Database Management Project

Final Report, Section-5

Group-3

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CHAPTER-1: INTRODUCTION

A. BACKGROUND OF THE ORGANIZATION

Independent University Bangladesh (IUB) was founded in 1993 as a private university. IUB has developed to become one of the premier institutions in Bangladesh, with over 12,000 students and a faculty of over 500 people.

IUB currently has 5 academic schools.

1) School of Business & Entrepreneurship

2) School of Engineering, Technology, and Sciences

3) School of Environment & Life Sciences

4) School of Liberal Arts & Social Sciences

5) School of Pharmacy and Public Health

B. BACKGROUND OF THE PROJECT

Student Performance Monitoring System (SPMS 4.0) is a system used in educational institutions to implement Outcome-Based Education (OBE). The approach aids in the evaluation of students, instructors, schools, departments, and programs. The Higher Authorities of the educational institution can establish effective ways to increase educational quality by monitoring and evaluating data. SPMS 4.0 is intended to give educators with accurate and timely information regarding student progress and learning outcomes, allowing them to identify areas for improvement and make changes to the curriculum or teaching techniques.

C. OBJECTIVE OF THE PROJECT

SPMS 4.0 is a system that assists educational institutions in tracking the performance of students, teachers, departments, schools, and programs. It accomplishes this by keeping data on assessments like quizzes and exams, as well as course outlines and student grades, in a database. This data is used to assess how successfully students are completing their learning objectives, as well as to help teachers and schools discover areas for improvement. SPMS 4.0 also gives reports to higher authorities, which might assist them in making decisions to improve educational

quality. This technique is beneficial because it enables everyone to keep track of their performance and make changes to improve their learning results.

D. SCOPE OF THE PROJECT

The plan is to improve an existing web application by adding newly added features that will enable course outcome calculation based on the performance data of the students.

This will be done by adding new data fields to the existing application to capture important information such as student ID, educational year, semester, course and section, and grades.

Users will have the option of manually inputting the data or importing a CSV file, which will be used to extract data points and enter them into the database.

A new feature that will calculate the course outcome percentage, which will depend on the grading system used by the institution. The calculated course outcome percentage will be viewable to both students and faculty members through the web application. Students will be able to view individual course outcome percentages while faculty members will have access to all student outcome percentages in their course.

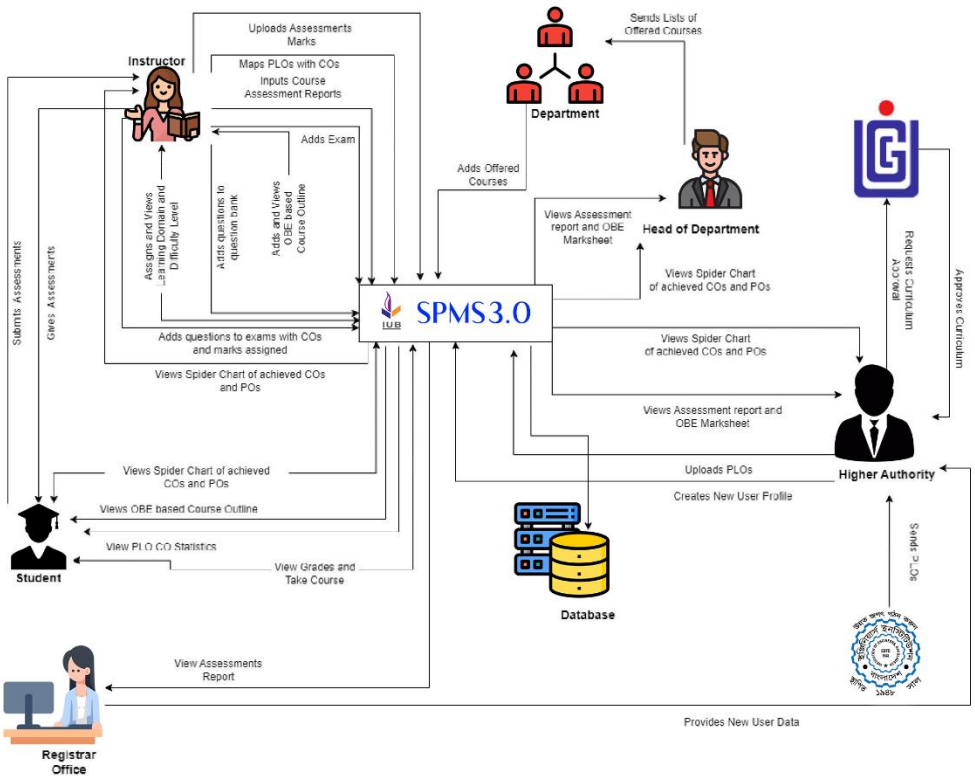
The new features will focus on user-friendliness, simplicity, analysis, and security. The user interface design will be kept simple, and effective security measures will be implemented to safeguard sensitive student information stored in the database.

CHAPTER-2: REQUIREMENT ANALYSIS

Requirement analysis means gathering and knowing what the people involved want and need for a project. It includes finding out, studying, putting in order requirements, and testing to make sure they match the project's goals. The aim is to make a simple and precise list of requirements for creating and testing a software system.

A. RICH PICTURE-EXISTING SYSTEM (SPMS 3.0)

A rich picture is an image that depicts a graphical representation that helps in understanding a complex system or problem by showing multiple components, connections, and interactions in a simplified manner. This allows people to identify important issues, explore potential solutions, and attain a shared understanding of the problem or system.



Here are the key stakeholders identified in this rich picture:

1. UGC
2. IEB
3. Higher Authorities such as VC, Dean, etc.
4. Department Head
5. Department Office
6. SPMSV3.0 Admin
7. Registers Office
8. Faculty
9. Students

Additionally, there is a component in the diagram labeled "Main Storage" which is also considered a stakeholder.

B. SIX-ELEMENT ANALYSIS- EXISTING SYSTEM (SPMS 3.0)

The rich picture reveals nine key processes involved in the system:

1. Creating, storing, and distributing course outlines
2. Adding questions to the question bank and grading answer scripts
3. Analyzing course-based student performance trends based on GPA
4. Evaluating faculty-based student performance based on GPA
5. Assessing course-wise PLO achievement of individual students
6. Monitoring student performance trends under the guidance of VC/Dean/Head of Department
7. Collecting CLO-PLO statistics for courses, programs, departments, and schools
8. Comparing expected vs achieved PLO for courses, students, departments, and schools
9. Determining the department average of total PLO achieved and attempted students
10. Analyzing student enrollment statistics for VC-wise, Dean-wise, and Department Head-wise.

To assess the impact of the six elements involved in each process, we can conduct a six-element analysis. The six elements include:

1. Human Involvement
2. Non-computing hardware
3. Computing hardware
4. Software
5. Database
6. Network and communication.

Preparing, storing, and giving Course Outline	**Faculty:** 1) Signs into the system using their ID and password. 2) Select the "Create Course Outline" tab. 3) Select from the options that they wish to add to their course outline. 4) Press the Create button. 5) Store the course outline in the system. **Students:** 1) Signs into the system using their ID and password. 2) Select Course 3)View/Download course outline from the system.		**Computer/ Laptop** 1) Used to Sign into SPMS 3.0 **Printer** 1) Used to print hard copies, of course, outlines if required.	**SPMS 3.0** 1) Used to store data in the database.	**SPMS 3.0 Database** 1) All valid data are stored here, which can be updated by SPMS 3.0 admins.	**Internet** 1) Used to Sign into SPMS 3.0

Add Questions to the question bank and grading the answer script	**Faculty:** 1) Signs into the system using their ID and password. 2) Select the course and choose the sections that have to solve the question. 3) Input the question in the		**Computer/ Laptop** 1) Used to Sign into SPMS 3.0 **Printer** 1) Used to print the grades gotten by the whole section.	**SPMS 3.0** 1) Used to store data in the database or generate a result graph using data from the database.	**SPMS 3.0 Database** 1) All valid data are stored here, which can be updated by SPMS 3.0 admins.	**Internet** 1) Used to Sign into SPMS 3.0
	question bank. 4) Press the Assign Button. 5) Grade the answers submitted by the students **Student:** 1) Signs into the system using their ID and password. 2) Answer the question assigned by the faculty in the answer bank					

Course based student performance trends according to GPA.	**Department Head:** 1) Signs into the system using their ID and password. 2) Input the time period and course ID to be viewed. 3) View student progress through a graph made after analysis and the GPA earned by the maximum/minimum /average students. **Faculty:** 1) Signs into the system using their ID and password. 2) Search for the course that they are teaching using the course ID and time period, and view the progress of those students in that course.		**Computer/ Laptop** 1) Used to sign into SPMS 3.0. **Printer** 1) Used to print a hard copy of the progress of the current semester's students and compare it with the progress of the previous semester's students who took that course.	**SPMS 3.0** 1)Used to store student Data into the database or generate a performance analysis graph using data from the database.	**SPMS 3.0 Database** 1) All valid data are stored here which can be updated by SPMS 3.0 admins.	**Internet** 1) Used to Sign into SPMS 3.0

	Student: 1) Signs into the system using their ID and password. 2) Search for the course using the course ID and view their progress in that course and the GPA they earned. **Dean/VC:** 1) Signs into the system using their ID and password. 2) Search for the course using course ID and time period and view the progress of the students of that course					

Faculty based student performance according to GPA	**Faculty:** 1) Signs into the system using their ID and password. 2) View the progress of the students who are being taught by them. **Department Head:** 1) Signs into the system using their ID and password. 2) Search for a faculty to be assessed using the faculty's name.		**Computer/ Laptop** 1) Used to Sign into SPMS 3.0 **Printer** 1) Used to print hard copy of a report of students who completed most the PLO achievements If needed.	**SPMS 3.0** 1) Used to store data and generate PLO automatically based on the CO provided**.**	**SPMS 3.0 Database** 1) All valid data are stored here which can be updated by SPMS 3.0 admins.	**Internet** 1) Used to Sign into SPMS 3.0 **wad**

	3) View the progress of the students who are being taught by that faculty based on the GPA earned by the students. **Dean/VC:** 1) Signs into the system using their ID and password. 2) Search for a faculty to be assessed using the faculty's name and Department ID. 3) View the progress of the students who are being taught by that faculty based on the GPA earned by the students.					

Course wise PLO achievement of a student	**VC/ Dean:** 1) Signs into the system using their ID and password. 2) Select PLO achievement Tab and search using Course ID 3) View the PLOs achieved by the student. **Department Head:** 1) Signs into the system using their ID and password. 2) Select PLO		**Computer/ Laptop** 1) Used to Sign into SPMS 3.0 **Printer** 1) Used to print hard copy of a report of students who completed most the PLO achievements If needed.	**SPMS 3.0** 1)Used to store Data and generate PLO automatically based on the CO provided	**SPMS 3.0 Database** 1) All valid data are stored here, which can be updated by SPMS 3.0 admins.	**Internet** 1) Used to Sign into SPMS 3.0

	achievement Tab and search using Course ID 3) View the PLOs achieved by the students. **Faculty:** 1) Signs into the system using their ID and password. 2) Select PLO achievement Tab and search using Course ID 3) View the PLOs achieved by the students in a course. **Student:** 1) Signs into the system using their ID and password. 2) View the PLOs they have achieved so far and how many they need to achieve to complete the course.					

Student performance trend under VC/Dean/Head of Department	**Dean:** 1) Signs into the system using their ID and password. 2) Search for Department Head to be checked using their Name and Department ID. 3) View student		**Computer/ Laptop** 1) Used to Sign into SPMS 3.0 **Printer** 1) Used to print the hard copy of the progress report if needed.	**SPMS 3.0** 1) Used to store data in the database or generate a performance analysis graph using data from the database.	**SPMS 3.0 Database** 1) All valid data are stored here, which can be updated by SPMS 3.0 admins.	**Internet** 1) Used to Sign into SPMS 3.0

	progress under them or them. **VC:** 1) Signs into the system using their ID and password. 2) Search for a Dean or Department Head to be checked using their Name and either School ID or Department ID. 3) View student progress under them. **Department Head:** 1) Signs into the system using their ID and password. 2) View student progress under them.					

Course, program, department, and school CLO-PLO statistics	**Dean/VC:** 1) Signs into the system using their ID and Password. 2) View CLO-PLO mapped statistics achieved by students. **Department Head:** 1) Signs into the system using their ID and Password. 2) View CLO-PLO mapped statistics achieved		**Computer/ Laptop** 1) Used to Sign into SPMS 3.0 **Printer** 1) Used to print the hard copy of the progress report if needed	**SPMS 3.0** 1) Used to store data in the database and generate CLO-PLO statistical data or graphs.	**SPMS 3.0 Database** 1) All valid data are stored here, which can be updated by SPMS 3.0 admins.	**Internet** 1) Used to Sign into SPMS 3.0

	by students. **Faculty:** 1) Signs into the system using their ID and password. 2) View CLO-PLO mapped statistics achieved by students. **Student:** 1) Signs into the system using their ID and password. 2) View CLO-PLO mapped statistics achieved by them and other students.					

Course, student, department school wise expected vs achieved PLO	**Dean/VC:** 1) Sign into the system using an ID and password. 2) View the students achieved PLO of the students during time entered that has been inputted and compare it to what was expected and achieved. Department Head: 1) Sign into the system using an ID and password. 2) View the		**Computer/ Laptop** 1) Used to Sign into SPMS 3.0 **Printer** 1) Used to print the hard copy of both the previous and current semester's achieved PLO to compare.	**SPMS 3.0** 1)Used to store data into the database or generate a performance analysis graph using data from the database.	**SPMS 3.0 Database** 1) All valid data are stored here, which can be updated by SPMS 3.0 admins.	**Internet** 1) Used to Sign into SPMS 3.0

	achieved PLO of the students during time entered that has been inputted and comparison between expected and achieved. **Faculty:** 1) Sign into the system using an ID and password. 2) View the achieved PLO of the students during time entered that has been inputted and comparison between expected and achieved. **Student:** 1) Sign into the system using an ID and password. 2) View the students achieved PLO of the students during time entered that has been inputted and comparison between expected and achieved.					

Department average of total PLO achieved and attempted students	**Dean/VC:** 1) Sign into the system using an ID and password. 2) Enter the time period of the semester wished to be viewed. 3) View the		**Computer/ Laptop** 1) Used to Sign into SPMS 3.0 **Printer** 1) Used to print the hard copy of PLO reports	**SPMS 3.0** 1)Used to store Data into the database or generate performance analysis graph using data from the	**SPMS 3.0 Database** 1) All valid data are stored here, which can be updated by SPMS 3.0 admins.	**Internet** 1) Used to Sign into SPMS 3.0

	departmental average of total PLO achieved along with the number of students who attempted. **Department Head:** 1) Sign into the system using an ID and password. 2) Enter the time period of the semester wished to be viewed. 3) View the departmental average of total PLO achieved along with the number of students who attempted. **Faculty:** 1) Sign into the system using an ID and password. 2) View the total departmental average of the PLO achieved by the students.			database.		

	Student: 1) Sign into the system using an ID and password. 2) View the total departmental average of the PLO achieved by the students					

Student Enrollment Statistics VC-wise, Dean-wise, Department Head-wise.	**VC** 1) Sign into the system using an ID and password. 2) Select Student Enrollment Statistics tab and select Year and Semester under that tab 3) View Student Enrollment Statistics of That Year and Semester. **Dean** 1) Sign into the system using an ID and password. 2) Select Student Enrollment Statistics tab and select Year and Semester under that tab 3) View Student Enrollment Statistics of That Year and Semester.		**Computer/ Laptop** 1) Used to Sign into SPMS4.0 **Printer** 1) Used to print the hard copy of Student enrollment statistics, if needed.	**SPMS 3.0** 1) Used to store data into the database and generate student enrollment statistics graphs.	**SPMS 3.0 Database** 1) All valid data are stored here, which can be updated by SPMS 3.0 admins.	**Internet** 1) Used to Sign into SPMS 3.0

	Department Head 1) Sign into the system using an ID and password. 2) Select the Student Enrollment Statistics tab and select Year and Semester under that tab.					

	3) View the Student Enrollment Statistics of That Year and Semester.					

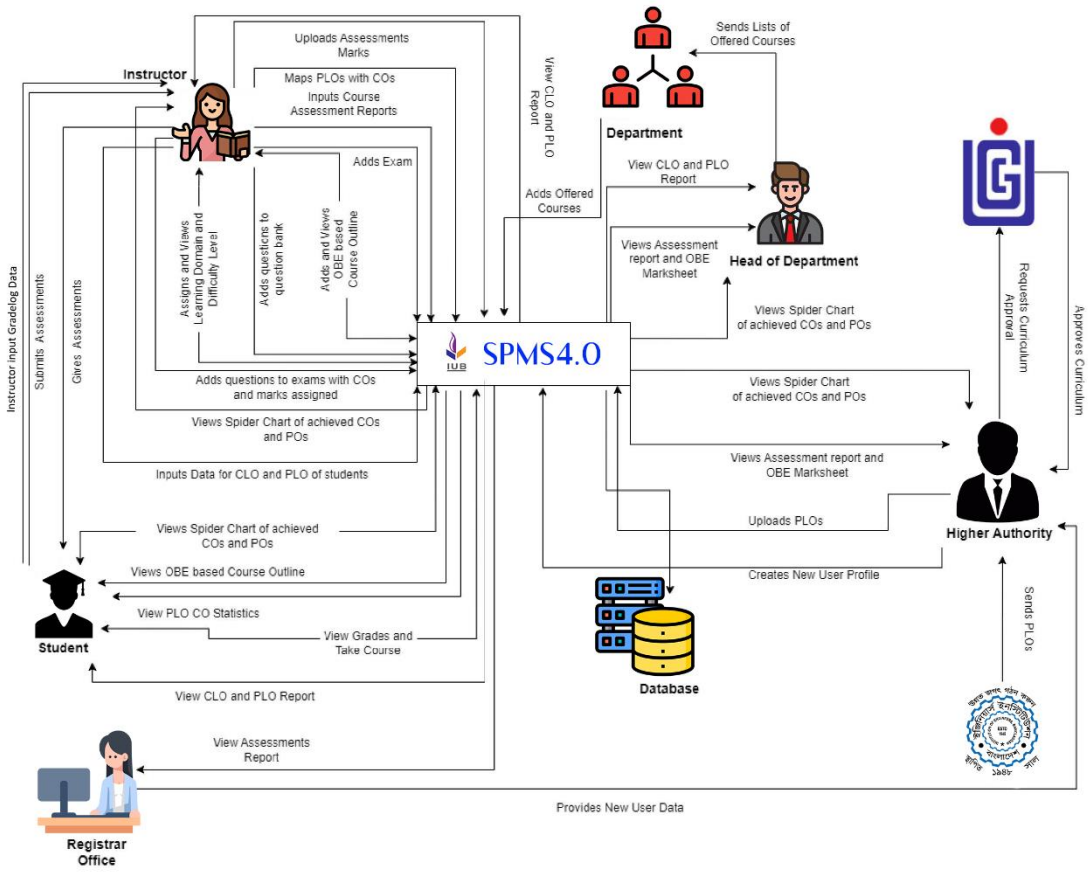
D. PROBLEM ANALYSIS-EXISTING SYSTEM (SPMS 3.0)

The problems in SPMS2.0 were analyzed, and the proposed solution are given in the following.

Process Name	Stake Holder	Concern	Analysis	Proposed Problem
Assessments and Grading	Faculty, Student	1) Answer Script and question paper condition, 2) Giving and Receiving Process, 3) Unreliable Storage, 4) Lack of Domain of Learning and Question Difficulty visibility	1) The Answer Scripts and question paper are stored in the database so there is no problem with physical storage space or condition of the paper, 2) Online submission of assessment saves time as it negates the necessity to submit a physical copy in person, 3) Use digital storage instead of physical storage, 4) Questions get their difficulty level and domain of learning automatically assigned according to the bloom's taxonomy once	The proposed solution will help eliminate the concerns/problems identified in the analysis.

			placed inside the question bank.	
Preparing and Storing Course Outline	Department Office, Faculty, Student	1) Waiting delay for receiving necessary resources, 2) Making Course Outline, 3) Condition of the Course Outline, 4) Giving and Receiving Process	1) Course Outlines can be automatically made inside SPMSV3 according to the things the Faculty wants to add in their outline, 2) Use digital storage instead of physical storage, 3) The Course Outlines can be stored into the database so there is no problem in physical storage, 3) The Course Outlines can be stored into the database so there is no problem in physical storage space or condition of the paper, 4) Students can download the Course Outline so there is no delay in receiving the outlines.	The proposed solution will help eliminate the concerns/problems identified in the analysis.

E. RICH PICTURE-PROPOSED SYSTEM (SPMS 4.0)



In this rich picture, the stakeholders include:

1. UGC
2. IEB
3. Higher Authority (VC, Dean etc.)
4. Department Head
5. Department Office
6. SPMSV2.0 Admin
7. Registers Office
8. Faculty
9. Student

The main storage system used in this scenario is SPMS V4.0.

F. SIX ELEMENT ANALYSIS- PROPOSED SYSTEM (SPMS 4.0)

The rich picture identifies nine key processes in the system:

1. Creating, storing, and distributing course outlines
2. Adding questions to the question bank and grading answer scripts
3. Analyzing course-based student performance trends based on GPA
4. Evaluating faculty-based student performance based on GPA
5. Assessing course-wise PLO achievement of individual students
6. Monitoring student performance trends under the guidance of VC/Dean/Head of Department
7. Collecting CLO-PLO statistics for courses, programs, departments, and schools
8. Comparing expected vs achieved PLO for courses, students, departments, and schools

9. Determining the department average of total PLO achieved and attempted students

10. Analyzing student enrollment statistics based on VC, Dean, and Department Head.

To evaluate the impact of six elements on each process, a six-element analysis can be conducted. The six elements include:

1. Human involvement

2. Non-computing hardware

3. Computing hardware

4. Software

5. Database

6. Network and communication.

Preparing, storing, and giving Course Outline	**Faculty:** 1) Signs into the The system uses their ID and Password.		**Computer/ Laptop** 1) Used to Sign in to SPMS4.0	**SPMS 4.0** 1) Used to store Data into the	**SPMS 4.0 Database** 1) All valid data are stored here	**Internet** 1) Used to Sign into SPMS4.0

	2) Select Create Course Outline Tab. 3) Select From the options that they wish to add to their course outline. 4) Press the Create button. 5) Store course outline into the system. **Students:** 1) Signs into the System using their ID and Password. 2) Select Course 3)View/Download Course Outline From the System.		**Printer** 1) Used to print a hard copy of course outlines if required.	database	which can be updated by SPMS4.0 admins.	

Add grade by manual form or CSV file.	**Faculty:** 1) Signs into the The system using their ID and Password. 2) Select a course and choose sections, semesters, year. 3) Input the student ID. 4) Giving all the information according to the grade submit the manual form. 5) In another way faculty can upload CSV ffilesthat will be automatically stored in database. 6) **Student:** 1) Signs into System using their		**Computer/ Laptop** 1) Used to Sign into SPMS4.0 **Printer** 1) Used to print the grades gotten by the whole section	**SPMS 4.0** 1) Used to store Data into the database or generate result graph using data from the database.	**SPMS 4.0 Database** 1) All valid data are stored here which can be updated by SPMS4.0 admins	**Internet** 1) Used to Sign into SPMS4.0

	ID and Password. 2) Student can see their grade from the dashboard.					

Course based student performance trend according to GPA	**Department Head:** 1) Signs into System using their ID and Password. 2) Input the time period and course ID to be viewed. 3) View student progress through a graph made after analysis and the GPA earned by maximum/minimum/average students. **Faculty:** 1) Signs into system using their ID and Password. 2) Search for the course that they are teaching using course ID and time period and view the progress of that students of that course.		**Computer/ Laptop** 1) Used to Sign into SPMS4.0 **Printer** 1) Used to print hard copy of the progress of current semester's students and compare with the progress of the previous semester's students who did that course.	**SPMS 4.0** 1)Used to store student Data into the database or generate performance analysis graph using data from the database.	**SPMS 4.0 Database** 1) All valid data are stored here which can be updated by SPMS4.0 admins.	**Internet** 1) Used to Sign into SPMS4.0

	Student: 1) Signs into					

	System using their ID and Password. 2) Search for the course using course ID and View their progress of that course and the GPA they earned. **Dean/VC:** 1) Signs into system using their ID and Password. 2) Search for the course using course ID and time period and view the progress of the students of that course					

Faculty based student performance according to GPA	**Faculty:** 1) Signs into system using their ID and Password. 2) View the Progress of the students who are being taught by them. **Department Head:** 1) Signs into system using their ID and Password. 2) Search for a		**Computer/ Laptop** 1) Used to Sign into SPMS4.0 **Printer** 1) Used to print hard copy of a report of students who completed most the PLO achievements If needed.	**SPMS 4.0** 1) Used to store Data and generate PLO automatically based on the CO provided.	**SPMS4.0Database** 1) All valid data are stored here which can be updated by SPMS4.0 admins.	**Internet** 1) Used to Sign into SPMS4.0

	faculty to be assessed using the faculty's name. 3) View the Progress of the students who are being taught under that faculty basing on the GPA earned by the students. **Dean/VC:** 1) Signs into system using their ID and Password. 2) Search for a faculty to be assessed using the faculty's name and Department ID. 3) View the Progress of the students who are being taught under that faculty basing on the GPA earned by the students.					

Course wise PLO achievement of a student	**VC/ Dean:** 1) Signs into system using their ID and Password. 2) Select PLO achievement Tab and search using Course ID 3) View PLOs achieved by the		**Computer/ Laptop** 1) Used to Sign into SPMS4.0 **Printer** 1) Used to print hard copy of a report of students who completed most the	**SPMS 4.0** 1)Usedto store Data and generate PLO automatic ally based on the CO provided.	**SPMS4.0 Database** 1) All valid data are stored here which can be updated by SPMS4.0 admins.	**Internet** 1) Used to Sign into SPMS4.0

	student. **Department Head:** 1) Signs into system using their ID and Password. 2) Select PLO achievement Tab and search using Course ID 3) View PLOs achieved by the students. **Faculty:** 1) Signs into system using their ID and Password. 2) Select PLO achievement Tab and search using Course ID 3) View PLOs achieved by the students in a course. **Student:**		PLO achievements If needed.			

	1) Signs into system using their ID and Password. 2) View PLOs they have achieved so far and how many they need to achieve to complete the					

	course.					
Student performance trend under VC/Dean/Head of Department	**Dean:** 1) Signs into system using their ID and Password. 2) Search for Department Head to be checked using their Name and Department ID. 3) View student progress under them or them. **VC:** 1) Signs into system using their ID and Password. 2) Search for a Dean or Department Head to be checked using their Name and either School ID or Department ID. 3) View student progress under them.		**Computer/ Laptop** 1) Used to Sign into SPMS4.0 **Printer** 1) Used to print the hard copy of the progress report if needed	**SPMS 4.0** 1)Used to store Data into the database or generate performance analysis graph using data from the database.	**SPMS 4.0 Database** 1) All valid data are stored here which can be updated by SPMS4.0 admins.	**Internet** 1) Used to Sign into SPMS4.0

	Department Head: 1) Signs into system using their ID and Password. 2) View student progress under them.					

Course, Program, department, school CLO-PLO statistics	**Dean/VC:** 1) Signs into system using their ID and Password. 2) View CLO-PLO mapped statistics achieved by students. **Department Head:** 1) Signs into system using their ID and Password. 2) View CLO-PLO mapped statistics achieved by students. **Faculty:** 1) Signs into system using their ID and Password. 2) View CLO-PLO mapped statistics achieved by students. **Student:**		**Computer/ Laptop** 1) Used to Sign into SPMS4.0 **Printer** 1) Used to print the hard copy of the progress report if needed	**SPMS 4.0** 1)Used to store Data into the database and generate CLO-PLO statistical data or graphs.	**SPMS 4.0 Database** 1) All valid data are stored here which can be updated by SPMS4.0 admins.	**Internet** 1) Used to Sign into SPMS4.0

	1) Signs into system using their ID and Password. 2) View CLO-PLO mapped statistics achieved by them and other students.					

Course, student, department school wise	**Dean/VC:** 1) Sign into the system using ID		**Computer/ Laptop** 1) Used to	**SPMS 4.0** 1)Used to store Data	**SPMS 4.0 Database** 1) All valid	**Internet** 1)Used to Sign

expected vs achieved PLO	and Password. 2) View the achieved PLO of the students during time entered that has been inputted and comparison between expected and achieved. **Department Head:** 1) Sign into the system using ID and Password. 2) View the achieved PLO of the students during time entered that has been inputted and comparison between expected and achieved. **Faculty:** 1) Sign into the system using ID and Password. 2) View the achieved PLO of the students during time entered that has		Sign into SPMS4.0 **Printer** 1) Used to print the hard copy of both the previous and current semester's achieved PLO to compare.	into the database or generate performance analysis graph using data from the database.	data are stored here which can be updated by SPMS4.0 admins.	into SPMS4.0

	been inputted and comparison between expected and achieved. **Student:** 1) Sign into the system using ID and Password. 2) View the					

	achieved PLO of the students during time entered that has been inputted and comparison between expected and achieved.					

Department average of total PLO achieved and attempted students.	**Dean/VC:** 1) Sign into the system user ID and Password. 2) Enter the time period of the semester wished to be viewed. 3) View the departmental average of total PLO achieved along with the number of students who attempted. **Department Head:** 1) Sign into the system using ID and Password. 2) Enter the time period of the semester wished to be viewed. 3) View the departmental average of total PLO achieved along with the number of		**Computer/ Laptop** 1) Used to Sign in to SPMS4.0 **Printer** 1) Used to print the hard copy of the PLO reports	**SPMS 4.0** 1)Used to store data into the database or generate performance analysis graph using data from the database.	**SPMS 4.0 Database** 1) All valid data are stored here which can be updated by SPMS4.0 admins.	**Internet** 1) Used to Sign into SPMS4.0

	students who attempted.					

	Statistics tab and select Year and Semester under that tab 3) View the Student Enrollment Statistics of That Year and Semester. **Department Head** 1) Sign into the system user ID and Password. 2) Select Student Enrollment Statistics tab and select Year and Semester under that tab 3) View the Student Enrollment Statistics of That Year and Semester.					

View CLO and PLO Report	**Student:** 1) Sign into the system user ID and Password. 2) Select CLO and PLO report Tab and search using StudentID 3) View CLO and PLO report **Department Head:** 1) Sign into the system user ID and Password. 2) Select CLO		**Computer/ Laptop** 1) Used to Sign in to SPMS 4.0 **Printer** 1) Used to print the hard copy of the Student CLO and PLO report.	**SPMS 4.0** 1) Used to store Data in the database and generate CLO and PLO report.	**SPMS 4.0 Database** 1) All valid data are stored here which can be updated by SPMS4.0 admins.	**Internet** 1) Used to Sign in to SPMS4.0
	and PLO report Tab and search using StudentID 3) View CLO and PLO report **Faculty:** 1) Sign into the system user ID and Password. 2) Select CLO and PLO report Tab and					

	search using StudentID 3) View CLO and PLO report					
Input Data for CLO and PLO of student.	**Faculty:** 1) Signs into the System using their ID and Password. 2) Select CLO and PLO report Tab then add student info tab. 3) Input the data of the student 4) Press save to database.		**Computer/ Laptop** 1) Used to Sign into SPMS 4.0	**SPMS 4.0** 1) Used to store Data of the sudent into the database	**SPMS 4.0 Database** 1) All valid data are stored here which can be updated by SPMS4.0 admins.	**Internet** 1) Used to Sign into SPMS4.0

CHAPTER-3: LOGICAL SYSTEM DESIGN

A. BUSINESS RULES (SPMS 4.0)

1. A STUDENT must belong to a single DEPARTMENT and has several attributes such as StudentID, FirstName, LastName, dateOfBirth, gender, email, phone, address, departmentID, programID, enrollmentYear, enrollmentSemester, and password. A DEPARTMENT can have one or more STUDENTS.

2. A STUDENT can enroll in several SECTIONS. A REGISTRATION comprises RegistrationID, sectionID, and studentID. At least one STUDENT must perform a registration.

3. A SECTION should have one or more REGISTRATIONS, and a REGISTRATION must have at least one SECTION. A SECTION consists of sectionID, sectionNum, courseID, facultyID, and year.

4. A REGISTRATION can be associated with multiple EVALUATIONS. An EVALUATION can only belong to one REGISTRATION and includes evaluationID, examID, registrationID, and totalMarks.

5. A COURSE OUTCOME must be associated with only one PROGRAM LEARNING OUTCOME (PLO), but a PLO may have one or more COURSE OUTCOMES. A PLO includes ploID, ploNum, and programID.

6. A PLO must be linked to one PROGRAM, and a PROGRAM can be associated with one or more PLOS. A PROGRAM has programID, programName, and departmentID, and must have one or more COURSES. A COURSE consists of one course.

7. A PROGRAM must belong to only one DEPARTMENT, and a DEPARTMENT can have one or more PROGRAMS. A DEPARTMENT consists of departmentID, departmentName, and schoolID.

8. A DEPARTMENT must belong to one SCHOOL, and a SCHOOL may have one or more DEPARTMENTS. A SCHOOL includes schoolID and schoolName.

9. An EMPLOYEE can hold one of the four positions: Dean, Department Head, Faculty, or VC. An EMPLOYEE comprises employeeID, password, firstName, and lastName.

10. Only one DEAN can lead a SCHOOL, and a DEAN has schoolID, startDate, and endDate.

11. A DEPARTMENT HEAD must manage one and only one DEPARTMENT, and a DEPARTMENTHEAD includes departmentID, startDate, and endDate.

12. Every faculty member must be a part of just one department. A department can have one or more faculties. A FACULTY consists of departmentID, rank, and joinDate. A faculty member can teach various sections. It is necessary for one faculty member to teach one SECTION.

13. Only one section can have a course outline. It is necessary for one course outline to belong to one SECTION. A COURSE_OUTLINE consists of elements like courseOutlineID, sectionID, contactHours, courseDescription, objective, content, refMaterials, courseType, courseTitle, prerequisiteCode, and creditValue.

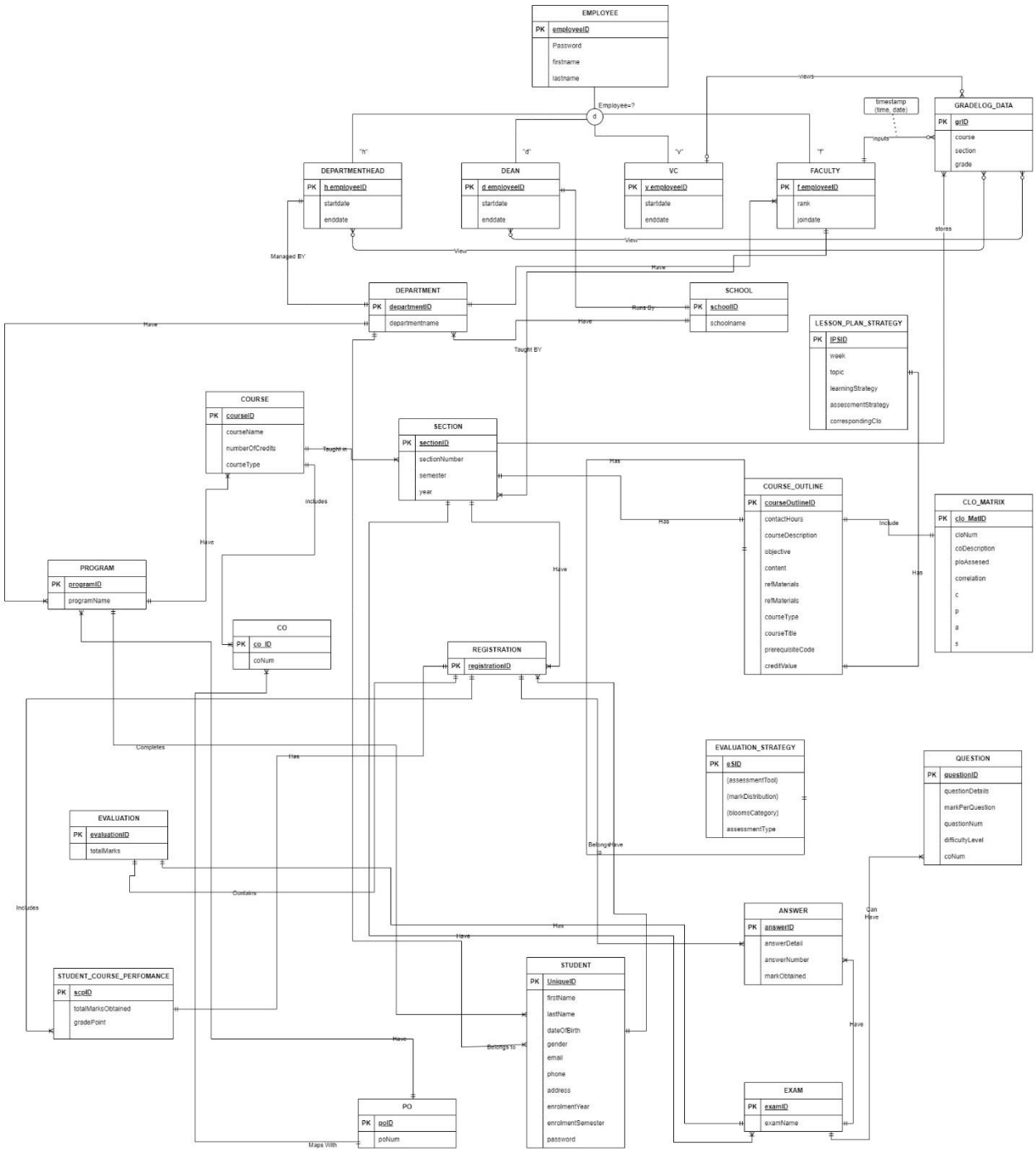
14. It is necessary for one course outline to have a CLO Matrix. One CLO MATRIX belongs to one course outline. A CLO_MATRIX has clo_MatID, cloNum, coDescription, ploAssessed, correlation, courseOutlineID, c, p, a, and s.

15. One Evaluation strategy has to exist for a Lesson Plan Strategy. One Lesson Plan Strategy belongs to one Evaluation strategy. A LESSON_PLAN_STRATEGY consists of lPSID, week, topic, learningStrategy, assessmentStrategy, correspondingClo, and courseOutlineID.

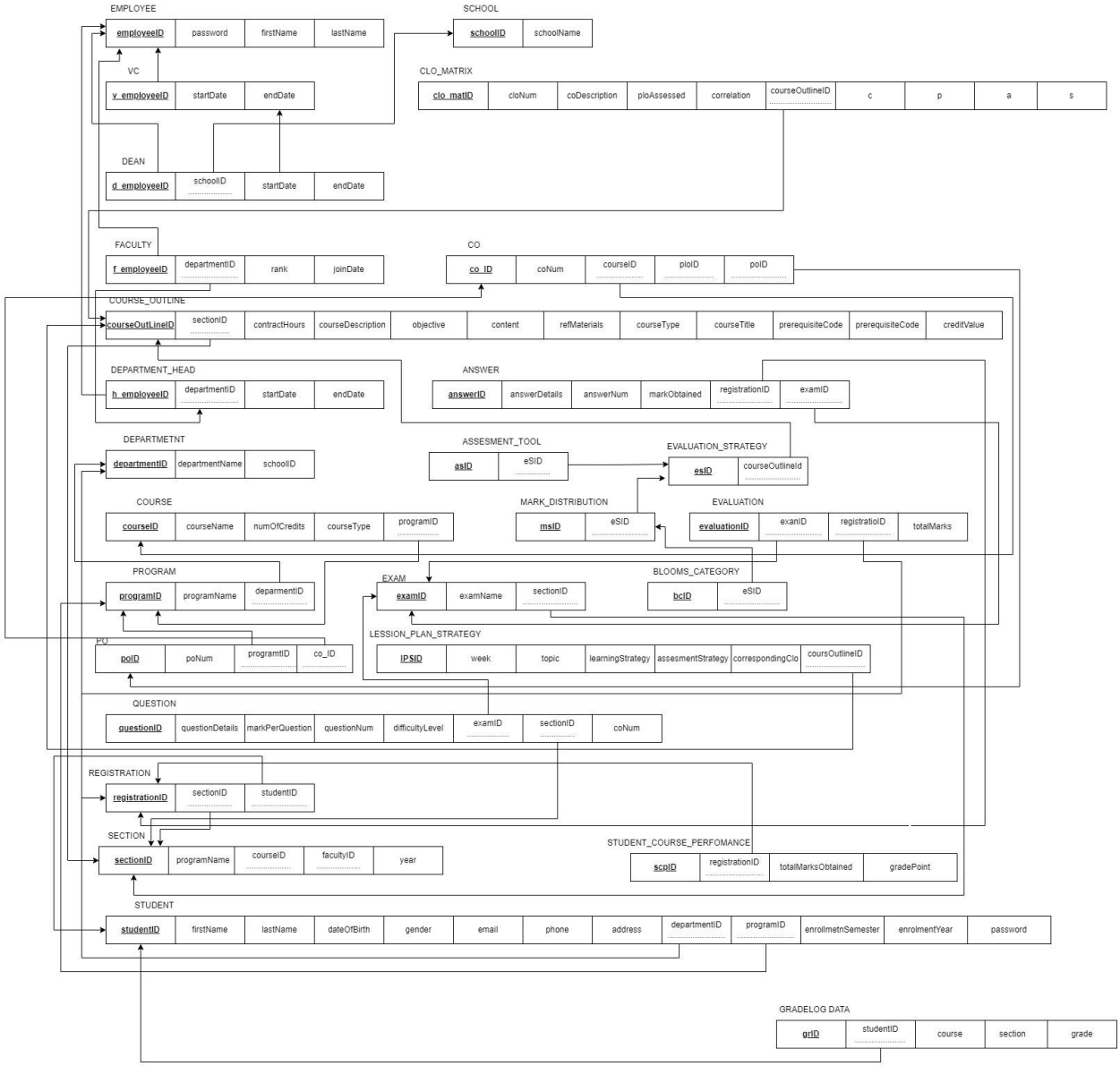
16. Only one evaluation can be conducted for an exam. An exam belongs to one or more sections. An EXAM has examID, examName, and sectionID. A section needs to have one or more exams.

17. One exam should include one or more questions. Every question needs to be a part of one exam. A QUESTION includes questionID, questionDetails, marksPerQuestion, questionNum, difficultyLevel, examID, and coNum. A question can only be answered one time.

B. ENTITY RELATIONSHIP DIAGRAM (ERD):



C. ENTITY RELATIONSHIP DIAGRAM TO RELATIONAL SCHEMA:



D. NORMALIZATION:

EMPLOYEE (i)	employeeID	i1
	password	i2
	firstName	i3
	lastName	i4
VC (v)	v_employeeID	v1
	startDate	v2
	endDate	v3
DEAN (w)	d_employeeID	w1
	schoolID	h1
	startDate	w2
	endDate	w3
FACULTY (F)	f_employeeID	f1
	departmentID	d1
	rank	f2
	joinDate	f3
COURSE_OUTLINE (c)	courseOutlineID	c1
	sectionID	y1
	contactHours	c2
	courseDescription	c3
	objective	c4
	content	c5
	refMaterials	c6
	courseType	c7
	courseTitle	c8
	prerequsiteCode	c9
	creditValue	c10
DEPARTMENTHEAD (k)	h_employeeID	k1
	departmentID	d1
	startDate	k2
	endDate	k3
DEPARTMENT (d)	departmentID	d1
	departmentName	d2
	schoolID	h1
COURSE (u)	courseID	u1
	courseName	u2
	numOfCredits	u3
	courseType	u4
	programID	r1
PROGRAM (r)	programID	r1
	programName	r2
	departmentID	d1
PO (x)	poID	x1
	poNum	x2
	programID	r1
	coID	o1
QUESTION (q)	questionID	q1
	questionDetails	q2
	markPerQuestion	q3
	questionNum	q4
	difficultyLevel	q5
	examID	e1
	courseID	u1
	coNum	q6
REGISTRATION (g)	registrationID	g1
	sectionID	y1
	studentID	s1
SECTION (y)	sectionID	y1
	sectionNum	y2

	semester	y3
	courseID	u1
	facultyID	f1
	year	y4
STUDENT (s)	studentID	s1
	firstName	s2
	lastName	s3
	dateOfBirth	s4
	gender	s5
	email	s6
	phone	s7
	address	s8
	departmentID	d1
	programID	r1
	enrollmentSemester	s9
	enrollmentYear	s10
	password	s11
SCHOOL (h)	schoolID	h1
	schoolName	h2
CLO_MATRIX (m)	clo_MatID	m1
	cloNum	m2
	coDescription	m3
	ploAssessed	m4
	correlation	m5
	courseOutlineID	c1
	c	m6
	p	m7
	a	m8
	s	m9
CO (o)	coID	o1
	coNum	o2
	courseID	u1
	ploID	p1
	poID	x1
ANSWER (a)	answerID	a1
	answerDetails	a2
	answerNum	a3
	markObtained	a4
	registrationID	g1
	examID	e1
EVALUATION_STRATEGY (t)	eSID	t1
	assessmentTool	t2
	markDistribution	t3
	bloomsCategory	t4
	courseOutlineID	c1
EVALUTION (n)	evaluationID	n1
	examID	e1
	registrationID	g1
	totalMarks	n2

EXAM (e)	examID	e1
	examName	e2
	sectionID	y1
LESSON_PLAN_STRATEGY (l)	lPSID	l1
	week	l2
	topic	l3
	learningStrategy	l4
	assessmentStrategy	l5
	correspondingClo	l6
	courseOutlineID	c1
STUDENT_COURSE_PERFORMANCE (z)	scpID	z1
	registrationID	g1
	totalMarksObtained	z2
	gradePoint	z3
GRADELOG DATA (b)	grID	b1
	studentID	s1
	course	u1
	section	y1
	grade	b2

1NF:

1) There are no repeating groups

2) There is at least one primary key

i1	i2	i3	i4	v1	v2	v3	w1	w2	w3	w4	f1	f2	f3	c1	c2	c3	c4	c5	c6	c7

c8	c9	c10	k1	k2	k3	d1	d2	u1	u2	u3	u4	r1	r2	x1	x2	q1	q2	q3	q4	q5

q6	g1	y1	y2	y3	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	h1	h2	m1	m2	m3

m4	m5	m6	m7	m8	m9	o1	o2	a1	a2	a3	a4	t1	t2	t3	t4	n1	n2	e1	b1	b2

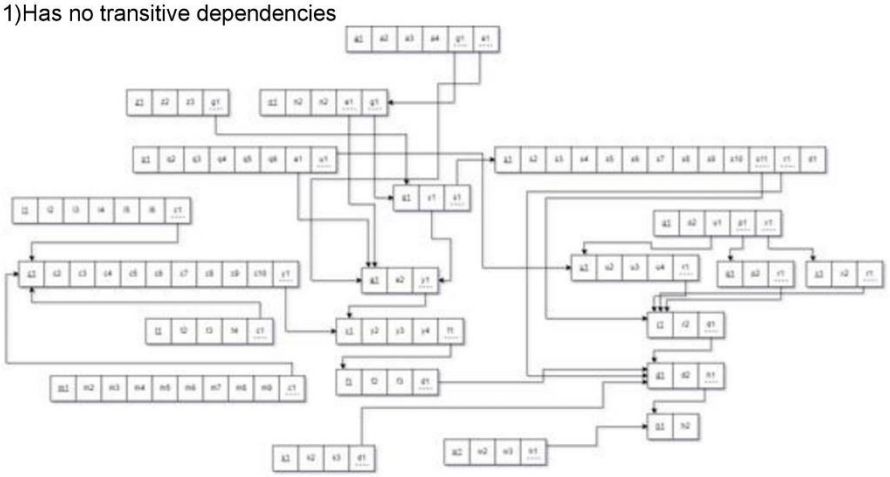
e2	l1	l2	l3	l4	l5	l6	z1	z2	z3

2NF:

1)Partial dependency has been removed

3NF:

1)Has no transitive dependencies



Already in BCNF Form as there is no determinant that is not a unique identifier.

E. DATA DICTIONARY:

Name	Data type	Size	Remark
courseCode	VARCHAR	10	This is the primary key of “assesment_t”. Example: CSE303
assesmentType	VARCHAR	150	This is the primary key of “assesment_t”.
assesmentTools	MEDIUMTEXT		This is the attribute named assesmentTools of “assesment_t ”.
markDistribution	VARCHAR	45	This is the attribute named markDistribution of “assesment_t ”.
bloomsCatagory	VARCHAR	45	This is the attribute named bloomsCatagory of “assesment_t ”.
totalMarks	INT	11	This is the attribute named totalMark of “assesment_t”.

assesment_t

blooms_learning_level_t

Name	Data type	Size	Remark
courseCode	VARCHAR	10	This is the primary key of “blooms_learning_level_t”. Example: CSE303
cloMatrixNo	INT	11	This is the attribute named cloMatrixNo of “blooms_learning_level_t”.
C	INT	11	This is the attribute named C of “blooms_learning_level_t”.
P	INT	11	This is the attribute named P of” blooms_learning_level_t”.

A	INT	11	This is the attribute named A of "blooms_learning_level_t".
S	INT	11	This is the attribute named S of "blooms_learning_level_t".

clo_matrix_t

Name	Data type	Size	Remark
courseCode	VARCHAR	10	This is the primary key of "clo_matrix_t". Example: CSE303
cloMatrixNo	INT	11	This is the primary key of "clo_matrix_t".
cloName	VARCHAR	10	This is the attribute named cloName of "clo_matrix_t".
cloMatrixDes	MEDIUMTEXT		This is the attribute named cloMatrixDes of "clo_matrix_t".
ploAssessed	VARCHAR	10	This is the attribute named ploAssessed of "clo_matrix_t".
ploCloCorelations	INT	11	This is the attribute named plpof "clo_matrix_t".

course_content_t

Name	Data type	Size	Remark
courseCode	VARCHAR	10	This is the primary key of "course_content_t". Example: CSE303

courseContentNo	INT	11	This is the primary key of “course_content_t”.
titles	MEDIUMTEXT		This is the attribute named titles of “course_content_t”.
descriptions	LONGTEXT		This is the attribute named descriptions of “course_content_t”.

course_outline_t

Name	Data Type	Size	Remark
courseDescription	LONGTEXT		This is the attribute named courseDescription of “course_outline_t”.
courseReference	LONGTEXT		This is the attribute named courseReference of “course_outline_t”.
courseCode	VARCHAR	10	This is the primary key of “course_outline_t”. Example: CSE303
courseTitle	VARCHAR	45	This is the attribute named courseTitle of “course_outline_t”.
courseType	VARCHAR	45	This is the attribute named courseType of “course_outline_t”.
creditValue	INT	11	This is the attribute named creditValue of “course_outline_t”.
coursePolicy	LONGTEXT		This is the attribute named coursePolicy of “course_outline_t”.

contractHours	VARCHAR	50	This is the attribute named contractHours of “course_outline_t”.
courseObjectives	LONGTEXT		This is the attribute named courseObjectives of “course_outline_t”.
academicDishonesty	LONGTEXT		This is the attribute named academicDishonesty of “course_outline_t”.
studentDisabilities	LONGTEXT		This is the attribute named studentDisabilities of “course_outline_t”.
nonDiscriminationPolicy	LONGTEXT		This is the attribute named nonDiscriminationPolicy of “course_outline_t”.
prerequisite	VARCHAR	45	This is the attribute named prerequisite of “course_outline_t”.

course_t

Name	Data type	Size	Remark
courseID	VARCHAR	10	This is the primary key of “course-t”.
course_name	VARCHAR	45	This is the attribute named course_name of “course_t”.
credit	INT	11	This is the attribute named credit of “course_t”.
course_type	VARCHAR	30	This is the attribute named course_type of “course_t”.

ploID	INT	11	This is the attribute named ploID of “course_t”.
programID	INT	11	This is the attribute named programID of “course_t”.

department_t

Name	Data Type	Size	Remark
departmentID	VARCHAR	10	This is the primary key of “department_t”.
department_name	VARCHAR	45	This is the attribute named department_name of “department_t”.
schoolID	VARCHAR	10	This is the attribute named schoolID of “department_t”.

faculty_t

Name	Data type	Size	Remarks
facultyID	VARCHAR	10	This is the primary key of “faculty_t”.
f_name	VARCHAR	45	This is the attribute named f_name of “faculty_t”.

l_name	VARCHAR	45	This is the attribute named l_name of “faculty_t”.
dob	DATE		This is the attribute named dob of “faculty_t”.
gender	VARCHAR	10	This is the attribute named gender of “faculty_t”.
phone	VARCHAR	15	This is the attribute named phone of “faculty_t”.
address	VARCHAR	45	This is the attribute named address of “faculty_t”.
email	VARCHAR	35	This is the attribute named email of “faculty_t”.
start_date	DATE		This is the attribute named start_date of “faculty_t”.
rank	VARCHAR	30	This is the attribute named rank of “faculty_t”.
departmentID	VARCHAR	3	This is the attribute named departmentID of “faculty_t”.
picture	MEDIUMLOB		This is the attribute named picture of “faculty_t”.

grade_t

Name	Data type	Size	Remarks

studentID	INT	11	This is the primary key of “grade_t”.
educational_year	INT	11	This is the primary key of “grade_t”.
educational_semester	VARCHAR	10	This is the primary key of “grade_t”.
enrolled_course	VARCHAR	45	This is the primary key of “grade_t”.
enrolled_section	INT	11	This is the primary key of “grade_t”.
grade	VARCHAR	5	This is the attribute named grade of “grade_t”.

lesson_plan_t

Name	Data type	Size	Remarks
courseCode	VARCHAR	10	This is the primary key of “lesson_plan_t”.
noOfWeeks	INT	11	This is the primary key of “lesson_plan_t”.
topics	MEDIUMTEXT		This is the attribute of “lesson_plan_t”.
teachingLearningStrategy	MEDIUMTEXT		This is the attribute of “lesson_plan_t”.
assesmentStrategy	MEDIUMTEXT		This is the attribute of “lesson_plan_t”.
coRespondingClo	VARCHAR	15	This is the attribute of “lesson_plan_t”.

login_t

Name	Data type	Size	Remarks
userID	INT	11	This is the primary key of “login_t”.
password	VARCHAR	45	This is the attribute of “login_t”.
type	VARCHAR	30	This is the attribute of “login_t”.

program_t

Name	Data type	Size	Remarks
programID	INT	11	This is the primary key of “program_t”.
programe_name	VARCHAR	45	This is the attribute of “lesson_plan_t”.
departmentID	VARCHAR	10	This is the attribute of “lesson_plan_t”.

question_t

Name	Data type	Size	Remarks
questionID	INT	11	This is the primary key of “question_t”.
assesment_name	VARCHAR	45	This is the attribute of “question_t”.
question	LONGTEXT		This is the attribute of “question_t”.
total_marks	INT	11	This is the attribute of “question_t”.

weight	INT	11	This is the attribute of “question_t”.
cloID	INT	11	This is the attribute of “question_t”.
sectionID	INT	11	This is the attribute of “question_t”.

registration_t

Name	Data type	Size	Remarks
registrationID	INT	11	This is the primary key of “registration_t”.
semester	VARCHAR	10	This is the attribute of “registration_t”.
sectionID	INT	11	This is the attribute of “registration_t”.
studentID	INT	11	This is the attribute of “registration_t”.
year	INT	11	This is the attribute of “registration_t”.
courseID	VARCHAR	10	This is the attribute of “registration_t”.

school_t

Name	Data type	Size	Remarks
schoolID	INT	11	This is the primary key of “school_t”.
school_name	VARCHAR	45	This is the attribute of “school_t”.

section_t

Name	Data type	Size	Remarks
sectionID	INT	11	This is the primary key of “section_t”.
section_name	VARCHAR	30	This is the attribute of “section_t”.
semester	VARCHAR	10	This is the attribute of “section_t”.
courseID	VARCHAR	10	This is the attribute of “section_t”.
facultyID	INT	11	This is the attribute of “section_t”.
year	INT	11	This is the attribute of “section_t”.

student_t

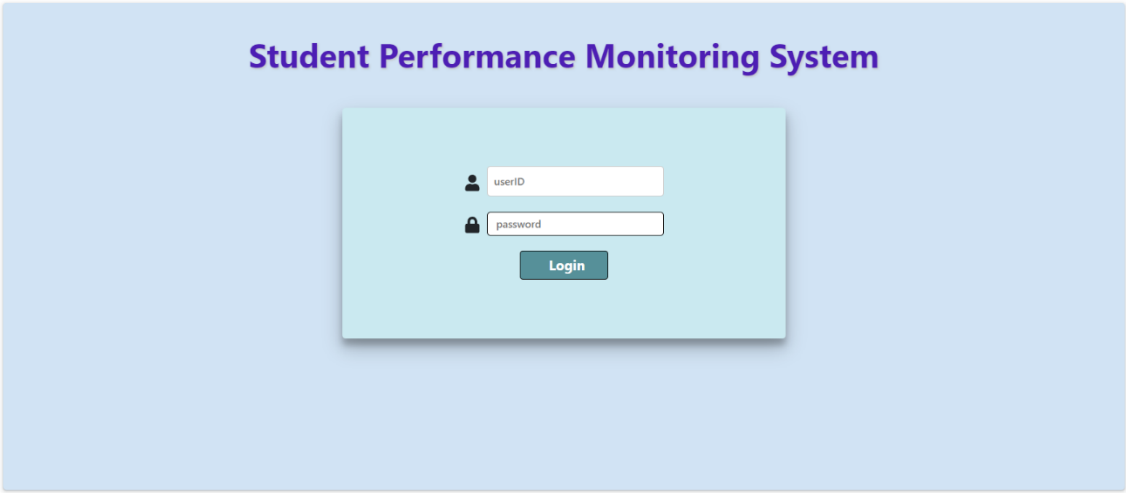
Name	Data type	Size	Remarks
studentID	INT	11	This is the primary key of “student_t”.
f_name	VARCHAR	45	This is the attribute of “student_t”.
l_name	VARCHAR	45	This is the attribute of “student_t”.
dob	DATE		This is the attribute of “student_t”.
gender	VARCHAR	10	This is the attribute of “student_t”.

email	VARCHAR	35	This is the attribute of “student_t”.
phone	VARCHAR	15	This is the attribute of “student_t”.
address	VARCHAR	45	This is the attribute of “student_t”.
enrollment_date	DATE		This is the attribute of “student_t”.
departmentID	VARCHAR	10	This is the attribute of “student_t”.

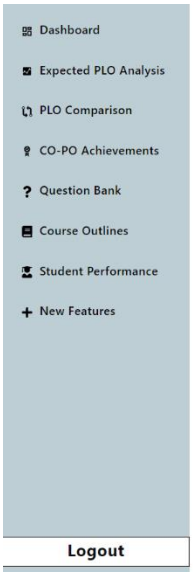
question_t

Name	Data type	Size	Remarks
question	LONGTEXT		This is the primary key of “question_t”.
courseID	VARCHAR	15	This is the primary key of “question_t”.
qtype	VARCHAR	10	This is the primary key of “question_t”.
cloNO	INT	11	This is the attribute of “question_t”.
marks	INT	11	This is the attribute of “question_t”.
difficulty	VARCHAR	15	This is the attribute of “question_t”.

CHAPTER-4: PHYSICAL SYSTEM DESIGN




```
db = mysql.createConnection({
    host: 'localhost',
    user: 'root',
    password: 'pass',
    database: 'spmsv4'
});
app.post('/login', (req, res) => {
    const userID = req.body.userID;
    const password = req.body.password;
    db.query(
        "SELECT * FROM login_t WHERE userID = ? AND password = ?",
        [userID, password],
        (err, result) => {
            if (err) {
                console.log(err);
            }
            if (result.length > 0) {
                res.send(result);
            }
            else {
                res.send({ message: "Wrong username/password combination!" });
            }
        }
    );
});
```



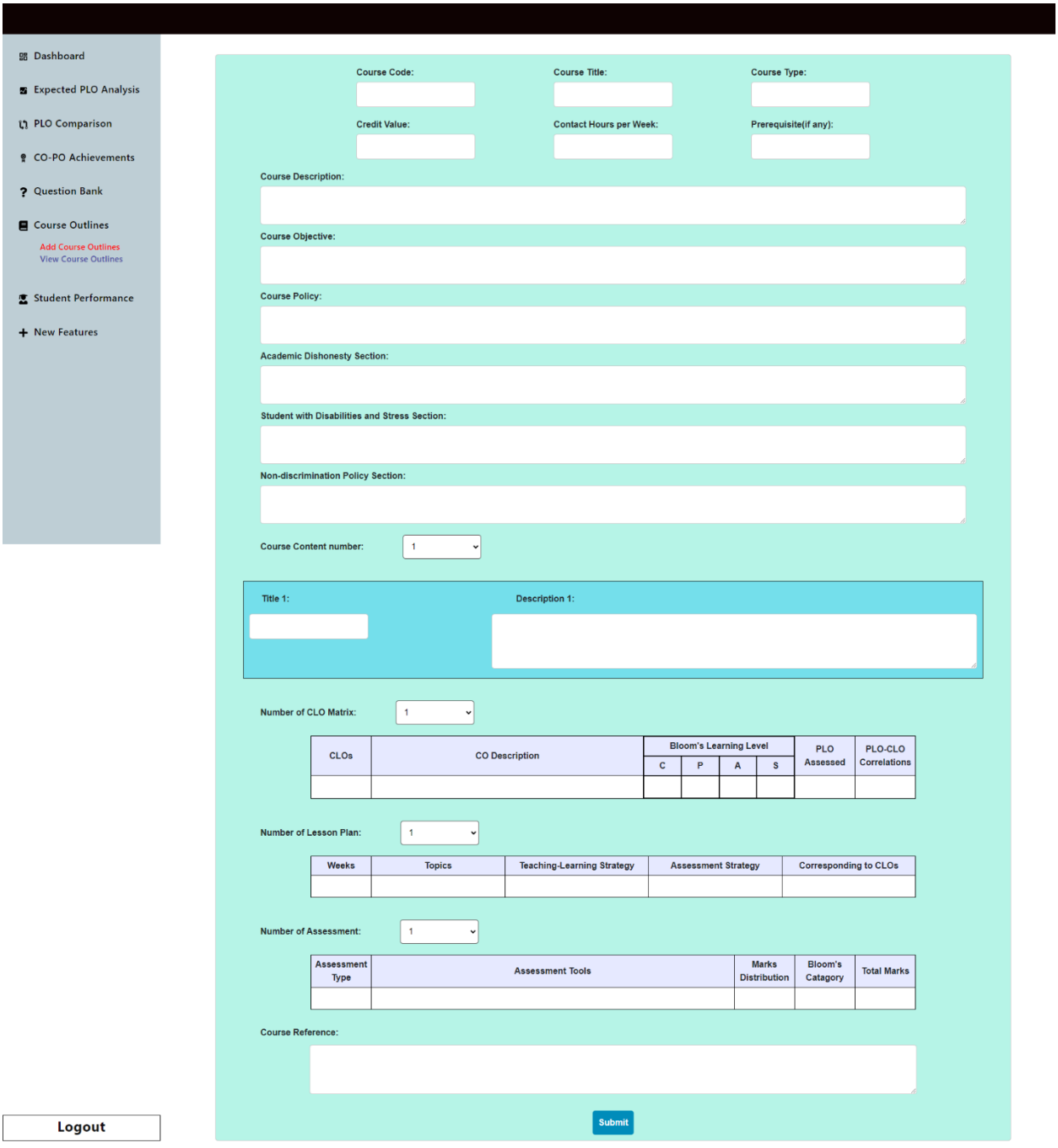
Noor-E Sadman!

Adjunct Faculty

Department Of CSE

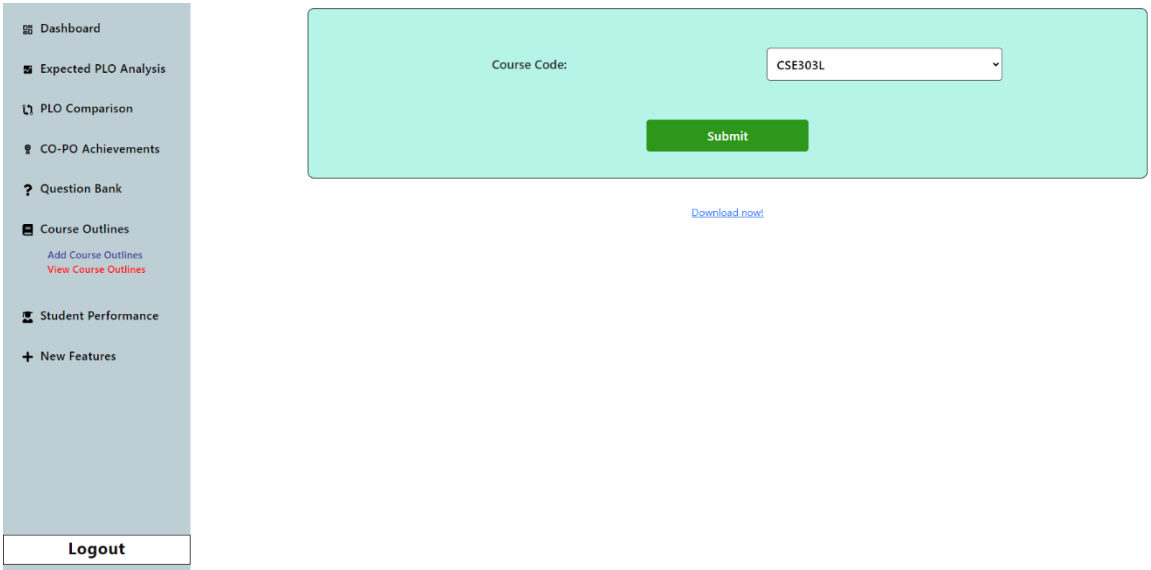
Independent University, Bangladesh

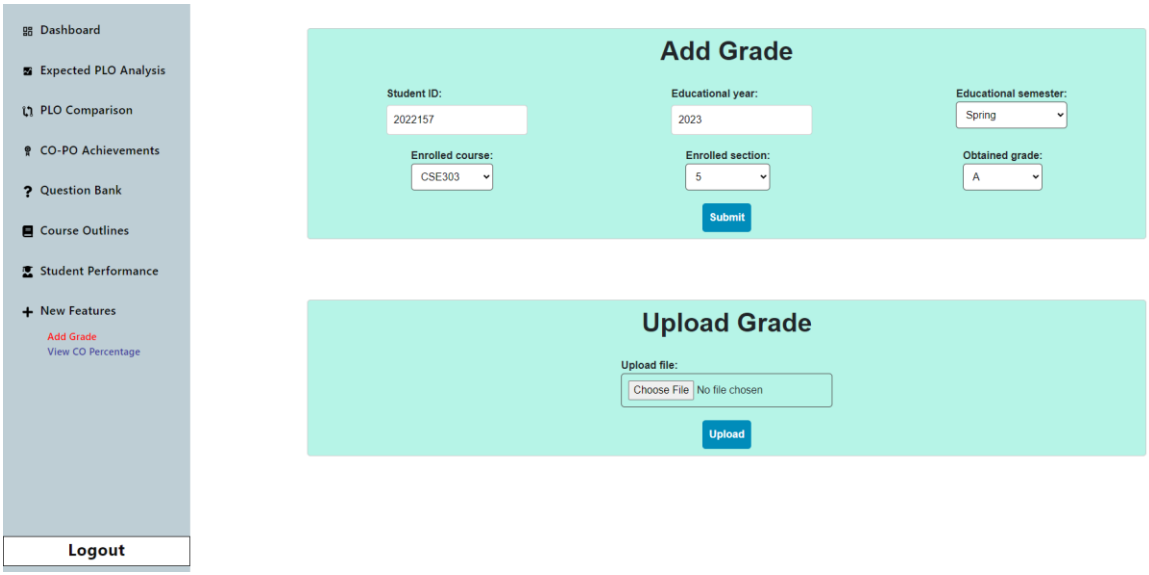
email: N/A


Dashboard
Expected PLO Analysis
PLO Comparison
CO-PO Achievements
Question Bank
Course Outlines
Add Course Outlines
View Course Outlines
Student Performance
New Features
Logout
Course Code:
Course Title:
Course Type:
Credit Value:
Contact Hours per Week:
Prerequisite(if any):
Course Description:
Course Objective:
Course Policy:
Academic Dishonesty Section:
Student with Disabilities and Stress Section:
Non-discrimination Policy Section:
Course Content number:
1
Title 1:
Description 1:
Number of CLO Matrix:
1
CLOs
CO Description
Bloom's Learning Level
C
P
A
S
PLO Assessed
PLO-CLO Correlations
Number of Lesson Plan:
1
Weeks
Topics
Teaching-Learning Strategy
Assessment Strategy
Corresponding to CLOs
Number of Assessment:
1
Assessment Type
Assessment Tools
Marks Distribution
Bloom's Catagory
Total Marks
Course Reference:
Submit

```
const handleFileUpload = (event) => {
  const file = event.target.files[0];

  Papa.parse(file, {
    header: true,
    skipEmptyLines: true,
    complete: function (results) {
      const mydata = results.data.map(row => {
        return {
          studentID: parseInt(row.studentID),
          educational_year: parseInt(row.educational_year),
          educational_semester: row.educational_semester,
          enrolled_course: row.enrolled_course,
          enrolled_section: parseInt(row.enrolled_section),
          grade: row.grade
        }
      });
      setCsvData(mydata);
    }
  });
}
```




Dashboard
Expected PLO Analysis
PLO Comparison
CO-PO Achievements
Question Bank
Course Outlines
Student Performance
New Features
Add Grade
View CO Percentage
Logout
Add Grade
Student ID:
2022157
Educational year:
2023
Educational semester:
Spring
Enrolled course:
CSE303
Enrolled section:
5
Obtained grade:
A
Submit
Upload Grade
Upload file:
Choose File
No file chosen
Upload

```
const submitFile = (e) => {
  e.preventDefault();
  if (csvData.length > 0) {
    axios.post('http://localhost:3002/uploadGrade', {
      data: csvData
    }).then((response) => {
      alert('Grade added successfully!');
    })

  }
  else {
    alert('Please upload a file!');
  }
}


const handleSubmit = (event) => {
  event.preventDefault();
  axios.post('http://localhost:3002/addgrade', {
    studentID: parseInt(studentId),
    educational_year: parseInt(year),
    educational_semester: semester,
    enrolled_course: course,
    enrolled_section: parseInt(section),
    grade: grade
  }).then((response) => {
    console.log(response);
    alert('Grade added successfully!');
  })

};
```

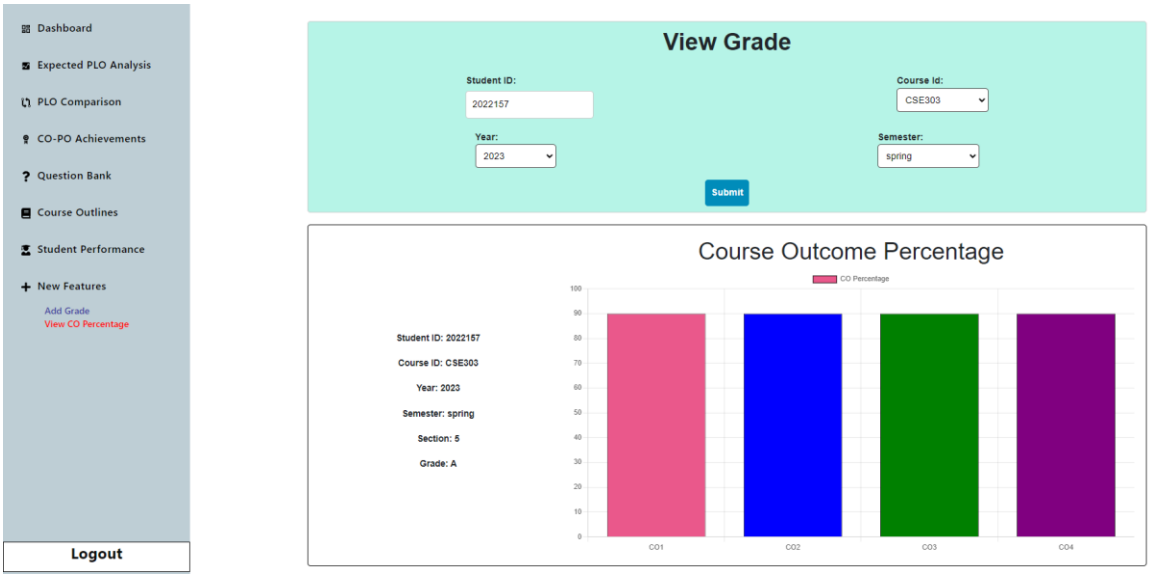
```
app.get('/getGrade/:studentID/:courseId/:year/:semester', (req, res) => {
    const studentID = parseInt(req.params.studentID);
    const enrolled_course = req.params.courseId;
    const educational_year = parseInt(req.params.year);
    const educational_semester = req.params.semester;

    db.query(
        "SELECT * FROM grade_t WHERE studentID = ? AND enrolled_course = ? AND educational_year = ? AND
        educational_semester = ?",
        [studentID, enrolled_course, educational_year, educational_semester],
        (err, result) => {
            if (err) {
                console.log(err);
            }
            else {
                res.send(result);
            }
        }
    );
    });
```

```
app.post('/uploadGrade', (req, res) => {
    const data = req.body.data;
    data.forEach(element => {
        db.query(
            "INSERT INTO grade_t (studentID, educational_year, educational_semester, enrolled_course,
            enrolled_section, grade) VALUES (?,?,?,?,?,?)",
            [element.studentID, element.educational_year, element.educational_semester, element.enrolled_course,
            element.enrolled_section, element.grade],
            (err, result) => {
                if (err) {
                    console.log(err);
                }
                else {
                    console.log(`inserted of studentID: ${element.studentID}`);
                    res.send("done");
                }
            }

        );
    });
    console.log("All data inserted successfully!");


}
```




```
app.post('/clomatrix/create', (req, res) => {
    const courseCode = req.body.courseCode;
    const cloMatrix = req.body.cloMatrix;
    let cloMatrixNo = 1;

    for (let i = 0; i < cloMatrix.cloName.length; i++) {
        db.query(
            "INSERT INTO clo_matrix_t (courseCode,cloMatrixNo,cloName,cloMatrixDes,ploAssessed,ploCloCorelations)
            VALUES (?,?,?,?,?,?)",
            [courseCode, cloMatrixNo++, cloMatrix.cloName[i], cloMatrix.cloMatrixDes[i], cloMatrix.ploAssessed[i],
            cloMatrix.ploCloCorelations[i]],
            (err, result) => {
                if (err) {
                    console.log(err);
                }
                else {
                    console.log(`inserted of cloMatrix: ${cloMatrix.cloName[i]}`);

                }
            }
        );
    }

});
```

CHAPTER-5: CONCLUSION

A. PROBLEM AND SOLUTION:

Analysis Phase:

During the analysis phase, the SPM project team worked with assumptions and questions since there was not enough specific data. They created a picture of the organization's operations and conducted interviews with important people to get a better understanding.

Designing Phase:

During the designing phase, the team researched and organized important entities in a way that made sense, based on feedback from instructors.

Implementation Phase:

In the implementation phase, the team successfully met all the requirements for the software system. They used specific tools like HTML, CSS, and JavaScript to create the front-end and Node JS and Express Js for the back-end. They also used MySQL to integrate the database.

B. ADDITIONAL FEATURE AND FUTURE DEVELOPMENT:

Future plan for SPMS4.0 may include integration with other educational technology platforms. The goal is to improve the accuracy and effectiveness of outcome based education frameworks and enhance the user experience while complying with ethical standards and regulations.

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