CSE 303 & CSE 303l

Database Management Project

Report 01

Group 01

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SPMS2.0(Updated)

Contents

CHAPTER 1 – INTRODUCTION:

The Independent University Bangladesh (IUB) has robust and versatile schools - notably consisting of following:

- **Business & Entrepreneurship**

- **Engineering, Technology & Sciences**

- **Environment and Life Sciences**

- **Liberal Arts & Social Sciences**

- **Pharmacy and Public Health.**

The university has been an active participant in the growth of the education sector in Bangladesh and produced capable and knowledgeable scholars contributing both here and abroad. [1]

IUB has achieved this through working closely with relevant government education institutions and organizations such as the University Grants Commission (UGC), Ministry of Education, and other necessary institutes for each of the schools, regularly updating its curriculums and putting in a system to monitor student performance based on a quantified approach between course curriculum and standards set by UGC and the Bangladesh government and constantly tracking student performance for every semester – mainly,

using Outcome-Based Education (OBE) for monitoring performance and setting university curriculum. [1]

The focus of this report is to study the current student performance monitoring system that IUB uses, do the required analysis of its processes, and propose a new and better improved system that reduces error, makes analysis of data and report generation easier by all vested quarters and produce/show valuable information needed for IUB and its collaborators in making necessary improvements in academia to produce better scholars. The first part focuses on the details of the organization in question and the project that we have undertaken for it. The second part focuses on the existing system and its shortcomings and an introduction of the proposed system that we plan to replace the existing system with. The third and fourth will be heavily technical and focus on how we plan to bring the proposed system into being.

During our research into the existing system for student performance monitoring we have found many areas where valuable changes could be made to make each process of monitoring student performance faster, make communication between necessary stakeholders easier, take away chances for errors and data duplication, and most importantly make it easier for all stakeholders to easily surf through large datasets to get meaningful information to their requirement .

As we go through this report, we will dig deeper into how the current student performance monitoring system operates, the business processes involved, where there are concerns and issues related to data management, and how we can make a better system to address these issues for fixing and improvement.

A. BACKGROUND OF THE ORGANIZATION- IUB:

Independent University – Bangladesh (IUB), established in 1993, is one of the oldest private universities in Bangladesh, currently has more than an estimation of 7,048 undergraduate and graduate students and over 10,455 alumni. This student population is mostly predicted to grow at 10% annually. [2]

IUB, over-time, has shown remarkable outcomes in producing graduates with marketable skills only because of staying disciplined and up to date with the on-going curriculum and progress system. Dedicating attention towards IUB's School of Engineering and Computer Science, and more specifically focusing the Department of Computer Science and Electrical science into a well-funded research hub running several research projects. IUB is also committed to curve potential graduates of international standard who are mainly equipped to provide new leadership to the national economy through skilled employment, entrepreneurship and/or applied research. This is successful due to the overwhelming support of the Bangladesh Government and the UGC for IUB to be able to create state-of-the-art lab facilities in their department. It is because of IUB's approach to academics as an "Application Oriented Learning" philosophy that "not only teaches students the fundamental principles of learning, situation -handling, and have better overall perception by providing them with hands-on training sessions." [3]

Continuously growing it's lab facilities and flourishing on its curriculum according to current market economic demands, the SECS and the Department of Computer Science and Engineering at IUB has constantly worked with IEB, UGC and the Ministry of Education to track their students' overall performance under specific periods by quantifying specific courses and its relating assessments into measurable trackers to gain valuable insights for improvement of students over the years as a student in a

certain department.

These processes and criteria credentials courses are ultimately set by IEB along with relevant government potentials to set the bar for up-coming graduating engineers from top universities in Bangladesh. These set of standards come in the form of Program Educational Objectives (PEO) and Program Learning Outcomes (PLO) [1] for specific departments in an Accreditation Manual which are mapped to specific courses by relevant Course Instructors and Co-Ordinator's. This allows the Department of CSE at IUB, SECS, IEB and all other relevant stakeholders to have a calculating assessment of the current state-of-affairs and the performance of each student under each course for every semester. This will also allow users to track performance of faculties, courses, departments and schools and provides valuable insight for making necessary improvements.

B. BACKGROUND OF THE PROJECT SPSM 2.0:

Measuring the output of students, faculties, departments, and their respective courses in order to measure their productivity in regard to the outcome relevance of the course activities. Basically, to provide a range of tools and data intended to help universities and education authorities such as IEB, UGC, as well as other stakeholders to evaluate the performance of students and inform strategies for improvements. Developing a national framework for Outcome-Based Education while at the same time leaving considerable freedom to universities in implementing local approaches.

C. OBJECTIVE OF THE PROJECT SPSM 2.0:

The SPMS 2.0 system monitors and summarizes the performances of the stakeholders - students, faculties, schools, and departments through the database of the assessments. For evaluation purposes the system would be able to store individual assessment marks (midterm, quizzes, assignment, projects, presentations and so on). As well as the marks of those assessments with respect to their Course Outcomes (CO) and Program Learning Outcomes (PLO) accordingly in the database of the system to observe the outcome and performance of the student's faculties, schools, and departments.

The students being the primary stakeholder, would be able to statistically directly monitor the overall performance to their satisfaction of certain course objectives. Hence based on their performances and faculty evaluation the higher stakeholders (Head of department and Admin) can understand and manage the degree in comparison to which different course outcomes targets and their achievements are being understood by the student, department, school, and university body as a whole. SPSMS 2.0 also monitors the impact of policies against overall administrative goals and targets by the system. The system's main target is to monitor the

whole university activities through the database and produce analytics for the Head of Department, Faculty, School, Students, and their Courses in a given period of time (yearly and semester wise).

D. SCOPE OF THE PROJECT:

We did a complete analysis of the existing system and found out places in the business processes which can cause severe lapses in time and communication, which we will discuss in the next chapter.

Our solution is to create a Web application, called SPMS 2.0 (Student Performance Monitoring System 2.0), using a Relational Database Management System (RDMS) to store, edit, add, and update necessary data for monitoring student performance and producing and storing related OBE data, reports, and documents.

We produced potential users for the web based SPMS 2.0 system and speculated how they would be using the system and the necessary information and data they would need access to. Since the problems can arise from many points of all business processes, we will make custom user interfaces and login capabilities for all stakeholders who will also be the users of this system.

Since we use a (RDBMS) for data storage, retrieving necessary files, tabular data, page layouts and reports becomes incredibly easy and allows us to interact with the necessary data to occur real-time. We also create interfaces for all users to easily access these data and use them to generate and download reports.

We build an interface for faculties to be able to collaborate with each other on developing course outlines, course reports, marksheets, assessments, mapping assessments to CO's and PLOs for PLO achievements, and record assessments of students throughout the semester for all their courses.

Students, the IUB leadership team and government agencies can also access the systems for drawing conclusions.

Data will also be protected, and each stakeholder will be shown only that data which is relevant to them, respectively.

Ch-2: Requirement Analysis:

The Requirement Analysis is the means of using industry tools, methods, and standards, to research and visualize the current system and the processes that go into the business operation of a certain organization. "Requirements Analysis is the process of determining what the database is to be used for. It involves interviews with user groups and other stakeholders to identify what functionality they require from the database, what kinds of data they wish to process and the most frequently performed operations." [4]

By doing this we can see each stakeholder and how they interact with each other. We use simple notations and symbols to give anyone the idea of how a business process works and dissect it accordingly.

As we will see, this process of analyzing lets us find out apparent and not so apparent problems with an existing system of monitoring student performance that is manual and depends on involving third party actors and stakeholders causing errors in the system.

A. RICH PICTURE – EXISTING BUSINESS SYSTEM:

A Rich Picture is a way to explore, acknowledge and define a business process and express it through diagrams to create a preliminary mental model. A rich picture helps to open discussion and come to a broad, shared understanding of a situation. [5]The finished rich picture could be of value to other stakeholders of the problems in an existing system, but also allows them to capture many different facets of the situation. Rich pictures concentrate on both the structure and the processes of a given situation. [6]

The Rich Picture Analysis also takes in to account the following:

·   **Structures**

·   **Processes**

·   **Climate**

·   **People**

·   **Issues expressed by people**

·   **Conflict**

As we can see, this rich picture was prepared keeping exactly those things in mind.

Figure 1- Rich Picture of Existing System to Monitor SPMS.

The Rich Picture Analysis shows us that we have the following types of stakeholders:

1. **IEB/UGC/Ministry of Education**

2. **VC/Board of Trustees**

3. **Head of Department/Dean of School**

4. **Department (working under Head of Department/Dean of School)**

5. **Faculty/Course Coordinators**

6. **Registrar's Office**

7. **Admin (working under Registrar's Office)**

8. **Students**

We can also identify three separate storage systems or facilities, namely:

1. **The Department Storage**

2. **The Registrar's Office Storage**

3. **IRAS**

From this Rich Picture we have drawn out 7 process that are key to monitoring student performance and improving curriculum. The processes are as follows:

1. **Map Course Outcomes (COs) to Program Learning Outcomes (PLOs).**

2. **Record Student Assessment Data.**

3. **View Assessment Reports over a given time-period for inspection and analysis of student performance trend.**

4. **Produce OBE Marksheet & Course Assessment Report.**

5. **Create student/faculty account and enter/customize necessary data.**

6. **View Records OBE Marksheets, Course**

7. Request for review and change of grades.

Using these processes, we draw six elements analysis of the existing system in the next section.

B. Six Elements Analysis - Existing Business System:

The Six Elements Analysis provides a detailed description of the role of each element in each process. It is clear from the table below that Human entities dominate all key functions of this system (especially in the most critical two processes- mapping course outcomes and viewing document related to them.) For example, the current system is heavily dependent on manually processed and handled hardcopy databases. Thus, there is a significantly long chain of waiting between interdependent procedures before the Human elements can fulfill their end of the bargain in the process.

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C. PROCESS MODEL – EXISTING BUSINESS SYSTEM:

Business Process Model and Notation (BPMN) is a graphical representation for specifying business processes in a business process model. [7] We use business process model diagrams to dissect each of the business processes mentioned in the previous section.

Each diagram separates the stakeholders involved in the processes, the exchanges among them and the decisions each of them need to make.

D. PROBLEM ANALYSIS – EXISTING BUSINESS SYSTEM:

Based on the existing systems' Six Elements Analysis, the shortcomings in each process were identified. There is a repeating pattern in the far-right column of this table. It appears that the facilitation of a private online platform will improve the system in many ways.

Process Name	Stakeholders	Concerns(Problems)	Analysis (Reason of the Problems)	Proposed Solution

Student Enrollment	1.Student 2. Registrar Office 3. Department Head	School-wise, department-wise and program-wise student enrollment comparison.	Student enrollment and other information are not counted in the system .	We want to keep the in the count of students enrolled school-wise, department-wise and program-wise and make it transparent semester-wise
Performance trend according to GPA and CGPA	1.Student 2.Teachers 3.Department-Head 4. VC	1.School-wise, department-wise and program-wise student performance trends based on CGPA with respect to a given period of time/semesters. 2.Course-wise (for a selection of courses) student performance trend based on GPA with respect to a given period of time/semesters.	GPA and CGPA need to be calculated by the teachers manually .	We want keep the data and create a graph of GPA and CGPA and it gets easier to evaluate and analyze in a glance

PLO and CO achieved and attempted	1.Student 2.Instructor 3.Department 4.School	1. Student-wise, Instructor wise department wise, Department, School-wise PLO and CO analysis were absent and transparent.	PLO and CO are not calculated or analyzed	PLO and Co will be calculated and made transparent for analysis and comparison semester wise/time period.

E. RICH PICTURE - PROPOSED SYSTEM:

The Course Outcomes (COs) and Program Learning Outcomes (PLOs) will be visible in a new system, an online platform called SPMS, where it will have its own database that host the data of all the courses, faculties, as well as updated tables every semester to keep track of which courses have been assigned to which faculties in a given semester. We are making the new system (to track student performance, but also to track faculties teaching a specific course or the performance of students in a course over a period) and why it is hard to track these trends and data right now. Briefly, we can see that the SPMS relational database (a non-human) quite literally plays a significant role in the student performance monitoring system. Also, this entity holds the greatest number of interconnections between all other processes.

We will use different user interfaces designed for specific user needs based on the concerns and problems we found in the problem analysis. The Head of the Department/Dean of School, Course Instructor/Coordinator/Faculty, Admin, Student, IEB/UGC/Ministry of Education, VC/Board of Trustees, Department Staff, all these stakeholders mentioned will have access to view the report of a student.
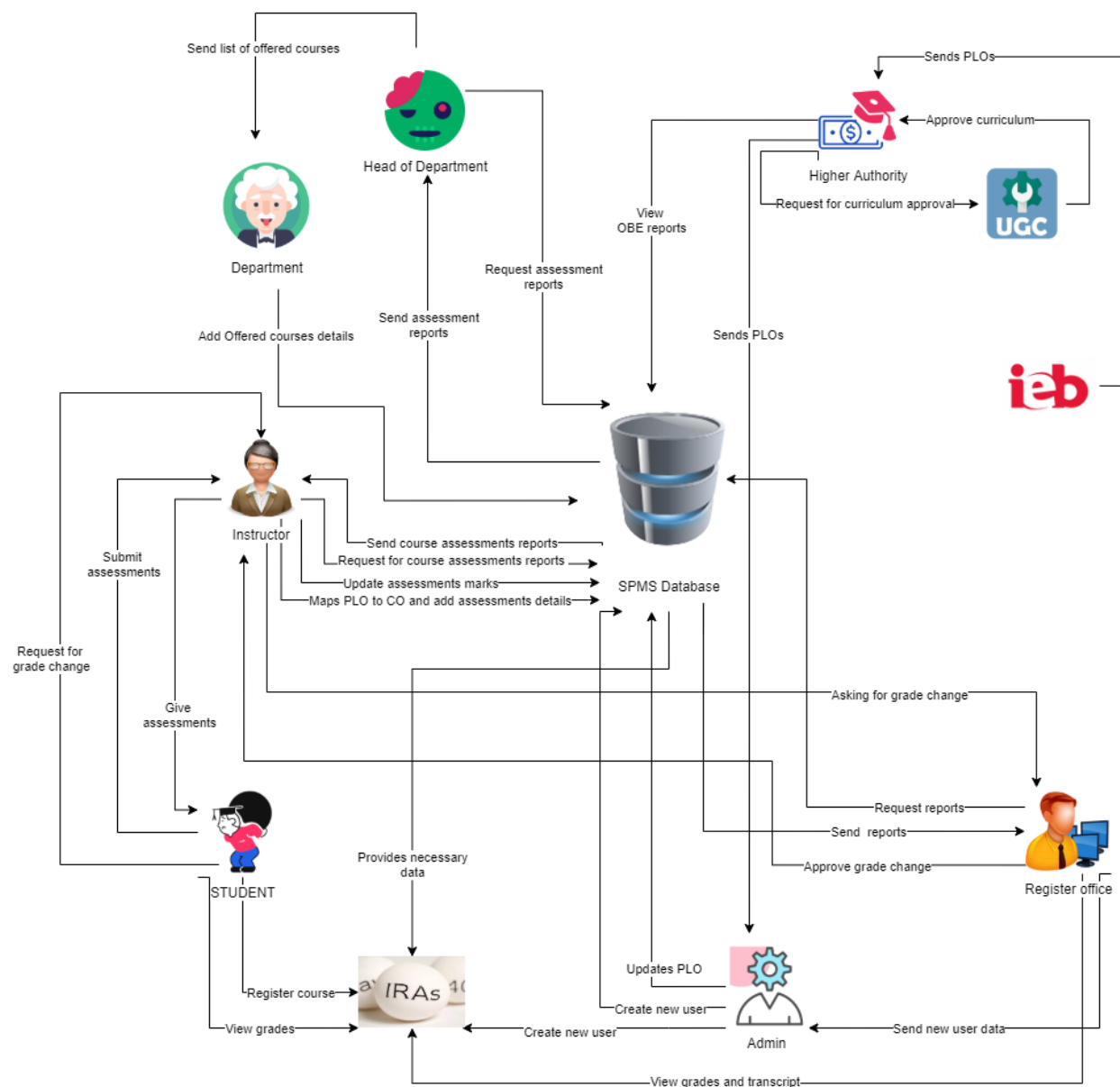
Figure 2 - Rich Picture of Proposed System to Monitor Student Performance.

F. SIX ELEMENTS ANALYSIS - PROPOSED SYSTEM:

The six elements analysis of the proposed system is a continuation of an analysis process where each analysis is based on the one that comes before it. Based on the rich picture, the role of each element in the new system is further understood in the table below.

G. PROCESS MODEL - PROPOSED SYSTEM:

After understanding the role of each element in each process, the Business process model and notation provides an unambiguous dictation of the exact sequence of steps that will follow to fulfill each process. Every module of this diagram will serve as a high-level starting point for deriving the implementation details in the later chapter.