Resource Management System for Disability Services

GRADUATE PROJECT REPORT

Submitted to the Faculty of
the Department of Computing and Mathematical Sciences
Texas A&M University-Corpus Christi
Corpus Christi, Texas

in Partial Fulfillment of the Requirements for the Degree of
Master of Science in Computer Science

by

Bindu Y aparla
Spring 2005

Committee Members

Dr. John Fernandez
Committee Chairperson

Dr. David Thomas
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ABSTRACT

The Resource Management System for Disability Services (RMSDS) provides support services for the disabled students, which will aid them in participating and performing efficiently in all educational activities. The students can check-out the equipment needed for their classroom and exam use. They can reserve the equipment and also check the availability of the equipment. The students can also schedule their exams on the World Wide Web so that they do not have to be at the Disabled Student Services (DSS). The RMSDS also provides the DSS staff a system for tracking users and equipment.

This system will also send a reminder to the students about the due-dates of the equipment. The RMSDS will also provide the DSS staff with an incident report form to report any kind of incidents that occur during an exam, so the DSS administrators and the respective professors can take appropriate action on the student. The database tool for the project is MySQL, and PHP is used for the dynamic HTML pages.
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1. INTRODUCTION AND BACKGROUND

The Office of Disabled Student Services (DSS) coordinates the physical and academic support services for any Texas A&M University-Corpus Christi student who has a documented need because of permanent or temporary disability. Students with documented disabilities may request reasonable accommodations that will enable them to participate in and benefit from all educational programs and activities. This project is concerned with developing a system for students with disabilities to access the inventory and to request the equipment that will aid in better learning. The Americans with Disabilities Act requires that each academic accommodation be made on an individual or case by case basis. This legislation requires the University to work to ensure that it is programmaticaly and architecturally accessible to all students.

1.1 DSS Rules and Procedures

Presently, the Disabled Student Services (DSS) rules and procedures are paper and mobility intensive. The students, who qualify, must come to the DSS office each semester to register so that they can use DSS services. They must present a copy of their class schedule with a completed registration form and questionnaire. The DSS office then prepares the faculty notification letters for each class the student is enrolled. The student picks up the completed forms and notification letters and distributes them to his or her instructors.
1.1.1 Acknowledgement of Test Conditions Form

If the student qualifies for exam accommodations, the faculty will receive the notification letters from the students. The faculty will then fill out the acknowledgement of testing conditions for the exam/quiz. The form has the list of materials the student is allowed to use during the exam.

1.1.2 Exam/Quiz Schedule Form

The student is also given copies of the Exam/Quiz Schedule Form to complete for each class. The form contains a section where the instructor tells DSS the method he/she would like to receive the exam/quiz (i.e., email, fax, hand carry...etc.). The student must submit this form, signed by his/her instructor in order to schedule the Exam and/or Quiz.

Once the DSS office receives an Exam/Quiz Schedule form from the student, they will fill out a yellow exam card that lists the pertinent information about each Exam/Quiz. The Yellow card includes details such as

- Student’s name
- Class day and location
- Instructor’s name and phone number
- Date of the exam
- Duration of the exam
- Special accommodations needed
- Method of receiving the exam
- Method of returning the exam
1.1.3 Exam Schedule Sheet

The DSS also keeps track of the exams in schedule sheets for each day of the semester where they write scheduled exam times, the student and professor’s names and block off the amount of time the student will be allowed. The office also has a form to keep track of the method by which the exam/quiz is to be received/ or returned.

1.1.4 Check-out of the Equipment and Furniture

If the student qualifies for special furniture (i.e., wheel chair table, lumbar supporting chair…etc.), seating arrangements (i.e., reserved seat in a classroom) and/or adaptive/assistive equipment/software (i.e., FM microphone/receiving system, tape recorder, computer screen enlarging software, computer screen reading software), the student must request the equipment.

Once the student has registered, arrangements are made to place the special furniture or set up the special seating arrangements. These vary depending on the location of the class the student will be attending, and the disability needs of the student. In case the student needs adaptive/assistive equipment/software, the student must make his/her request prior to the semester. This will allow the DSS staff sufficient time to make sure that the needed equipment is in proper working condition and is available to the student.

1.2 A brief overview of the existing System

The system that is currently in use is a paper based check-out sheet which is transferred to an Excel sheet. In order to schedule an exam the student either calls or stops by the office. The student must notify DSS 48 working hours prior to the exam so that a room is reserved for them. DSS records the student’s name and qualifying disability. The DSS also records other student needs, e.g. scribes, readers, computers etc. According to the
student’s preferences, the DSS will inform the instructors regarding the picking up of the exam. The day before the exam, DSS fills out an exam pick-up/deliver sheet to keep track of the staff personnel that will pick-up/deliver the exam and the location of the exam.

1.3 Difficulties in using the existing system

Many a time, when a student wants to check-out a piece of equipment, either a form is not filled out, or is not filled out completely. At the time of returning the equipment the item is not always put back in the inventory. There is no electronic system for entering newly purchased items into the inventory, thus making it difficult to even know the total inventory.

The process of exam scheduling produces a paper trail. There is a problem when a scheduled exam or pick-up/delivery is not written down. Another problem is that once an exam is delivered, the only thing that is left to show that DSS ever had it is from what is noted on the pick-up/deliver and schedule sheets. All the information written on the 3x5 cards attached to the envelope containing the exam leaves with the exam and DSS loses the information when the exam is delivered. The other problem is that the students do not always notify DSS at least 48 hours prior to the exam being given. The availability of rooms to proctor exams is also very limited. The DSS must request additional rooms from the Executive Assistant of Planning and Institutional Effectiveness. These requests must be made at least 24 working hours in advance. If DSS does not have the lead-time then the proctoring rooms will not be available.
1.4 The reason for upgrading to an on-line system

The online system provides facilities for students to both reserve and check the availability of equipment. It cuts down on the paper trail and makes it easier for the student to schedule an exam. The RMSDS provides easier access for students who may have a disability, and in-person checkout of the item is difficult. The system allows students to be better equipped when they attend their classes, and also aids the faculty to teach effectively. As far as assisting the faculty and staff, the RMSDS provides more efficient notification of the faculty, as well as tracking the exam from scheduling, pick-up, proctoring time and delivery.

RMSDS allows the students to schedule exams/ quizzes and to make requests for special furniture and adaptive/ assistive equipment. The DSS office operates mainly under the Americans with Disabilities Act and the Rehabilitation Act. In general, those laws mandate that all of the buildings, classes, programs, web sites, anything that is available to the general student population, must be accessible to students with disabilities because TAMUCC receives federal funding.

If the Disability Student Services had software online to give students the ability to schedule exams/ quizzes and allow faculty the ability to approve those exams/ quizzes, as well as, inform DSS how to receive and return those exams/ quizzes and generate the needed reports, then it makes DSS more efficient.

The system is more efficient if the software is tied to an inventory program that allows the student to reserve furniture, equipment, or software, if it was available and also let the student know if said furniture, equipment or software needs to be purchased. It also makes the DSS more efficient and it makes it easier for the DSS to keep track of the present inventory, future requests, and return dates of inventory currently checked-out.
1.5 Americans with Disabilities Act

Students with documented disabilities may request reasonable accommodations, which will enable them to participate in and benefit from all educational programs and activities. The Americans with Disabilities Act requires that each academic accommodation be made on an individual or case-by-case basis. This legislation requires the University to work to ensure that it is programmatically and architecturally accessible to all students.

Section 504 specifically refers to post secondary and vocational education services. The legislation reads: "No otherwise qualified handicapped individual in the United States shall, solely on the basis of handicap, be excluded from participation in, be denied the benefits of, or otherwise be subjected to discrimination under any program or activity receiving Federal financial assistance."

Services and auxiliary aids from DSS are provided to assure that students with physical, sensory, neurological, chronic health, learning, psychological and other impairments qualifying under Section 504 of the Rehabilitation Act and the Americans with Disabilities Act, have equal access to all programs and physical resources of the University. (Americans with Disabilities Act 1990, PL 101-336)[ADA 1990].

1.6 Need for an Online System for DSS staff and students

In the current era of a highly computerized world, one might expect that the rapid technological growth and the increasing computerization of society would lead to innovations that would remove many of the roadblocks faced by disabled people in society. Unfortunately, that is not the case. Instead, access to information and high-tech careers by disabled people has been hampered by shortsightedness on the part of computer and
telecommunications systems designers. Most hardware and software has been, and continues to be, designed by and for people who are not disabled [Ephraim1992].

RMSDS will help the DSS staff in tracking their equipment, scheduling exams, and also maintaining the student’s database. RMSDS also provides disabled students an easy way of scheduling exams online. The students can also request equipment or special furniture such as wheel chair tables. Based on the students’ request the DSS staff will make sure to arrange the appropriate equipment in the classroom or the exam room.

Considering the time and expense to make a Web site easier for a person with disabilities to use, many companies have decided not to re-design their Web pages. However, the companies should rethink this decision and take a closer look at the benefits that come from making a site more accessible to the disabled. [Salamone 2002]

Considering the factors mentioned above, it is always a good idea to develop a system for disabled students. The RMSDS is primarily aimed at providing support services for the DSS and only a part of it is providing disabled students the ability to reserve equipment/furniture and scheduling exams.

1.6.1 Disabled Student Services in other Universities

Middle Tennessee State University offers wide variety of services to students with disabilities including assisting in registration, providing readers, maintaining an inventory of auxiliary aids, offering testing accommodations, providing access to the latest in adaptive computer technologies, and acting as liaison to University departments. The University has two different Web sites for different audiences. For the people with Cognitive Disabilities, they have a text only site, which does not contain graphical elements and are compatible with the screen readers. These types of Websites with text are very helpful for the people with color blindness, and also for older people [MTSU 2004].
2. RESOURCE MANAGEMENT SYSTEM FOR DISABILITY-SERVICES (RMSDS)

The main objective of the Resource Management system for Disability Services (RMSDS) is to design an online system for the Disability Student Services and also for the disabled students at Texas A & M University – Corpus Christi. The RMSDS has three main functions.

1. Inventory Management
2. Exam Scheduling
3. Incident Reports

2.1 Main RMSDS Functions

2.1.1 Inventory Management

The DSS staff has an interface where they can add, edit and delete the inventory. They can view the inventory requests made by the students. The student has an interface where he/she can choose the equipment or software that is needed. In order to check out the equipment the student has to come to DSS office and check the items out. The student can also request a specific type of furniture to be placed in the exam/classroom.

2.1.2 Exam Scheduling

Students can schedule their exams provided they are approved for exam services. This is based on the type of disability. The students have an option to schedule all the exams for a course they are enrolled in or they can schedule for a single exam/quiz. The students are required to file their request 48 hours prior to the exam. The staff can view all the requests made by students. Once the staff gets all the requests prior to the exam, they will send the student’s exam request form to the instructor. The professor will approve the
exam requested by the student and also the allowed materials the student can bring for the exam. Once the instructor approves the exam and lists the materials that are allowed, the DSS staff will update the student’s record.

2.1.3 Incident Report

Incident reports are the reports generated by the DSS staff. The report contains the severity of the incident that occurred during the exam. The proctor (DSS staff) will record the student’s information such as his name, DSSID, phone number, and the exam. DSS staff will submit this information along with the initial action taken during the exam. This information will later be reviewed by the DSS administrator who will take further follow-up action.

2.2 Security Issues involved in RMSDS

Students with disabilities have the constitutional and statutory confidentiality protection of non-disclosure of their disability. The DSS cannot disclose to anyone (no matter who the person is, be it parent, faculty, or staff outside DSS) whether or not a student has a disability without a written consent from the student. Nor can this office disclose what type of disability a student has without written consent from the student. The only persons on campus that know which students are registered with DSS as having a disability are the staff of this office.

There are three levels of privileges

1. Administrator

2. DSS Staff

3. Students of the DSS

The administrator will have full privileges, such as adding other administrators, adding, deleting, and editing the staff information. Both staff and administrators can add, edit, and
delete the student information. Both can add, update, and delete the inventory. They can also add the courses and associate the students with the appropriate course based on the student’s class schedule.

The DSS staff can file an incident report after an exam and the administrator has to make a final decision. If necessary he/she will consult the instructor for the course. The staff can only view/modify the reports they file. They can not modify other staff’s reports or delete their own report.

The homepage for RMSDS, as shown in Figure 2.1, has the navigation to the office of Disabled Student Services, and also the login pages for staff and students. The homepage has a mission statement of the RMSDS.

\[\text{Figure 2.1 Resource Management System for Disability Services Home page}\]

The administrator and staff are authenticated based on the type of the user ‘ADMIN’ for administrator and ‘STAFF’, for staff from the Staff table. The staff enters the username and password in the login form, Figure 2.2. If the username and password does
not match they will be directed back to the login page displaying the error message. Based on the type of the user and user name the session ID will be set.

Figure 2.2 Admin/Staff Login Form

Once the staff has entered the username and password correctly, they will be directed to the staff’s homepage.

Likewise the students can also login using the student login form (Figure 2.3). If the username and password are incorrectly entered they will be directed back to the login page, else the students will be presented with their homepage where they have access to request equipment and furniture or can schedule exams.

Figure 2.3 Student Login Form
2.3 Recording Student Information

The student has to provide his personal details such as name, social security number, address, phone number, college, degree, and also proof of his/her disability. The information will be entered into the database by the staff of DSS as shown in Figure 2.4, once the student’s disability is verified.

Figure 2.4 Add Student Information Form

Once the staff submits all this information, the form fields will be validated for correctness. The fields should match with the data types in the MySQL database. For this input validation, scripts are written in PHP. Once the fields are validated the staff will be directed to a confirmation page. If any of the above information is found to be incorrect, the user is provided the opportunity to edit the information. Once the staff clicks on Add Student button, the student’s information will be entered into the Student table.

The student is then provided with a username and password as shown in Figure 2.5. The username is a combination of the first letter in the first name and the last name. If there
is another user with the same username then a suffix of ‘1’ will be added to the username. The password will be generated by combining the first letters of both the first and last names and adding to it the last four digits of Social Security Number. From this point, the student can request for the equipment, training, and schedule for the exams. The student cannot change his password. They have to contact the DSS staff.

![Figure 2.5 Student’s Account Information Screen](image)

**2.4 Adding Course Information**

Once the student has been registered in the RMSDS database, the staff can add the student’s course information as shown in Figure 2.6. Prior to adding the student’s information, the staff has to add the courses in which the student is enrolled. This form contains the course information such as the course number, course description, semester, year, instructor’s name, days, time, and location of the class.
If the faculty name is not in the Instructor drop-down box, the staff has to select “New” from the Instructor drop-down box, and then they will be directed to the Add Faculty page. In this form (Figure 2.7) they will add faculty details.
2.5 Adding Inventory

The DSS staff can also add new inventory into the database as shown in Figure 2.8. Initially they have to submit the type, description and quantity of the inventory. Once they submit this information they will be directed to a confirmation page. If the inventory information is correct they can select ‘yes’, and this will add the item into the Inventory table.

![Figure 2.8 Adding Inventory](image)

Once the inventory has been added, it will be displayed as shown in Figure 2.9, to make sure that the item has correctly been added into the database.

![Figure 2.9 Notification of the Inventory addition](image)
2.6 Searching/Editing Inventory

The DSS staff also can search the inventory based on the description of the item. They can select the item from a drop down box as shown in Figure 2.10, and when they click on “search button” all the items that match the description type will be displayed. If the item is not found in the inventory table, they will be taken to the search inventory page.

![Figure 2.10 Searching the Inventory Item](image)

From the search results, the staff can edit or delete the items from the inventory as shown in Figure 2.11.

![Figure 2.11 Edit/ Delete Inventory Screen](image)

The DSS staff can also view the requested equipment and furniture on a day to day basis. The staff can also view the exams scheduled from the Exams navigation button on the Web page.
3. SYSTEM DESIGN

The background, main objectives and a brief description of the user interface of this project were explained in the previous sections. In this section, a brief overview of the analysis, design and implementation phases of this project is given.

3.1 Initial Requirement Analysis

This project was initially requested by Mrs. Deanna Solomon, Network Manager 1, Systems, Mary & Jeff Bell Library, TAMUCC.

Mrs. Deanna Solomon provided the background information for the existing system and what needs to be accomplished for the Disabled Student Services. She explained the need for a new system and the scope of the project. She suggested sources for getting information for the design of the database. She presented her vision of a Web-based system, and noted that the security of this system is an important issue. The platform and languages to be used were also discussed.

Later, meetings were conducted with the Accommodation Specialist for DSS, Mrs. Julie Joffray. Mrs. Joffray deals with the Testing Services, Exam Scheduling, Inventory Management, and registration of the Disabled Students who need special accommodations. She provided all the forms that staff has to work with in order to accomplish their tasks and also explained the need of an online system which can keep track of the inventory, and she stated that students should be able to schedule their exams from their home without them being on-campus.

Detailed excerpts of these meetings can be found in the Appendix A. Based on these excerpts and initial requirement analysis, the design of the database schema and user interface were completed and implemented.
3.2 Main Components of the Project

The Resource Management System for Disability Services (RMSDS) is written using PHP Hypertext Preprocessor version 4.2 (server side and client side scripting language), HTML, DHTML and JavaScript, with MySQL version 3.23.58 as the database. The server-side implementation is comprised of the MySQL database installed on the Library’s test server (which is operating under the Red Hat Linux release 8.0). The Web pages are also installed on the Library server so that they are accessible to all users from anywhere on and off-campus.

This project consists of the following interfaces, scripts, databases etc.

- A user authentication page.
- A Webpage to retrieve student information in case they forgot the password.
- Interface to add, update and maintain database.
- PHP scripts that query the database.
- Scripts to schedule a class room, reserve the equipments, and request for readers, scribes and special furniture.
- Mailing script to send student’s account information to the student’s email address.
- Scripts to develop interface written in Java scripting to generate pop-up menus, resetting the Web forms.

3.3 System Requirement

The various components of the project that are discussed in the next subsection are:

- Hardware: Linux server with Redhat Linux 8.0 as the Operating System
- High level Programming Languages: PHP, HTML and JavaScript (to develop interactive user interfaces)
• Web Authoring Tools: Microsoft FrontPage, Macromedia Dreamweaver MX.

• Image editing tools: Macromedia Fireworks MX.

• Database: MySQL version on Linux server.

• A Linux test server has been setup in the Systems Office of Mary and Jeff Bell Library.

3.3.1 Hardware

The system is residing on a Dell Power edge server on which are installed Redhat Linux 8.0, Apache Web server and MySQL database server.

3.3.2 High Level Programming Languages

This project uses languages such as PHP (Personal Home Page) a Hyper Text preprocessor, Java Script, CGI (Common Gateway Interface), and HTML (Hyper Text Markup Language).

3.3.3 JavaScript

JavaScript is a Java based scripting language. It is a good scripting language to develop dynamic Web pages.

3.2.4 PHP

This project uses PHP, which is a server-side scripting language designed specifically for the Web. Within an HTML page, PHP code is embedded, and executed each time the page is visited. The PHP code is interpreted at the Web server and generates HTML or other output that the user will see.

PHP was conceived in 1994 and was originally the work of Rasmus Lerdorf [Welling 2001]. PHP is an Open Source product. PHP originally stood for Personal Home Page, but was changed in line with the GNU recursive naming convention (GNU = Gnu’s
Not Unix) and now stands for PHP Hypertext Preprocessor. The version of PHP that is used in this project is 4.0 [Weiling 2001].

PHP has many advantages in comparison to its main competitors such as Perl, Microsoft Active Sever Pages (ASP), Java Server Pages (JSP), and Cold Fusion. [PHP 2004].

- It is a free open source scripting language.
- Very well supported by the computer services department of Texas A&M University – Corpus Christi. This will aid a lot in the successful implementation of the system
- A very large and wide range function reference.
- Similar language constructs as C++ and Java.
- Supports many databases and in particular it works really well with MySQL.
- High performance
- Built-in libraries for many common Web tasks
- Low cost
- Ease of learning and use
- Portability
- Availability

3.3.5 MySQL

MySQL is a very fast, robust, relational database management system (RDBMS). A database system enables the user to efficiently store, search, sort, and retrieve data. The MySQL server controls access to the data to ensure that multiple users can work with it concurrently, to provide fast access to it, and ensure that only authorized users can obtain
access. Hence MySQL is a multi-user, multi-threaded server. It uses SQL (Structured Query Language), the standard database query language worldwide [DuBois 1999].

3.4 Web Database Architecture

The basic operation of a Web server is shown in Figure 3.1. This system consists of two objects: a Web browser and a Web server. A communication link is required between them. A Web browser makes a request of the server. The server sends back a response. This architecture suits a server delivering static pages well. The architecture that delivers a database backed Web site is a little more complex. [Weiling 2001]

![Figure 3.1 The client/server relationship](image)

3.5 Stages in a Web Database Transaction

A typical Web database transaction consists of the following stages:

1. A user’s Web browser issues an HTTP request for a particular Web page.
2. The Web server receives the request, retrieves the file, and passes it to the PHP engine for processing.
3. The PHP engine begins parsing the script. Inside the script is a command to connect to the database and execute a query (perform the search for the inventory). PHP opens a connection to the MySQL server and sends on the appropriate query.
4. The MySQL sever receives the database query and processes it, and sends the result back to the PHP engine.
5. The PHP engine finishes running the script, which will usually involve formatting the query results nicely in HTML. It then returns the resulting HTML to the Web server.

6. The Web server passes the HTML back to the server, where the user can view the list of inventory that has been requested (Figure 3.2).

![Diagram of Basic Web Database Architecture]

**Figure 3.2 Basic Web Database Architecture**

The process is basically the same regardless of the scripting engine or database server being used. Often the Web server software, the PHP engine, and database server all run on the same machine. However, it is also quite common for the database server to run on a different machine for reasons of security, increased capacity, or load spreading. From a development perspective, this will be much the same work with, but it might offer some significant advantages in performance [Welling 2001].

The Web interface through which users access the system was built using Dreamweaver. The database was created using MYSQL. Server side scripting language PHP was used to communicate with the database. PHP and MYSQL were used because they are open source and are available free of cost [Welling 2001]. These products are readily available in the University. Compared to other scripting languages like ASP, Cold Fusion, Perl and Java, PHP is preferred mainly due to the following reasons [Williams 2002]:

- PHP is much faster when compared to ASP
- Unlike Cold Fusion, PHP runs on virtually every platform
- Format and syntax of PHP is easy when compared to Perl
• PHP is simpler to use than Java and makes it easy to architect Web applications.

MySQL has become the most popular open source database and the fastest growing database in the industry. Some reasons for using MySQL as the database are [MySQL 2004]:

• It is a free open source database
• It has an architecture that is very reliable and fast
• It is very easy to use and deploy

Several software tools were used to aid in the process of the development:

• Macromedia Dreamweaver 4.0, A Web design Integrated Development Environment (IDE) used for the design and development of the HTML pages and forms and DHTML scripting.
• HTML-kit version 5.1 – A PHP syntax highlighting IDE used for the development of PHP scripts. It has a really good interface and various features that helped in developing and debugging the PHP code
• PHPMyAdmin 2.5.4 – A widely used tool intended to handle the administration of MySQL server over the web.

### 3.6 Design Process

The following steps were taken during the design process.

• Based on the initial requirement analysis a project proposal document was prepared. Mrs. Deanna Solomon reviewed the document to ensure that the problem was properly addressed.
• The current manual system of Exam Scheduling, Inventory check-out, handling of the Incident Reports was reviewed.
• The database schema was designed based on the user interface design, the various entities of the system and the relationships between those entities.

3.7 Database Schema

The database schema [Welling 2001] for the software of the system is named as “Inventory”. The major tables in Inventory database are as follows:

3.7.1 Courses Table

The Courses table as shown in Figure 3.3 contains the list of all possible courses and the course information associated with each and every course. COURSE_ID is the primary key, FACULTY_ID is the foreign key.

<table>
<thead>
<tr>
<th>Field</th>
<th>Type</th>
<th>Attributes</th>
<th>Null</th>
<th>Default</th>
<th>Extra</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>COURSE_ID</td>
<td>bigint(20)</td>
<td>No</td>
<td>Yes</td>
<td>NULL</td>
<td>Change Drop</td>
<td>Unique Fulltext</td>
</tr>
<tr>
<td>COURSE_NUM</td>
<td>varchar(15)</td>
<td>No</td>
<td>Yes</td>
<td>NULL</td>
<td>Change Drop</td>
<td>Primary Index</td>
</tr>
<tr>
<td>COURSE TITLE</td>
<td>varchar(35)</td>
<td>Yes</td>
<td>NULL</td>
<td></td>
<td>Change Drop</td>
<td>Primary Index</td>
</tr>
<tr>
<td>COURSE_DESC</td>
<td>varchar(20)</td>
<td>Yes</td>
<td>NULL</td>
<td></td>
<td>Change Drop</td>
<td>Primary Index</td>
</tr>
<tr>
<td>SEMESTER</td>
<td>varchar(15)</td>
<td>Yes</td>
<td>NULL</td>
<td></td>
<td>Change Drop</td>
<td>Primary Index</td>
</tr>
<tr>
<td>YEAR</td>
<td>varchar(15)</td>
<td>Yes</td>
<td>NULL</td>
<td></td>
<td>Change Drop</td>
<td>Primary Index</td>
</tr>
<tr>
<td>FACULTY_ID</td>
<td>int(11)</td>
<td>No</td>
<td>0</td>
<td></td>
<td>Change Drop</td>
<td>Primary Index</td>
</tr>
<tr>
<td>DAYS</td>
<td>char(3)</td>
<td>No</td>
<td>M</td>
<td></td>
<td>Change Drop</td>
<td>Primary Index</td>
</tr>
<tr>
<td>START TIME</td>
<td>time</td>
<td>No</td>
<td>00:00:00</td>
<td></td>
<td>Change Drop</td>
<td>Primary Index</td>
</tr>
<tr>
<td>END TIME</td>
<td>time</td>
<td>No</td>
<td>00:00:00</td>
<td></td>
<td>Change Drop</td>
<td>Primary Index</td>
</tr>
<tr>
<td>LOCATION</td>
<td>varchar(25)</td>
<td>No</td>
<td></td>
<td></td>
<td>Change Drop</td>
<td>Primary Index</td>
</tr>
</tbody>
</table>

Figure 3.3 COURSES Table

3.7.4 Faculty Table

Faculty table as shown in Figure 3.4 has FACULTY_ID as primary key, and contains information about the instructor such as his/her location, phone number, and email address. The Faculty information is entered at the time of entering the course information. This information is retrieved while selecting the instructor from the add courses form.
3.7.5 Exam Table

The Exam table as shown in Figure 3.5 contains EXAM_ID as a primary key, COURSE_ID, DSSID, and FACULTY_ID as foreign keys.

3.7.6 Inventory Table

The Inventory table as shown in Figure 3.6 has INVENTORY_ID as the primary key and DSSID as the foreign key.
The Staff table as shown in Figure 3.7 contains the information about the DSS staff. Based on the type of user the privileges will vary. Administrator will have a full control of the system.

The Student table as shown in Figure 3.8 contains student’s information. DSSID represents the primary key. DSSID is the Social Security Number of the student. The USER_NAME is created by combing the first character of the first name and the last name.
The Password is encrypted using MySQL Password ( ) function. Password is generated by combing the first characters of first, last names followed by last four digits of the student’s DSSID.

**Figure 3.8 Student Table**

### 3.7.9 Incident Table

*Incident* table as shown in Figure 3.9 deals with any type of incidents that occur during the exam. The DSS staff will log the information in after the exam, and finally the administrator of the DSS will take a follow-up action and will print a report on the student and updates the student file.

**Figure 3.9 Incident Table**
3.8 Structure Chart

A structure chart graphically displays the hierarchical algorithmic structure of a system. For RMSDS the structure chart can be depicted as in the Figure 3.10.

**Resource Management System for Disability Services**

![Structure Chart for RMSDS](image)

**Figure 3.10 RMSDS- Structure Chart**
3.9 Entity – Relationship Diagram

An entity relationship diagram shows the list of all possible entities and the relationships that exist among these entities [Pressman 2002]. The Courses table contains a list of all the possible courses that students are taking and their corresponding timings, locations and the instructor. There may be many students enrolled in a course, and a student can be enrolled in more than one course. The instructor can teach more than one course. The courses are entered into the Courses table based on the class schedule of the student and then the students are assigned to the respective course. The Courses and Students tables are related by using a Course_Student bridge table. Likewise, the Faculty table is also related to the Courses by Courses_Faculty bridge table. The Entity Relationship Diagram is shown in Figure 3.11.

![Figure 3.11 Entity – Relationship diagram](image-url)
3.10 Data Flow diagram

A data flow diagram serves two purposes [Pressman 2001]:

- Provides an indication of how the data is transformed as they move through the system
- Depicts the functions that transform the data flow
- The Physical dataflow diagram can be shown as in Figure 3.12.

![Diagram](image-url)
The Level 0 DFD for the RMSDS is illustrated in Figure 3.13. The Administrator on login is presented with three options. The administrator/staff can register the course, add/or edit student information and add/ or edit the inventory. There are other tasks such as adding new staff, changing the password for the staff and students, approval of the exams, and check-in/check-out of the inventory/furniture. The only difference between the administrator and staff interface is that the staff does not have privileges to add another staff. Administrator only has the privileges to add the DSS staff.

**Figure 3.13 RMSDS Staff DFD**

The course registration process is illustrated in Figure 3.14.

The administrator or DSS staff will add students to the *Students* table. Then based on the students’ class schedule, the staff will add the course information. Once they add the course information they will add the courses to the *Students* table by using the bridge table to associate the students with the courses.
A student first makes a request for exam scheduling 2 days prior to the exam (Figure 3.15). The DSS staff, after logging in, will view all the requests made by students for exam scheduling. The DSS staff will then forward this information to the instructors. The instructors will notify the DSS about the allowed materials for the exam. DSS staff will also choose the method of receiving and delivery of the exams by DSS. The DSS will finally send a remainder that the exam has been scheduled.
3.11 Use Cases

As requirements are gathered as part of informal meetings, the software engineer (analyst) can create a set of scenarios that identify a thread of usage for the system to be constructed. These scenarios, often called use-cases, provide a description of how the system will be used [Pressman 2001].

To create a use-case for the RMSDS, different types of people were identified that use the system. These are

1. DSS Administrators
2. DSS support staff
3. Disabled Students

These are the actors that typically represent roles that people play as system operates.

The use-cases for the actors are developed based on their respective roles.

A use-case for Incident Report filing is as follows.

1. The DSS staff (proctor) immediately after the exam fills in the incident report for respective students if any incidents are occurred during the exam. They have to select a student from the drop-down box and also have to select the exam for which the incident has been filed. They also have to select the radio button for the severity of the incident. In the text box provided for the Incident the staff fills in the incident that occurred during the exam.
2. The administrator then reviews the incidents filed by the DSS staff and takes the follow-up action and submits the administrator action.
3. The administrator can edit all the incident reports, but the staff can only edit the incident reports that have been filed by them.
3.11 Listing of Major Scripts

Figure 3.14 shows the listing of major scripts and their brief description.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Script Name</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><code>index.php</code></td>
<td>Welcomes the users to the RMSDS website.</td>
</tr>
<tr>
<td>2</td>
<td><code>Stafflogin_form.php</code></td>
<td>Verifies the username and password.</td>
</tr>
<tr>
<td>3</td>
<td><code>Changepassword.php</code></td>
<td>Allows the user/staff to change his password.</td>
</tr>
<tr>
<td>4</td>
<td><code>Addstudents.php</code></td>
<td>Allows the user to enter student information.</td>
</tr>
<tr>
<td>5</td>
<td><code>Editstudent.php</code></td>
<td>To edit the Student information</td>
</tr>
<tr>
<td>6</td>
<td><code>deletestudents.php</code></td>
<td>Deleting the students from the students table</td>
</tr>
<tr>
<td>7</td>
<td><code>Addfaculty.php</code></td>
<td>Adding the new faculty information</td>
</tr>
<tr>
<td>8</td>
<td><code>Editfaculty.php</code></td>
<td>To edit the Faculty information</td>
</tr>
<tr>
<td>9</td>
<td><code>Addcourses.php</code></td>
<td>Adding the courses based on student’s class schedule</td>
</tr>
<tr>
<td>10</td>
<td><code>Newrequests.php</code></td>
<td>Displays the new exam requests that students had made that needs to be sent to the Instructors.</td>
</tr>
<tr>
<td>11</td>
<td><code>Pendingrequests.php</code></td>
<td>Displays the Exam requests that needs to be approved/waiting for the approval from the Instructor</td>
</tr>
<tr>
<td>12</td>
<td><code>Approvedrequests.php</code></td>
<td>Displays the approved exam requests</td>
</tr>
<tr>
<td>13</td>
<td><code>Addinventory.php</code></td>
<td>Adding new items to the Inventory list</td>
</tr>
<tr>
<td>14</td>
<td><code>Editinventory.php</code></td>
<td>Editing the Inventory items</td>
</tr>
<tr>
<td>15</td>
<td><code>Searchinventory.php</code></td>
<td>Searching the Inventory</td>
</tr>
</tbody>
</table>
### Figure 3.16 Listing of Major Scripts

#### 3.12 Security features

Security is one of the most important features today in any Web database application because some of the information in the database needs to be kept confidential. Security implemented in this project can be explained by means of session id, password authentication, backing up of data, and password expiration.

- **Session Id:** Each user is identified by means of a session id. All the scripts that access the database first check whether the session id is still valid or not. If by any chance the session is expired the user is directed back to the main login page.

- **Password authentication:** Passwords are encrypted and stored in the database using MySQL function PASSWORD ( ). This function uses a non-reversible hashing algorithm.

- **Backing up data:** The MySQL database is backed up frequently by the systems administrator. This is done in order to recover from any disaster.

- **Password expiration:** This mechanism is implemented in order to make sure that the password expires after a semester is over. In order to know the new username and Password the Systems Administrator needs to be contacted.
4. TESTING AND EVALUATION

Usability evaluation is any analysis of an empirical study of the usability of a prototype or system. The goal of the evaluation is to provide feedback in software development. Despite best efforts and sound practices, the original goals for the system may not in fact be achieved. More profoundly, the original project goals may have been successfully achieved, but they may turn out to be the wrong goals. Usability evaluation helps designers recognize that there is a problem, understand the problem and its underlying causes in the software, and plan changes to correct the problem. [Rosson 2002].

Testing of this project included the usability of the following graphical user interfaces.

- Home page for disability services
- Interface to add, update the student records for the use of administrator
- Exam Scheduling
- Add/Edit Inventory

4.1 RMSDS System Testing

System testing was performed to test functionality, performance and accuracy. Tests were also performed on the interfaces at regular intervals to make sure all the scripts work accurately. The system was tested at several stages while it was being developed and the errors that were found at each stage were corrected. Different factors that were tested in those tests are:

- Script accuracy – Are the scripts that query and update the database accurate?
- Security – are all the interfaces properly authenticated to ensure security?
Each module was tested independently for data integrity, data consistency, consistency of data input and output formats and to check if it had achieved the requirements. Standard coding guidelines were adopted along with proper documentation to facilitate easy maintenance.

4.2 Usability Testing

Usability testing is a technique to ensure that the intended users can complete the required tasks efficiently, effectively, and satisfactorily.

4.2.1 Testing Goals

The goal of usability testing is to determine the ease of use of the system by the users. The RMSDS has different kinds of users. They are the staff and the disabled students. In a usability test, some questions are asked:

- Was navigating through the system comfortable?
- Do you have any difficulty in understanding the terminology?
- Is the content legible and easy to read?
- Is the subject content displayed complete?
- Are the colors and graphics pleasing?
- Is there any consistency in the Layout and Menus?

4.3 Evaluation

The evaluation of RMSDS is based on the user reaction and user satisfaction obtained after performing a set of actions on the system. For evaluating the system the test was conducted on a Windows machine with Internet Explorer 6.0 as the Web browser.
4.4 Evaluation Measures

The following evaluation measures were used to evaluate the overall effectiveness of the system:

1. The average time to complete each task
2. The percentage of success in finding the information correctly
3. The level of satisfaction achieved by the participant
4. The users were also asked to evaluate the security of the RMSDS system. This includes trying to access the Web page which the staff is not authorized to use.
5. The ease of understanding the terminology used on the Web pages
6. Completeness with which the site’s subject is treated
7. Appearance of the site
8. Consistency in Layout, Menus, and Visual Cues

4.5 Evaluation Results

System testing was done by the DSS staff. The users involved in the testing are:

1. Mrs. Julie Joffray, Accomodation Specialist, Disability Services, TAMUCC.
2. Mrs. Maria Ammerman, Administrative Assistant, Disability Services, TAMUCC.

Both the users were given with a set of User Reaction Survey forms (Appendix C, User Reaction Survey Forms), to evaluate RMSDS, once they finish their tasks they answered the questions and also submitted the feedback and comments on RMSDS.

The DSS requires that the student’s personal details should not be disclosed. This is the reason why the disabled students were not used for evaluating the RMSDS.
The DSS staff was really impressed with the system. They made some positive feedback about the RMSDS. They especially liked the functionality of the system and also the uniform look and feel of the Web site. The users were excited about the fact that the system is available all the time and can be accessed from anywhere. After completing the usability testing, changes suggested by the users were made.
5. RESULTS AND CONCLUSION

The Resource Management System for Disability Services serves the DSS staff and to some extent the disabled students. The system provides greater efficiency than the manual process of inventory check-out and exam scheduling currently utilized. It also helps the DSS staff in reducing the paper work and tracking their equipment more efficiently.

Some of the major outcomes of the RMSDS are as follows:

1. Inventory management system

2. Exam Scheduling
   a. Students request for exam scheduling
   b. DSS staff send the request forms to the professors
   c. Professors approve the exams to be scheduled.
   d. DSS staff adds the exams scheduled for a particular student.

3. Filing Incident Reports

   The project is implemented as a Web based system using PHP, HTML and JavaScript to develop the Graphical User Interface (GUI) and MySQL as the Database Management System. The database server is installed on a Red Hat Linux Operating system. Various testing was conducted as mentioned in the testing and evaluation section. Results of these tests were used to evaluate the success of this system.
6. FUTURE WORK

In the future, the software could be expanded to allow faculty to post their exams on the secure system and the students could take their exams online in a proctored environment. It would help to ensure the integrity of the exam. There are some suggestions regarding the uploading of the exam review questions by the instructor of the course, so that the students need not attend the exam review.

The RMSDS is primarily aimed at Disability Student Services. There is some discussion of expanding this project on a large scale so that all TAMUCC Web pages can be accessible by students with physical or cognitive disabilities. The RMSDS can be expanded so that it is useful for blind users using screen readers. In order for the students to access Web pages, they should be designed in a text-only format, so that people with color blindness could easily read the content.
BIBLIOGRAPHY AND REFERENCES


APPENDIX A: REQUIREMENT ANALYSIS MEETINGS

Meetings with Mrs. Julie Joffray

Mrs. Julie Joffray is the Accommodations Specialist at Disabled Student Services, TAMUCC.

Following are the excerpts from the interview:

1. Background information about the existing system.

2. Need for making the current manual system into an automated and user-friendly system so that the students can go online and perform some of the activities where they do not require being at the University.

3. The discussions with Mrs. Joffray gave a general feeling of how the whole system might look.

4. She explained thoroughly the scope of this project. She also described the number of different users that will be accessing this system.

5. She emphasized the importance of having a secure system as it deals with the Disabled Students confidential information and the whole system would hold very critical information.

6. The platform and languages that will be used were also discussed.

7. Mrs. Joffray explained how the DSS functions and what are the security levels and the permissions to be given to the DSS staff where it restricts them from looking at some of the confidential information pertaining to the student.

8. There were some suggestions made to expand the work for visually impaired users, and the DSS requirements for future.
APPENDIX B: Data Dictionary of High-Level Data Flow Diagram

1. Actual Database Files – The actual database files as stored inside the database system.
2. Create Email Request – The request by PHP scripts to the mail server to send an email.
3. Database Server – The back end database that will process all queries and give appropriate results.
4. Email – The email that is sent to the user.
5. HTML document – The resulting HTML document from the processing by the server.
6. Host – The whole system with the web server, the PHP scripts and the Mail Server.
8. Mail Server – This is a mail server of any standard mail system
9. MySQL – This is the database management system that is used for this project
10. Output – The various results that the user can view on the browser.
11. PHP scripts – The actual scripts which will have the coding to process all the requests.
12. Query Results – The results from the queries.
13. Request – The request the web server gives to the PHP engine.
14. SQL Query – Any legal query in Structured Query Language to the MySQL server.
15. URL containing parameters – The parameters which were input by user in the various forms.
16. User – The various users of this system.
17. Web Browser – The application that allows accessing the system through the Internet.
18. Web Server – The server side application that accesses the PHP scripts. It is responsible for validating all the client requests and sending an appropriate response.
APPENDIX C: USER REACTION SURVEY FORM

Resource Management System for Disability Services (RMSDS)