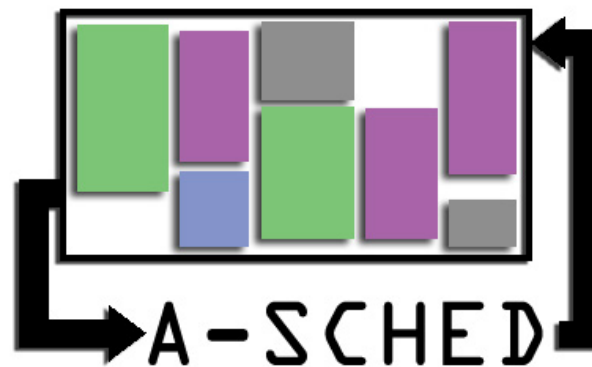


PRELIMINARY PROPOSAL FOR A WEB BASED
ACADEMIC RESOURCES ALLOCATION SYSTEM



ACADEMIC SCHEDULER

ELECTRICAL AND COMPUTER ENGINEERING

UNIVERSITY OF PUERTO RICO - MAYAGUEZ CAMPUS

ICOM 5047

Computer Engineering Design

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1. Executive Summary

1.1 Project Overview

The Department of Electrical and Computer Engineering (ECE) of the University of Puerto Rico at Mayagüez (UPRM) is a significant component of this public institution. The Department (ECE) is composed by 51 professors, approximately 1,500 students and a considerable amount of administrative employees. With four Academic Programs, the educational interest of those coworkers had been for several years to prepare students to obtain a solid education that, in the future, allow them to be professionals with vast engineering skills, humanistic sense and with the necessary knowledge to solve the problems that human beings encounter every day in our society.

In order to offer the best possible education, the Associate Director, with the assistance of the ECE administrative employees, generate the academic schedule for following semesters. Currently, the academic schedule is created manually. The Associate Director considers the professors preferences, the classrooms availability, the class period distribution and the academic programs to put together the best possible schedule.

For this reason, the ECE department has initiated a request to develop an Academic Scheduler computer application that will monitor courses and professor's information; therefore providing assistance on the development of the schedule. The application will significantly improve the communication between the department administration and its professors.



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In this project we will utilize our experience to shorten development time as much as possible, and at the same time recognize the significance of not having to sacrifice the quality of the end product. A-Sched Company estimate that the development and implementation of the system will take fifteen weeks including all phases, starting on August 15, 2005 and completing it by November 30, 2005.

A-Sched Company presents a solution with a qualified team that will benefit the ECE Department. The solution provides a cost effective way to improve the scheduling process, with an investment of \$70,353.49. The Academic Scheduler will facilitate the staff work and reduce the time spent in the scheduling process. In this web-based system, users can utilize their time in an efficient way and feel comfortable during the schedule design because of the system availability. The system will also facilitate the end user station configurations because no software is needed to be installed in the client's station further than a web browser. The solution will also reduce errors in the design as it will present the data to the user in a selective manner so the user is prevented from entering wrong data, making it a more secure system. We understand that our software development experience will allow us to deliver a successful project to the ECE Department.

The purpose of this proposal is to provide the ECE department with a design and development plan that presents a reliable solution for the management of its academic programs. This proposal outlines the requirements for a high quality solution, using Netbeans, MySQL and Java Database Controller (JDBC) development tools.



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1.2 Document Description

This proposal document will cover:

1. The Project antecedents that include the general current system description.
2. The Objectives set by the project designers to make the best possible solution with the technological resources available.
3. The Deliverables related to each system objective.
4. The development methodology based on the task time required to achieve the goals.
5. The resources, personnel required software and other tools to be used to complete the solution.
6. The methods that will be used in case of potential problems.

1.3 Deliverables and Milestones

In order to present the work A-Sched Company is going to deliver a progress report and a presentation at the end of each phase. The project will be divided in 4 phases:

- Phase 1: Defining the problem
 - Proposal (Sept. 22)
 - Presentation (Sept. 22)
- Phase 2: Database and JSP Development
 - Progress Report #1 (Oct. 12)
 - Presentation (Oct. 14)
- Phase 3: Servlets and Queries Development
 - Progress Report #2 (Nov.2)
 - Presentation (Nov.4)



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- Phase 4: Final Documentation
 - Final Report (Nov.28)
 - Final presentation (Nov.28)
 - Brochure(Nov.28)
 - User guide (Nov. 28)
 - Poster (Nov. 28)

Section 4 of this proposal presents a detailed description of each phase with their respective deliverables.



2. Current System Description

2.1 Schedule Process Description

Every semester one of the Associate Directors is responsible for making the class schedule for subsequent semesters. Each year, during the first academic semester (August- December) the associate director creates the schedule for the second semester (January- May) and during the second semester (January- May) the administrator builds the schedule for the summer section (4-week and extended 6-week summer sections) and for the first academic semester (August-December).

This manual labor requires several days of dedication; for that reason the associate director needs to obtain a variety of information for the next semester such as: the courses that the area committees plan to assign, professor's preference and the classroom availability. After he/she has gathered all this information, the next step is to assign the courses to the professors.

In order to achieve this purpose, the associate director has to take into consideration the following set of instructions:

- Professor's preference
 - The associate director should assign 12 credit- hours per professor, considering the courses the professor chose as preferred in the professor's preference sheet.
 - In case the assignment of courses is more than 12 credits- hours, the associate director must consult the professor and probably offer an additional compensation.



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- In case, two or more professor desire to give the same course, seniority must be taken into consideration. The associate director must give the course to the professor with a higher seniority.
- Students
 - The schedule must be designed following the graduate and undergraduate catalog, to bring a regular student enough options from which to choose courses.
- Rooms and Resources
 - Some courses need special rooms and special resources. In that case, it is important to assign the correct rooms and hours to fulfill the course requirements.

2.2 Previous developments

2.2.1 By the team

During the last semester (January 2005- May 2005) three members of the Company attended to Software Engineering course (ICOM 4009) where they designed the Class Scheduler System. They worked with Analysis and Object Modeling developing Use Cases, Object Diagrams, Entity Diagrams, Scenarios, Mock-ups and other design Documentation.

The result of this development was a design of a modular system which intended to provide help in the class schedule creation. The system was divided in three modules: (1) Administration module, in which the administrator had the option of viewing and editing all the information of the system; (2) Committee module which helped the committees in the selection of course offer for the semester; and (3) Professor module which served as an aid for the professors to fill in the preference form.



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2.2.2 By other teams

During the last semester (January 2005- May 2005) the course ICOM 5047: Computer Engineering Design developed the Academic Resources Allocation Project (ARAP). This project consists on the creation of the database schema, administration and professor modules which included the administration and professor interfaces.

2.3 Project Relevance

Technological innovations offer people new tools to manage information. In order to move forward with technology the ECE Department has to take into consideration these new resources and apply them as work tools. This project has been designed to be an efficient tool that provides a central access point for users to save, edit and preserve valuable information.



3. Proposed System

3.1 Objectives

In order, to improve the process of the ECE Department schedule design, the A-Sched Company recommends the Academic Scheduler System. This system will assist the ECE Department staff in developing the schedule by making the design an extremely efficient process. It will reduce the time spent in the schedule design which gives the staff the opportunity of using their valuable time in other important tasks. The system will help, dramatically in the process as it will reduce the conflicts in the schedule design. With the aid of MySQL database, NET Beans platform and the Java programming language, the A-Sched Company will develop the best solution for the ECE Department. By using these technologies the ECE Department will be able to create an open and robust framework that provides a strong foundation for all their present and future Schedule Design needs.

With the creation of the Academic Scheduler System the ECE Department will provide its users a single point of entry to view, analyze and record the information necessary to make the schedule in a comprehensive easy-to-use web-based system. Taking advantage of web technology the system users will be able to have a view of the pertinent information, plus there is no need to install client software on the users' computers.

3.2 Solution Scope Overview

The scope of this proposal contemplates the creation of an Academic Scheduler System that will be designed to meet the specific management of information. The system will allow interaction between modules through a relational database, quickly and securely. The System will serve as a base to allow future modules to be accessible in an integrated



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platform. The goal is that when the ECE Department staff needs information, they will go to the System to find it in an easy and reliable way.

3.2.1 Solution Scope

The solution scope for the Academic Scheduler System will encompass the following:

A) The **installation and configuration** of the software needed for the production environment:

- Net Beans 4.1
- MySQL

B) **Implementation of the System Security** for the Academic Scheduler system. This includes the configuration of the system according to the needs of the ECE department, the implementation of a security model for accessing the different modules of the system.

C) **Creation of a MySQL database** that will contain ECE Department related information. This will also contain the information for the Academic Scheduler System that will be used as a source for the schedule design.

It is designed to be a central repository of information. By combining information from different modules in a single database, the users will be able to produce reports with information from multiple modules.



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D) Development of a System Home Page. This will be the starting point for all navigation, The Academic Scheduler System interface is designed to be intuitive and easy to use. The goal is to make it easy for the user to locate the desired information quickly, then access and manipulate it in the most productive way. It will also include information that is relevant to all users of the System, such as deadlines for deliverables.

3.2.2 System Modules

There are two modules in the Academic Scheduler System: the Administration Module and the Professor Module.

A) **Administration Module** – Gives the system administrator full access to the system. The administrator can search, view and update any information in the system.

B) **Professor Module** – Gives the professors access to their preference form. This module will be fully available to the professors only during the preference form filling period. After the Professor's preference deadline no professor can edit the information submitted in their preferences. They can only edit their personal information.



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3.2.3 Other system features

A) **Robust Security Model** – The System includes a security model that ensures information is only accessible by users with the appropriate security clearance. Some information may be accessible to all system users, while other information is limited to users in one module, or specific users in the administration module. The model is flexible to meet the desired security requirements using database tables.

B) **Documentation** - The Academic Scheduler System will include on-line user documentation in hypertext format. In addition to being accessed on-line, the documentation can be printed. Technical documentation (database design, source code, logical schema) will be provided in electronic format.

The solution will consist of an integrated web application solution. The Home Page for the Academic Scheduler System will contain a list of several modules that provide useful functionality to the system to satisfy the ECE Department needs.



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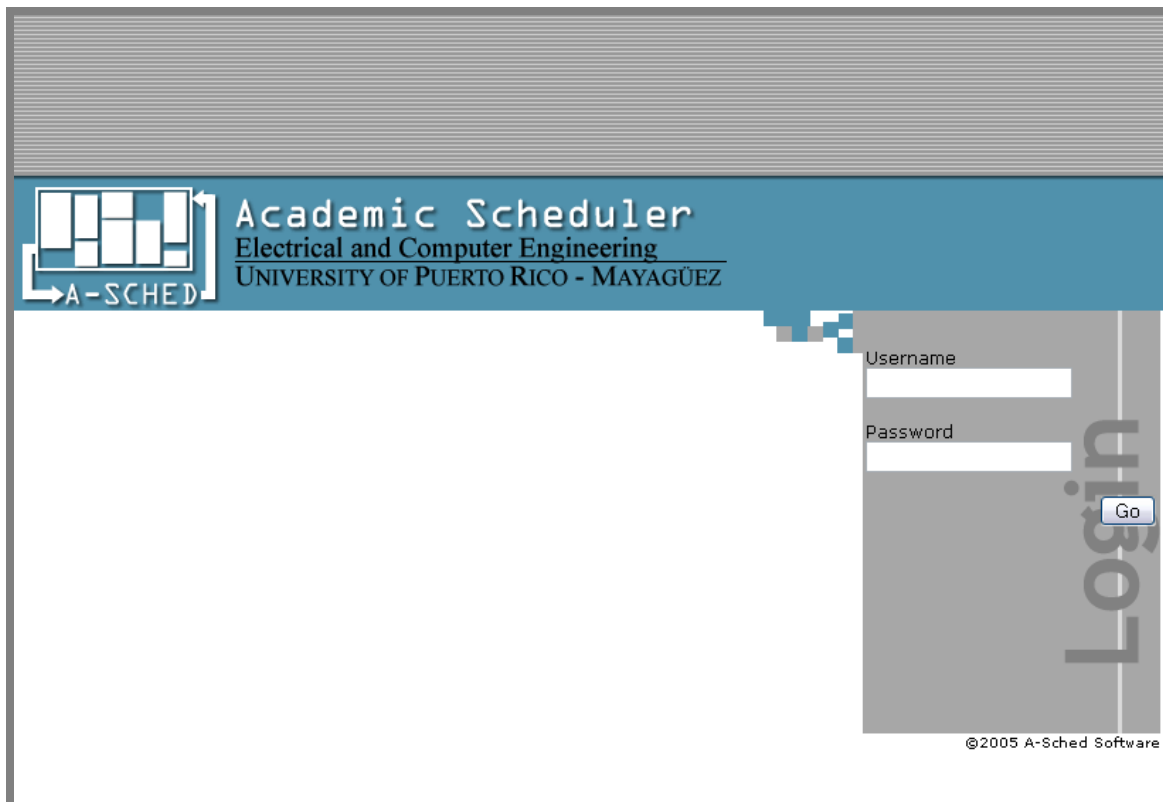


Figure 3. 1 Login Page for the Academic Scheduler System

C) Deliverables

The following items will be delivered:

- 1. Proposal Document** - This document includes the necessary elements to solidify the agreements between the ECE Department and A-Sched Company with respect to the scope, roles and responsibilities in accordance with the requirements of the project.



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2. Project Schedule - The goal of Project Schedule Section is to establish a working schedule and timelines required to complete the full scope of the project.

3.Functional Specification – This section details every element of the solution deliverables, explaining in exact and specific terms what the team is building and deploying.

Application Design – Blueprint of the solution to be developed regarding application development and configuration. It includes:

- Database Schema
- Web Application
- User Interface (UI)
- Web Controls
- System Objects

Test Specification Document - Test specifications and test cases help to ensure that project teams test the functions, features, and performance of solutions rigorously and completely with a minimum of ambiguity. Test specifications and test cases become the basis for regression testing and evaluation when teams make changes necessary to correct errors, improve performance, and meet requirements. This document will provide procedure results of the testing of the system.

Software Installation and Configuration - The proper installation and configuration of the software components to meet the requirements of the proposed solution. The software



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components to be installed and configured will include the following as needed:

- MySQL
- Net Beans 4.1

Hardware Consulting – A-Sched Company will recommend the minimum hardware requirements for the infrastructure needed to implement the Academic Scheduler System.

Security Implementation – A-Sched Company will implement the security for all the components installed, configured or developed by A-Sched Company as needed.

Software Development - The development required to complete the solution will require the programming of several components. After completion of all the development tasks there will be a process of testing and validation. The end user will be involved in the validation and approval of the solution.

Project Closing Document - This document signals the project's end. It also provides closure to the project team allowing them to engage fully in other activities.

3.2.4 Technical Characteristics of Academic Scheduler System

General Product Overview

The system will be developed using NetBeans 4.1 and MySQL in an n-tier environment where the programming components have been divided with the



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objective of maximizing the performance of the application. This type of development permits programming adjustments and enhancements. This will only affect the layer that needs to be modified without having to sacrifice other functionality. The interface layer will consist of the user interface components that will perform graphical rendering, specific to the user interface layer. The middle tier application layer will contain the data access components that will perform the transactions relating to loading and storing information in the database layer. The system will be developed using Java Servlets, which will perform the database transactions when managing the database information. This means that if something fails in the middle of a transaction all modified information will be rolled back to its original state, and only if the transaction is successful will it then be committed to the database. The database layer will contain the data structures (MySQL Tables) that contain the information with the proper indexing, integrity, security and data access interfaces. The implementation of the n-tier solution will allow high scalability and availability of the system. The availability and scalability allows efficient response time as the system resources increment with use and can limit or eliminate down time in case of failure of the server.

A) User Interface

The Academic Scheduler System interface will be based on a series of electronic forms (screens) that will allow the user to immediately know if the entered information is valid, or needed information is missing at the moment of completing the transaction. All validation will be done at the moment the information is entered by the user so if it is invalid it will not be stored in the database. On line reference tables (look-up tables) will be used, which will limit the user to enter valid data at the moment of storing the transaction. This predefined information will be presented in the form



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of drop-down lists boxes, radio button lists or check lists. Additionally this technique reduces the necessity of the users memorizing codes or available options because they will be presented on the screens.

B) Documentation

The solution will consist of an on-line help module. The information besides being available on line will also be provided in a printable format. Technical documentation (database design, source code, installation instructions) will also be provided.

C) Programming Style

The application is designed to be intuitive and user friendly. We use standard date formats for management of periods and format functions for data entry as well as data presentation.

In the technical aspect we use transactional processing of information in the database server with the capacity to commit and rollback to ensure data integrity.

D) Security

The Academic Scheduler System security will be maintained by MySQL tables that will utilize logins to map to the appropriate permissions in the system modules. A user will have access to the modules specified in the security area and in those modules the user can perform the appropriate actions assigned (add, edit, delete).



E) Functional Characteristics of Academic Scheduler System

All modules will be integrated in the same database management system and user interface. As mentioned before access to the system and its individual modules will be controlled by system tables that will relate user logins with the associated tasks that he/she can perform in the system. The system functionality will be presented in a main screen that will allow navigation via links to the rest of the system modules.

F) Module Characteristics

1. Administration module

The Academic Scheduler System will maintain information relevant to the participating administrators. This information will be used as part of multiple transactions in the system. In case that the user is an administrator, they will be allowed to add, edit or delete any information. The administrator profile will present a description of the administrator personal information.

The system will store the following information for the administrator

- Demographic (administrator name, addresses, phone numbers)
- Information of courses, classrooms and resources including name, code and other related information.
- Information of professors (profiles, preference forms)
- The system will provide search capabilities



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An initial search screen will be presented to allow the searching, editing, adding or deleting profiles. The system will only use soft delete when deleting system information for audit purposes. This means that the information will remain in the database but it will appear deleted to the user.

The user will be able to search profiles by name.

2. Professors Module

The Academic Scheduler System will maintain information relevant to the professors. This information will be used as part of multiple transactions in the system. In case that the user is a professor, they will be allowed to update their personal information and fill their academic preference form. The professor profile will present a description of the professor personal information.

The system will store the following information for the professor:

- Demographic (professor name, addresses, phone numbers, etc.)
- Academic Preference (preferred courses, preferred schedule, etc.)



3.2.5 Software Products Overview

Because our project is at an educational level we are limited to open source development tools.

A) **Net Beans 4.1**

Net Beans 4.1 is an open source development tool which supports client-server architecture programming. With Net Beans 4.1 we can deploy highly available and scalable applications on standard PC hardware. This tool enables to create a J2EE application, add Web modules, and deploy the application.

B) **MySQL**

MySQL is an open source database management system, which fulfills our needs for developing this project. MySQL Server provides a platform with a functionality that is sufficient for The ECE Department needs. With the lowest implementation and maintenance costs in the industry, MySQL delivers rapid return on data management investment.

C) **Education and Training**

A key factor for the successful deployment and adoption of new technology is the education, training and documentation provided to those who will develop, maintain and use the application. The following represents key elements that impact this proposal.



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The documentation will include the following:

- End User Manual – A document will be prepared in which a detailed description of the usage of the system will be presented. This document will be accessed through a link in the application and will be delivered in html or word format as needed.
- Database Documentation - A document will be prepared in which a detailed description of the database will be presented. This document will be delivered during the development process.
- JSP Documentation - A document will be prepared in which a detailed description of the interfaces will be presented. This document will be delivered during the development process.

Due to the limited time no training is going to be offered for the system users further than the User's Guide although some users are going to interact directly with the system during the development process.

3.3 Out of Scope

This section identifies all areas that are out of scope of the proposed solution. Out of scope should include a list of solution components, deliverables, services, software, hardware or other areas that may be related to the proposed solution and need be assumed by the client as part of a proposed solution.



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The following items are not in scope:

- Modifications that are necessary to any external applications are not contemplated in the project tasks, and if needed should be realized by ECE Department personnel.
- Acquisition, installation and physical configuration of Hardware are not contemplated in this project. Hardware will be acquired, installed and configured by ECE Department personnel. The configuration of routers, switches and other communication hardware are the responsibility of ECE Department.
- Processing of data sources or data elements not specified in the proposed solution.
- Modifications to current Domain configurations are out of the scope of the system.
- Training outside that of which is specifically mentioned in this proposal.
- Support services of any kind outside that of which is specifically mentioned in this proposal.



4. Schedule

This part of the document summaries the tasks that will be develop to achieve the project goals. This approach helps the successful completion of the project. It consists of dividing the critical aspects of the solution in four phases, which helps validate and deliver the final product. These four phases are: Defining the solution, JSP and Database Development, Servlets and Queries Development and Final Documentation. The project phases are defined in the subsequence sections.

4.1 Phase 1: Defining the problem

During this phase, the project teams define the high-level view of the project's requirements, goals, and constraints. In order to get the necessary knowledge, the members of A- Sched Company read tutorials, read previous documentation, evaluate the current system and proposed a solution to the problem. This phase culminates when the group set the tasks to develop the system and set the methods to solve the problem. This phase started on August 17, 2005 and will finish on September 23, 2005 with the proposal submission. The following tables summarize the first phase tasks, which are grouped into four subtasks.

Research	Duration	Start	Finish
Read Current System Description	3 days	Aug. 15	Aug. 17
Read Final Report (last semester)	1 day	Aug. 17	Aug. 17
Read tutorials	10 days	Aug. 17	Sept. 2



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Presentations	Duration	Start	Finish
Goals Presentation	0 days	Aug. 19	Aug. 19
Deliverables Presentation	0 days	Aug. 24	Aug. 24
Assessment Presentation	0 days	Aug. 31	Aug. 31
Preliminary Proposal Presentation	0 days	Sept.12	Sept. 12

Preliminary Proposal	Duration	Start	Finish
Composition	4 days	Aug.31	Sept.5
Revision	3 days	Sept.6	Sept.8
Submission	0 days	Sept.8	Sept.8

Proposal	Duration	Start	Finish
Revision	5 days	Sept.16	Sept. 23
Submission	0 days	Sept. 26	Sept. 26

4.2 Phase 2: JSP and Database Development

During the phase 2, *JSP and Database Development*, the project team works on the system interfaces and the database schema design and implementation. These tasks are developed simultaneously because changes in the user interfaces may result in changes to the database schema. This phase also includes the training of the developers in the Net Beans 4.1 platform, java programming language, java server pages, java servlets, html and MySQL. The phase 2 culminates in the delivery of the completed database schema implementation and the user interfaces along with the first progress report and first progress presentation.

4.3 Phase 3: Servlets and Queries Development

During the phase 3, *Servlets and Queries Development*, the project team works on the system logic programming. This phase includes the java servlets which are going to connect the GUI with the database and control the flow of information between the client



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and the server. This part will also incorporate the development of the queries that will access the database. Phase 3 culminates with the delivery of the completed database and the user interfaces connection along with the second progress report and second progress presentation. The tasks that A- Sched has to work on in this phase are:

- Java Servlets
- Testing and Validation
- Application Validated and Approved
- Solution Installed and Configured in all Environments
- Documentation and Training Delivered

4.4 Phase 4: Final Documentation

During the phase 4, the project team works on system testing, debugging and final documentation. This phase also includes the production of a brochure, user's guide and poster. The phase 4 culminates with the delivery of the completed system along with the final report and final presentation.



5. Personnel and Project Costs

To develop the best system as possible, the A-Sched has assigned seven qualified engineers to develop the system. Six engineers will provide work as Engineer I and one will provide work as Engineer V. The next sections (Section 5.1.1, Section 5.1.2) will present in detail the engineers type necessary to develop the project and the task they must carry out.

5.1 Software Engineer I

The Software Engineer I is a position that assumes the responsibility of designing, modifying, developing, writing, implementing, and analyzing software programming applications. This type of engineer performs engineering design evaluations support and/or install, and may develop a range of software products. He/She recommends alterations to development and design to improve the quality of products and/or procedures. The requirements to be an Engineer I are: (1) A bachelor's degree in Engineering and 0-2 years of experience in the field or in a related area. He/She must have knowledge of commonly-used concepts, practices, and procedures within a particular field. This position requires following instructions and pre-established guidelines to perform the functions of the job. For that reason this kind of personnel works under immediate supervision.

In this project we are assigning six Software Engineer I in order to achieve the expected objectives and deliverables. Each software engineer is responsible for certain specific task: JSP, Database, Servlets and Documentation.



5.2 Teams Descriptions

Documentation Team

Technical Writer: Ninochka Santa

Technical Writer: Alexis Perez

Technical Writer: Luis Echevarría

Technical Writer: Agnes Velez

Technical Writer: Antonio Grande

Technical Writer: Julio Baerga

The Documentation Team is responsible for the production of the proposal, progress reports, presentations, brochure, user guide, poster, and meeting records.

JSP Team

JSP Developer Leader: Julio Baerga

JSP Developer: Agnes Velez

JSP Developer: Antonio Grande

JSP Developer: Ninochka Santa

The JSP Team is in charge of the initial creative stage of the graphical user interface (GUI); the team will sketch, plan and propose a certain GUI to the other teams. After the GUI is approved, the sketches will serve as a fixed guide for designing and coding purposes since it will include descriptions for uniform code development. Once the GUI is planned, the JSP team will start with the implementation. All web pages, whether dynamic or not are the JSP Team's responsibility. Every aspect of the creation of a webpage is a JSP Team responsibility, including forms, menus and graphics. In summary, the JSP Team is in charge of the whole look of the Academic Scheduler as well as the inner workings of its interface.



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Database Team

Database Analyst Leader: Alexis Pérez

Database Analyst: Luis Echevarría

Database Analyst: Agnes Velez

Database Analyst: Antonio Grande

The database team is in charge of delivering the fully functional database module along with all its documentation. The team will design the database according to an analysis that will be made to fulfill the application needs. The database schema will be developed according to the interface fields, which means that changes in the interfaces may result in changes in the database schema. After the schema is completed, the team is going to create the physical database and run several tests on it to ensure the functionality of the system. Once the database design is completed it will be deployed in the server and fully tested with test data. Finally the database team will deliver the full documentation of the database (schemas, diagrams, system source analysis and any other required documents).

Servlets Team

Java Developer Leader: Luis Echevarría

Java Developer: Agnes Velez

Java Developer: Julio Baerga

Java Developer: Alexis Perez

The servlets team will develop the programs that run on the Web server and manage the dynamic aspect of the Web pages. The team will make the connection with the database and control the flow of information between the client and server. Finally the servlets team will deliver the necessary documentation related to the servlets module.



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5.1.2 Professional Backgrounds

Agnes Vélez: Software Engineer I

Agnes Vélez is a Computer Engineer from the University of Puerto Rico at Mayagüez. She has taken a Software Engineering course. She was part of a team that made a design for a class scheduler for the Computer and Electrical Engineering Department. Agnes has worked with C, C++ and Java programming languages. She has also worked with databases systems and web applications. She is currently webmaster of the IEEE Circuits and Systems Society.

In this project Agnes is going to be working in the development of the user interface using Java Server Pages (JSP). She is going to work also in the design and testing of the database system. She is also going to work in the documentation of the system.

Alexis Perez: Software Engineer I

Alexis Perez is a Computer Engineer from the University of Puerto Rico at Mayagüez. He has programming experience in the Java programming language. Alexis worked in web application programming, database management systems and other programming environments. Alexis has taken courses like: Software Engineering, Data Structures, Java, and is taking courses like Databases and Design in Computer Engineering.

Alexis is going to be in charge of the database module of the system. He will be working on the design of the database schema, the implementation of the database and the testing of the created database. He will also work in the java servlets during the second development phase of the project. Finally, he will be working in the system documentation.



Antonio Grande: Software Engineer I

Antonio Grande is a Computer Engineer from the University of Puerto Rico at Mayagüez. He has experience working with C++ and Java language, Database systems and project management. He has taken courses like: Software Engineering, Data Structures, C++ and Artificial Intelligence.

Antonio is going to work in the analysis, design of the database and in the testing of the final outcome of the database. Also, he is going to work on the creation of the user interface using Java Server Pages. And finally, he is going to work in the system documentation.

Julio E. Baerga: Software Engineer I

Julio E. Baerga is a Computer Engineer graduated from the University of Puerto Rico at Mayagüez. He has experience working with Web related and Operating Systems specific development. Julio has programming knowledge in internet technologies like Java, HTML, JSP, ASP, PHP and Macromedia Flash. Julio has worked with the C++ and C language for non web related software.

For the Academic Scheduler project Julio will work as “Lead” of the JSP Team, working with the development of the graphical user interface and its implementation. He will also work as a “Java Developer” for the Servlets Team and he will help with the documentation process as part of the Documentation Team.



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Luis D. Echevarría: Software Engineer I

Luis D. Echevarría is a Computer Engineer graduated from the University of Puerto Rico at Mayagüez. Luis has developed windows and web applications using the following programming languages: c++, java, HTML, and SQL. He worked on the analysis and design of a Website for the UPRM Book Store as requisite of the Software Engineering Course. He has also worked on the analysis, design, and implementation of a Clothing Store Website for the Database Course.

Luis will work on the Academic Scheduler as a Database Analyst and Java Developer for the database and servlets module, respectively. Luis will take the lead in the Servlets Team and will also be part of the Database and Documentation Team.

Ninotchka Santa: Software Engineer I

Ninotchka is responsible that the project reports are completed on time as the Documentation Leader. She also has to efficiently plan meetings, work as the repository administrator and coordinate the work done by the other teams. This position requires a large amount of responsibilities, as discuss below:

- Make sure the project team operates effectively and efficiently
- Develop a basic plan of the project
- Maintain control of the project schedule and budget.
- Identify problems and make an effort to solve it.
- Keep documented the progress of the project.
- Report to the Project client about the progress of the project.



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5.3 Engineer V

The Engineer V provides expert consultation in one or more areas for the design, development and implementation of technical products and systems. He/She is going to be recognized as a technical leader and resource. This position requires the recommendation of alterations and enhancements to improve quality of products and/or procedures. This person is responsible for all internal activities and product development and requires a bachelor's degree in engineering and at least 8-10 years of experience in the field or in a related area. He/She must demonstrate expertise in a variety of the field's concepts, practices, and procedures and an extensive experience and judgment to plan and accomplish goals. This position has need of a consultant that can work on complex projects, for that reason he/she is going to be considered as the top level contributor/specialist. It is expected a wide degree of creativity and latitude.

5.3.1 Professional Description

Fernando Vega: Engineer V

This project will count with the assistance of the professor Fernando Vega that is currently an Associate Professor in the ECE Department of the University of Puerto Rico at Mayagüez, where he worked since 2001. Dr. Vega obtained his “Electronic Engineer” degree from Javeriana University in Bogotá, Colombia. He worked for Avianca Airlines as a Telecommunications Engineer with emphasis in data transmission and digital communications and later, he obtained his M.Sc. and Ph.D. in Electrical Engineering from Syracuse University, USA. Currently, he teaches ICOM 5047: Design Project in Computer Engineering.



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5.4 Estimated Project Expenses

This section provides an estimate for the proposed Academic Scheduler System. Table 5.1 describes in details the Total Cost of develop the Academic Scheduler System. The total cost including Emplacement and Overhead Costs are estimated to be **\$70,353.49**. Those costs consist of the salary of six Engineers I that will be remunerate with \$5,227.50 for the total contract. This project also requires one Engineer V, which is in charge of the consulting area of the project. The company will pay \$2,965.50 for 75 hours of consulting.

Table 5.1: Estimated Project Expenses

Employees	Position	Rate/hr.	Hrs/Contract	Payment /Contract
Agnes	Software Engineer I	\$20.50	255	\$5,227.50
Alexis	Software Engineer I	\$20.50	255	\$5,227.50
Antonio	Software Engineer I	\$20.50	255	\$5,227.50
Luis	Software Engineer I	\$20.50	255	\$5,227.50
Julio	Software Engineer I	\$20.50	255	\$5,227.50
Ninotchka	Software Engineer I	\$20.50	255	\$5,227.50
Fernando	Software Engineer V	\$39.54	75	\$2,965.50
Employment Sub-Total Costs				\$34,330.50
6.20% S.S				\$2,128.49
1.45% Medicare				\$497.79
6.20% Unemployment				\$2,128.49
Employment Total Costs				\$39,085.27
80% Overhead				\$31,268.22
Total Project Costs				\$70,353.49



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Table 5.1 Puerto Rico's base pay for Software Engineer I position

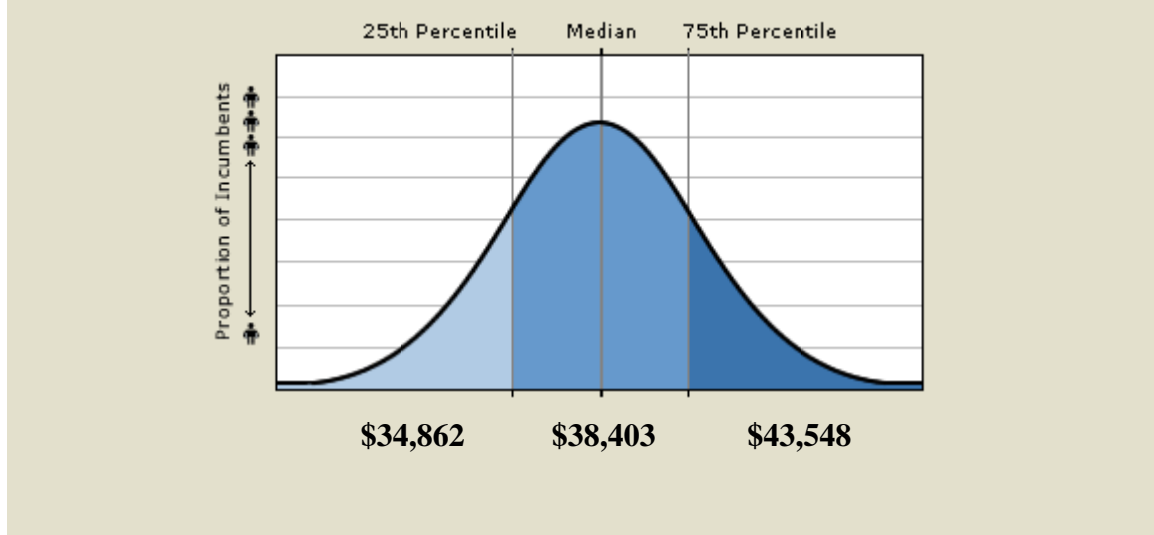


Table 5.1 Puerto Rico's base pay for Software Engineer I

The table 5.1 shows the base payment in Puerto Rico for the Software Engineering I position, described in Section 5.1.1. The payments fluctuate from \$34,000 to \$44,000; in this case the \$38,403 was the salary took into consideration for the costs calculations.



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Table 5.2 Base pay for Engineer V position in Puerto Rico

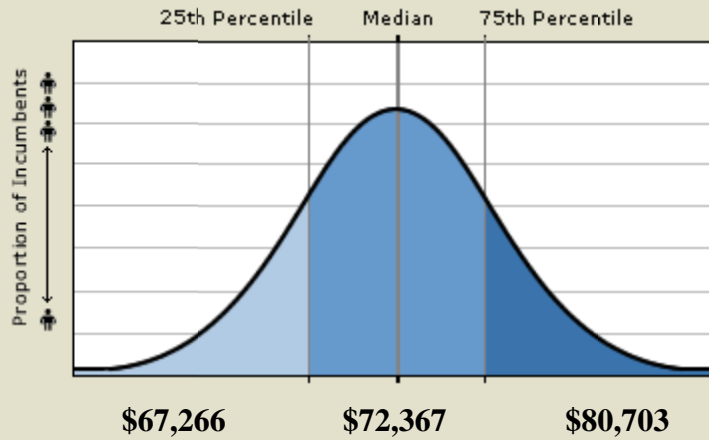


Table 5.2 Puerto Rico’s base pay for Software Engineer V

The table 5.2 shows the base payment in Puerto Rico for the Engineering I position, described in Section 5.1.1. The payments fluctuate from \$34,000 to \$44,000; in this case the \$38,403 was the salary taken into consideration for the costs calculations.



6. Potential Risks

The following outline shows an estimate of the risks that can be generated during the development of the Academic Scheduler System. It is important to acknowledge that more risks can come across when the project reaches its advanced phases. For the moment the following risks had been identified:

6.1 Technical Risks

- Lack of availability or cooperation from the Electrical and Computer Engineering Department IT staff: this can delay the expected finish date if access to the data sources and network is not provided as scheduled.

Solution: Adjust the due date to reflect the necessary additional time.

- Previous version of the project: when the project is a continuation of a previous one it could bring some problems such as bad documentation and implementation of the design, and not well identified requirements.

Solution: Ask for a meeting with the previous team in order to get familiar with their development.



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6.2 Human Risks

- Team availability – sickness or excessive work on other classes.

Solution: Deadlines must be estimated providing an appropriate amount of extra time.

6.3 Environmental Risk

- Weather affects personnel availability – there is a possibility of catastrophic events that have an effect on the full development of the project.

Solution: Depending on the time lost, the project tasks have to be re-scheduled according to UPRM schedule adjustments.

6.4 Other

- Cost risks are taken into consideration. The cost of the Project is \$70,353.49. This amount includes 80% of overhead (\$31,268.22). That overhead quantity take into consideration the costs associate to the risks as: employee overtime hours, trainings, extra consulting and other risk that can appear.



7. Assessment Methods

A-Sched has decided that the project requires to be completed by November 28, 2005. With this purpose in mind, the project is divided into four phases that contains the specific tasks to achieve this goal. In order to control the quality of the project, the team also has developed procedures for monitoring, collecting and storing data on project performance. The following tasks must be realized weekly:

- Meetings (Every Monday)
- Status Presentations(Every Friday)

The Academic Scheduler System is the project that A-Sched is developing for the ICOM 5047: Design in Computer Engineering course. For that reason the project will be evaluated by percentage. The overall value of the project is 100%: 80% divided in four phases and Fernando Vega 20% for class assistance and web- participation. The following sections (Section 7.1- Section 7.4) show the name of the phases with the delivery names and the percent for each delivery. The Section 7.5 shows the 20% the professor Fernando Vega uses to give credit for class and web participation.

7.1 Phase 1: Defining the solution

Proposal	18%
Proposal Presentation	2%
Total %	20%



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7.2 Phase 2: JSP and Database Development

First Progress Report	13%
First Progress Report Presentation	2%
Total %	15%

7.3 Phase 3: Servlets and Queries

Second Progress Report	13%
Second Progress Report Presentation	2%
Total %	15%

7.4 Phase 4: Final Documentation

Brochure	5%
Poster	5%
User guide	3%
Final Report	10%
First Progress Report Presentation	7%
Total %	30%

7.5 Other evaluation

Webpage participation	10%
Class participation	10%
Total %	20%



8. References

www.salary.com

<http://ece.uprm.edu>

<http://webct.uprm.edu>

“Computer Aided System for Class Schedule Design”, J. Fernando Vega-Riveros, August 9, 2005.