



## PROJECT REPORT

### CSE303: DATABASE MANAGEMENT SYSTEM

STUDENT PERFORMANCE MANAGEMENT SYSTEM

**TEAM: DATA NEWBIES**

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## CH-1 INTRODUCTION

### a. Background of the organization

The Independent University in Bangladesh (IUB) is a private university that was founded in 1993. IUB is currently the top university in the country with a particular emphasis on research and global partnership. IUB has five different academic schools with several departments.

- Business and Entrepreneurship
- Engineering, Technology and Sciences
- Environment and Life Sciences, Liberal Arts & Social Sciences
- Pharmacy and Public Health.
- School of Liberal Arts & Social Sciences

Over the years, IUB has played an active role in advancing the education sector in Bangladesh. It has produced competent and knowledgeable scholars who have contributed significantly to both domestic and international areas. The university has achieved this through regular updates of the curriculum with the implementation of a system to monitor student performance based on a quantified approach between the course curriculum and the standards set by UGC and the government of Bangladesh. The University Grants Commission (UGC), the Ministry of Education and other necessary institutions have aided each of the schools in achieving their objective. IUB aims to produce graduates of international standards who possess the knowledge and skills necessary to provide leadership in business, public service and welfare in the local environment, encourage and support valuable research. IUB follows a trimester system and offers three academic terms. They are spring, summer, and autumn semester classes for each term begin in January, May, and September respectively. IUB is committed to ensuring that eligible students are not prevented from achieving their goals due to financial constraints. The Financial Aid Office is dedicated to meeting the financial needs of eligible students and operates with high priority. In accordance with the private university Act 2010 of Bangladesh, IUB offers financial aid, scholarships, and tuition fee discounts to eligible students as part of its Financial Aid Policy.

### b. Background of the project

Our project aims to create a software solution that can assist universities in enhancing the way they evaluate students, making it more productive and effective. At the core of our project is the concept of Course Learning Outcomes (COLs) and Program Learning Outcomes (PLOs), where each CO is linked to a PLO representing a specific valuable skill that students are expected to develop or enhance by the end of the course, such as problem analysis, design, and implementation. The project intends to evaluate students efficiently by checking if the PLOs mapped to the COs requirements are fulfilled for each student. The system allows input from IEB to set PLO requirements, while faculties input the COs for each student for the system to map the COs to PLOs accordingly. The CLOs are chosen carefully to ensure that students acquire the most valuable skills from each course, and

## **Student Performance Monitoring System**

## **Data Newbies**

students can monitor their progress in each sector, identifying areas for self-improvement and growth. Furthermore, our software aims to benefit institutional bodies such as faculty members, administrative bodies, and departmental bodies, by enabling them to track student progress, departmental performance, and better allocate resources.

### **c. Objective of the Project**

The objective of this project is to enhance the existing web application Student Performance Management System (SPMS 4.0) by adding new features that allow for the calculation of course outcomes based on student performance data. The enhanced SPMS 4.0 system will use the following data points in the calculation of course outcomes are Student ID, Educational year, educational semester, Enrolled course, Enrolled section, Obtained grade, Faculty ID, and Timestamp. SPMS 4.0 will provide a comprehensive solution for managing student registration, course selection, and academic records, with the added functionality of calculating course outcomes. This will enable faculty members to track and monitor student performance more effectively. Also, providing students with a clearer understanding of their academic progress. So, the main objective of the project is to create a more efficient and effective system for managing student performance data and calculating course outcomes.

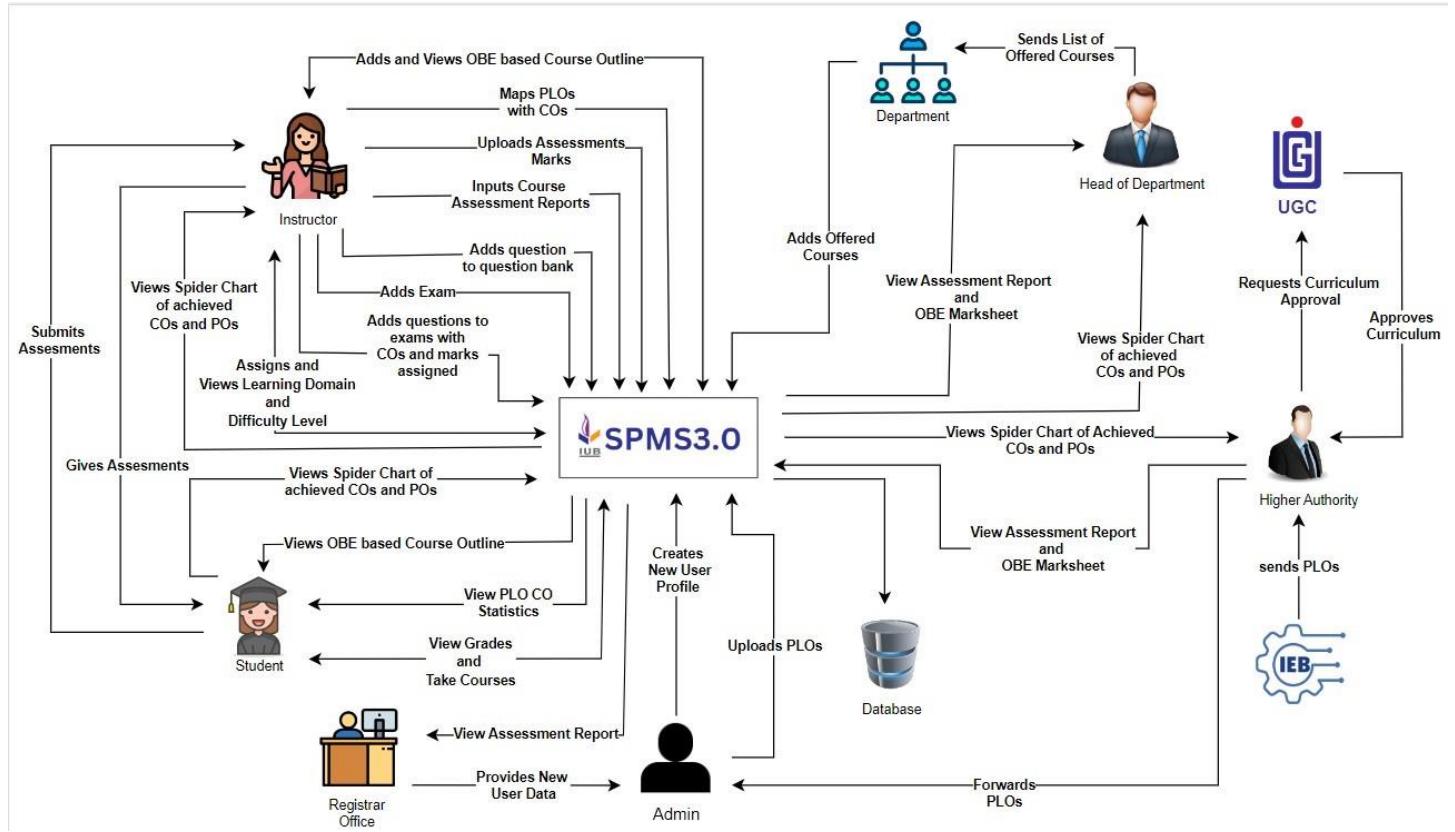
### **d. Scope of the Project**

The scope of the project for SPMS 4.0 includes adding new data fields to capture important data from different data tables. Allowing users to input all data manually in a form. However, a new feature will be implemented to calculate course outcome percentages based on obtained marks for each course. Finally, the calculated course outcome percentage will be displayed to both students and faculty members. These enhancements will improve the overall functionality and user experience of SPMS 4.0.

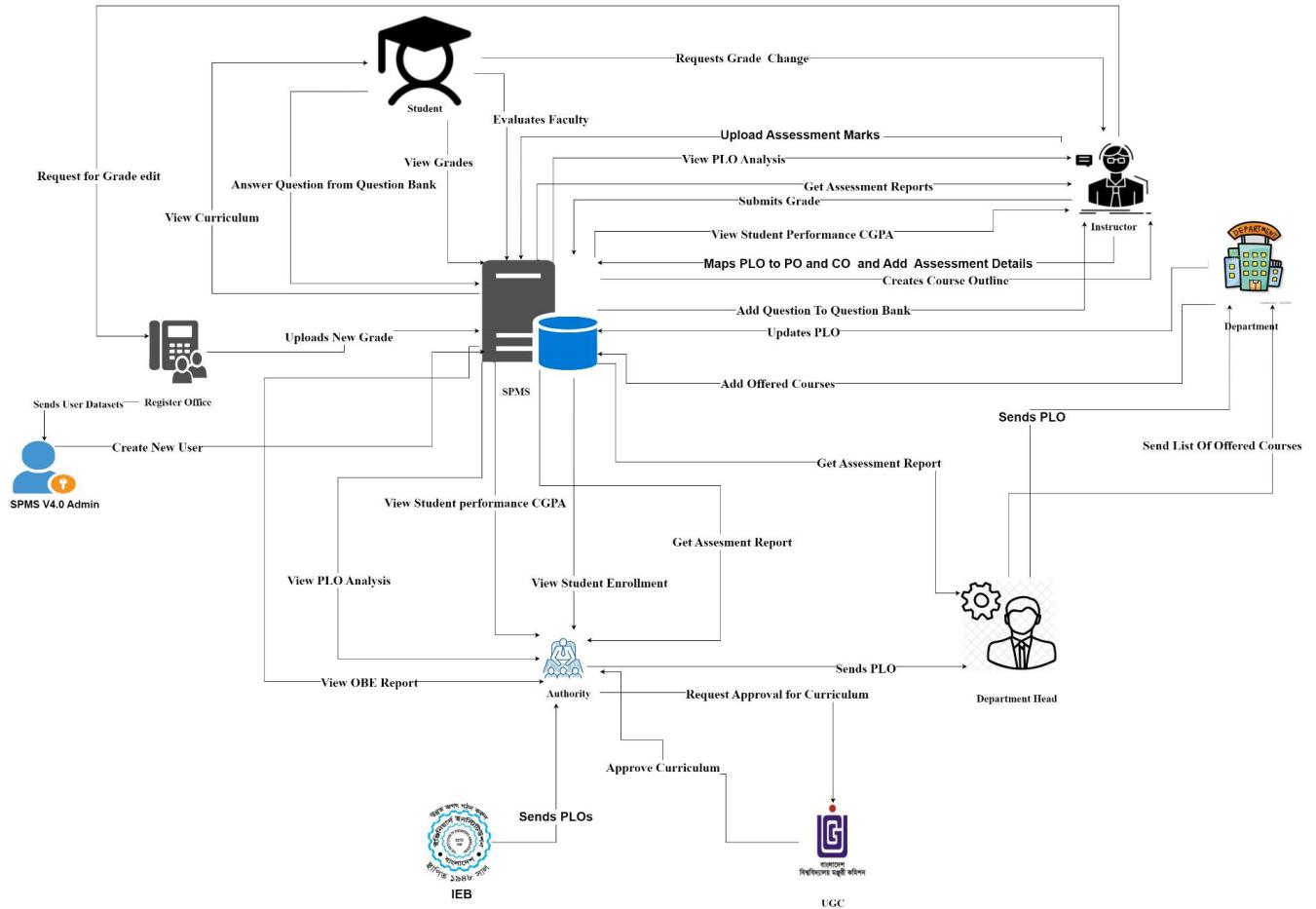
## CH-2: REQUIREMENT ANALYSIS

### a. Rich Picture (As-Is)

A rich picture is a visual diagram used to represent a complex situation. It includes people, objects, processes, and relationships. Mainly used in business analysis, database management, organizational management, and strategic planning to help stakeholders gain a deeper understanding of the system.



## b. Rich Picture (To-Be)



Rich Picture to Propose System- SPMS-4.0

### c. Six Elements Analysis (As-Is)

We can use six element analysis to analyze the impact of six elements in a process here. They are

- Human
- Non-computing Hardware
- Computing Hardware
- Software
- Database
- Communication and Network

Process						
	Human	Non-Comp Hardware	Computing Hardware	Software	Database	Network and communication

## Student Performance Monitoring System

Data Newbies

Map Course Outcomes (COs) to Program Learning Outcomes (PLOs)	IEB/UGC/ Ministry of Education: 1. Send Accreditation Manual with PLOs defined to Heads of Department/Dean of School. Head of Department / Dean of School: 1. Receive Accreditation Manual from IEB. 2. Send the Accreditation manual to Department Staff. 3. Direct Department Staff to tell Course Instructors and Coordinators to design Course Outline and Course Assessment Reports. Department: 1. Send Course Instructors the Accreditation	Pen and paper: 1. Is used for noting down intermediat e Brainstormi ng ideas. Board and marker: 1. Is used for noting down intermediat e Brainstormi ng ideas.	Computer: 1. Course Coordinator s use computers to make softcopies of Course Outcomes (COs) of the specific courses they are experts in. Printer: 1. To print out hardcopies of Course Outcomes (COs).	MS Word: 1. Course Coordinator s use MS Word to make a detailed course outline and Course Assessment Reports with Course Outcomes (COs) mapping to Program Learning Outcomes (PLOs). Excel Sheet: 1. Excel Sheet is used by Course. Coordinator s to map specific questions in the Midterm, Final exams, and Project work to specific Course outcomes (COs).		Internet & Email: 1. Use the internet and emails to communicate with UGC/IEB or other stakeholders to discuss important topics related to mapping Course Outcomes to Program Learning Outcomes. Others: 1. Use phones or physical means with stakeholders to discuss important topics related to mapping Course. Outcomes to Program Learning Outcomes.

	Manual with Defined PLOs. Course Instructor: 1. List course content. 2. List CO's. 3. Map Course Content to Course Outcomes (COs). 4. Map COs to PLOs. 5. Map COs to specific questions of Mid-term, Final Exams questions and Project Work. 6. Starting to design course assessment report using course outline, Course Content and CO's.					
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Record Student Assessment Data	Faculty/ Course Coordinator: 1. Assign project work and Assignments. 2. Take quizzes and exams throughout the semester. 3. Record assessment data of students throughout the semester of each student for every assessment (quizzes, assignments, project, exams) on softcopies	Pen & Paper: 1. Use pen & paper to record assessment data and marks obtained on physical paper in tabular Format (hardcopies ).	Computer: 1. Creating softcopies of records of all assessment data for specific courses are done on Computers.	Excel Sheet: 1. Record necessary assessment data and final grades on Excel Sheets.  IRAS: 1. Upload students' final grades to IRAS for viewing by students or the Registrar's office.	Department Storage: 1. Records of students' assessment data and final grades may be saved in the department office and registrar's office for future reference. IRAS Database server: 1. IRAS	Internet: 1. The Internet is used to communicate with IRAS to Store final grades of students.
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Student Performance Monitoring System	<p>and hardcopies. 4.</p> <p>Record marks for each specific question in the midterms and final exams. 5.</p> <p>Calculate total marks of quizzes, assignments, and midterm and final exams and assign final grades to each student of specific courses.</p> <p>6. Convert finals and midterms marks.</p> <p>7. Bring all the marks of every student for a course into a Marksheets.</p> <p>8. Grade the student.</p> <p>9. Upload students' final grades on IRAS.</p> <p>10. Send the Marksheets to the Department.</p> <p>11. Send the Marksheets to the Registrar's Office.</p>			uses a database server to store and maintain student grades information.		Data Newbies

Produce OBE Marksheets & Course Assessment Report	Faculty: 1. Calculate total marks received for each CO by calculating the marks received for questions and/or other Assessments mapped to CO's.	Pen and Paper 1. OBE marksheets stored in hardcopy. Additional markings may be made to further separate	Computer/ Phone: 1. Uses computers to make softcopies of the OBE Marksheets and Course	Coded Excel sheet: 1. Faculty/Coordinator uses automated excel sheets to calculate the student's	Department Storage: 1. Records of students' assessment data and final grades will be	Internet/Mail: 1. An Online platform (such as Google Sheets) may be used for processing the OBE
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	<p>2. Calculate total percentages received for each COs on the OBE Marksheets.</p> <p>3. Declare if a student has achieved a specific CO (if CO percentage is greater than or equal to 40).</p> <p>4. Declare if a student has received a PLO for a related CO.</p> <p>5. Make a table giving the verdict and analysis of how many students were able to receive a certain CO and PLO and other documents containing necessary information and data.</p> <p>6. Design Course Assessment Report using Course Outline, Course Content and Course Outcomes.</p> <p>7. Send the final version of the OBE Marksheets to the Dept. Office.</p> <p>Department Office:</p>	<p>between students.</p>	<p>Assessment Reports.</p> <p>Printer:</p> <p>1. Print hardcopies of final versions of the OBE Marksheets and Course Assessment Reports.</p>	<p>success/failure in Achieving PLOs.</p> <p>MS Word:</p> <p>1. Used to make Course Assessment Report softcopies.</p>	<p>saved in the department for future reference.</p> <p>Registrar's Office Storage:</p> <p>1. OBE Marksheets, Course Assessment Reports and other documents submitted by the department is stored for future reference.</p>	<p>assessment data spreadsheet.</p>
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	1. Send the OBE					
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	<p>marksheet, Course Assessment Report and others to the Registrar's Office.</p> <p>2. Store the OBE Marksheet and Course Assessment Report in the department.</p> <p>Registrar's Office: 1. Stores the OBE Marksheet and Course Assessment Reports and other documents and reports in the Registrar's Office.</p>					
View grades and download Transcript s	<p>Students:</p> <p>1. Log into IRAS.</p> <p>2. Search semester wise result for intended semester.</p> <p>3. See grades for specific semesters.</p> <p>4. Download transcript through browser into hard disk.</p> <p>Registrar's Office:</p> <p>1. Access IRAS.</p> <p>2. View students' grades if and when it is necessary.</p> <p>3. Download their</p>	<p>Pen and Paper</p> <p>1. Tabulated transcripts may be printed onto paper. Hardcopy is used as the primary source of truth during applications and other paperwork.</p>	<p>Computer/ Phone:</p> <p>1. Used for accessing IRAS.</p> <p>Printer:</p> <p>1. Used to print the tabulated transcript.</p> <p>Prints tabulated transcripts.</p>	<p>IRAS: 1. Store's letter grades of each completed course.</p> <p>2. Provides the online user interface for viewing grades and transcripts.</p>	<p>Registrar's Office Storage:</p> <p>1. Student information is kept in admin in hardcopies for future reference.</p> <p>IRAS Database Server:</p> <p>1. A Database Management Service is used to store, maintain, edit and receive</p>	<p>Internet/ Email</p> <p>1. The Internet is used to communicate with IRAS to store final grades of students.</p> <p>2. Softcopies may be mailed.</p>

					student grades	
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	transcripts.				information in IRAS. Web Server: 1. User interface and website pages are served using a remote web server.	
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Create student/faculty account & enter/customize necessary data	Admin: 1. New students' information is collected from registration processes. 2. New faculty information is received from HR. 3. Creates an account for students and faculties. 4. Customize some account details when necessary, for students or faculty.	Pen and Paper: 1. May be used for writing/copying student/faculty's vital login information for account creation.	Computer: 1. Used for accessing & adding/editing data to IRAS.	IRAS: 1. User interface is provided to interact with student/faculty data.	Registrar's Office Storage: 1. Student information is kept in admin in hardcopies for future reference. IRAS Database Server: 1. A Database Management Service is used to store, maintain, edit and receive student grades information in IRAS. Web Server: 1. User interface and website pages are served using a remote	Internet/Email 1. The Internet is used to communicate with IRAS to store final grades of students. 2. Softcopies may be mailed.
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					web server.	
View Records OBE Marksheets, Course Assessment Reports over a time period for inspection and analysis of student performance trends	IEB/ UGC: 1. Inform the university head of a deadline within which OBE Marksheets, Course Assessment Reports and other documents are needed for quality inspection to make necessary improvements to degree programs. 2. Inform the university head if govt. official will visit the campus. 3. Visit	Pen and Paper: 1. May be used for noting/mark in g down key points of the report. 2. Hardcopies of reports may be used.	Computer: 1. Used to display OBE Marksheets and Course Assessment Report's softcopies. 2. Send OBE and Course Assessment Reports to other computers.		Department Records 1. Retrieval of OBE marksheets and Course Assessment reports when needed. 2. Stores records on stakeholders interpretation of student performance trends.	The internet: 1. OBE marksheets and course assessment reports may be mailed online. 2. Online platforms such as Google Docs/Sheets display reports of softcopies.

	<p>university and relevant depts to receive the necessary documents and reports.</p> <p>Head of Dept/Dean of School:</p> <ol style="list-style-type: none"> <li>1. Request to view records of OBE Marksheets, Assessment Reports to analyze students' performance trends.</li> <li>2. Direct Department Staff to gather necessary documents, OBE Marksheets, Assessment report for a given time - period specified by govt. officials.</li> <li>3. Receive the necessary documents gathered by the dept.</li> <li>4. Evaluate the need to change/ improve the department's educational resources based on students' performance</li> </ol>				
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trends. VC/Board of Trustees: 1. Request to view records of OBE						
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	Marksheets, Assessment Reports to analyze students' performance trends. Departmental Staff: 1. Gather necessary OBE Marksheets, Assessment Reports & other documents. 2. Provide all the necessary documents to govt. officials.				
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Request for review and change of grades.	<p><b>Students:</b></p> <ol style="list-style-type: none"> <li>1. Request for grade change and review to faculty.</li> </ol> <p><b>Faculty/ Course Coordinator:</b></p> <ol style="list-style-type: none"> <li>1. Check exam papers and other assessments upon request.</li> <li>2. If change needs to be made, send a grade change request of a specific student to admin if not, end the process.</li> </ol> <p><b>Admin:</b></p> <ol style="list-style-type: none"> <li>1. Receive a request to change the grade of a specific student.</li> <li>2. Change grade of student based on Faculty request.</li> </ol>	<p><b>Computer/ Phone:</b></p> <ol style="list-style-type: none"> <li>1. Used for communicating with the faculty.</li> </ol>	<p><b>IRAS:</b></p> <ol style="list-style-type: none"> <li>1. Used by the admin for changing the grade.</li> </ol>	<p><b>IRAS server:</b></p> <ol style="list-style-type: none"> <li>1. Update student grade data.</li> </ol> <p><b>Department Storage:</b></p> <ol style="list-style-type: none"> <li>1. Update student grade data.</li> </ol> <p><b>Registrar's Office Storage:</b></p> <ol style="list-style-type: none"> <li>1. Update student grade data.</li> </ol>	<p><b>Internet:</b></p> <ol style="list-style-type: none"> <li>1. Email is primarily used for communication.</li> </ol> <p><b>Phone:</b></p> <ol style="list-style-type: none"> <li>1. May be used for communication.</li> </ol>
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## d. Six Elements Analysis (To-be)

Process						
	Human	Non-Comp Hardware	Computing Hardware	Software	Database	Network and communication
Create student and Faculty account	<p><b>Admin:</b> Collects Students and Faculties' information from IRAS. Updates information into the SPM Database. Creates new Student or Faculty accounts when required.</p> <p><b>Developing team and IT Experts:</b> Builds and Maintains the SPMS system.</p>	<p><b>Pen and Paper:</b> It is used for writing student or faculty is login information for account creation.</p>	<p><b>Computer:</b> It used for accessing and adding or editing data.</p>	<p><b>Operating Software:</b> Used by IRAS and SPMS 4.0.</p> <p><b>SPMS 4.0 :</b> User interface is provided to interact with student or faculty data.</p>	<p><b>IRAS:</b> Used by the Admin as a source of information for user accounts.</p> <p><b>SPMS 4.0:</b> user account stored in database server and maintain their information.</p>	<p><b>Internet:</b> It is used to access and store data from the IRAS to SPMS.</p>

<b>Admin creates a new Form</b>	<p><b>Admin:</b> First of all a new form will be created. Then add necessary parameters into the form.</p>	<p><b>Pen and Paper:</b> It is used to make parameter list. Such as Student ID , Educational year , Educational semester and so on.</p>	<p><b>Computer:</b> It used for accessing and editing data.</p>	<p><b>Operating Software:</b> Used by IRAS and SPMS 4.0.</p> <p><b>IRAS :</b> Used as a source of data from which the accounts will be created</p> <p><b>SPMS:</b> The software for which the admin will create new form based on parameters and calculated course outcomes.</p>	<p><b>IRAS:</b> Used by the Admin as a source of information for user accounts.</p> <p><b>SPMS 4.0:</b> uses a database server to store student information.</p>	<p><b>Internet:</b> It is used to access and store data from the IRAS to SPMS.</p>
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<b>Record Student course learning outcome Data from PLO</b>	<p><b>Admin:</b> Faculty assign Assignments.</p> <p>Record assessment data of students throughout the semester of each student for every assessment (quizzes, assignments, project, exams) on softcopies and hardcopies. Bring all the marks of every student for a course into a marksheet. Send the marksheet to the registrars office.</p>	<p><b>Pen and Paper:</b> Use pen and paper to record assessment data and marks obtained on physical paper in tabular format.</p>	<p><b>Computer:</b> It is used for creating softcopies of records of all assessment of students data for specific courses.</p>	<p><b>Operating Software:</b> Used by IRAS and SPMS 4.0.</p> <p><b>Excel Sheet:</b> Record all necessary assessment data and final grades on excel sheets.</p> <p><b>SPMS:</b> It is used for the faculty as collect all COs of students.</p>	<p><b>IRAS:</b> Used a database server to store and maintain student grades information</p> <p><b>SPMS 4.0:</b> uses a database server to store student course outcome information.</p>	<p><b>Internet:</b> It is used to access and store data from the IRAS to SPMS.</p>
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<b>Update Curriculum in SPMS 4.0</b>	<b>Admin:</b> Updates changes in the curriculum.	<b>Pen and Paper:</b> It is used in case the updates are noted.	<b>Computer:</b> Used to update changes and print the curriculum data report.	<b>Operating Software:</b> Used by IRAS and SPMS 4.0.  <b>SPMS 4.0:</b> It will contain the updated data.	<b>IRAS:</b> Used a database server to store and maintain student grades information  <b>SPMS 4.0:</b> Student informations data are stored here also it can be updated by SPMS 4.0 admin.	<b>Internet:</b> It is used to access and store data from the IRAS to SPMS.
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<b>view course outcomes and make spider chart</b>	<p><b>Admin:</b> <b>Faculty:</b> Update the database with the achieved COs marks of the student.</p> <p><b>Student:</b> Request the faculty to receive the exam paper to view on it.</p>	<p><b>Pen and Paper:</b> Use pen and paper to record assessment data and marks obtained on physical paper in tabular format.</p>	<p><b>Computer:</b> It is used to update changes and view grades along with spider chart.</p>	<p><b>Operating Software:</b> Used by IRAS and SPMS 4.0.</p> <p><b>SPMS 4.0:</b> It will contain the updated data.</p>	<p><b>SPMS 4.0:</b> It is used to store the updated data of the Student.</p> <p>Provide the SPM software with the information it where will need any queries from the database.</p>	<p><b>Internet:</b> It is used to access and store data from the IRAS to SPMS. Grade reports may be sent via email which is accessed by using the Internet.</p>
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## e. Problem Analysis (As-is):

Process Name	Stakeholders	Concerns (Problems)	Analysis (Reason of the Problem)	Proposed Solution
<b>CO-PLO Achievement</b>	1. Student 2. Admin 3. Faculty	1. Generated reports may not be clear or enough to make assessment.	1. Despite generating several reports, another form of report may prove to be useful to give a clear view of COs and POs achieved.	1. Generating Spider Charts for percentages achieved of both COs and Pos.
<b>Question Bank</b>	1. Faculty/Instructor	1. There is no interface for faculties to add assessment materials.	1. Faculty will need an option to add all the assessment materials to the system. 2. The system currently has no unified storage for past and present assessment materials.	1. Faculty will have option to add quiz/mid-term/final-term and assign marks. 2. All assessment materials can be found in one place. 3. The assigned marks will be used to calculate percentage of COs and POs achieved. 4. Difficulty level of question will be mapped from the questions according to the verbs list provided.
<b>Course Outline</b>	1. Faculty/Instructor	1. A feature is needed to generate course outline.	1. A feature is needed to generate course outline after providing some of the key details of course. 2. Some of the key details include course code, grading chart, CO matrix, Bloom's Learning Level, etc.	1. Provide the feature to generate course outline. 2. Provide option to download the generated course outline in a PDF file for all stakeholders involved.

## f. Process Diagram (As-is):

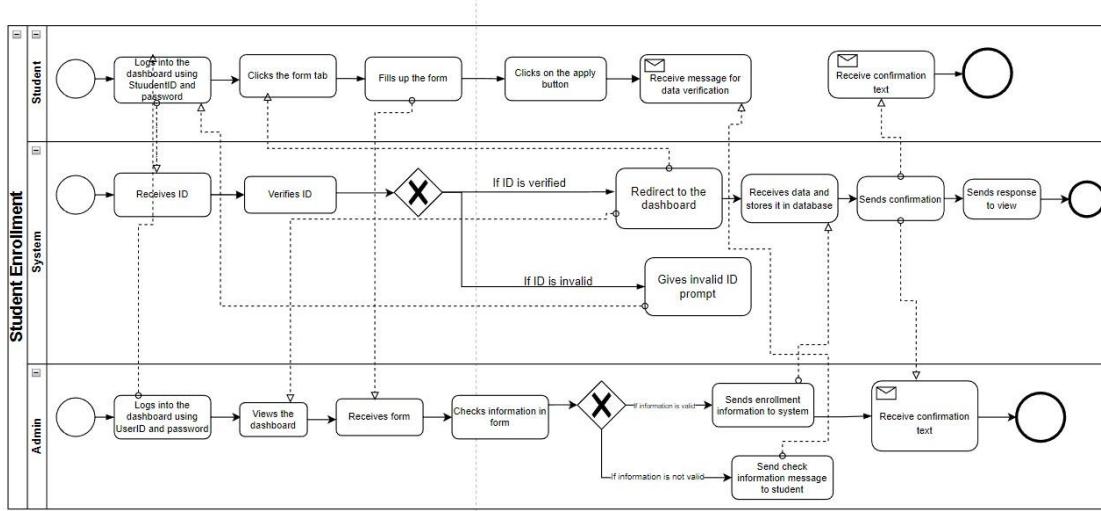


Figure 1.7: Student Enrollment

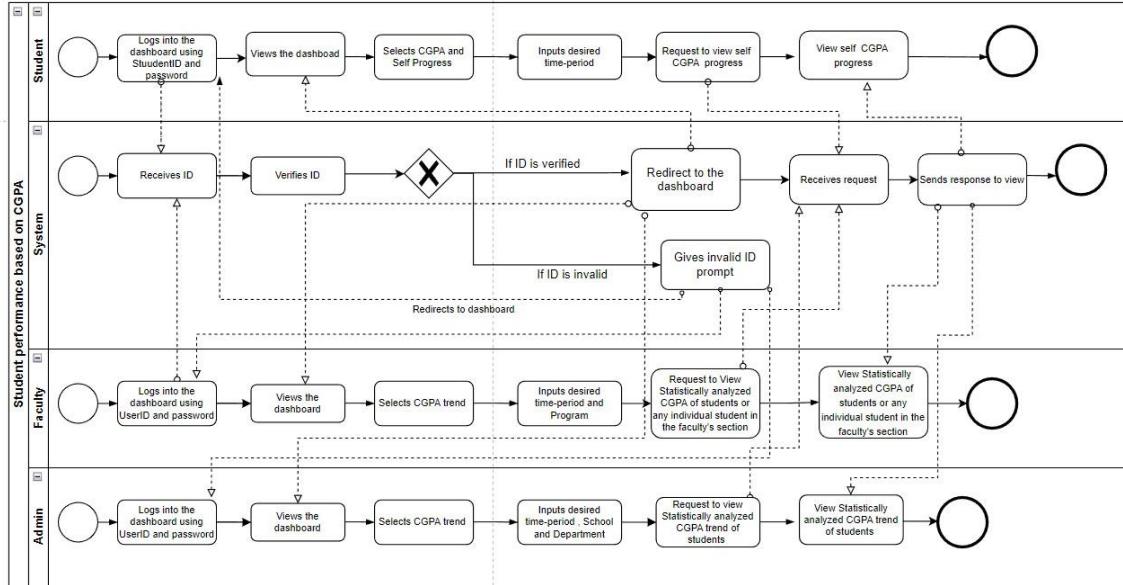


Figure 1.8: Student Performance based on CGPA

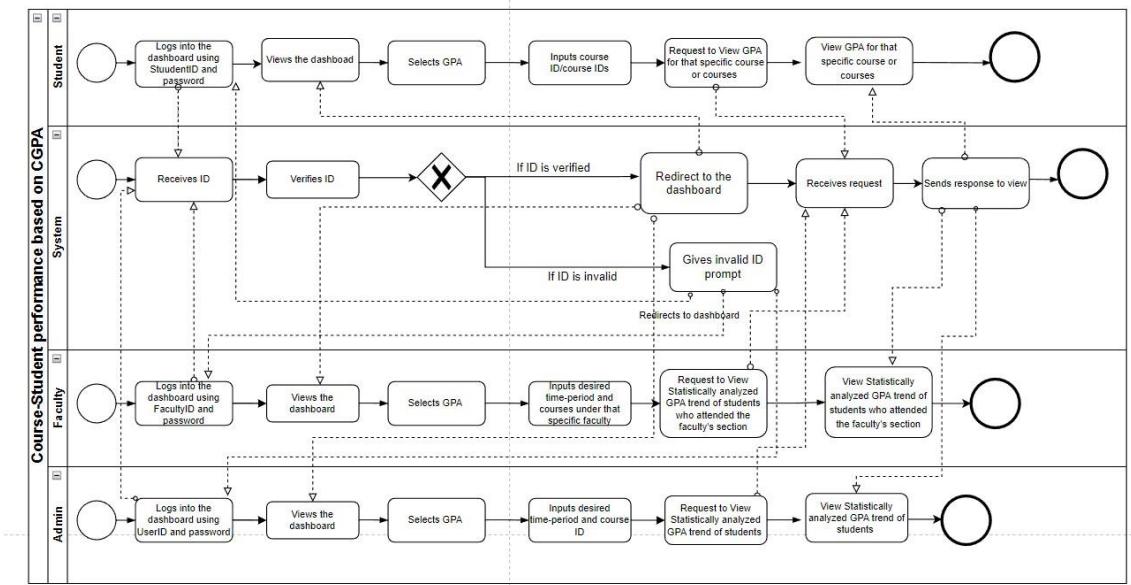


Fig 1.9:Course-Student performance based on CGPA

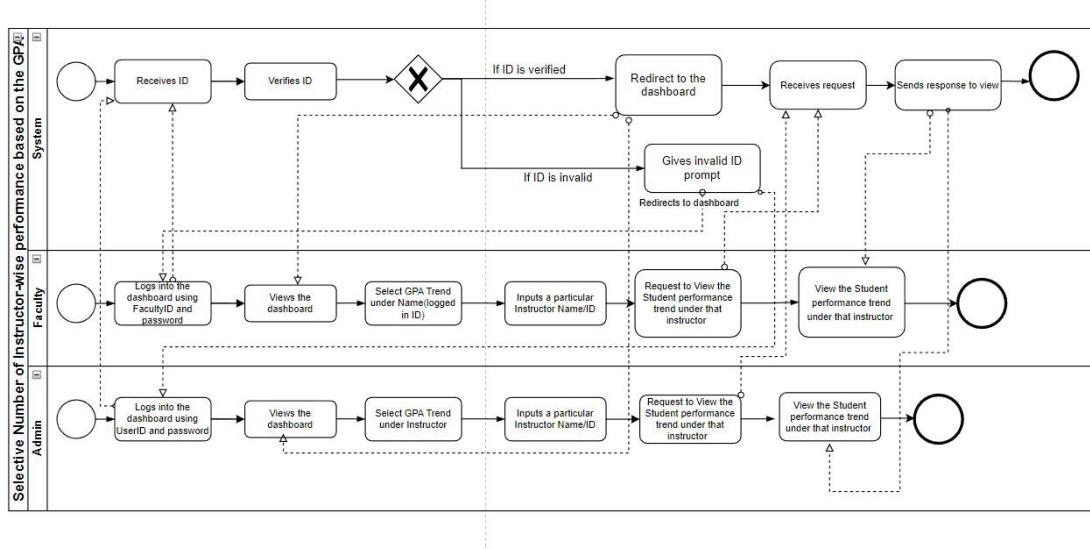


Figure 2.0: Selective Number of Instructor-wise performance based on the GPA

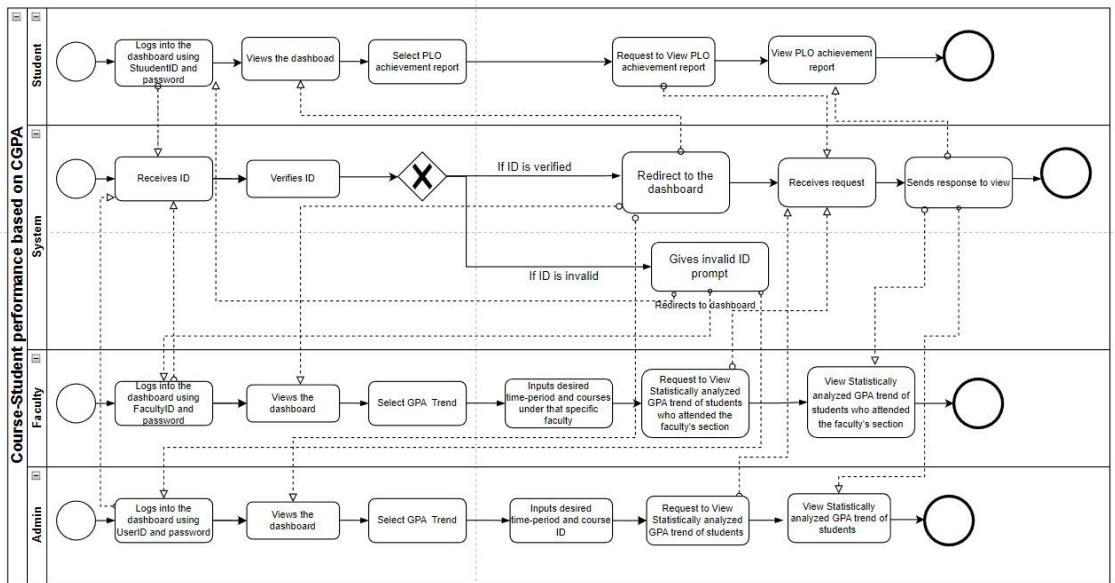


Figure 2.1: Course-wise Student Performance based on GPA

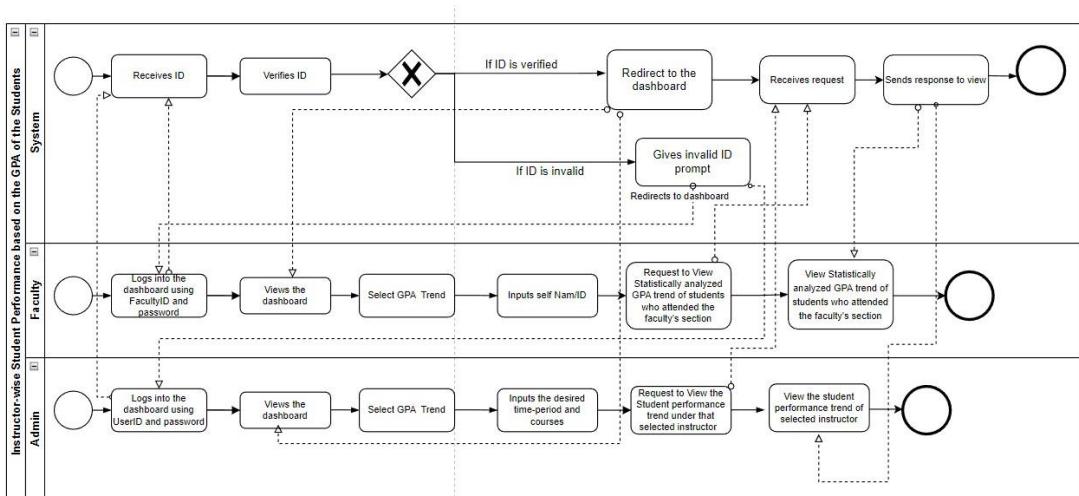


Figure 2.2: Instructor-wise Student Performance based on the GPA of the Students

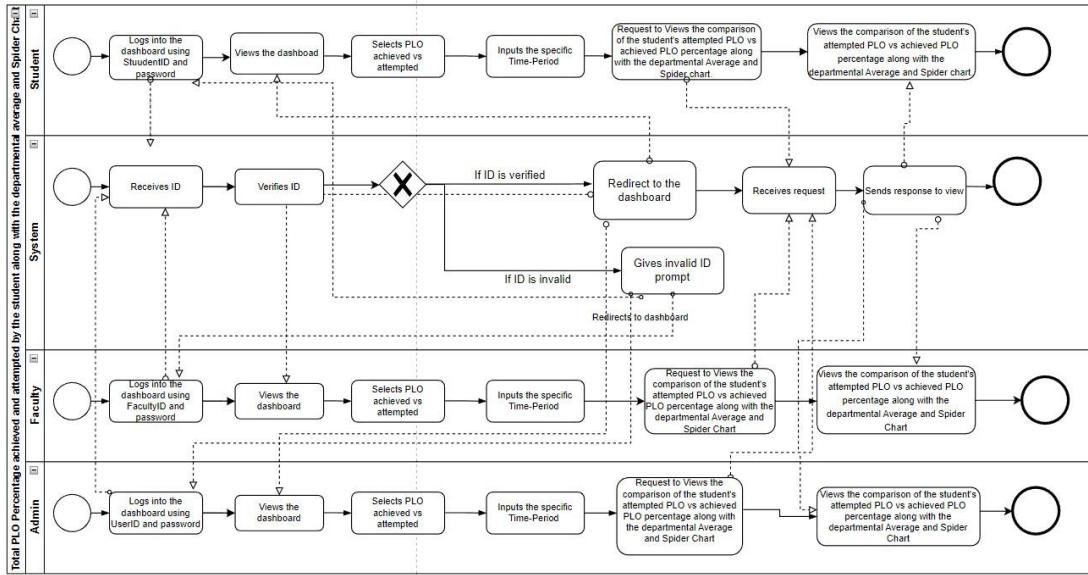


Figure 2.3: Total PLO Percentage achieved and attempted by the student along with the departmental average and Spider Chart

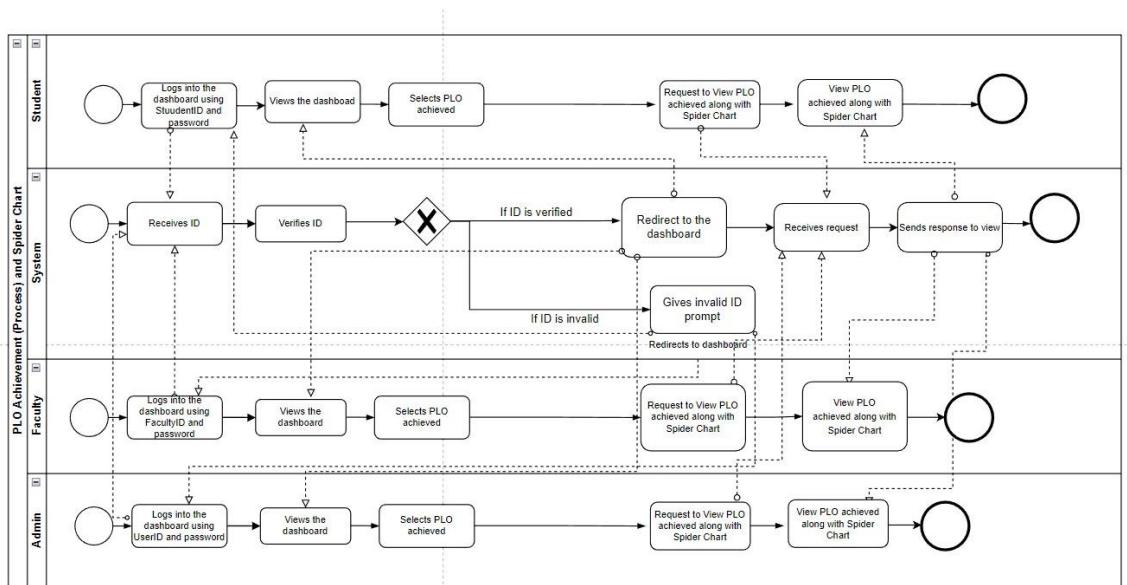


Figure 2.4: PLO Achievement (Process) and Spider Chart

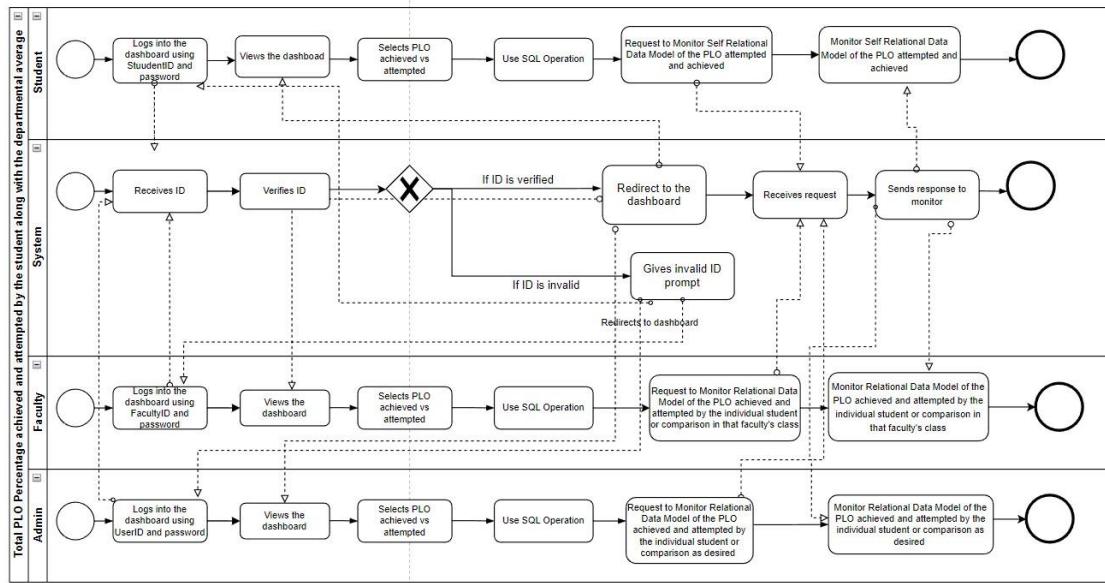


Figure 2.5: Comparison of PLO Achieved vs Attempted (Process)

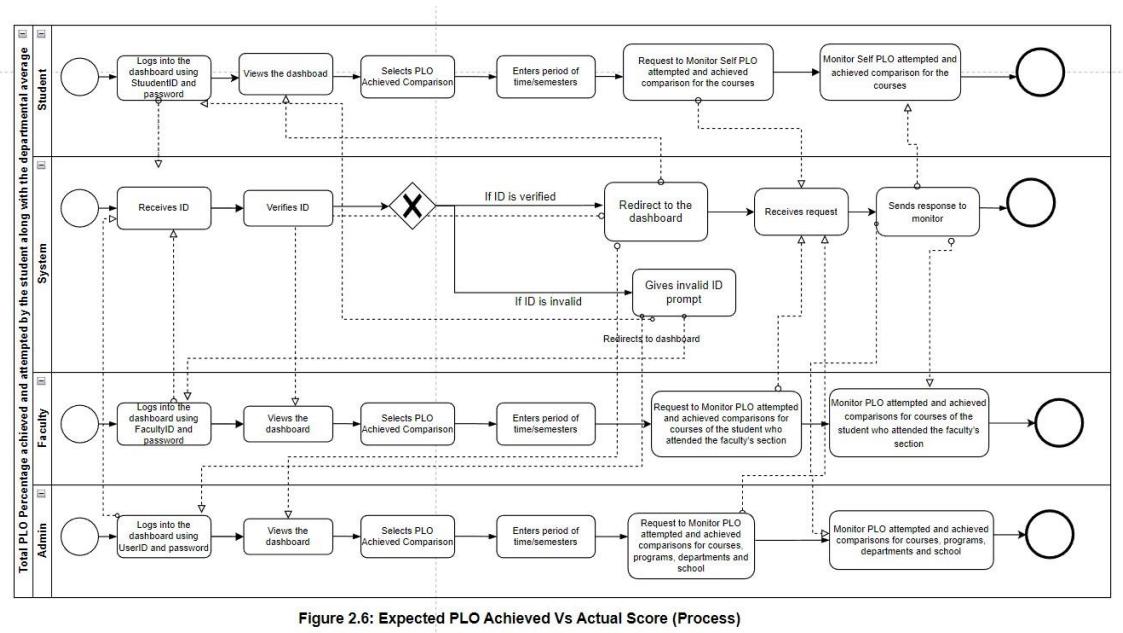


Figure 2.6: Expected PLO Achieved Vs Actual Score (Process)

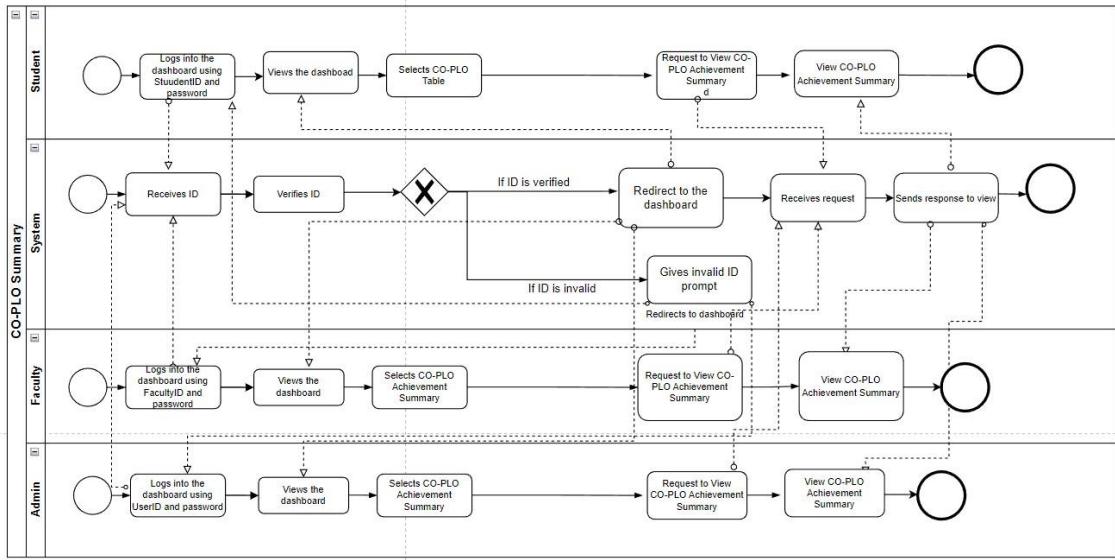


Figure 2.7: CO-PLO Summary (Process)

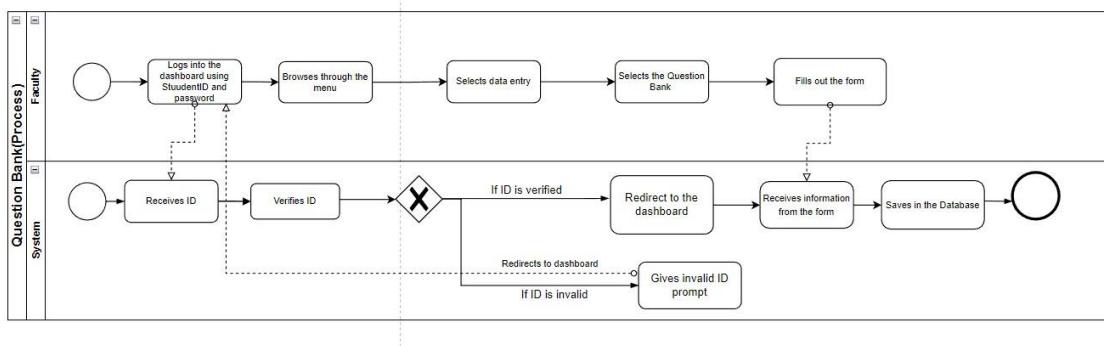


Figure 2.8: Question Bank(Process)

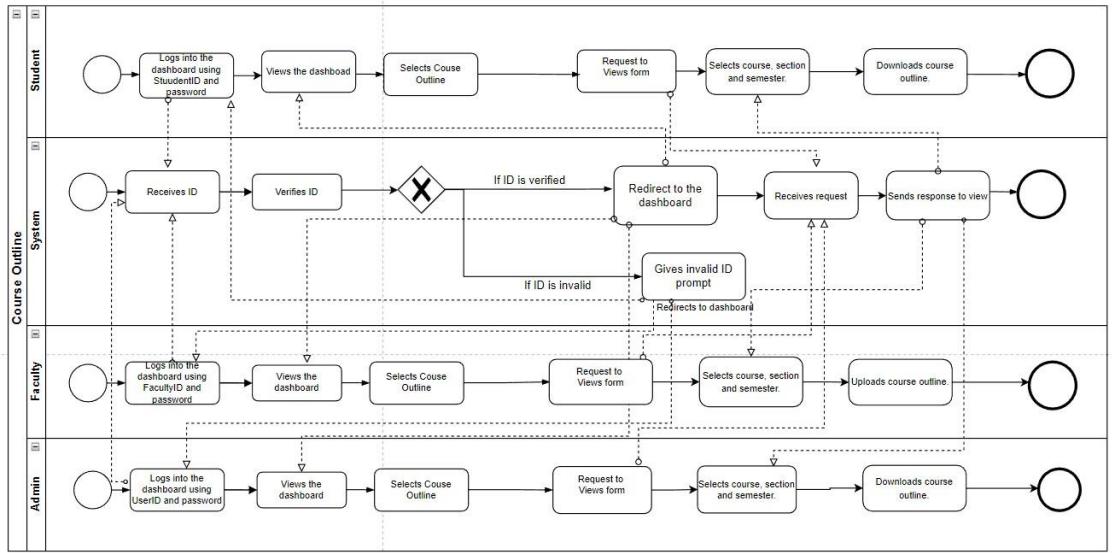


Figure 2.9:Course Outline

## g. Process Diagram (To-be):

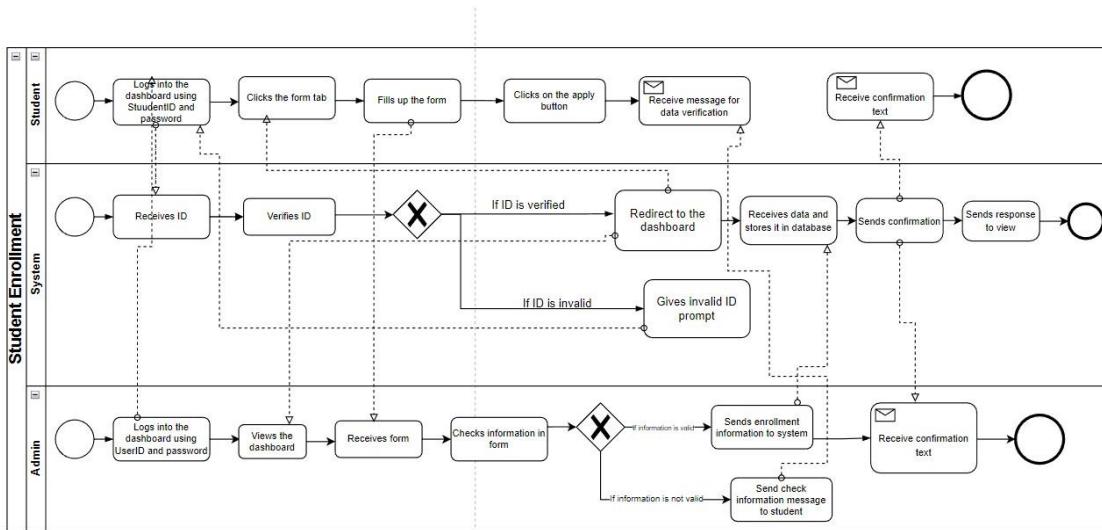


Figure 1.7: Student Enrollment

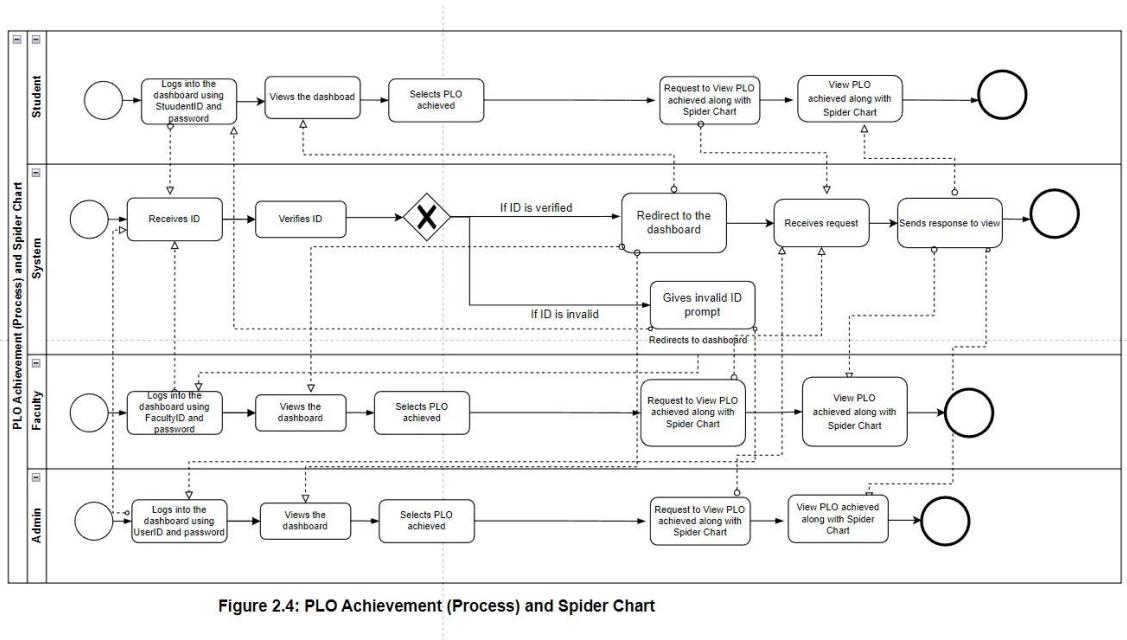
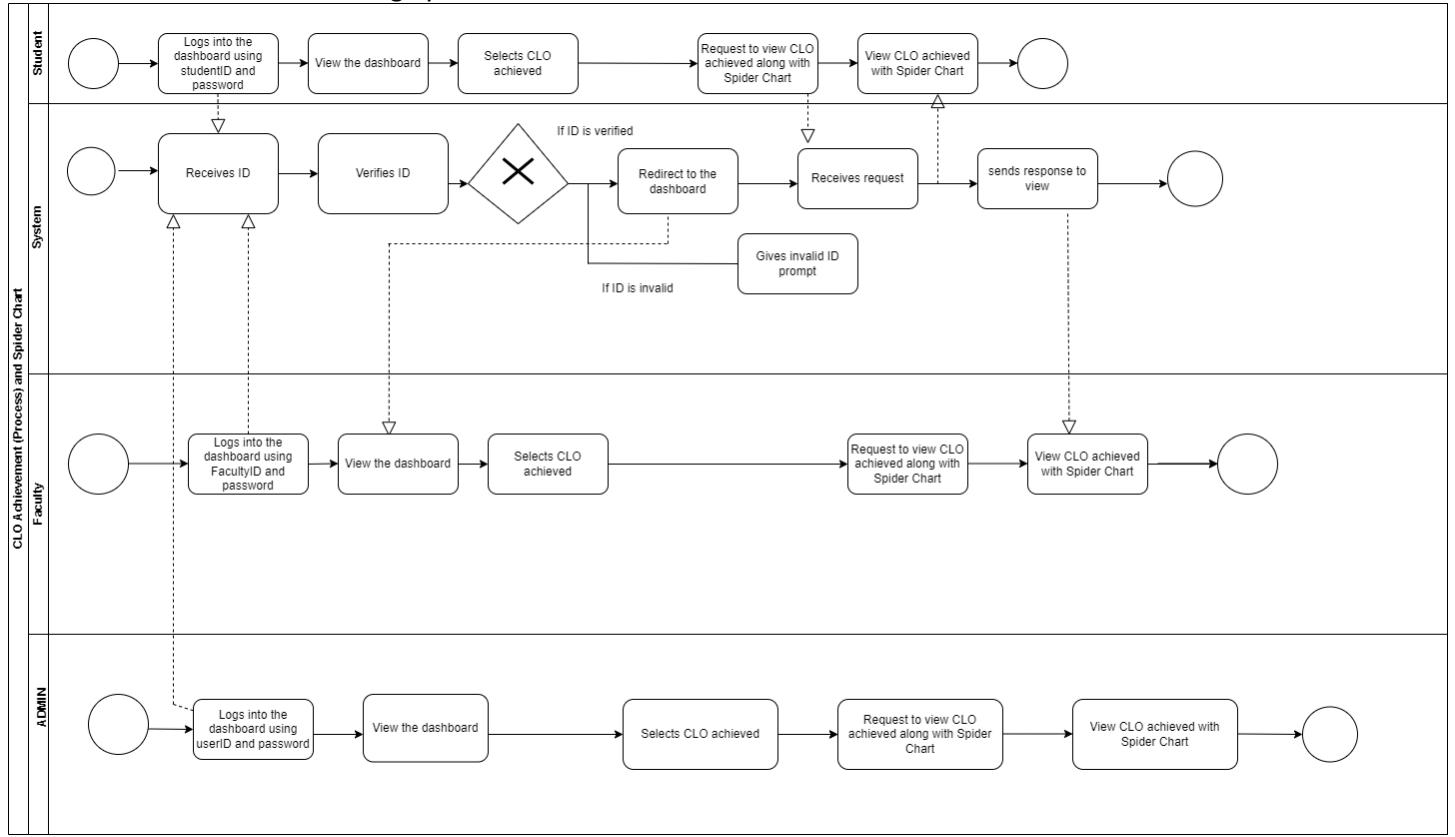


Figure 2.4: PLO Achievement (Process) and Spider Chart



## CH-3 LOGICAL SYSTEM DESIGN

### a. BUSINESS RULES

The OBE2.0 aims to improve the efficiency of monitoring student performance. It uses the data provided by IUB regarding their departments, programs, faculties, students and other relevant information to create a better, time efficient system. All the COs (Course Outcomes) and the mapped PLOs (Program Learning Outcome) are stored in the system and compared with each other so OBE2.0 can generate the result of PLO fulfilment.

In a university, a student enrolls under a specific degree program, which falls under a certain school. Students usually take courses as per the curriculum of their respective programs. STUDENT's have ID, name (First Name, Last Name), email, phone number.

Each program belongs to a department and the related departments are kept under schools of the University. Each program consists of many courses. Courses are taught by faculties; departments are run by department heads and schools are run by deans.

Under the OBE model, for each program there will be a set of program learning outcomes (PLO). To fulfill the requirement of a degree program a student must achieve the PLOs associated with that program. To evaluate the students in each course, there are a set of course outcomes (CO) that are mapped with the PLOs of the degree program.

There are different SCHOOLS in a university, each of which have ID and name. Under a school, there are different programs. A PROGRAM has an ID and a name.

There are many departments under the programs. The DEPARTMENT has a department ID and name. In a department, there are faculty members and a department head who is also a faculty. Usually, department heads create the initial mapping of courses with PLOs and store it in the system.

Departments offer multiple courses. A COURSE each of has a unique course ID, course title, credit hour, and a course category (ex- foundation, major, minor). Each course contains a course outline through which students will be able to know what they will learn within the course. Students may view one or many course outlines and a single course outline can be viewed by multiple students. A COURSEOUTLINE has a unique ID, course objective, course description, course policy, course content, credit hour, course value, year, lesson plan and materials. Under each course, the COs are measured through different assessment techniques. Courses may be retaken by students if they wish to improve their grade.

Courses will be mapped with PLO. PLO has a unique ID, name, details, level.

A course has multiple course outcomes. A single CO can be mapped with multiple PLO. Every CO has a unique ID, number, level, description. It should be noted that, mapping of CO and PLO are corelated to each other.

A student may fail to fulfil a PLO in a course but they can fulfil the requirement by achieving the PLO from another course higher than the previous course. The PLO percentage is tracked for progress purposes as well as comparison between sets of students, where one might have achieved a certain PLO in all courses that had it, and the other achieved it in fewer courses. COs are also tracked.

Students are required to complete the courses associated with the programs to fulfil the requirement of the degree so for each semester. Every course has at least one section and a course may have multiple sections. A SECTION has ID, section no, room no, total no. of enrolments, student capacity, class time, semester and year.

Every semester, faculty members are assigned to the courses in specific sections. A faculty member may be assigned to multiple sections of a single course. FACULTY members have a unique ID, name (first name, last name), email and contact number. In case a student can't fulfil a PLO that they already fulfilled in the previous course, it can be misleading, and the decision on how to handle such cases might be reserved by the faculty members of the courses.

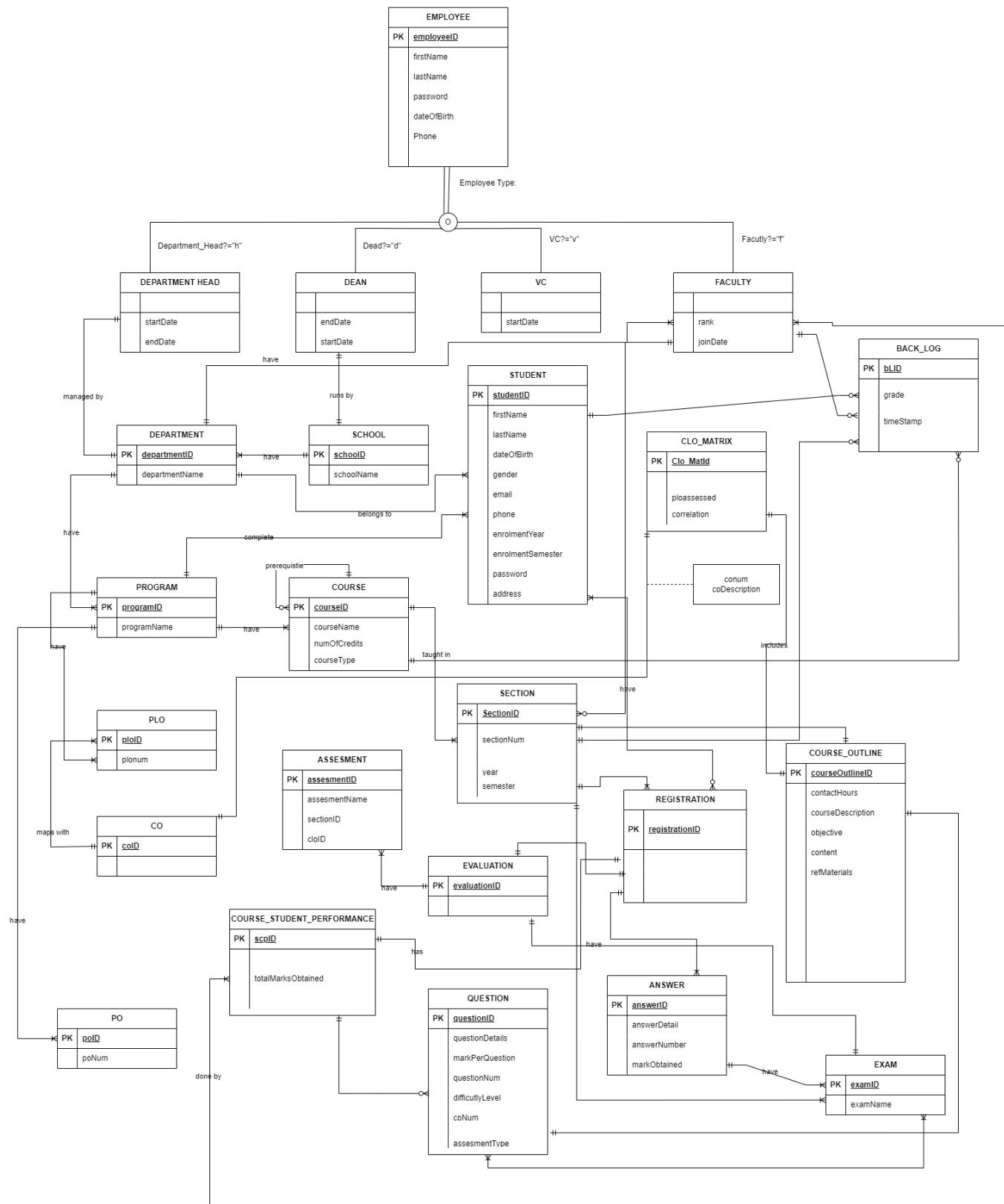
In every section, there are multiple assessments. In ASSESSMENT, there are assessment ID, bloom level, bloom category, marks. Each assessment has a main assessment which is a part of itself. In MAIN ASSESSMENT, there are assessment type and total duration. The existence of an assessment data is dependent on the existence of the main assessment data. If main assessment data is removed, then assessment data is also removed.

Under an assessment, there are multiple questions. In the QUESTION section, there are question ID, question type, question detail and sample answers.

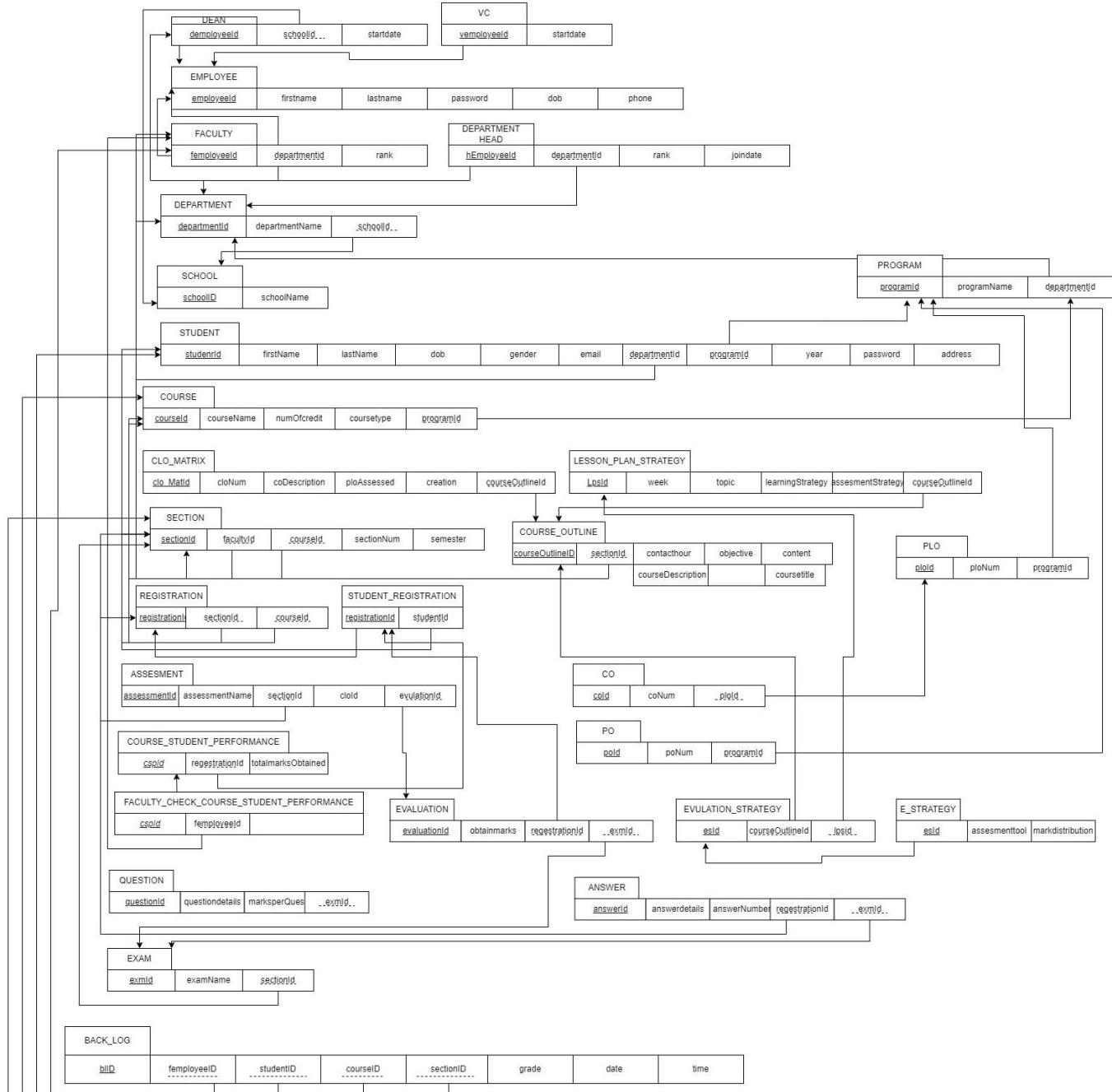
**Student Performance Monitoring System****Data Newbies**

Faculty members will evaluate the exams after students have taken them. EVALUATION has a unique ID, obtained marks and the students' answer. The faculty members evaluate the COs achieved and mapped PLOs achieved by each student in a course. To reduce workload of the faculty, the OBE2.0 system will have automated checking of the scripts through the help of the sample answer and make evaluation reports using the marks generated.

## b. ENTITY RELATIONSHIP DIAGRAM



## 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	
	prerequisiteCode	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
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
PLO (p)	ploID	p1
	ploNum	p2
	programID	r1
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)	IPSID	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
BACK_LOG	StudentID	s1
	FacultyID	f1
	SectionID	y1
	CourseID	u1
	Grade	z4
	Date	d3
	Time	d4
		b1

**1NF:** A relation that has a primary key and in which there are no repeating groups.

R1

a1	k1	l1	m1	n1	o1	q1	t1	e1	z1	a2	a3	c1	c2	c3	c4	c5	c6	c7	c8	c9	c10	d1	d2	e2	e3	e4
f1	f2	f3	g1	g2	g3	g4	h1	h2	i1	i2	k2	k3	l2	l3	l4	l5	l6	m1	m2	m3	m4	m5	m6	m7	m8	n2
o2	p1	p2	q2	q3	q4	q5	q6	r1	r2	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	t2	t3	t4	u1	u2	u3
u4	v1	v2	v3	w1	w2	w3	x1	x2	y1	y2	y3	y4	z2	z3	z4											

**2NF:** A relation in first normal form in which every non-key attribute is fully functionally dependent on the primary key.

R10

→	a1	a2	a3	a4	g1	i1	g2	g3	g4	y1	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	i2	y2	y3	u1	f1	y4
	d1	d2	h1	h2	f1	f2	f3	r1	r2	u2	u3	u4															

R12

k1	k2	k3
----	----	----

R14

m1	m2	m3	m4	m5	m6	m7	m8
----	----	----	----	----	----	----	----

R15

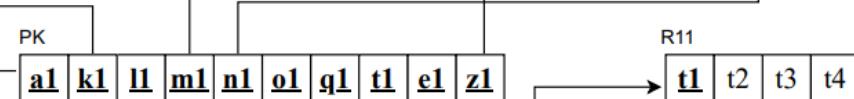
z1	z2	z3	z4
----	----	----	----

R16

n1	n2
----	----

PK

a1	k1	l1	m1	n1	o1	q1	t1	e1	z1
----	----	----	----	----	----	----	----	----	----



R13

l1	l2	l3	l4	l5	l6	c1	c2	c3	c4	c5	c6	c7	c8	c9	c10
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----

R17

q1	q2	q3	q4	q5	q6
----	----	----	----	----	----

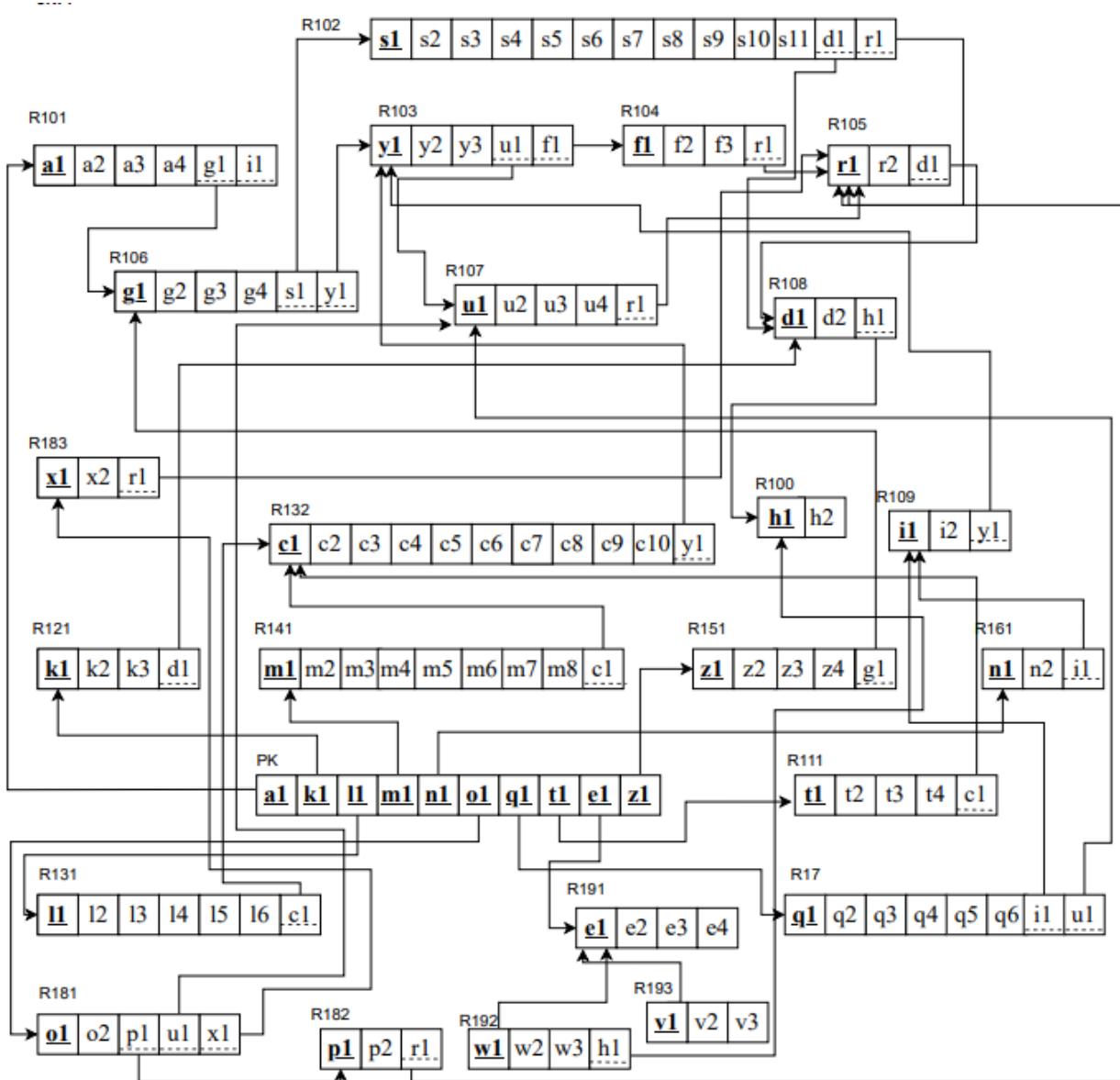
R18

o1	o2	p1	p2	x1	x2
----	----	----	----	----	----

R19

e1	e2	e3	e4	v1	v2	v3	w1	w2	w3
----	----	----	----	----	----	----	----	----	----

**3NF:** A relation that is in second normal form and has no transitive dependencies.



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

## e. DATA DICTIONARY

### School

Name	Type	Size	Remark
schoolID	VARCHAR	6	This is the Primary Key of School.
schoolName	VARCHAR	45	This is the name of the School. Example: "School of Engineering, Technology and Science"

### Student

Name	Data Type	Size	Remark
studentID	VARCHAR	7	This is the primary key of this relationship. This contains the ID of the student. Example: "1820735"
FirstName	VARCHAR	30	This is the first name of the student.Example: "Nahyan"
LastName	VARCHAR	15	This is the last name of the student.Example: "Tajnoor"
S_email	VARCHAR	30	This is the email address of the Student. Example: "1830022@iub.edu.bd"
S_phoneNumber	VARCHAR	14	This is the phone number of the Student.

### Department

Name	Data Type	Size	Remark
departmentID	VARCHAR	7	This is the Primary Key of the Department.Example: "CSE"
departmentName	VARCHAR	43	Name of a particular department Example "School of Computer Science"

			andEngineering
--	--	--	----------------

## Program

Name	Data Type	Size	Remark
programID	VARCHAR	7	This is the Primary Key for a Program.Example: "B.Sc".
programName	VARCHAR	30	This is the name of the Degree Program.Example: "Bachelor of Science"

## Courses

Name	Data Type	Size	Remark
courseID	VARCHAR	9	This is the Primary Key for the Course.Example: "CSE203"
Course_title	VARCHAR	50	This is the name of the Course. Example "Database Management"
creditHour	INTEGER	4	This is the credit for the Course.Example: "3"

## CO

Name	Data Type	Size	Remark
coID	VARCHAR	27	This is the Primary Key for Course Outcome.Example:1
Co_number	VARCHAR		This is the details of the course outcome.
ploID	VARCHAR	5	Level of CO. For example: 400 level courses like cse437.
Level	INTEGER	3	1 Low, 2 Mid, 3 High

co_description	TEXT		This is where the description is added. It is used because TEXT holds a string with a maximum length of 65535 bytes.
----------------	------	--	--

## PLO

Name	Data Type	Size	Remark
ploID	VARCHAR	5	This is the Primary Key for the PLO.
Name	VARCHAR	35	This is the name of PLO. Example: "Learning SQL"
Details	TEXT		This is the details of the Program Learning Outcome.
Level	INTEGER		Level of PLO. Example: 1

## Section

Name	Data Type	Size	Remark
sectionID	INTEGER		This is the Primary Key for Section. Example: "2"
secNumber	INTEGER		This is the total no of student of section Example: "25"
roomNumber	VARCHAR	7	This is the room no of the section. Example: "BC5012"
totalNumberOfEnrollment	INTEGER		This is the total no of enrollment of the section. Example: "45"
classTime	VARCHAR	17	This is the class time of the section Example: "MW 8:00 AM - 9:30 AM"

semester	VARCHAR	6	This is the name of the semester's section. Example: "Autumn"
year	DATE		Year of the section Example: "2022"

## Assessment

Name	Data Type	Size	Remark
assessmentID	VARCHAR	29	This is the Primary Key for the assessment id. Format: "courseID_section_semester_year_typeofAssess" Example: "CSE101_01_2_2021_01"
BloomLevel	VARCHAR	8	This entity stores the name of assessment. Example: "Final"
Marks	INTEGER		Here will store the total marks of assessment. Example: 40
Bloom Category	VARCHAR	9	
assessmentType	VARCHAR		Quiz, Mid, Final
totalduration	VARCHAR	5	Exam is at 10:30

## Evaluation

Name	Data Type	Size	Remark

evaluationID	VARCHAR	33	This is the Primary Key for the evaluation id. Format: "courseID_section_semester_year_typeofAssess_stu dID" Example: "1820735_CSE101+L_01_summer_2021_01_"
obtainedMarks	FLOAT		Here will store the total obtained marks of a student. Example: 30.5
StudentAnswer	LONGTEXT		This entry will store the student's answer.
quesID	VARCHAR	29	Example: "CSE303_01_summer_2021_01_001,"
cOID	VARCHAR	27	This is the Primary Key for Course Outcome.Example:1
ploID	VARCHAR	5	This is the Primary Key for the PLO.

## Question

Name	Data Type	Size	Remark
quesID	VARCHAR	29	This is the Primary Key for the assessment id. Format: "courseID_section_semester_year_typeofAssess_questi onNumber" Example: "CSE303_01_summer_2021_01_001,".
quesType	TEXT		Quiz, Mid OR Finals
sampleAnswer	TEXT		This is the sample answer of the question.
quesDetail	INT		Each question's mark.

## Backlog

Name	Data Type	Size	Remark
bLID	INT	15	This is the Primary Key for the backlog id.
studentId	VARCHAR	10	This contains the ID of the student. Example: "1820735"

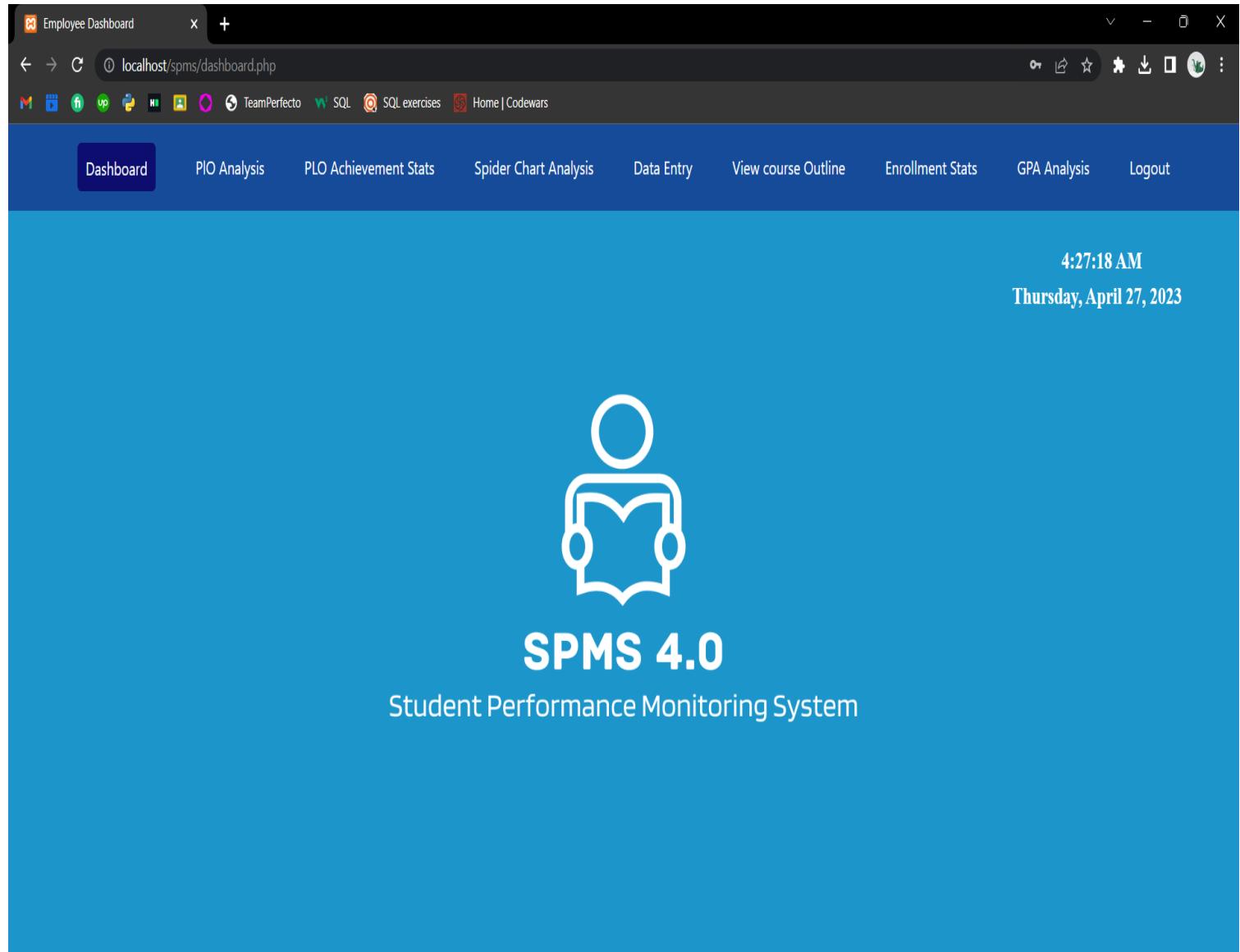
### Student Performance Monitoring System

Data Newbies

FacultyId	VARCHAR	10	This contains the ID of the faculty.
CourseId	VARCHAR	10	This contains the ID of the course. Course Example: "CSE203"
sectionId	VARCHAR	10	This contains the ID of the section. Example: "5"
grade	VARCHAR	05	Marks Example: "A- "
timeSpam	timeSPAM	10	date

## CH-4 PHYSICAL SYSTEM DESIGN

### a. INPUT FORMS, OUTPUT QUERY & REPORTS





Student Grade Upload Manual x +

localhost/spms/manualUploadGrade.php

Dashboard PLO Analysis PLO Achievement Stats Spider Chart Analysis Data Entry View course Outline Enrollment Stats GPA Analysis Logout

How many students' grade do you want to upload? 1 SUBMIT

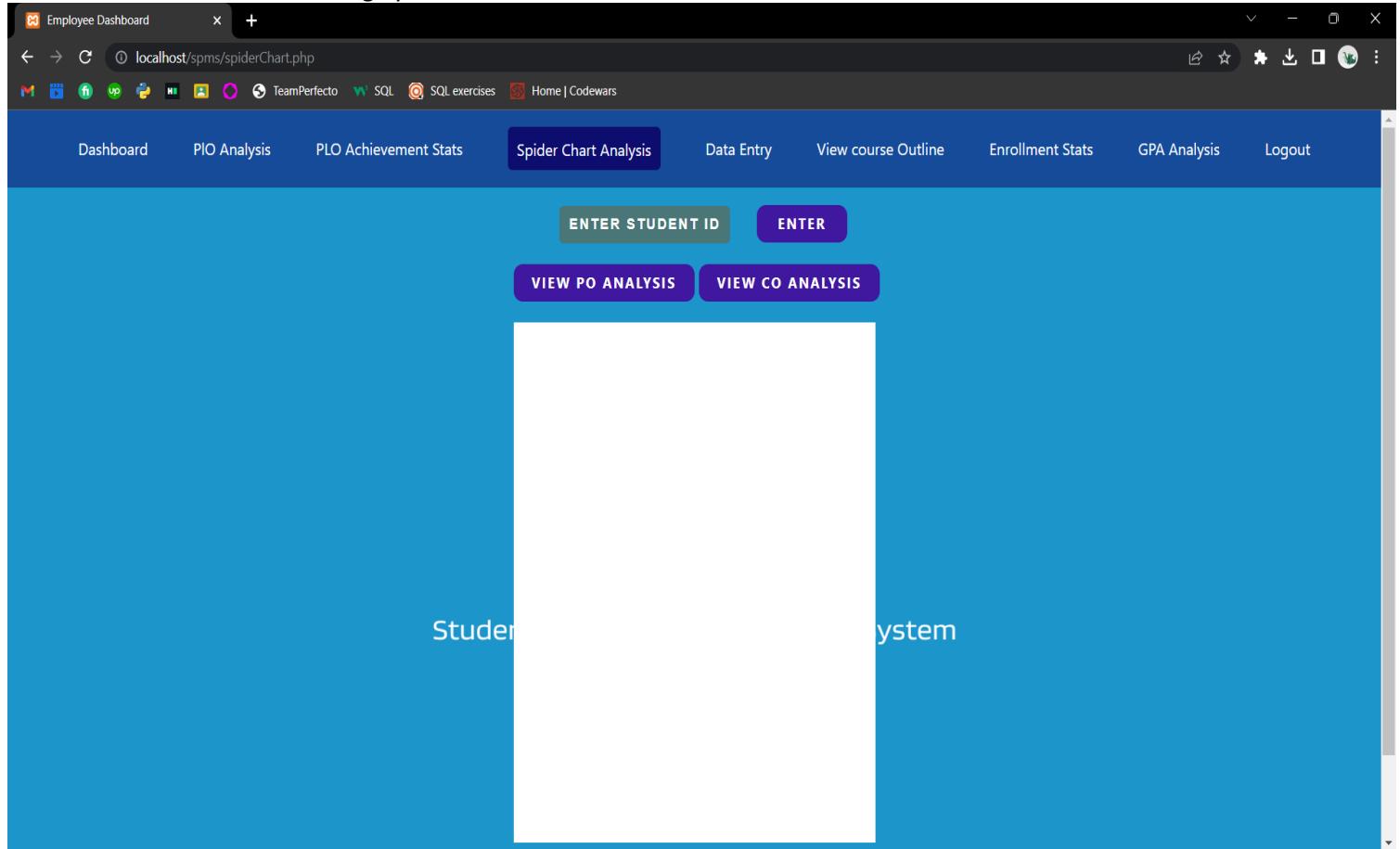
Student 1 Student ID: Education Semester: Education Year: Enrolled Course: Enrolled Section: Grade Point:

UPLOAD



**SPMS 4.0**

Student Performance Monitoring System



```
login.php X
C: > Users > csari > Downloads > spms-master > spms-master > login.php
1  <?php
2
3  $invalid=0;
4
5  if($_SERVER[ 'REQUEST_METHOD' ]=='POST'){
6
7      include 'connect.php';
8
9      $userType=$_POST[ 'userType' ];
10     $ID=$_POST[ 'ID' ];
11     $password=$_POST[ 'password' ];
12
13     if($userType!='student'){
14         $sql="SELECT * from employee_t where employeeID='$ID' and password='$password'";
15         $result=mysqli_query($con,$sql);
16         if($result){
17             $num=mysqli_num_rows($result);
18             if($num>0){
19                 $invalid=0;
20                 session_start();
```

```
signup.php X
C: > Users > csari > Downloads > spms-master > spms-master > signup.php
1  <?php
2  $success=0;
3  $user=0;
4
5  if($_SERVER['REQUEST_METHOD']=='POST'){
6      include 'connect.php';
7
8      $employeeID=$_POST['employeeID'];
9      $password=$_POST['password'];
10
11     $sql="SELECT*from employee_t where employeeID='$employeeID'";
12     $result=mysqli_query($con,$sql);
13     if($result){
14         $num=mysqli_num_rows($result);
15         if($num>0){
16             $user=1;
17         }
18     else{
19         $sql="insert into employee_t (employeeID,password)
20             values('$employeeID', '$password')";
21         $result=mysqli_query($con,$sql);
```

```
spms.sql X

C: > Users > csari > Downloads > spms-master > spms-master > spms.sql

90  --
91
92  CREATE TABLE `back_log_t` (
93      `bLID` int(11) NOT NULL,
94      `studentID` int(7) NOT NULL,
95      `year` year(4) DEFAULT NULL,
96      `semester` varchar(6) DEFAULT NULL,
97      `courseID` varchar(6) DEFAULT NULL,
98      `sectionNum` int(5) DEFAULT NULL,
99      `gradePoint` float DEFAULT NULL,
100     `employeeID` int(4) NOT NULL,
101     `timeStamp` timestamp NOT NULL DEFAULT current_timestamp()
102 ) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4;
103
104 --
105 -- Dumping data for table `back_log_t`
106 --
107
108 INSERT INTO `back_log_t` (`bLID`, `studentID`, `year`, `semester`, `courseID`,
109 `employeeID`, `timeStamp`) VALUES
110 (3, 2022082, 2023, 'Spring', 'ENG101', 5, 2.7, 2259, '2023-04-26 05:18:38'),
111 (4, 2022083, 2023, 'Spring', 'ENG101', 5, 3.3, 2259, '2023-04-26 17:01:03'),
112 (5, 2022084, 2023, 'Spring', 'ENG101', 5, 2, 2259, '2023-04-26 17:16:28');
```

spiderChart.php X

C: &gt; Users &gt; csari &gt; Downloads &gt; spms-master &gt; spms-master &gt; spiderChart.php

```
37
38 #chartdiv {
39   width: 100%;
40   height: 500px;
41   background-color:pink;
42 }
43
44
45
46 .studentID{
47   background-color:#6698FF;
48   height:36px; border: 1px solid;
49   cursor: pointer;
50   border-radius: 5px;
51   font-size: 14px;
52   letter-spacing:2px;
53   font-weight: bold;
54   text-transform: uppercase;
55   border: none;
56   outline: none;
57   text-align: center;
58   color:white;
59 }
```

```
48      <label for="nav-check">
49          <span></span>
50          <span></span>
51          <span></span>
52      </label>
53  </div>
54
55  <div class="nav-links">
56      <ul>
57          <li><a href="employee_dashboard.php" target="_self">Dashboard</a></li>
58          <li><a href="exam.php" target="_self">Exam</a></li>
59          <li><a href="createCourseOutlinePage1.php" target="_self">Create Course Outline</a></li>
60          <li><a href="viewCourseOutline.php" target="_self">View Course Outline</a></li>
61          <li><a href="logout.php" target="_self">Logout</a></li>
62      </ul>
63  </div>
64 </div>
65
```

dashboard.php X

C: > Users > csari > Downloads > spms-master > spms-master > dashboard.php

```
56      </li>
57
58  <li><a href="#">PLO Achievement Stats</a>
59
60      <div class="menu1">
61          <ul>
62              <li><a href="ploComparisonStudent.php"> PLO Comparison(Student) </a> </li>
63              <li><a href="ploComparisonCourse.php"> PLO Comparison(Course) </a> </li>
64              <li><a href="ploComparisonProgram.php"> PLO Comparison(Program) </a> </li>
65              <li><a href="ploComparisonSchool.php"> PLO Comparison(School) </a> </li>
66              <li><a href="ploComparisonDepartment.php"> PLO Comparison(Departement)</a> </li>
67          </ul>
68      </div>
69
70  </li>
71
72
73
74  <li><a href="spiderChart.php">Spider Chart Analysis</a></li>
75
```

## CH-5 CONCLUSION

### a. Problem and Solution:

- **Analysis Phase:**

The Analysis phase is the most important stage in any project. As it sets the foundation for the entire project. It involves identifying the problem or opportunity that needs to be addressed and gathering data to understand the current situation. As our project in analysis phase we faced some common problems. In particular, we faced difficulties in creating a Rich Picture, Entity Relationship Diagram (ERD), Normalization, and Six Element Analysis. These are important tools that are used to understand the operations of an organization and identify areas for improvement.

- **Designing Phase:**

The designing lays the foundation for the entire process. It is important to create visual representations of the project, such as Rich Pictures, Entity Relationship Diagrams (ERD), Normalization, and Relation Schema. These tools help to provide a clear understanding of the project and its various components. As well as identifying potential problems and solutions. However, one of the major challenges faced during the designing phase was the lack of website tools available for creating these visual representations. This made the process more difficult and time-consuming and as designers had to resort to manual methods of drawing and creating these diagrams.

- **Implementation Phase:**

For SPMS 4.0 all the System requirements were completed successfully.

Front-End Developing tools: HTML, CSS, JavaScript, Developing tools: PHP

Database-integration: MySQL

## b. Additional Features and Future Development

In SPMS 4.0, we plan to enhance the data management system by adding new data fields to capture important information from different data tables. Users will be able to input all data manually in a user-friendly form. However a new feature will be implemented to calculate course outcome percentages based on obtained marks for each course. This will improve the functionality and user experience of the system. Students and faculty members will be able to easily access and view their course outcome percentages. Finally, we hope that a new feature will come to SPMS that may be gives a new way to see a candidate's grade based on their performances. This will provide students and faculty members with valuable insights into their academic progress and help them make informed decisions about their future courses and academic goals.