

# WEB MANAGEMENT APPLICATION FOR ASSIGNED CLASSROOM AND LABORATORY ENGINEERING FACULTY OF APPLIED SCIENCE

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**SUMMARY** - *The present project is based in the "Application Web of Administration for the Assignment of Classrooms and Laboratories of the Ability of Engineering in Applied Sciences", using the methodology of agile development SCRUM. The document consists of five chapters in which remove in a clear way, step to step the development of the different stages until the culmination of the project. In the Chapter 1 are described Antecedents, Description of the Problem, Current Situation, General Objective, Specific Objectives, the Justification of the Tools and study Methodology that it was used to develop the system. In the Chapter 2 the resolution of the problem, the reach is explained that will complete to finish the project and the functional architecture of the application. In the Chapter 3 the development of the Methodology SCRUM is documented, Servant of Applications Apache Web Tomcat, Framework JSF, Language of Programming Java, System Agent of Database PostgreSQL, JBOSS, EJB, JPA, Eclipse, Spring security, primefaces. In the Chapter 4 the construction of the Application is developed, it is described the lists of the system, pile of products, pile of tasks, planning of the project and the iterations. Finally in the Chapter 5 are presented the conclusions, recommendations obtained in the realization of the Project of Titillation and also the impact that it will generate when using the application.*

**KEY WORDS** - *Assign classroom and FICA Laboratories*

## 1. INTRODUCTION

At the present time the registration of Classrooms and Laboratories are carried out in electronic leaves of Excel in a manual way, also on it takes time, effort and it hinders in great scale an agile acting and guessed right in this activity, as well as it is tedious to have to register in several places the corresponding information, it is exposed to errors in the fingering or entrance of data causing this way duplicity, loss and inconsistency of the same one and confusion to the moment to require this information.

## 1.1 DESCRIPTION OF THE PROBLEM

In the Faculty of Engineering in Applied Sciences every period is generated academic serious inconveniences in the assignment of classrooms and laboratories to the students and educational of the 6 engineering careers, what produces confusion and uneasiness in professors and students in a preferable way in the first weeks of classes.

Among the causes they are: the opening of different matters in each semester, the variation of educational that dictate the matters, this produces that in the same hours several matters coincide, in the same classrooms and laboratories, this situation requires several approaches, eg to distribute the schedules along the day and of every day of the week, and that the educational ones don't also vary in their classes of a semester to other, or that you increases the number of classrooms for the FICA.

## 1.2 OBJECTIVES

### 1.2.1 OBJECTIVE GENERAL

- Implement a software application that performs the management for assigning classrooms and laboratories in races of the Engineering Faculty of Applied Science taking into account the limitations of schedules of teachers, number of classrooms and physical resources.

### 1.2.2 SPECIFIC OBJECTIVES

- Investigate all elements or variable involved in the allocation of schedules, classroom laboratories in races of the Engineering Faculty of Applied Science.
- Investigate the development tools and methodologies to be used for system development.

- Design and implement the application taking into account all the elements and options investigated.
- Design and execute tests of the benefits of the application.

### 1.3 RATIONALE FOR THE TOOLS AND RESEARCH METHODOLOGY

The tools used for the implementation of this project whose main feature being free software, which allows save on implementation costs and freeing the institution of license fees.

The system is hosted on a server in the Department of Computer Engineering Faculty of Applied Science (FICA) also is available for use from the intranet.

For the implementation of the Web Mapping Application Laboratories Classrooms and the Java programming language is used, is one of the new tools to create end user -friendly interfaces. The NetBeans IDE is programming is a professional development tool, providing access to a set of development tools needed for creating data -oriented management applications, n -tier and web servers.

JavaServerFaces (JSF) is a technology that is implemented in the project because the developer saves time by providing extensive resources, especially for forms management and presentation of data in database.

The Apache Tomcat server application, this server allows you to run applications developed in java language. PostgreSQL is the engine of the database is used for storing and managing information. This software is used because it is stable, reliable, used platform, provides a simple but powerful database which is also free.

SCRUM is a methodology that manages the development of the project because it is agile development and is one way to tackle projects iteratively, quickly and efficiently.

## 2. DESIGN SOLUTION

### 2.1 PROBLEM RESOLUTION

The Web Application Management for Assigned Classrooms and laboratories will be developed in the web platform, which keeps the information and functions available to users, according to

their privileges, via a web browser.

This feature will streamline the activities of employees in the area and decrease your workload to derive some of the activities currently carried out at other people.

The system is developed in layers is a client - server architecture, where business logic design logic is separated.

We have the presentation layer is the graphical interface; this layer must be friendly, understandable and easy to use for the user.

The business layer is where the application programs that run here all the rules are set to be met.

The data layer is where the data resides and is responsible for accessing them.

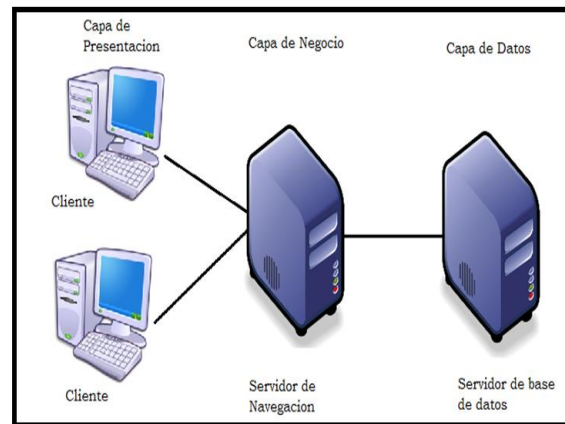


Figure 1: Design of layers

## 2.2 SCOPE

The system allows submitting reports in a way the end user friendly graphical, course load per classroom, laboratory, per teacher and per semester, meeting the requirements requested.

### 2.2.1 Determination of requirements

The system performs the following functions:

- Enables the creation, modification and editing system users.
- Supports the creation, modification and editing Period, Mail, Subject, Teacher, Level, Classroom, Laboratories, Races, Classes Hours.
- Record the number of students for each subject and parallel.

- Manual allocation schedules for classes.
- Controls crossing hours of classrooms, laboratories and faculty.
- Manages modification of schedules in specific matters.
- Display of the hours of classroom and laboratory available.
- Access to view and print schedules for classroom, laboratories, teachers and semesters.
- Reports on the web for users, teachers and students.
- Stores different versions of programs.



Figure 2: System Modules

- **Administration Module**  
This module is responsible for managing the entire system is creating, modifying and editing users, periods, tights, subjects, teachers, parallel, classrooms, laboratories, hours.
- **Management Module**  
This module manages all information is classrooms and labs that created teachers are assigned.
- **Security Module**  
This module is the most important because it is based on more restrictions used in any system, and the concepts of authentication and authorization is used, based on require a valid and active user, and a set of roles that will allow the user perform only those operations that are assigned to you.
- **Reporting Module**  
This module executes queries and generates reports and schedules created taking into account the following criteria: classroom, teacher, lab per semester.

## 2.3 SYSTEM ARCHITECTURE

### 2.3.1 FUNCTIONAL ARCHITECTURE

To define the architecture of the Web application, you have several open source technology tools available on the internet for the java language, which will be discussed in the following subsections. These use the MVC pattern, and also based on a structure of levels or layers: presentation, business and data.

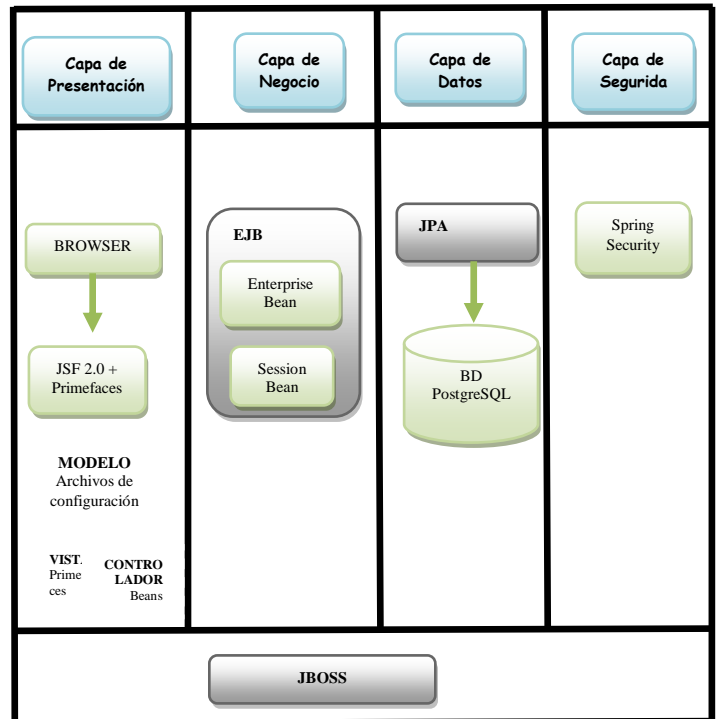


Figure 3: Architecture of the Web Application Management for Assigned Classrooms and Laboratories

For layer layout will be developed with Eclipse which allows management of user interfaces, windows and storage, JSF 2.0 framework to create web applications quickly with Primefaces offering components based API , AJAX , JSF 2.0 standards are also used with the expert approach

Also used the MVC is a design pattern that is used to separate data representation, which supports developers to create system functions that allow access to data without having to worry about how they are presented to the user.

The MVC pattern is responsible for the data and system rules. Coordinates business logic , access to the database, and all other system critical

actions that are unrelated to the visual part .

For EJB business layer which is a framework for creating applications without having to reinvent services such as transactions, security, automatic persistence, has standard construction applications such as Enterprise Java Beans and Session Beans used.

In the data layer that the JPA is the Java programming language that handles relational data in applications using Java Platform used. To store and manage the information that is used is the PostgreSQL database software.

For layer of security to use the Spring Security is a framework that provides powerful and highly customizable authentication, authorization for business applications, is also easy to learn, deploy and manage.

JBOSS has implemented Apache Tomcat is a J2EE application server implemented in open source pure Java, this server includes all the layers discussed above is also used.

### 3. CONSTRUCTION OF IMPLEMENTATION

#### 3.1 SYSTEM ROLES

Achieve goals and build what the customer needs is the primary goal of the team, and therefore uses the effective collaboration that takes as a commitment by each of the members.

The task force for the development of the application is presented below.

ROLE	NAME	DESCRIPTION
(Product owner)	ING. JAIME AGUAS	THESIS DIRECTOR
(ScrumMaster)	DEISI MONTENEGRO	AUTHORS
(Team members)	DEISI MONTENEGRO	AUTHORS

Table 1: System Roles

#### 3.2 BATTERY PRODUCT (PRODUCT BACKLOG)

The requirements to be designed and coded in the phase iterations are described in this stack, also serve to describe the functionality of the system.

ID	NAME	OBSERVATION
R1	Analysis and structuring of the	Creation of the project, analysis of the data model

	project	
R2	Publication of schedules on the web	You do all software installations needed for the functioning
R3	Management interfaces	Creation, deletion and modification of the necessary interfaces to the system
R4	Security and access control	Is where the user must be identified at the time of access to the system and can assign different permissions to each user permissions
R5	Reports on web	View and print reports for students, teachers and users as required

Table 2: Stack product schedules system

#### 3.3 TASK STACK (SPRINT)

In this stack requirements analysis is performed in which no small tasks developers to take more than a couple of days of implementation.

Analysis and structuring of the project		
ID	NAME	OBSERVATION
T1	Installing and Configuring PostgreSQL	You need to install the engine in the database which will create the necessary tables and their relationships in which to store all system information.
T2	Configuring PostgreSQL with Eclipse	
T3	Creating database layered system	
T4	Creating tables required for the system with their respective primary or foreign keys.	

Table 3: Analysis of structure and system times

Publicación de horarios en la web		
ID	NAME	OBSERVATION
T5	Installing Eclipse	You need to install Eclipse for programming methods and JSF and JBoss is configured to the system anywhere.
T6	Configuring JSF with Eclipse	
T7	Installing JBoss	
T8	Configuring JBoss in Eclipse	

Table 4: Publication of schedules on the web system

Gestión de interfaces Módulo Administración		
ID	NAME	OBSERVATION
T9	Creating, editing and modification of Faculty	The interface should make user friendly
T10	View report Colleges	
T11	Creating, editing and modification of Racing	
T12	View report Racing	
T13	Creating, editing and modification level	

T14	View report of Levels	
T15	Creating, editing and modification of Subject	
T16	View report of Subject	
T17	Creating, editing and modification of Teaching	
T18	View report Teachers	
T19	Creating, editing and modification of Class Time	
T20	View report of Class Hours	
T21	Creating, editing and modification of Period	
T22	See report Periods	
<b>Management Module</b>		
T23	Creating, editing, modifying and duplication Penum	
T24	See report Periods	
T25	Creating, editing and modification of Schedules	
T26	See Schedule report	
T27	Allow control the crossing of hours	
T28	Change schedules on specific subjects	
T29	Allocation of classrooms and laboratories	
T30	See report available Classrooms and Laboratories	
T31	View report of Classrooms and laboratories assigned	
T32	Creating the main screen of the system	

**Table 5:** Management Interface system times

<b>Security and access control Security Module</b>		
ID	NAME	OBSERVATION
T33	Designing the data structure for the access control system	You need security system so they can not make any changes without being authorized
T34	Create interface for entering the system	
T35	Add security to the system so that it need a user account and password	
T36	Create, edit and modify users	
T37	View user report	

**Table 6:** Security and access control system schedules

<b>Reports on the web</b>		
ID	NAME	OBSERVATION
T38	View list of reports per semester	Reports are required to publish the website
T39	View list of reports by classroom and laboratory	
T40	Report list View by teacher	
T41	View list of reports by students	

**Tabla 7:** Reportes de los horarios del sistema

### 3.4 PROJECT PLANNING

This section describes the requirements and tasks to be implemented in each iteration is chosen, and also the start and end dates for the implementation thereof is determined.

In this case there are five iterations, the same that are assigned to each of these requirements and tasks so you can deliver value to the customer in the shortest possible time.

ID	NAME	START	END	BUYERS
I1	Analysis and structuring of the project	01/07/2012	31/08/2012	R1, T1, T2, T3, T4
I2	Publication of schedules on the web	01/09/2012	30/09/2012	R2, T5, T6, T7, T8
I3	Management interfaces	01/10/2012	In Process	R3, T9, T10, T11, T12, T13, T14, T15, T16, T17, T18, T19, T20, T21, T22, T23, T24, T25, T26, T27, T28, T29, T30, T31, T32
I4	Security and access control	01/12/2012	31/12/2012	R4, T33, T34, T35, T36, T37
I5	Reports on web	01/01/2013	In Process	R5, T38, T39, T40, T41, T42, T43, T44, T45, T46, T47

**Table 8:** System Planning

## 4. CONCLUSIONS AND RECOMMENDATIONS

### 4.1 CONCLUSIONS

- We have designed a system that can be integrated with new developments, that is flexible, reliable, and adaptable to the needs of the Engineering Faculty of Applied Science.
- Work under Java platform provides application portability because it does not depend on either operating system.
- Using free software tools, one of the advantages is the low or no cost -free products that help provide midsize companies and small services, expand their infrastructure without discounted their attempts to see growth not to make payment of licenses.
- Improved the process of allocation of classrooms and laboratories by the system and can be viewed from anywhere in that

classroom lessons are received in different subjects.

- The design of the database was developed based on the size of information, ease of access and extraction of the required information, and meets the needs of data processing and reporting.
- The reports allow help students and teachers assess and interpret information more quickly and efficiently.

#### 4.2 RECOMMENDATIONS

- Before starting to develop an application is advisable to do a comparison of the Framework and celebrity and the characteristics and advantages each has to select the most appropriate tools.
- After selecting the Framework and tools to develop an application is very important to investigate whether there is sufficient information in books and on the internet as this will help us a lot during the development of the application.
- The scalable web application, is it can continue to evolve, because that has been implemented with a robust and flexible architecture, the system can incorporate for all faculties without much difficulty.
- It will be essential that the Technical University of Northern decide to migrate their systems to free software by the countless benefits it offers such as control over the software, reliability and stability, safety for the virus , the abolition of the use of copies not licensed, financial savings and a potential regional technological leadership.
- The authorities of the Technical University of Northern maintain this type of agreement that helps students develop their degree works as gain work experience.
- The teachers encourage research on students when they finish their college careers have the capacity to solve everyday problems in professional life capacity.

#### 4.3 IMPACT ANALYSIS

The impact analysis to determine the benefits and the degree of acceptance that the proposal generated in the institution.

For the analysis of impacts on the implementation of the application execution times of the processes are established based on an analysis was also performed before

and after implementation of the system.

##### • Previous Record

The assignment is performed as a part-based manner in which the requirements of teachers stood in classrooms with changes in the process of bringing some classes of problems crossings classrooms.

The allocation of classrooms and laboratories it done manually in Excel spreadsheets which was delayed one to three days in classrooms assigned to each subject and the risk that some subjects are left without classroom because they were assigned to other materials it had the same hours.

##### • Register Now

Some immediate positive results that will implement the web application on the person administering the system are: reduced time in the execution of tasks due to the integration and automation of functions, consistency and integrity of information control in a way Total where they will have no problem crossing classrooms, each subject has a space for classes.

Now with the application takes 3 hours to assign the classrooms and laboratories for all subjects of different races that will be reflected in the reports observed by web.

The web management application for the allocation of classrooms and laboratories improves the access time to information and updated in real time by accessing teachers and students observe the classroom and laboratory reports of a quick, clear and efficient manner in which they will teach their classes.

##### Advantage

- The ease and clarity with which can be implemented and used by college administrators.
- For Technical University North to deploy the Web application Management for Assigned Classrooms and laboratories will have a better organization, management and distribution of resources in this case as classrooms and laboratories.
- The application in other faculties will be beneficial because the system has a facility in



its application and speed of information processes, to make this possible you should take into account the necessary requirements of each faculty.

The system can be implemented in other higher education institutions achieving the above benefits.

### Benefits

- The benefits of this system are clearly identified and can say that it has successfully achieved compliance with the goal of providing a computer application to improve the allocation of classrooms and laboratories.

- Users can use the system to allow them access to reliable, accurate and timely, streamline processes of the institution and the ability to share information.

## 5. REFERENCES

### BOOKS

[LIB1] Amaro, S., & Valverde, J. (2007). Agile Software Development Methodologies: Scrum Lifecycle (pp. 20). In S. Amaro, & J. Valverde, Agile. Trujillo - Peru.

[LIB2] Dumortier, G. (2007) . Methodology (pp. 55-56). In Scrum NotaScrumPCUsers: Phases of Scrum process (pp. 55-56).

[LIB3] Palacio, J. (2008). Flexibility with Scrum (October 2008 Ed.). SafeCreative.

[LIB4] Palacio, J., & Ruata, C. (2011). Manager Scrum Project Management (7th Ed.). SafeCreative.

[LIB5] Parra, A., & Parra, E. (2010). Java Programming Language. Sun Microsystems.

[LIB6] Quesada, J. (2009). Features of JSF. In J. Quesada, JAVA SERVER FACES AND USE OF DESIGN PATTERNS (pp. 1-2).

[LIB7] Sabana, M. (2006). PostgreSQL. Megabyte S.A.C.

[LIB8] Spada, D. (2006). Usability in the SCRUM development process.

### WEB PAGES

[WEB1] Apache, T. (2012). Information Apache Tomcat. Retrieved from <http://tomcat.apache.org/>.

[WEB2] decodigo.com. (2012). JSF2 Java Server Faces 2.0 and NetBeans. Retrieved from <http://www.decodigo.com/2009/10/jsf2-java-server-faces-20-y-netbeans.html>

[WEB3] Dorado, J. (2012). JSF. Retrieved from JSF Lifecycle: <http://osl2.uca.es/wikiCE/index.php?title=JSF&oldid=1277>.

[WEB4] ECLIPSE. (2012). ECLIPSE IDE.

Retrieved from <http://www.eclipse.org>.

[WEB5] Enterprise, J. (2012). Defining EJB. Retrieved from [http://es.wikipedia.org/wiki/Enterprise\\_JavaBeans](http://es.wikipedia.org/wiki/Enterprise_JavaBeans).

[WEB6] Optimus, S., & Consulting. (2011). Roles in Scrum. Retrieved from <http://www.optimus-software.com/noticias/2011/10/31/roles-en-el-scrum>.

[WEB7] Reserv.itsolutions. (2012). Methodology. Retrieved from <http://www.reserv.com.ar/metodologia.php>.

[WEB8] RoseIndia. (2012). Enterprise Java Beans (EJB). Retrieved from [http://www.roseindia.net/javabeans/enterprise\\_java\\_beans\\_introduction.shtml](http://www.roseindia.net/javabeans/enterprise_java_beans_introduction.shtml).

[WEB9] RoseIndia. (2012). Java Persistence API. Retrieved from <http://www.roseindia.net/ejb/JavaPersistenceAPI.shtml>.

[WEB10] Scribd. (2012). Installation and configuration of JBOSS. Retrieved from <http://es.scribd.com/doc/59031804/3356121-Instalacion-y-Configuracion-Del-JBOSS>.

[WEB11] Scribd. (2012). JBOSS. Retrieved from <http://es.scribd.com/doc/19026497/JBOSS>.

[WEB12] Spring, S. (2012). Basic concepts and SPRING CHARACTERISTICS OF SECURITY. Retrieved from <http://www.adictosaltrabajo.com/tutoriales/tutoriales.php?pagina=utilizaciondegruposenspringsecurity>.

[WEB13] Technology, E. (2012). Introduction to EJB technology. Retrieved from <http://www.itech.ua.es/j2ee/2003-2004/abierto-j2ee-2003-2004/ejb/sesion01-apuntes.htm>.

[WEB14] Unit D. d. (2012). The JBoss Application Server. Retrieved from [http://laurel.datsi.fi.upm.es/~ssoo/DAW/Trabajos/2003-2004/Septiembre/19/Contenido\\_archivos/resource1/r1conten2-1.htm](http://laurel.datsi.fi.upm.es/~ssoo/DAW/Trabajos/2003-2004/Septiembre/19/Contenido_archivos/resource1/r1conten2-1.htm).

[WEB15] University, d. I. (2012). Features and Benefits of EJB. Retrieved from <http://sistemas.uniandes.edu.co/~isis2503/dokuwiki/lib/exe/fetch.php?media=principal:isis2503-ejb3.pdf>.

[WEB16] University, d. I. (2012). Basic concepts and internal structure of PostgreSQL. Retrieved from [https://docs.google.com/viewer?a=v&q=cache:WGO\\_ep-KXY4J:postgresql.uci.cu/system/files/Tema%25203.-%2520](https://docs.google.com/viewer?a=v&q=cache:WGO_ep-KXY4J:postgresql.uci.cu/system/files/Tema%25203.-%2520).

[WEB17] University, d. I. (2012). Enterprise Java Bean Architecture software. Retrieved from <http://sistemas.uniandes.edu.co/~isis2503/dokuwiki/lib/exe/fetch.php?media=principal:isis2503-ejb3.pdf>.