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ELEN 4009 - Software Engineering

Student Marks/Records Management Software - Requirements Gathering

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1. Introduction

1.1 Methodology

The System Development Life Cycle (SDLC) methodology to be used for the project follows the Agile Model, this models breaks down the product into a cycle, it quickly delivers a working product and is a more realistic methodology. Ongoing releases are produced with small incremental changes and it depends heavily on customer interaction [1]. Specifically the Scrum Agile Model will be adopted for the project, Scrum comprises of short sprints and it enables the software team to be able to prioritize on what matters most. It is basically about delivering more often and getting feedback what is regularly responded to [2].

1.2 Purpose

The purpose of this document is to present a detailed description of the requirements for the student marks/record system (SMMS). It will state the purpose and features of the system, the interfaces of the system, what the system will do, the limitations under which it must operate, define inputs and the expected reaction of the system (that is the outputs of the system).

Student Marks/Records Management Software provides on-line services that enable students to view their marks as they complete assignments, tests and laboratory work, the software system allows staff such as course coordinators the right to add/edit marks obtained by the student under different forms of assessment. It is a convenient way for students to have access to their marks in a safe and confidential way as opposed to accessing them on notice boards where everyone else can publicly see them. The system ensures that each student can track his/her tentative progress throughout the year,it also helps in establishing errors in the record as early as possibly.

1.3 Project Scope

- There are three basic users of the system - Students, Course coordinators and School administrator.
- The primary function of the application is to allow students and staff to log-in using their details (Student/Staff number and password) and be able to access and view student records, the records include student marks for all forms of assessments for all courses registered for.
- The system database stores user profiles and student marks records. Marks records are retained for a period of 10 yrs.
- The software program should have domains assigned, i.e. each user can be able to access relevant information and they are allowed to view/edit/add based on what their recognised domain.
- The system would be accessed online via a Browser and/or a Smart-phone App.

Below is a list of privileges per user as specified on the project brief [3].

The Course Coordinator should be able to:-

- Register himself/herself.
- Add various assessment method for the course and weighting for each assessment.
- Enter student marks on a user-friendly interface.
- Display or print out the table of students and their marks.
- Generate a summary statistics of the performance of the students - maximum, minimum, average, standard deviation or variants of each assessment.
- View projected pass rate based on the assessment marks accumulated students in class.

The School Administrator should be able to:-

- Register himself/herself.
- Display or print out table of students and their marks.
- Generate a summary statistics of the performance f the students.
- Generate a comparative chart of the assessment marks of selected courses being taken by students of a particular group.
- Histogram of assessment marks of all courses taken a specific student.
- Any recorded offences (e.g. plagiarism) for a student.

- The performances in the same course across different years may be compared.

The Student should be able to:-

- Register himself/herself.
- Display assessment marks for a course and statistics for that assessment.
- Display assessment marks for all the courses
- Based on current assessment marks, give what performance goals are needed to pass the course.

1.4   List of Definitions and abbreviations

1.4.1   Definitions

Term	Definition
Database	A collection of records stored within the system
Table	A collection of related data consisting of columns and rows

1.4.2   Abbreviations   **SMMS** - Student Marks/record management system

HTTP - Hypertext Transfer Protocol

HTML - HyperText Markup Language

RDBMS - Relational Database Management System

SQL - Structured Query Language

1.5   Tools used

Web server - Apache2

The Apache web server is the worlds most used web server software program, it uses HTTP to serve files that form web pages to users in response to their requests. It is an open source program [4, 5].

Development tools (Front-End) - HTML, CSS and Javascript

Development tools (Back-End) - PHP

PHP is a server scripting language, it is widely used, free, and efficient tool.

Database Platform - MySQL and PHPmyadmin

MySQL is an open-source RDBMS, it stores data in tables and PHPmyadmin is a graphical tool intended to handle administration of MySQL over the web.

1.6   Programs to install

To run the above mentioned programs these are the softwares to install: PHP, MySql and Apache.

2.   Expanded Description of the project

The software system will follow a Two-Tier Architecture due to its ease of use and maintainability as compared to a Three-Tier Architecture. However, the performance of a Two-Tier Architecture slows down with an increase in users [6], hence a Three-Tier Architecture will be implemented with an increase of the number of users. Figure 1 below shows the Two-Tier Architecture.

A Two-Tier Architecture is a software architecture where the interface runs on client and the data layer is stored on a server[7].
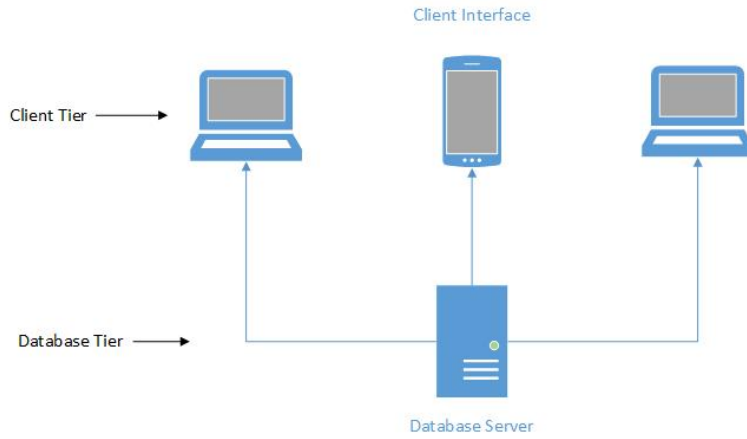
Figure 1 : Two-Tier Software Architecture

3. Overall Description

3.1 Constraints

- The User Interface language is English only.
- Students cannot view test marks, only the final marks.

3.2 ER Diagrams

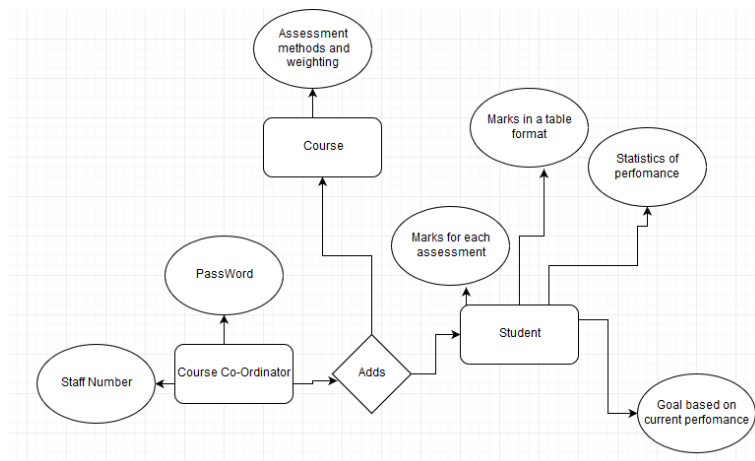The ER Diagrams show how data is organized within the database.

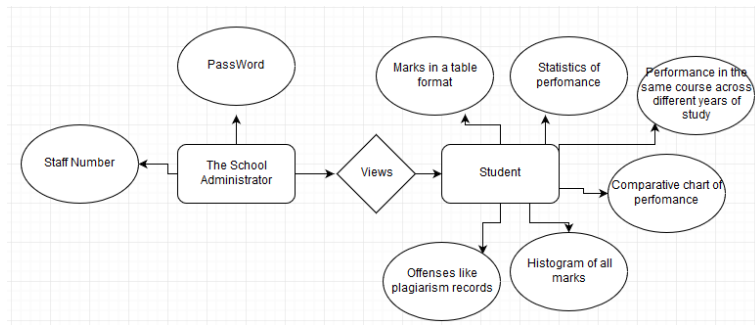Figure 2 : ER Diagram for Course co-ordinator and student

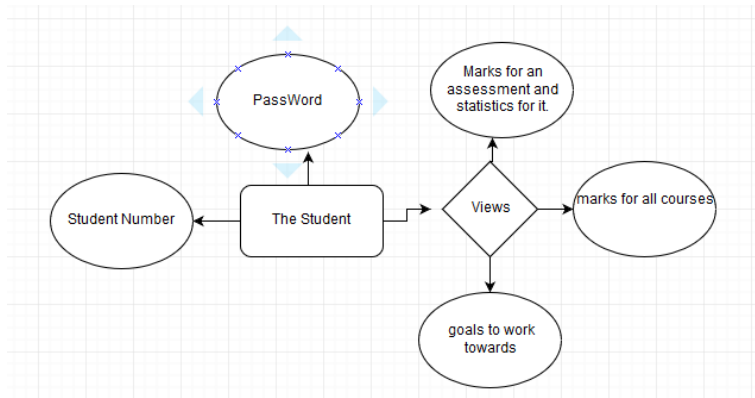Figure 3 : ER Diagram for the administrator and student

Figure 4 : ER Diagram for student

3.3 Hardware Specifications

Minimum Requirements

Client side

Windows	Processor	RAM	Disk Space
Internet Explorer	Intel Pentium III or AMD - 800 MHz	128 MB	100 MB
Google Chrome	Intel Pentium IV - SSE2 capable	128 MB	100 MB

Mac	Processor	RAM	Disk Space
Google Chrome	64 bit Intel processor	128 MB	100 MB

Linux	Processor	RAM	Disk Space
Google Chrome	Intel Pentium III processor	128 MB	100 MB

Server side

Linux	Processor	RAM	Disk Space
Apache 2	2 GHz processor or faster processor	1 GB (32 bit) or 2 GB (64 bit)	

Recommended Requirements

Client side

Windows	Processor	RAM	Disk Space
Internet Explorer	1 GHz or faster	1 GB (32 bit) or 2 GB (64 bit)	256 MB

Mac	Processor	RAM	Disk Space
Google Chrome	64 bit Intel processor	1 GB	256 MB

Linux	Processor	RAM	Disk Space
Google Chrome 1 GHz or faster	1 GB (32 bit) or 2 GB (64 bit)	256 MB	

Server side Server specifications will depend on the development of the project.

4. Specific Requirements

4.1 UML Activity Diagram

Figure 2 Shows the UML activity diagram of the how the software should work. As shown in the UML activity diagram, the user will first be ask to enter a user-name and a password. This is done to keep track of the type of user who will be interacting with the software i.e student, staff and admin. Each type of user will be given different rights to interact with the server as shown in the UML diagram. Students are only allowed to view the results, staff is allowed to change marks or add results and the administrator will be responsible of adding or removing users.

4.2 Use Case Reports

Since we have only three users of the software, namely student, staff and administrator, three use case reports have been made for each user.
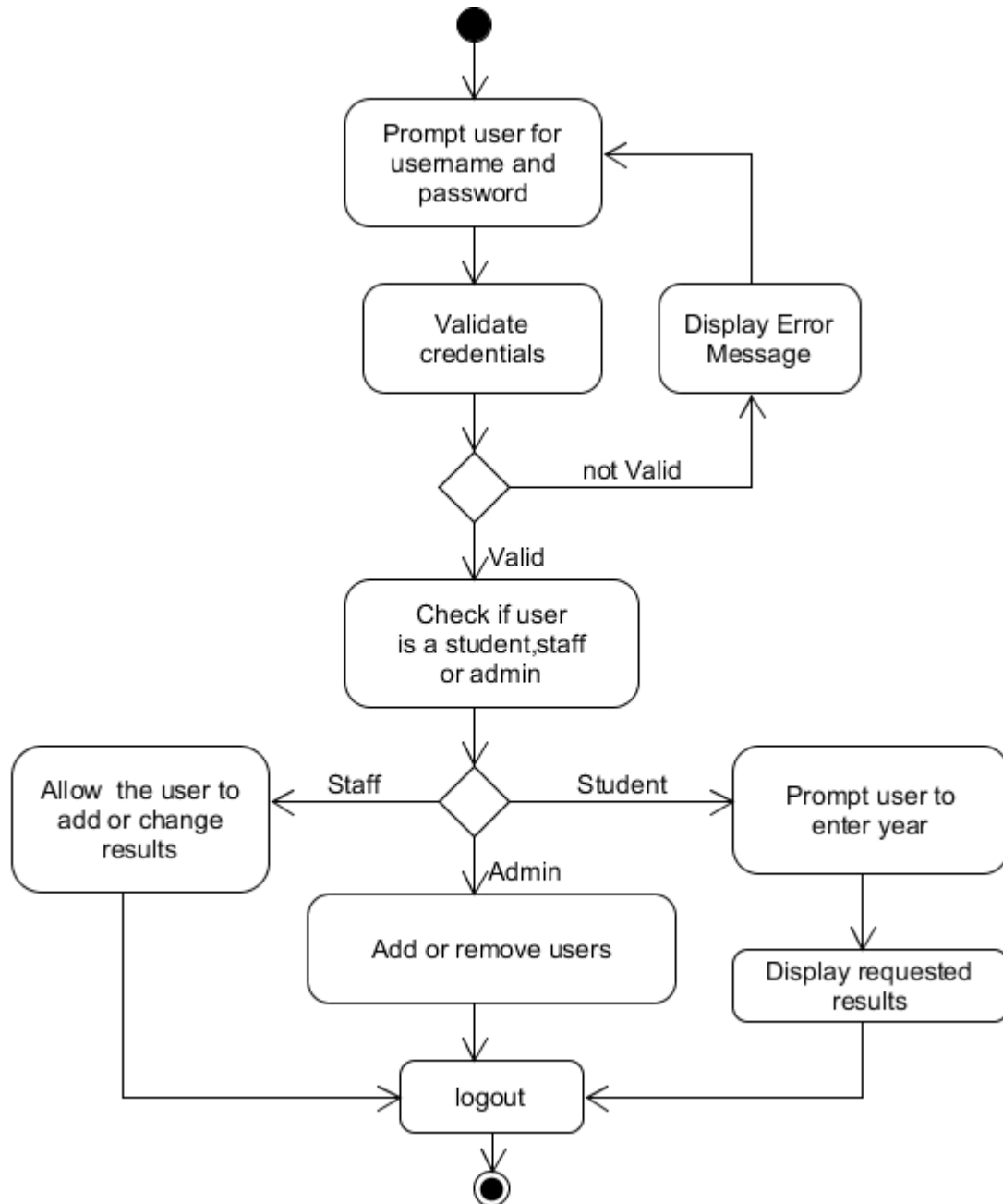
Figure 5 : UML Activity Diagram

4.3   Use Case Reports (Masana Khosa)

Since we have only three users of the software, namely student, staff and administrator, three use case reports have been made for each user.

A use case report for a student is shown in Figure 3.

Figure 6 : Use Case Diagram For Student
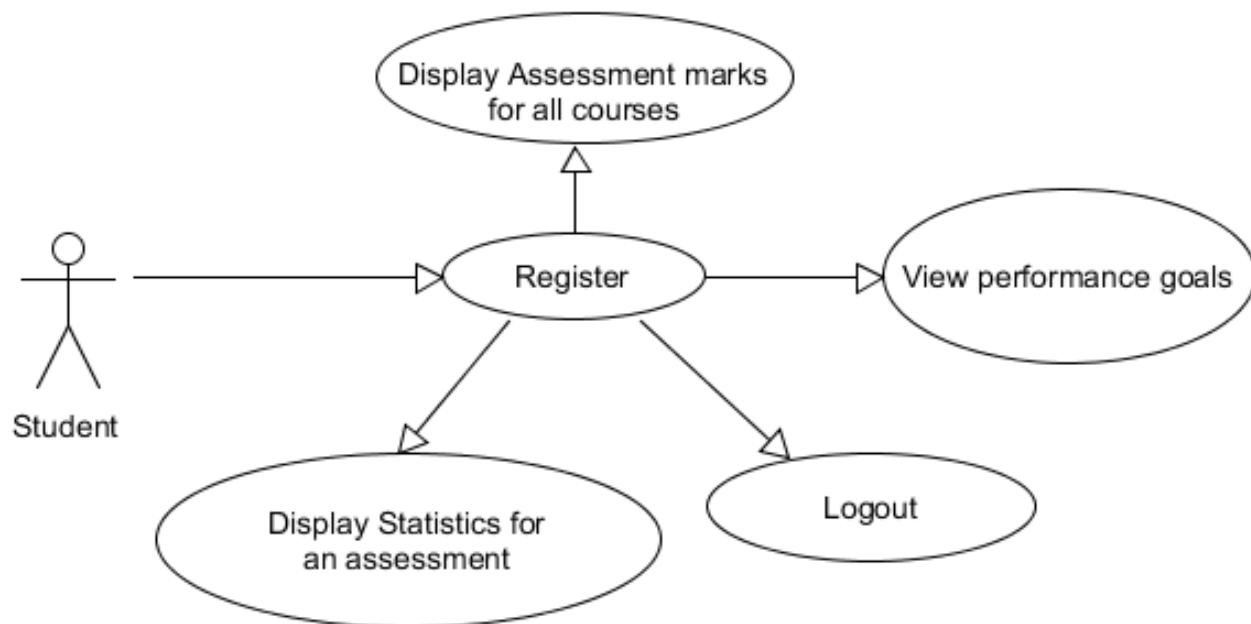
Use case	Description
Register	The student need to sign in in order to view the results
Display assessment marks	A student must be to display assessment marks for all courses
Statistics for an assessment	A student must be able to display assessment marks for a course and the statistics for that assessment
View performance goals	A student must be able to view what perfomance goals are needed to pass pass the course based on current assessment
Logout	The student must be able to logout

A use case report for Course Coordinator is shown in Figure 4.
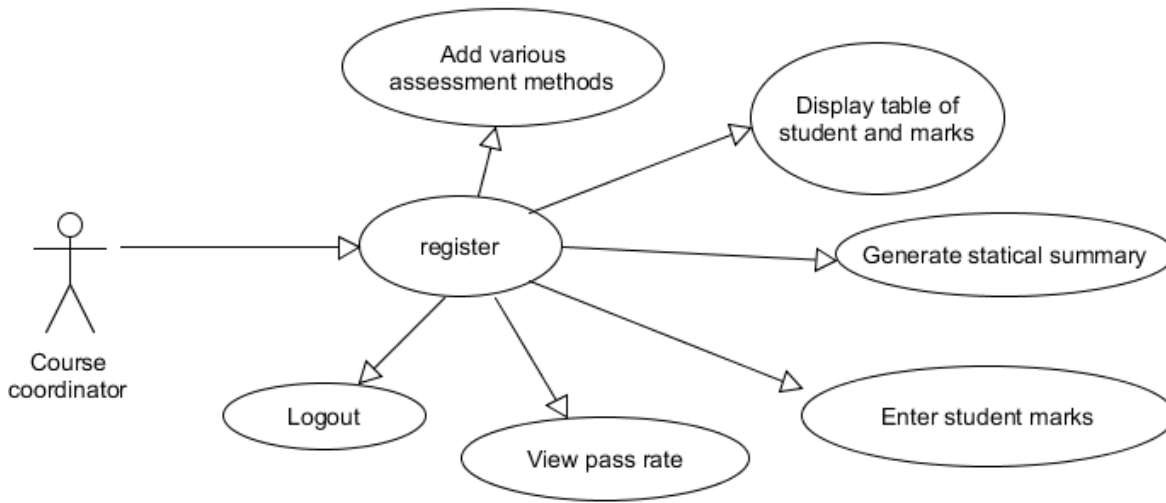
Figure 7 : Use Case Diagram For Staff

Use case	Description
Register	Staff need to sign in order to modify results
Add various assessment methods	Add various assessment method for the course and the weighting for each assessment
Display table of student and marks	Display or print out the table of studets and their marks
Generate statical summary	Generate A summary statistics of the perfomance of each student
Enter student marks	Enters the student's marks for each assessment in a user-friendly interface
View pass rate	View projected pass rate based on the assessment marks accumulated by the students in the class thus far
Logout	Coordinator member must be able to logout

4.3.3 Administrator Use-Case Report

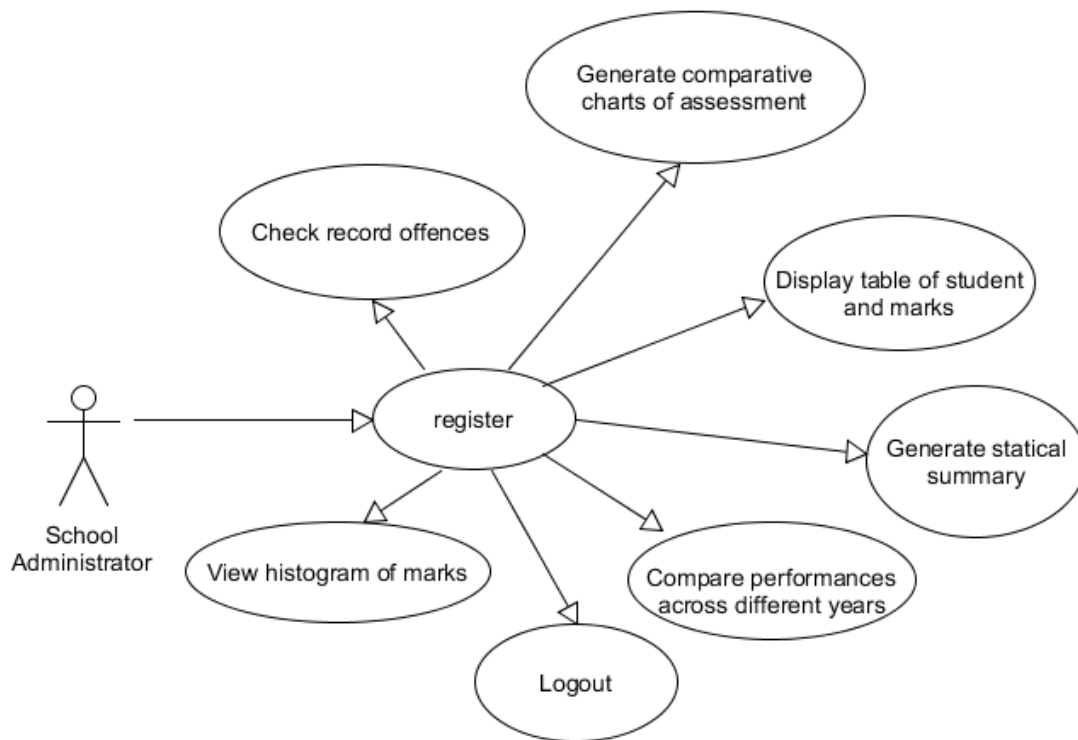A use case report for an Administrator is shown in Figure 5.

Figure 8 : Use Case Diagram For Administrator

Use case	Description
Register	Administrator need to sign in
Check record offences	The administrator must be able to check any record offences like plagiarism for a student
Generate comparative charts of assessment	Generate a comparative chart of the assessment marks of selected courses being taken by students of a particular group
Display table of student and marks	Display or print out the table of studets and their marks
Generate statical summary	Generate A summary statistics of the perfomance of each student
Compare performances across different years	compare performances in the same course across different years
View histogram of marks	View a histogram of assessment marks of all courses taken by a specific specific student
Logout	Administrator must be able to logout

5.   Sequence Diagram

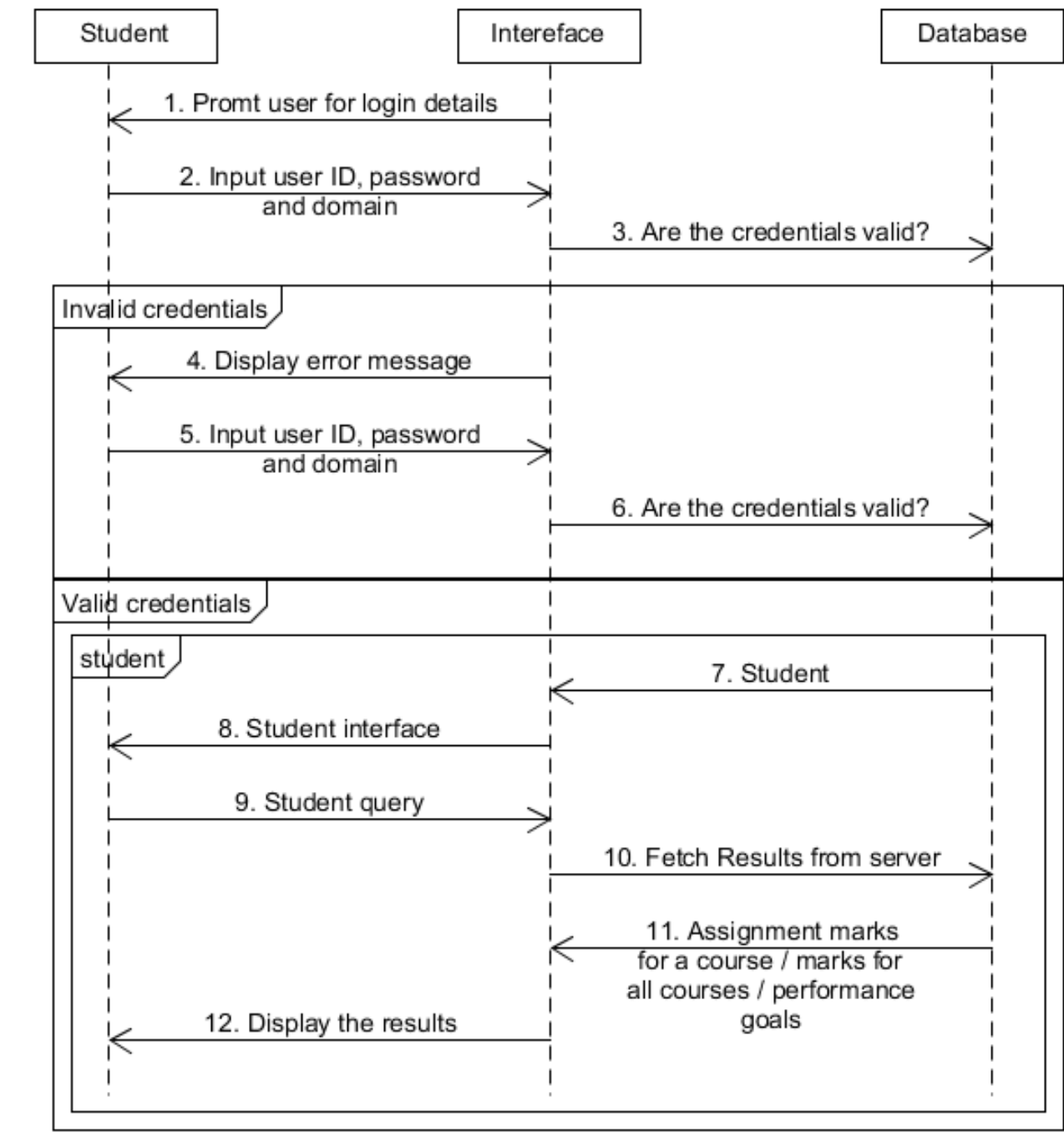The sequence diagram in Figure 11 shows Sequence diagram of a student.

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Figure 9 : Student Sequence Diagram

The sequence diagram in Figure 12 shows Sequence diagram of an administrator.
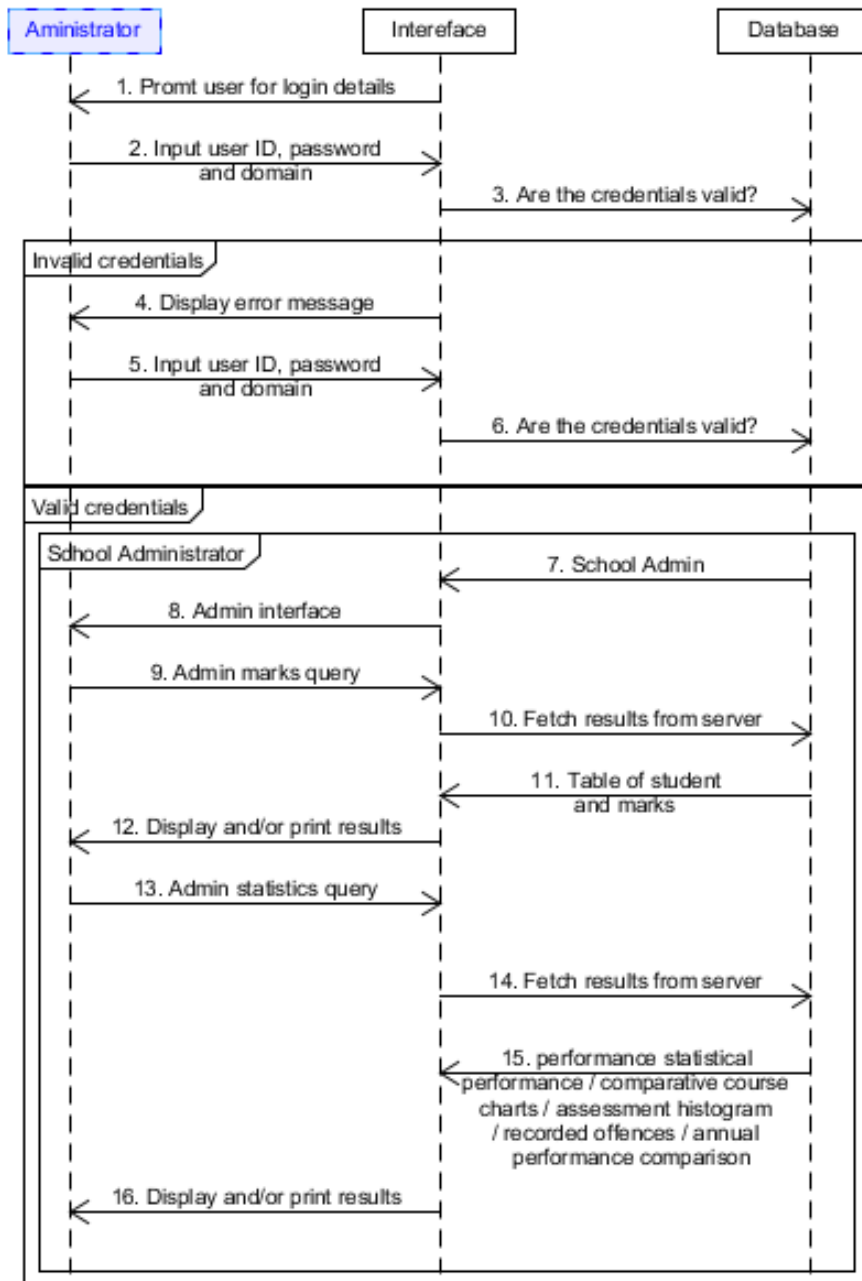
Figure 10 : Administrator Sequence Diagram

The sequence diagram in Figure 13 shows Sequence diagram of an course coordinator.
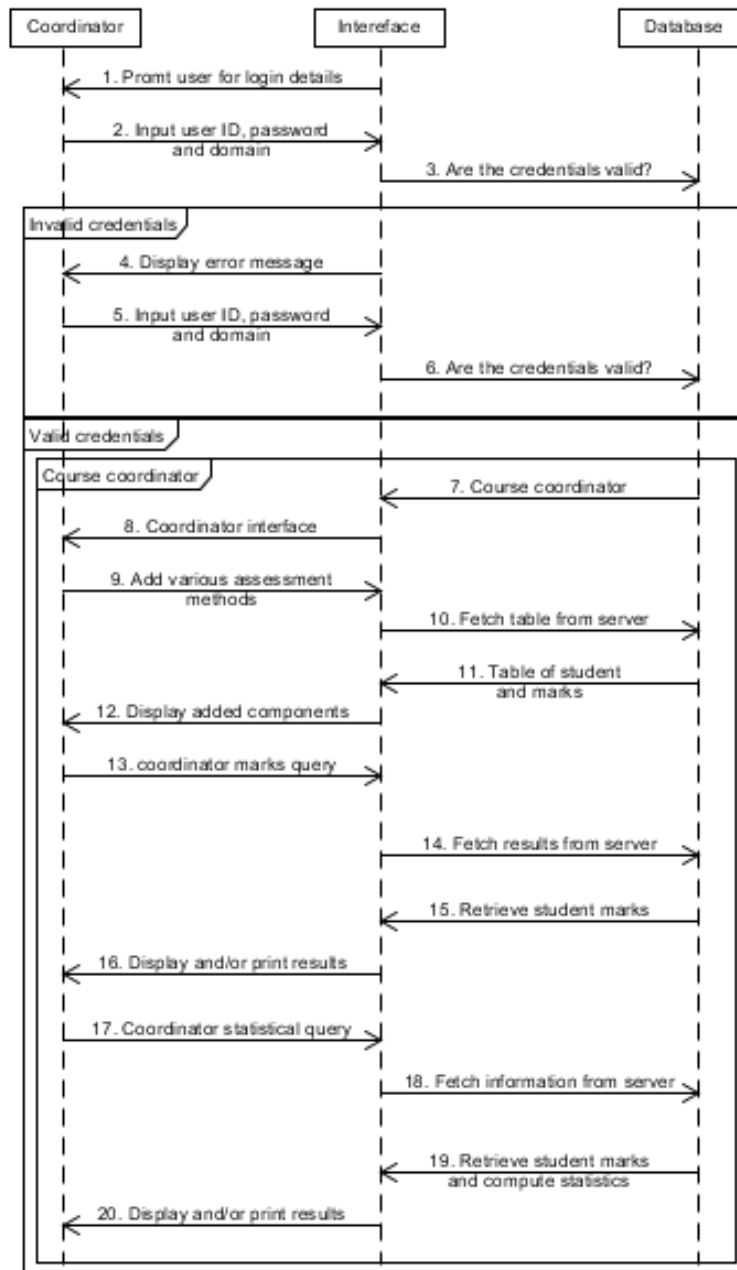
Figure 11 : Course Coordinator Sequence Diagram

6.   Responsibilities And The current prototype

6.1   Front-End

Masana Khosa and Londiwe Ngema are responsible for the front end, they designed the website page and the interfaces for the individual users. They also created domains to ensure that the user only has access to what they need. The current prototype allows users to log in and they are redirected to the different pages based on the scope above. Since there are different types of users with different privileges, they are distinguished using a domain. A student cannot log on the system as a stuff member and vice versa. When a user logs out they are directed to the home page.

6.2 Back-End

Sanele Gcaba and Tshegofatso Misapitso are responsible for the back end that is the database. The next step is to do the querying logic to link the back and front ends. The program is now able to log the registered users in and out based on the information from the database. Different interfaces can now be called upon for different users, i.e different interfaces for the school administrator, course co-ordinator and the students.

The developed Back-End constitute of a LAMP web server, this is hosted within a PC and accessible using a local host of a machine. The server that hosts the database was created using PHPmyadmin. The Back-end now has a database for users, it has a Username, Password and Domain. The back-end team has been able ensure a link between the front end interface and the login database.

The back-end: The proposed design of the back-end is to include a Linux Apache MySQL PHP(LAMP) installation.

The Linux operating system is chosen for the server to run on because of its Stability, Security and Cost of operation [8]. As a result Linux Mint operating system was chosen. The Linux is Just the base of the project that will allow the server to run off. The server proposed is an Apache server. This server is chosen because it is easy to install and operate. Apache will provide a secure, efficient and extensible server that provides HTTP services. The project requires that data is stored and later on read from. There is multiple datasets that need to be considered: for example multiple students that may be doing multiple courses and as a result a need for storing this data. MySQL was chosen because it is an open source database and large companies use it to save money and time powering their high volume websites [9].

PHP is selected as a server the scripting language. This is chosen because of the simplicity of the language and in addition JavaScript can be used to do client side validation to avoid overloading the server with server side validation. Validation would be necessary for authentication.

PHPMyadmin may be used in order to get a visual look of the database instead of having to type out queries in order to check that the data one expects to be in the database is actually in the database. Interacting: the client tries logging in:

- Client enters credentials, these credentials get validated onsubmit.
- If the credentials are correct: a PHP script is used to determine if the user is a student or staff member.
- If the user is a student then the student will only have certain privileges such as reading from the database only.
- If the user is an administrator or a staff member then they may be allowed to have different privileges to edit the database: such as alter student results and add new student onto the database.

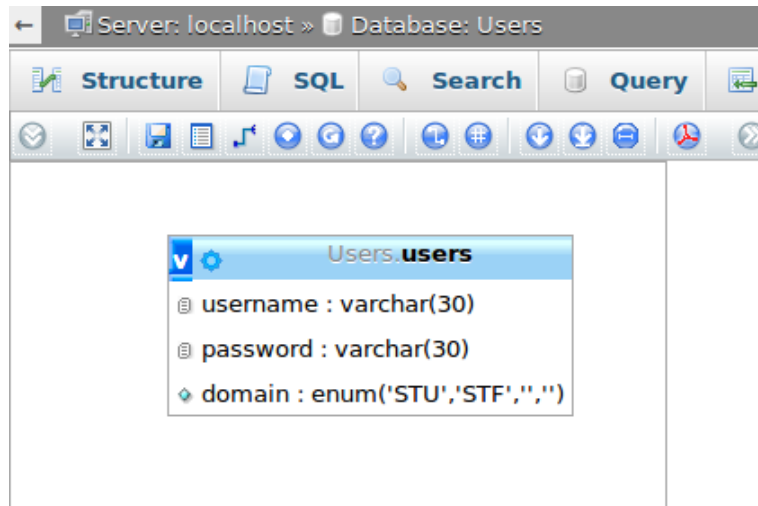Figure below shows the user database design.

Figure 12 : User Database

Additionally a student record Database was created and a figure below shows a structure for the database
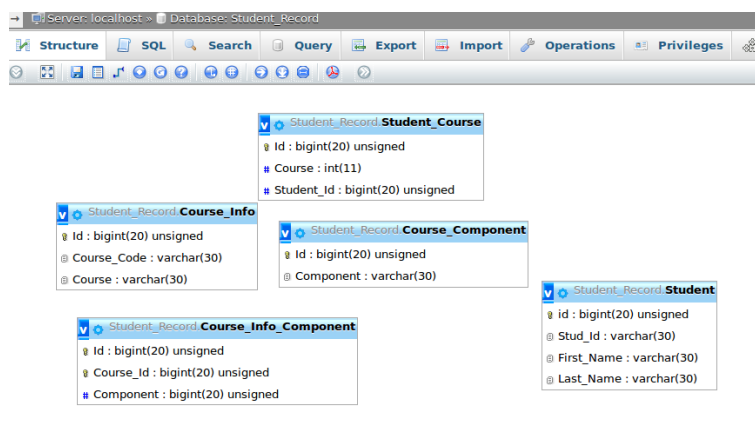

Figure 13 : Student Record Database

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