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**DESIGN AND
IMPLEMENTATION
OF THE WEB
APPLICATION FOR THE
ADMINISTRATION OF
RESEARCH PROJECTS
OF THE GRADUATE
STUDIES DIVISION
OF `` INSTITUTO
TECNOLÓGICO DE
VILLAHERMOSA ``**

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Abstract: The potential of information and communication technologies, combined with multimedia developments, is indeed very attractive.

The Internet, without going any further, in its current state of development, has already become an essential tool for any professional. These technologies are revolutionizing their daily activities by putting resources and means that were previously unthinkable at their fingertips.

One problem in this regard is the lack of appropriate registration, follow-up and support for research projects. This lack makes it difficult to provide adequate feedback and, therefore, to make decisions to fine-tune this strategy.

It is worth mentioning that the registration and follow-up of research projects have been carried out in a largely conventional manner, without making systematic use of information and communication technologies (ICTs), which has led, with some exceptions, to making both the operation of the strategy and its administration more cumbersome.

Keywords: web application, research projects, records, information technology.

INTRODUCTION

This project intends to use ICTs as an instrument that improves the registration, monitoring and administration of research projects.

Its main product, -a WEB application- will be available at all times for the different actors on the institution's servers for use on any computer with Internet access.

When creating a web page, it is necessary to keep in mind that everything used in it (navigation bars, graphics, colors, hypertext links and even the organization and placement of each resource) becomes a sign or symbol of communication, in part of your code.

Design involves creating, imagining the

page, defining how it will be, identifying the elements with which it will be built: documents, photographs, references, audio, etc.¹¹

The websites must present enough flexibility to adapt to different types of users. They must and can be subjected to redesigns, with the aim of adapting them to the characteristics and conditions of their users. Redesigning does not mean getting perfect sites but perfected ones. The improvements will always be well received, and in it the use is a faithful indicator of the acceptance/rejection of the improvements.

A good graphic design is mainly based on the design of the information, the design of the visual architecture, the creation of the interactive experience and the engineering of the use. Graphic design must serve as a support and submit to these aspects. The opposite must never happen.

Web pages must be versatile enough to be pleasing to all audiences, to meet their expectations, interests, and environments. No matter the user's location, they must always be able to access the site and connect. The colors used in the different types of interaction messages, such as error messages, must not bother users either.

With the previous elements and others that will be specified in the requirements, there will be a digital file that is easy to consult by the interested parties.

There will be an option to create, update and plan research projects registered and under follow-up, there will be an automated verification, control and evaluation mechanism for those aspects that the requirements establish as priorities, respecting, - in this relationship as in the previous ones - Confidentiality, security and accessibility of information.

Technological advances and innovative strategies for selling a product or promoting

any service present a variant aimed at disposing of these resources through the use of the Web. Without a doubt, the latter standing out in the field of reaching a larger audience. Consequently, Web applications have evolved to become powerful instruments in which technology and efficiency are harmonized for the user, making their tasks or processes more comfortable, in less time and at the same time maximizing the reliability of information and the quality of information of its services. The spread of technology means that the day-to-day operations of almost the entire organization become increasingly different from the proper functioning of this technique. The degree of this dependency is difficult to discern at first, as organizations and individuals adjust to new technology, manual procedures and systems to subtly and gradually change from being of any practical importance. In the past, the difficulties posed by Web applications were discussed, referring to people, not information technology, then an attempt has been made to arouse interest in the possibilities it offers, it can also solve most technical problems, but for those who understand technology-based innovation is finally a social process, when, many years later, the predictions made conferences on technological change are examined, its penetration and the incorporation of information technology into the technology is impressive. daily life because finally, its influence on man has not been long in coming and the human being has become widely aware of the profound alteration that the use not only of the computer but also of the set of information processing techniques derived from its use has led to build the challenges of the future. In correspondence with what has been stated, the challenge of the new times is to a large extent determined by the great advancement and advancement of telecommunications and information technology, by the speed

with which the product of these changes is becoming increasingly accessible. to all. There is a globalization process that cannot be seen only in the field of economy and markets, but also at an educational level. According to Moreno (2000): It is a reality that is generating a network of interrelationships or interdependencies between various geographical regions, countries and cultures that involve not only the economy but also many other facets of human activity.

METHODS

Web applications are popular because of the convenience of the web browser as a thin client, the independence of the operating system, and the ease of updating and maintaining web applications without distributing and installing software to thousands of potential users. There are applications like webmails, wikis, weblogs, online stores that are well known examples of web applications.

It is important to mention that a Web page may contain elements that allow active communication between the user and the information. This allows the user to access the data interactively, thanks to the fact that the page will respond to each of their actions, such as filling out and submitting forms, participating in various games and accessing all kinds of database managers.

In the early days of client-server computing, each application had its own client program that served as a user interface that had to be installed separately on each user's personal computer. The client made requests to another program -the server- which gave it a response. An upgrade to the server, as part of the application, typically required upgrading the clients installed on each personal computer, adding technical support cost and decreasing productivity.

Unlike the above, web applications dynamically generate a series of pages in a

standard format, such as HTML or XHTML, supported by common web browsers. Interpreted languages are used on the client side, directly or through plugins such as JavaScript, Java, Flash, etc., to add dynamic elements to the user interface. Typically each individual web page is delivered to the client as a static document, but the sequence of pages provides the user with an interactive experience.

During the session, the web browser interprets and displays the pages on the screen, acting as a client for any web application.

Web interfaces have certain limitations in the functionalities offered to the user. There are common features in desktop applications like drawing on the screen or drag-and-drop that are not supported by standard web technologies. Web developers often use interpreted languages (scripts) on the client side to add more functionality, especially to provide an interactive experience that does not require reloading the page each time (which is often annoying for users). Technologies have recently been developed to coordinate these languages with technologies on the server side. As an example, AJAX is a web development technique that uses a combination of various technologies.

Although there are many possible variations, a web application is normally structured as a three-tier application. In its most common form, the web browser offers the first layer, and an engine capable of using some dynamic web technology (example: PHP, Java Servlets or ASP, ASP.NET, CGI, ColdFusion, embPerl, Python (programming language) or Ruby on Rails) that constitutes the middle layer. Finally, a database constitutes the third and final layer.

The web browser sends requests to the intermediate layer that offers services using queries and updates to the database and in turn provides a user interface.

DEVELOPMENT ENVIRONMENT

For the development of this application it is planned to use mainly: PHP, MySQL and Apache.

According to Gutiérrez and Bravo (2005), PHP is an interpreted programming language or framework for HTML, originally designed for the creation of dynamic web pages. It is mainly used for server-side interpretation.

PHP is a recursive acronym that stands for PHP Hypertext Pre-processor. It was originally created by Rasmus Lerdorf in 1994; however the main implementation of PHP is now produced by The PHP Group and serves as the de facto standard for PHP as there is no formal specification. Released under the PHP License, the Free Software Foundation considers this license to be free software. It can be deployed on most web servers and on almost all operating systems and platforms at no cost.

The PHP language is installed on more than 20 million websites and on a million servers, the number of PHP sites has shared some of its dominance with other not so powerful new languages since August 2005.

PHP's close resemblance to the more common structured programming languages, such as C and Perl, allow most programmers to create complex applications with a very short learning curve. It also allows them to get involved with rich content applications without having to learn a whole new set of features.

According to López Quijado (2010), MySQL is a multi-threaded, multi-user, relational database management system with more than six million installations.

MySQL AB —since January 2008 a subsidiary of Sun Microsystems and this in turn of Oracle Corporation since April 2009— develops MySQL as free software in a dual licensing scheme. On the one hand it is offered under the GNU GPL for any

compatible use with this license, but for those companies that want to incorporate it into proprietary products, they must purchase a specific license from the company that allows them to use it.

It is mostly developed in ANSI C. Unlike projects like Apache, where the software is developed by a public community and the code copyright is held by the individual author, MySQL is sponsored by a private company, which owns the copyright of most of the code. This is what the aforementioned licensing scheme makes possible. In addition to the sale of proprietary licenses, the company offers support and services. For their operations they hire workers from around the world who collaborate via the Internet. MySQL AB was founded by David Axmark, Allan Larsson, and Michael Widenius.

Apache HTTP Server is an open source HTTP web server, for Unix (BSD, GNU/Linux, etc.), Microsoft Windows, Macintosh and other platforms, that implements the HTTP/1.1 protocol and the notion of virtual site.

When development began in 1995, it was initially based on code from the popular NCSA HTTPd 1.3, but was later completely rewritten. It got its name because Behelendorf wanted it to connote something that is firm and energetic but not aggressive, and the Apache tribe was the last to surrender to what would soon become the US government, and at that time the concern of their group was for companies to come along and “civilize” the landscape that the early internet engineers had created. Furthermore Apache consisted only of a set of patches to be applied to the NCSA server. In English, a patchy server (a “patched” server) sounds the same as Apache Server.

The Apache server is developed within the Apache Software Foundation's HTTP Server (httpd) project. Apache features, among other

highly configurable features, authentication databases and content negotiation, but was criticized for lacking a graphical interface to aid in its configuration. Apache is widely accepted on the web: since 1996, Apache has been the most widely used HTTP server. It reached its maximum market share in 2005, being the server used in 70% of the websites in the world, however it has suffered a decline in its market share in recent years.

METHODOLOGY TO USE

For the development of this project a systematic, disciplined and quantifiable approach is required.

In the case of the problems related to the project bank, it is concluded that the procedures and requirements identified are highly structured and stable.

This condition simplifies the selection of the development methodology, opting naturally for the cascade development model. According to Pressman (2006), it is the oldest paradigm of software engineering.

Waterfall development, also called the waterfall model, is the methodological approach that rigorously orders the stages of the software development process, in such a way that the start of each stage must wait for the completion of the previous stage. This greatly facilitates product development. The cascade development methodology contemplates: Requirements analysis, System Design, Program Design, Coding, Testing, Implementation and Maintenance.

MODELING

SPECIFICATION OF REQUIREMENTS

This application, which has been completed in its first stage corresponding to the specification of requirements and basic modeling, is carried out at the Villahermosa

Technological Institute (ITVH) and aims to use Information and Communication Technologies (ICT's) as an instrument that improves the registration, monitoring and administration of the projects developed in the Division of Postgraduate Studies and Research of the ITVH.

Its main product, -a WEB application- will be available at all times for the different actors on the institution's servers for use on any computer with Internet access.

Among other things, modules are required that manage information related to: projects, researchers, researchers' home institutions, collaborators, calls, convening agencies, funding institutions, funding details, products generated by the projects (theses, articles, etc.), academic bodies, members of academic bodies, research lines, documents in different formats related to all research activity, officials, etc.

With the previous elements and others that will be specified in more detail in the requirements, there will be a digital file accessible to interested parties, making extensive use of graphs with the most relevant variables for consultation, evaluation and decision-making purposes.

Finally, there will be an automated verification, control and evaluation mechanism for those aspects that the requirements establish as priorities, respecting - in this relationship as in the previous ones - the confidentiality, security and accessibility of the information according to the corresponding functional responsibility of the actors involved.

APPLICATION MODELING

In this first stage of project development, the objective is to model the solution based on the established requirements. The application is modeled with the Unified Modeling Language (UML) and the data through the

Relational Database Model (MRBD). For space reasons the UML diagrams are omitted and the second one is shown in a simplified way in Figure 1.

According to Kimmel (2007), UML is a pictorial language invented out of necessity to model software. Models are valuable because it is cheaper, faster, and easier to change models than it is to change code. The rules governing this standard are set by the Object Management Group (OMG). These models are very appropriate for object-oriented programming, as is the case with this application.

The MRBD is a visual diagramming resource widely used in the community of application developers where the tables with their attributes are properly interrelated and as a consequence of a normalization process to eliminate redundancies.

CONCLUSIONS

This paper reports the first stage of the development of a web application to automate the administration of research projects at the ITVH, which basically contemplates the specification of requirements, the UML modeling and the MDRB, the definition of the theoretical support behind of the application, the most appropriate development methodology according to the context and the selection of the languages and tools of the development environment.

Most of these aspects have been presented with the appropriate level of detail for this phase.

All this has been described together with the criteria considered in such a way that the first part of the development of this project has been concluded.

RECOMMENDATIONS

Despite the fact that the development process of this web application is in an initial phase, it is possible to observe how to use information and communication technologies in the administration of research projects. The requirements specify the scope of the automatable procedures.

The products obtained in this phase are enough to start the second stage that includes, among other activities, the implementation, testing, release and final documentation of the software.

At the end of the second part, you will have a powerful tool to manage projects.

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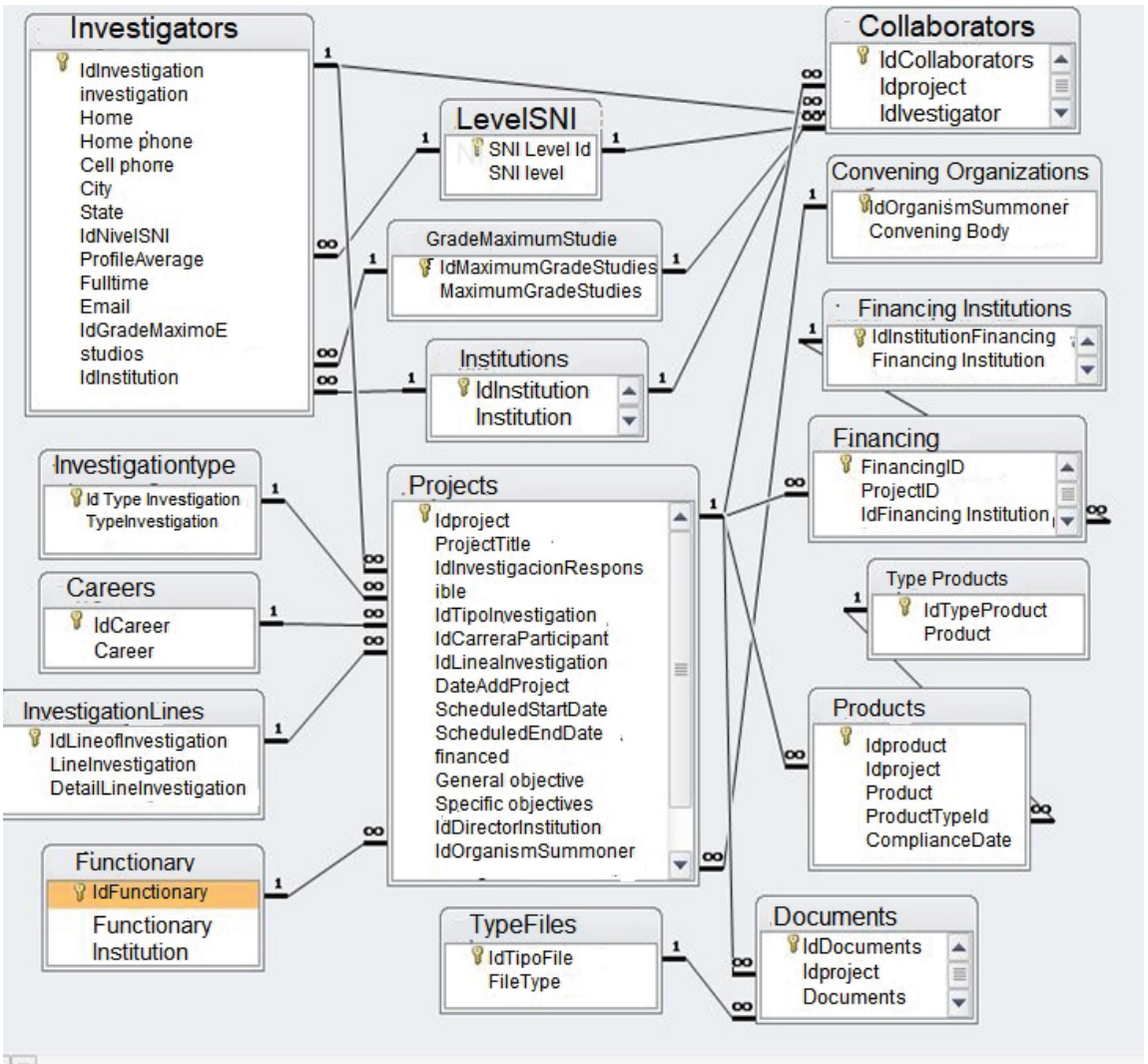


Figure 1. Relational database model of the project management web application.