed according to each sub-module developed, the following figure shows an example of this diagram on authentication and profiling sequence within the AS400 system is presented, although the example is the same use case here you can see more detail the behavior of the system in a profiling case.

The deployment diagram shows the physical components involved in the system, inside these you can find a VPN (Virtual Private Network) client that serves as a bridge for communication with an AS / 400 remote, the following figure shows the diagram deployment designed for project management module.

The project management module works on the client-server model, the server is an IBM machine where the AS400 system is and there the module project management runs on the client side is needed IBM software customer Access, the stage of development also included a VPN as shown in the diagram and thanks to this it is possible to connect the client to the server.

**D. Entity Relationship Diagram**

This diagram is a logical design of the database used in the development of module project management, this design was created considering sub-modules involving development, the number of tables created were 8 the same numbers of submodules, the following figure shows the entity relationship diagram elaborate.

**V. IMPLEMENTATION AND SOFTWARE TESTING**
The development of all submodules with its functions performed within the AS400 system using development tools such as the SDA, the compilation of all programs was performed using a CL or Language Control for ease in compiling, testing was performed on all submodules creating, removing and modifying records to see if the system was in compliance with the controls and validations on each submodule.

The following figure shows the main menu of project management module and from which will be testing the software installed on the development environment.

![Main Menu](image)

Fig. 5 Main Menu

From the main menu window you can access to all developed submodules, the following figures show the records created inside the database DB2.

Through creating submodules option is possible to add records to the database according to the table that corresponds, the following example shows a record created from the submodule of human resources, the figure shows all the form fields creation of resources with their respective field and value, the tests were performed on all submodules with the option of create, modify and delete.

![Created record](image)

Fig. 6 Created record

VI. CONCLUSIONS

After completing the development project management module, the following conclusions can be extracted:

- The AS / 400 system facilitated the development of the system through tools such as PDM (Programming Development Manager) and SDA (Screen Desing Aid), although these systems take a long time in production has not been inconvenient to work innovating and developing new alternatives for software development including non-IBM languages like Java or C.
- The requirements engineering was key in designing and modeling, guided points interviews and methodologies used in project leadership it was established what the needs of a project and which components should be included.
- The system implementation was carried out in a modular way and each installed phase proceeded to verify proper operation of each module in a unified way, this in order to ensure that each installation the system from failures, so tracking and control tasks testing and implementation is important for the start of production of a system like this part.

REFERENCES

