

Development of a Student Database Management System for a University

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ABSTRACT

In this scholarly thesis pertinent to the setting up of a automated student performance record management system which enables the users of a university like student and faculty to access the important information with ease through a user friendly web application. This proposed system aims at eliminating the practice of time consuming and vulnerable tradition of manual maintenance of student information in paper at the very basic level. In a university there are many departments all these departments provide various records regarding student. Most of these track records need to maintain information about the students. Thus by proposing a computerizes student record management system will enable the users to access data at any time and any place. The student web portal enables huge storage of data and easy retrieval. There are many departments in a college thus but introducing a student web portal will centralize the administration and the entire system will work as one single entity. The paper work would be reduced and number of workers in each department staff also reduces as one single operator can run this web application

Keywords: database, design, MySql, deployment, software modeling.

I. INTRODUCTION

Management information system (MIS) is a branch in industrial engineering and information management is now widely used around the world through database management system, many sub-roots of MIS are derived and in different departments and organization all around the world.

Some among them which are widely used are:-

- 1) Hospital database management system
- 2) Restaurant database management system
- 3) Salary database management system
- 4) Whole shale database management system

Thus this project deals with a concept derived from MIS, it is a unique attempt to aid the management of information of students in a university know as Student Database Management System.

What is student database management system?

A student database management system is automation of manual performance record management which enables the user to assess necessary data at any place and any time through internet. The student web portal contains a login page where after providing the login details the home page is appeared for the user where it shows important notifications and activities in the college like semester fee payment dates, exam registration,

change in exam time table, workshops or fests to be held, etc. the student can check his attendance a, semester marks and mid-exam marks for every semester which enables them to improve his performance in forthcoming semester. The faculty can also make changes in marks in case of any mistake immediately which eliminate the time consuming activities like registering a complaint and then faculty approving it then the administration making changes. The labs module also mentions the list of equipment and list of experiments done in the labs. The library section provides information about the availability of the books and journals in it. The admin module allows admin to make changes in faculty and student academic and personal details.

II. OVER VIEW OF SYSTEM

• Student Management

Create student profiles with unlimited custom categories and fields including demographic data, enrollment, attendance, schedule and more, and share academic records with faculties, and administrators.

• Enrollment

Enroll for academic courses and monitor the progress of students through the degree program with the flexibility to view course timetable and events in the calendar.

- **Attendance**
Allows teachers to mark attendance in the class and send attendance reports to administrators. Streamline attendance tracking and additionally further upgrade the system to automatically send notifications to parents through SMS, email, and messaging.
- **Grades**
Enables students to check their academic track record time to time and improve their performance and increase their CGPA.
- **Results**
Shows the results of every semester – the marks obtained in mid sectional exams and grades obtained in semester.
- **Labs scheduling**
This feature includes the time table / schedule of all the labs present in that particular department, the list of experiments and list of equipment present in the labs.
- **Library**
Provides data on the available books and journal papers in the library department wise and details of the library in charge and time of library availability.
- **Faculty details**
The faculty details includes the contact details of each and industrial professor like e-mail address and office number and professional details like designation , specialization, qualification department wise
- **Admin Module**
The admin module enables the administrator to update information time and time of all details regarding the student, faculty, labs, examination details, etc.
- **Notification**
Home page provides the important notification regarding fee payment, semester registration, etc. which would aid in being aware of important activities within the university

1.1 Statement of Problem

In present system all work is done on papers manually. The attendance in the present system is maintained in register books. The semester marks and mid sectional exam marks are maintained in papers. The student cannot access his/her academic details at all time and moreover searching for his marks in those set of papers is a time consuming activity. Disadvantages of present working system:-

- The data storage is relatively difficult in papers, files and registers. The retrieval of any data like marks attendance is time consuming
- Possibility of loss of data or any other malpractices.

- Updating of new data like mid1, marks mid2, marks, attendance of current month time to time is not possible.
- More number of workers dealing with the student information management.

1.2 Objective of the model

- The use of automated student database management system in place of papers.
- Obtaining a college web portal should provide all data and upgrade data time to time which should also improves transparency.
- The web portal should reduce the time consumption in assessing data.
- One system operator will be enough for deploying and maintaining data thus reduces the number of workers in the office staff.

III. SOFTWARE DEVELOPMENT LIFE CYCLE(SDLC)

The student web portal is nothing but a web application. The development of this web application is done by following the steps in a software development life cycle. Thus a right SDLC should be selected, and generally for web applications we use agile methodology. The steps involve are requirement analysis, designing, coding, deploying and maintenance.

3.1 Agile Software Development Model (ASDM)

It is based on iterative and incremental development, where requirements and solutions evolve through collaboration between cross-functional teams. It can be used with any type of the project, but it needs more involvement from customer and to be interactive. Also, it can be used when the customer needs to have some functional requirement ready. So this agile development is used with continuous focus on functional and non-functional requirement of the system and setting a logical and simplified solution to staff management problem and student accessibility problem.



The phases involved in agile software development model are as follows

IV. PHASES IN AGILE DEVELOPMENT

4.1 Requirement phase

The requirement phase involves the gathering of necessities and demands of each category of user – student and faculty .then prioritizing these requirements like software system availability. The requirements are of 2 types:-

Functional requirements:

- a) Student Admission
- b) Library books Management
- c) Student Attendance Management
- d) Examination Management
- e) Mark Evaluation Management

Non-Functional Requirements:

- a) Security
- b) Performance
- c) User friendly
- d) Maintainability

Student Requirements

- 1) To manage his/her data personal and academic performance details properly
- 2) To easily assess his/her marks of any previous semester or mid examination
- 3) To track his/her attendance and improve it
- 4) To get all up-to-date notifications or activities in his/her department.
- 5) To check time-table
- 6) To check availability of books in department library.
- 7) To check his/her academic details from anywhere and at any time via internet

Faculty Requirement

- 1) To evaluate and update marks of the students.
- 2) To make corrections in the marks of the student in case of any mistake.
- 3) To make corrections in attendance in case of any mistake.
- 4) To update their personal and professional details.
- 5) To get all up-to-date notifications or activities in his/her department.

Administrator Requirement

- 1) To create a user friendly interface this is easily interpretable.
- 2) To have stable system performance.
- 3) To provide security for the portal to avoid intervention of outsiders
- 4) To have easy maintainability of the portal
- 5) To be able to integrate the portal with any additional feature in future with disturbing the portal basic structure and frame-work.

System Requirements:

System Development Software Tools

- MySQL database to store and secure information.
- JQuery, JavaScript, CSS, HTML to develop the system.
- Apache Tomcat Server 8.0 for testing the application during development.

System Hardware Development Tools

- Microprocessor: Intel(R) Core(TM)i5-6200U CPU @ 2.3 GHz
- RAM: 8 GB of RAM
- Hard Disk: 1 terabytes (TB) on installation drive

Operating Systems:

- Windows 10 Pro 64 bits Operating System for developing this system.

4.2 Design Phase

4.2.1 Interface Design

The interface design focuses on the layout of the entire web portal that are actually visible to the users after deploying it into real time environment. The interface design only shows the physical framework of each web page in the portal .These is depicted through a set of UML diagrams. These diagrams are data flow diagrams, class diagrams, sequence diagram and entity relationship diagram.

4.2.2 Modular Design

The modular design involves the process of classifying the web portal elements into different sub-systems. The modular design of this web application is divided into collage details- which shows the college images, important notifications and activates in the college, student details- which shows student performance track record and faculty details- which shows faculty personal and professional details.

4.2.3 Database Design:

The database design involves the creating of tables where each table deals a particular set of information and each table contains columns where each column is a field name the data is inserted into the column. The database used in the making of this student web portal is oracle MySql4.1.3. There are a total of 7 tables for mid marks, 7 tables for semester grades and 1 table each for faculty, attendance and student details in the database. The web portal takes information by accessing the database the database is provided with commit, roll back and run options to make changes in the data. There are primary key fields that uniquely identify a record in a table. There are also fields that contain primary key from another table called foreign keys.

The case diagram for portal

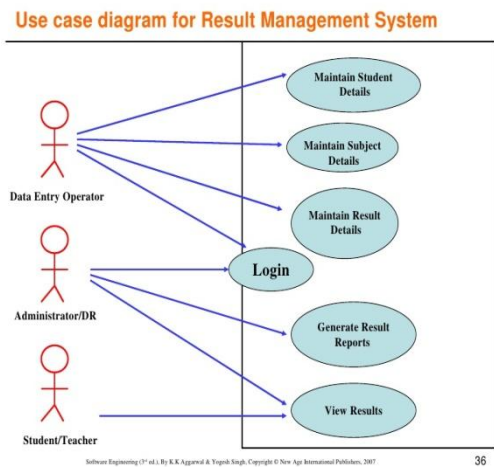


Figure 4.1

The data flow diagram for the portal:

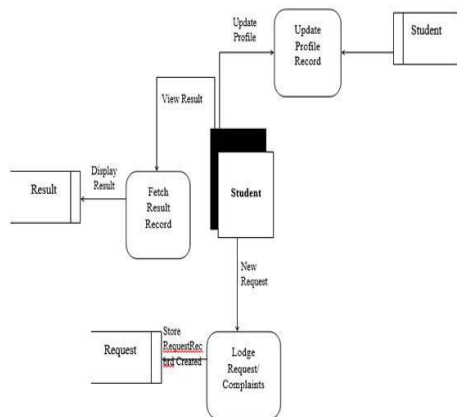


Figure 4.2

Data Flow Diagram for Student's Level

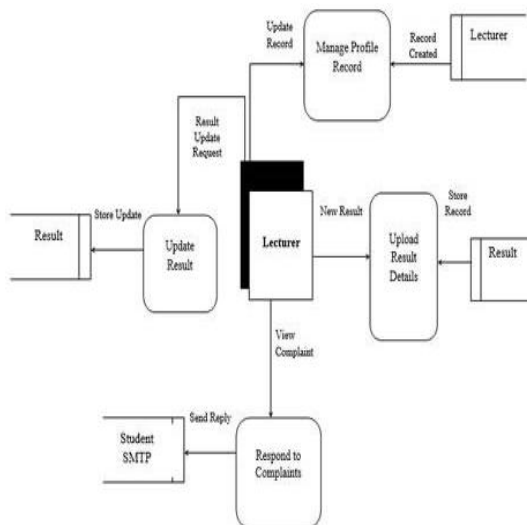


Figure 4.3

Data Flow Diagram Lecturer's Level

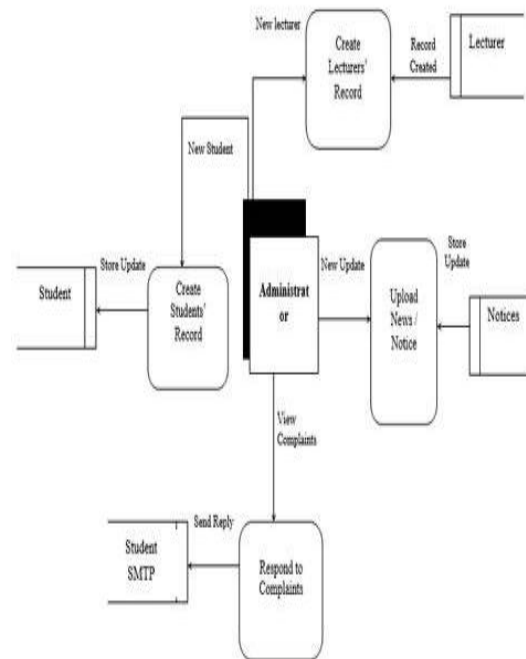


Figure 4.4

Data Flow Diagram for Administrator's Level

4.3 Implementation / Coding Phase

The coding used for programming this student information portal are JavaScript is one of the 3languages used in web developing are:

1. **HTML** to define the content of web pages
2. **CSS** to specify the layout of web pages
3. **JavaScript** to program the behavior of web pages

HTML

The HTML is hypertext markup language which is used to add and arrange contents in our web page. The html file is structured as initially the document type is mentioned then in header tags the name of portal will be mentioned. The body tag will contain the content of the web page the image file or multi-media file is given as attachment and paragraph tags the description is given . The CSS is also added into html file by typing style tag and write CSS codes within the tags or even add the java script by typing scripts tag and write java scripts within it.

The tags used in html in programming this web portal are:-

<!DOCTYPE> : defines the document type
 <html> : all content in a page is within the html tags and closed with </html>

<head> : the heading of any content in a html is put within this head tag, then it displays the heading separately in the web page. The size of the heading can be varied by using:

- <h1> : for larger size text
- <h2> : for smaller text size
- <h3> : for more smaller text size

<title> : the name of the web page is given within title tags which appears on web browser tab.
 <a> : it stands for attribute which creates a hyper link in the web page
 : this maker the hyper link created within the attribute to navigate to another page.
 <imgsrc= ""> : this enables developer to import an image into the web page , the image URL is given within the inverted commas.
 : it stands for unordered list , here the unorganized data is given which will display each item in output with bullets.
 : it stands for list item generally within unordered list tag .
 : it stands for ordered list which will display items in output with numbers.

Cascading style sheets (CSS)

The word CSS stands for cascading style sheets which is used for styling the web page and making the web page layout more attractive and easy to interpret. The CSS helps the content in web page mentioned in html to be organized in a logical and understandable manner. The CSS can be mentioned in a web application in two ways

- 1) By writing the CSS codes like background color, adjusting the margin and padding, etc. within the <style> tags and running the program for output.
- 2) By writing all the CSS codes in a different file and mentioning the file name like <link href= "style/filename.css "rel= "filename.css" >.The link href creates a hyper extension which navigates to other for CSS styling.

Some CSS codes used in designing this portal are-margin, padding, color, text, tables, background color, height, width, lists, outline, border, position ,etc.

JAVA SCRIPT

JavaScript are used as a programming language for web pages. The java scripts provide the behavioral implementation of the web page content. The functionality of each module in the page is given in javascripts. The entire javascript is given inside the html program within the <script> tag.

Function and interaction of codes at time of execution of the database in SDMS

- 1) The coding is done in 3 set of programs the initial input program is java file which will contain the details of verifying the username and password in the connection manager and the producing the result set and displaying the output statement as either login is successful or invalid

username or password. The input java file will create a bean file in the end.

- 2) The java bean file which is created earlier will be assigned with values from the database which will enable the bean file to carry the data whenever called.
- 3) The java servlet page also known as jsp file in short is the output program which will contain output display page design details and actual attendance data in it. When a user performs an action the web portals ip address will interact with the server and present the out , this output is in the jsp file

Steps To Create And Insert Data Into Database:

The database used is oracle 12c and the integrated development environment used is oracle SQL developer 4.1.3

1) Create Database Connection

- After installing SQL developer initially click on connections button. A drop box appears the connection name is given as HR-PDB12c and username and password are set.
- The service name given is PDBORCL which our pluggable database click on test after the test status is successful connect and save the connection

2) Creating tables for data

- Once connection is set up click on HR-PDB12c file any various options are available like tables, editing views, java, etc. click on tables option and choose new tables options. A new table is set add columns and give data type "string" for names "int" for numbers.

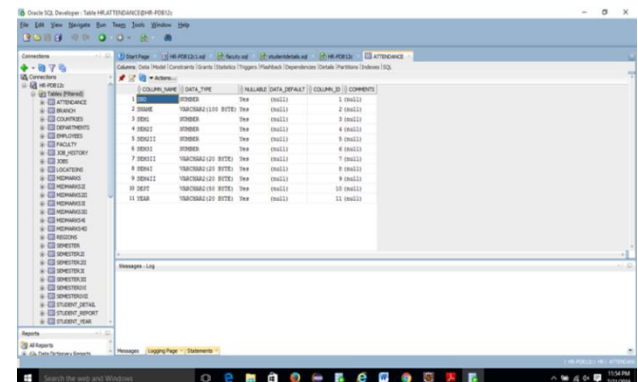


Figure 3.13

- Insert data into those tables and run the database.

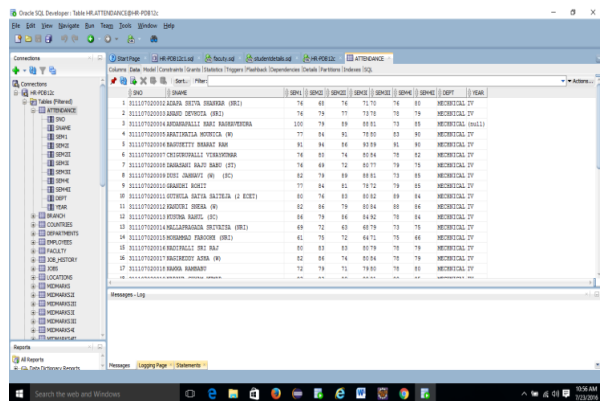


Figure 3.14

Steps To Run the Code

- The code is written in eclipse software which is a integrated development environment and it provides facility to run the code in it
- Create a database configuration file which checks the username and password before assessing data from database
- Create a .java file which contains class names in it. These class names contains the details of the input data
- When an action is performed the portal IP address hits the server to display the output. Here when an action is performed the java file carries the input and communicates to server through .jsp file which is a java servlet page
- The .jsp file displays the output for any action in the portal the data from the database is transferred through java Bean files which contain the actual output. This bean file is created in .java file and server communication with .jsp file is done through this bean file
- The code is run on eclipse the server used is apache tomcat 8.0 and we need to give the default browser in which our portal should run
- The output would be the portal running successfully

4.4 Testing Phase

Testing is a process of checking the software performance. The testing phase is debugging the errors encountered after the system functions as a whole. The testing includes testing a system dividing it into smaller entities, testing the looping of these small entities and working of system as a whole in actual user environment

4.4.1 Unit Testing

In this test the entire system is divided into smaller entities and each entity is known as a unit and each unit is testes one at a time. The test ensures the working of each module as per the requirement in functionality point of view rather actual module visible to the user.

4.4.2 Integration Testing

In this test each unit is looped together to form a long and continuous chain of modules till it does not cover the entire system. The test checks the behavior of the interface. This test is generally performed after unit test.

4.4.3 Regression Testing

This test is performed after the integrating test where the system is checked if it gives the desired output for the expected input data from user.

4.5 Deployment Phase

After successful testing the product is deployed to the customer for their use. As soon as the product is given to the customers they will first do the beta testing. If any changes are required or if any bugs are caught, then they will report it to the engineering team. Once those changes are made or the bugs are fixed then the final deployment will happen.

The major steps involved in this phase are:

Acquisition and Installation of Hardware and Software

- Conversion
- User Training
- Documentation

Generally following two types of documentations are prepared for any system

4.6 Maintenance Phase

The maintenance phase involves the regular checkup of the web application in actual user environment. After deploying the web portal in actual user environment the actual problem arises so one needs to attend to these bugs and fix it immediately. The problem usually arises due to the different versions and combination of software used like for example when we are using a previous version also java for SQL developer or previous version of database like 10g or 11g and developing the web application using 64 bit or 32 bit operating system or using windows XP, 7 or 10. These cause errors in the time of execution of the web application. The maintenance activities are of two type's adaptive maintenance where the software is tested on latest versions of operating system or on different devices. The other is corrective maintenance where the regular check-up takes place before any bugs appear.

V. RESULTS

5.1 Home Page

This is the page displayed after the student logs into the portal.

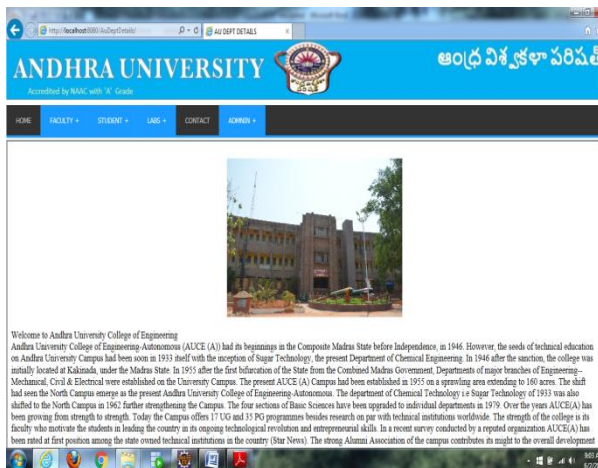


Figure 5.1



Figure 5.3

5.2 Student Module

The student module gives access to data regarding student-i.e. student internal marks, semester marks and attendance.

For Attendance

Go to Student module > Mechanical >Attendance

For Mid marks

Go to Student module > Mechanical >Mid marks

For Semester marks

Go to Student module > Mechanical >Semester marks



Figure 5.2

5.3 Faculty module

The faculty modules provides information of each professor in the particular department.

Go to faculty module > Mechanical department

5.4 Labs module

The labs modules give information of number of labs in that particular department

Go to labs module > Mechanical department



Figure 5.4

On selecting the option of lab in the table displayed on screen it takes us to the info page of the lab

Click on Department library



Figure 5.5

5.5 Contact module

Provides information of contact to the university authorities



Figure 5.6

5.6 Admin module

One of the major highlights of the portal is this module it gives the facility to edit and update data of other modules importantly the information on student module and information in faculty module.



Figure 5.7

Go to admin module > select student/faculty module > choice of data to be updated
 For updating data
 Input student Reg. No/ faculty name >click on get > update data > click on update

VI. CONCLUSION

The portal was designed for a very basic purpose for maintaining student data like –mid marks, semester grades, CGPA, SGPA, personal data, attendance and faculty data in a dynamic manner. The portal was programmed using simple and livid codes .The use of highly user friendly software like oracle 12c database, SQL developer for accessing the database and eclipse mars 2.0 integrated development environment helps in designing the portal with ease and in desired

manner. The portal is embedded with a local server through the software Apache tomcat 8.0 with server port 8015 and connector port 8020; this enables the portal to work on intranet. The portal used the following for enhancing its look and functionality- Hypertext markup language(HTML) was used for building web pages ,JavaScript's were used for programming web pages and Cascading style sheets(CSS) were used for styling the web page. The portal is provided with an admin login for updating the student and faculty information time to time. The portal eliminates the paper work which could lead to loss of data and data redundancy. The portal is enables its users to access, manage and update his/her data effectively and efficiently.

It allows for a centralized facility that can easily be modified and quickly shared among multiple users. Having a web based front end removes the requirement of users having to understand and use a database directly, and allows users to connect from anywhere with an internet connection and a basic web browser. It also allows the possibility of queries to obtain information for various surveys. Due to the many users reading and modifying student data in the department, it is an ideal use for such a system.

VII. FUTURE SCOPE

The following is just a sample of future opportunities that would help sustain the portal for undergraduates: -

1. One can upgrade this web portal to store subject video lectures under different professor names and also maintain the previous year's question papers in it.
2. The portal can be used to take day to day attendance and automatically send an SMS to the students and their parent.
3. One can deploy this web application into mobile android application and be used in smaller devices like mobile phones, tablets and notepads.
4. In future web portal can be combined with the university internal and external web sites. So that all courses in the university will have single web app.
5. Students can directly fill a resume forum system will use artificial intelligence and sent the resume to companies as per student requirement and eligibility criteria
6. The present system may be further upgraded in future even maintain the activities in hostel like hostel mess bill and attendance system even in hostels.
7. By using artificial intelligence the web portal may track the usage of Wi-Fi based on the students registered device.

VIII. NOMENCLATURE

SDLC- software development life cycle
SQL- structured query language
ASDM- agile software development model
DFD- data flow diagrams
CSS- cascading style sheets
HTML- hyper text markup language

XI. ACKNOWLEDGMENT

This project thesis and documentation is done with grim determination under strict tutelage of our mentor Dr. K. Venkata Subbiah and any claims raised by the third party for a facsimile unauthenticated copy is merely a coincidence and will be disavowed by the members of the batch. In addition, any attempts for emulating this thesis content and analysis will also be condemned and pertinent legal action will be sued against the third party. Finally we acknowledge the contribution of all those who have helped us directly or indirectly with their good wishes and constructive criticism which lead to successful completion of our Project.

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