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Research Article

# Integration and development of learning management features into the Colums platform

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**ABSTRACT**

Due to the increasing use of computerized information systems in higher and further education for both administrative (Human Resources, Finance, Student Records) and instructional (Teaching, Learning, and Research) purposes, the challenge of systems integration has emerged like Virtual Learning Environments, electronic resource discovery tools, etc. COLUMS is a comprehensive and deeply integrated software product for large, medium, and small educational institutions that automates data stream and can be thought of as an Organization Wide Computing Package. The concept of COLUMS is to interconnect Students, Teachers, Parents and Management in effective manner. To meet all the requirements of the customer, the system needs to be upgraded and merged with the E-learning system. In terms of administration and remote learning, the new system provides all requirements of the university. The use of this technology is to enable people to learn anytime and anywhere, and not only depend only on attend of the student to the university to learn and take the courses. Given the shortcomings of the COLUMS, this project introduces new capabilities and services to address these issues. such as selecting the course to study online, with easy and fast way to enroll to the course, each course will contain number of lessons which contain the scientific material, as well as add some extra feature to the course like announcement, drop box, homework, document and chat room. For the future work, add a more feature of alerting the users by sending phone SMS when the any change happen in the course. Moreover, white board technology (virtual Class) so the teacher can use the electric white board to describe the content of his subject online and the student can see the lesson as stream video. Finally, make the accessing of this system not only though browsing by the computer but also use the smart phone and tablet.

## 1. INTODUCTION

The internet has become an essential platform for the dissemination of information and the trading of commodities and services. Knowledge presentation, interaction, and sharing require methods and resources that facilitate learning. For this purpose, eLearning first gained popularity in the 1990s, when the internet began to become widely accessible to the general public. A relatively new concept, it is rapidly gaining ground in the educational system. Most schools have included some form of online education (eLearning) into their curricula. [1].

There are many people who can benefit from e-learning, including educators, business leaders, and students of various backgrounds. It's cheap, efficient, and yields quantifiable outcomes. Compared to traditional education, the time and money saved by taking courses online add up to significant savings. Due to the lack of location restrictions and associated fees, online education is more cost-effective than classroom-based training. [2].

### 1.1 Company background

Knight Information Solutions Sdn Bhd is a subsidiary of Knight Capital Sdn Bhd. Knight Capital's core business is the fast approval of short and mid-term loans to individuals, businesses and projects. Knight Capital is a company with a difference. Staffs who work with clients to deliver innovative business solutions have been dedicated to help the latter achieve their goals. The Knight Capital can be divided into three subsidiaries: Knight Information Solutions, Knight Consulting and Knight Properties. Figure 1 shows the structure of the Knight Capital.

Knight Information Solutions is an IT solutions provider specializing in education-related IT solutions. Knight Information Solutions offers technology-driven enterprise solutions that align with clients' strategic goals. Knight Information Solutions' "Centers of Excellence" that develop education industry-specific solutions. By combining process excellence, quality

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frameworks, and service delivery innovation, Knight Information Solutions provides unparalleled business value to its customers. Knight Capital's mature software development process encompasses the entire "Software Development Life Cycle," from business requirement analysis and business case submission to software warranty support.

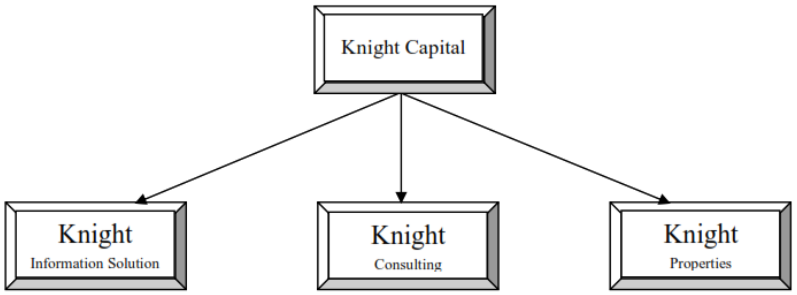


Fig.1. Structure of Knight Group

## 1.2 Problem Statement

Processing of data and e - learning are becoming increasingly important for the COLUMS system, and this study identifies significant shortcomings in that system. The issues are as follows:

1) Class schedule; most of the universities make the weekly schedule of their class. At the beginning of each week they publish their schedule, most of the students or even the teacher will face a problem in getting the new schedule.
2) Time and travel cost; some student have problem of attending university every day; because the transportation cost is expensive. And sometimes it needs time to reach the university, because of heavy traffic or long distance.
3) Student availability; students are not able to be available in university at specific time, for example if the student has a work.
4) Assignment and submission; some student have problem in submitting their assignment to the teacher due to technical problem in e-mail, or loss of the hard copy of the assignment.
5) Exchange information and file; the teacher has a file related to his/her subject that he/she is teaching, this file must be send to all the student in his/her class, so the teacher must know the email of all the students. Therefore any mistake in spelling of the mail, the student will not be able to get that file in the right time.
6) Unscheduled change; sometimes the university has a problem in announcing some changes in some parts; like changing the date of an exam or canceling the class. This problem comes either from technical error in email, or a mistake in typing the mail of the student or the teacher.

## 1.3 Project Objectives

The following are the objectives for this project:

1) To investigate the issue related to learning management system.
2) To propose new feature of learning management system for the current system.
3) To develop a prototype of learning management system to integrate it with COLUMS.
4) To test the functionality of the system.

## 1.4 Project Scopes

The project scopes describe the tasks that must be completed to deliver the LMS. The scope of this project are as outlined below.:

1) Analyzes and comprehends the learning management system requirements by analyzing the current system.
2) Develop a Software Requirement Specification (SRS) document.
3) Create Software Design Documentation (SDD)
4) Develop an E-Learning system.
5) The implementation of the graphical user interface will be done using ASP.NET, C# and MS SQL.
6) System testing and development of Software Test Description (STD) and Software Test Report (STR)

## 2. LITERATURE REVIEW

At first E-Learning was called "Internet-Based training" then it was changed into "Web-Based Training". Today these terms are still being used, along with variations of e-learning such as eLearning, ELearning, and eLearning [3]. Contemporary distance education, at least has been in existence since the period of Isaac Pitman shorthand class in Great Britain through letters and communication in the 1840s. Pitman was a practicing and experienced teacher that teaches at a private school he established in Wotton-under-Edge. He started a distance learning course, and use to send homework to his students through email and whenever they complete the assignment they send it back to him.

Pressey [4] stated, "The procedure in mastery of drill and informational material were in many instances simple and definite enough to permit handling of much routine teaching by mechanical means." Pressey developed a teaching machine that is almost look like a typewriter along with a window that shows one question with four answers. Whenever a key that is correspond with the right answer is pressed by a user it will record the result through a counter at the back of the machine and state the next question. When the user is through, the scorer of the test will slip the test paper again into the machine and write the given score on the counter.

The Altair 880 in (1975) which was the first personal computer was swiftly followed by the IBM PC and the Apple ii. But with the IBM and the Apple the computer was dependable satisfactorily, due to this it was used for didactical purposes. The way it was being used was increasing particularly in the area of mathematics and science. Simulations and programmed instruction were most often used [5]. They use computer to make current, tasks easier to implement. The computers are useful for some teachers and also serve as teaching aids for them. It is not only innovation in the field of education but also substitution of some teaching materialism.

The learning management systems (LMS) were used at the end of the 90s. Although some universities started to design and develop their own systems but most of the educational institutions started with systems off the market. Author asserts that the usage of the blackboard really influence and changed the educational institutions due to the fact that it was the first period when teachers will be accepting and using technology within the four walls of their classrooms [6]. The figure 2 shows the components of an E-learning system.

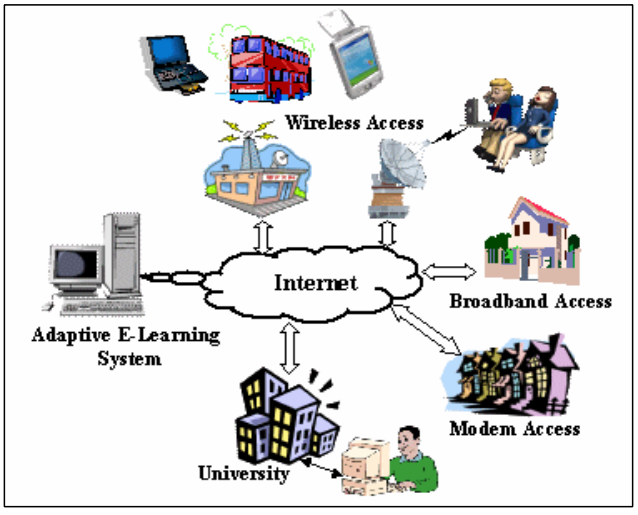


Fig.2. E-Learning system [7]

## 3. METHODOLOGY

The scrum method is used in this project for agile software development. It is considered as a “framework” rather than a methodology or complete process. The team who develop the software provides more than detailed and complete description about the way everything is done in the project; because they know how to deal with the problem they are facing. The ‘Scrum’ depends on a subjective organization and cross-functional team. The scrum team is considered as subjective organizer or (self-organizing) in the sense that there is no whole team leader who is responsible on decision like: ‘which person will do which task!’ or ‘how to solve a problem’. The overall team decides on these issues. The scrum team is cross-functional so that everyone necessary to take a feature from idea to implementation is involved. The teams responsible for agile development are propped by two specific members: a ‘Scrum Master’ and a ‘Product Owner’. The Scrum Master is considered as a technical director or ‘coach’ for the team, it helps the members of the team to use the Scrum structure at their

highest level of performance. On the other hand the product owner directs the team to right product building, and it also represents the business, customers or users. The figure 3 shows the process and stages of scrum method.

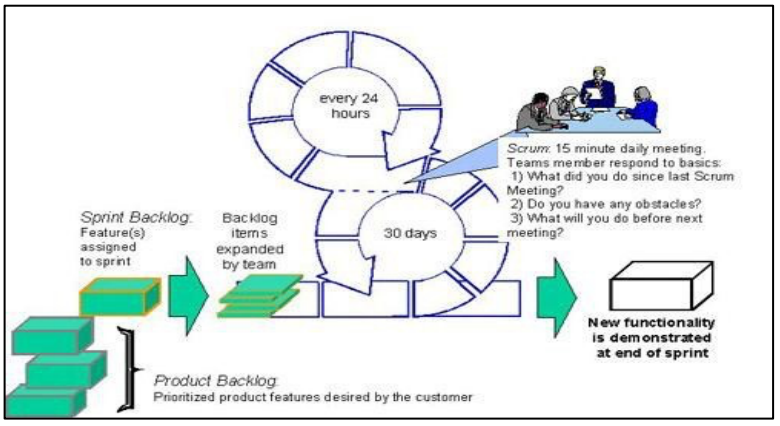


Fig.3. Life cycle of SCRUM

The used software technique must support the analysis and design model, as well as coding implementation phases. To fit the needs of software modeling and implementation, an object oriented has been chosen. To identify, visualize, construct and document the artifacts of software system, the UML is used as a standard language [8]. In this project, the UML diagrams will use Case Diagrams, Sequence Diagrams, Collaboration Diagrams, State Diagram and Class Diagram. The project was developed by relying on various software tools like windows 7, Microsoft office, Microsoft project, visual studio 2008, IIS server and MS SQL.

## 4. IMPLEMENTATION AND DISCUSSION

This section provides the output analysis, software design, implementation process that used to implement Learning Management System and testing methods. This section is structured in the following order: The first section elaborates the steps embroiled and the product of the completed action such as use case model, package diagram, class diagram and sequence diagram. The second section details the software design that is divided to two subparts named preliminary design and database design. The third section describes the implementation process which includes student activities and graphic user interface, teacher activities and graphic user interface and course creator activities and graphic user interface. The fourth section describes the testing methods.

### 4.1 Output analysis

The first task in the software development process is the understanding and evaluation of the system's requirements. This section is giving a wide berth about the procedures embroiled and the output of the activity performed. To understand it easily, this section is divided to other subsections like the follow:

#### 4.1.1 Use case model

UML's use case model is viewed as a patterned explanation of the system's functionality. Each Use Case is considered as a single, repeatable interaction that made by the actor of the system (user) while utilizing the system. The system contains 4 users who are: Admin, course creator, teacher and Student. Each user has different privileges as shown in figure 4 .

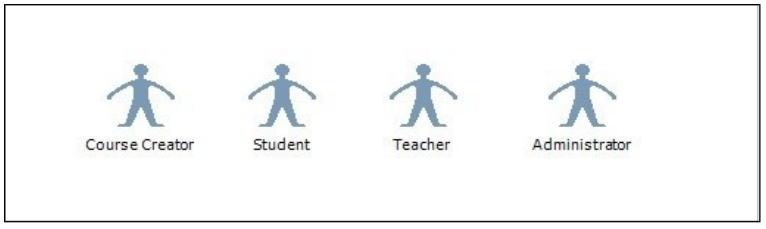


Fig.4. Actors in the System

The brain and other organic nervous systems serve as inspiration for the neural network (ANN) paradigm of data processing. This innovative data processing system architecture sets this paradigm apart from others. It is made up of multiple neurons; they are specially designed processing units that collaborate to tackle issues [4]. These neural interconnections are dense [5].

These actors –Administrator, Course creator, Teacher and Student communicates through 5 use cases which are: login, Manage course, Enroll to course, Study Online and Manage Course Content figure 5. An actor generates each use case with specific goal in mind.

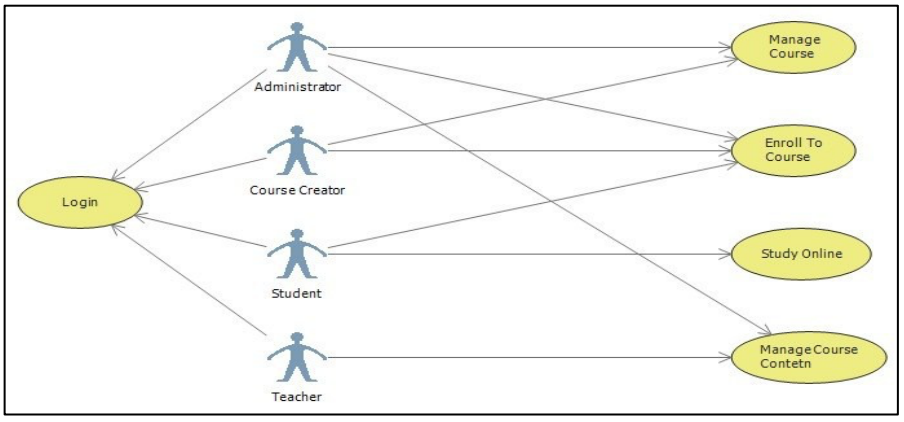


Fig.5. Use Cases diagram

### 4.1.2 Class Diagram

The interactions of the classes inside the system are described by class diagram. Class diagram shows the three variant perspectives while designing a system-conceptual, implementation and specification. The connected lines of the classes display the relationships between the classes and how they communicate. Figure 6 shows example of the class diagram for adding content of the topic take from SDD document. It is organized according to the class classifications which are Boundaries, Controls and Entities.

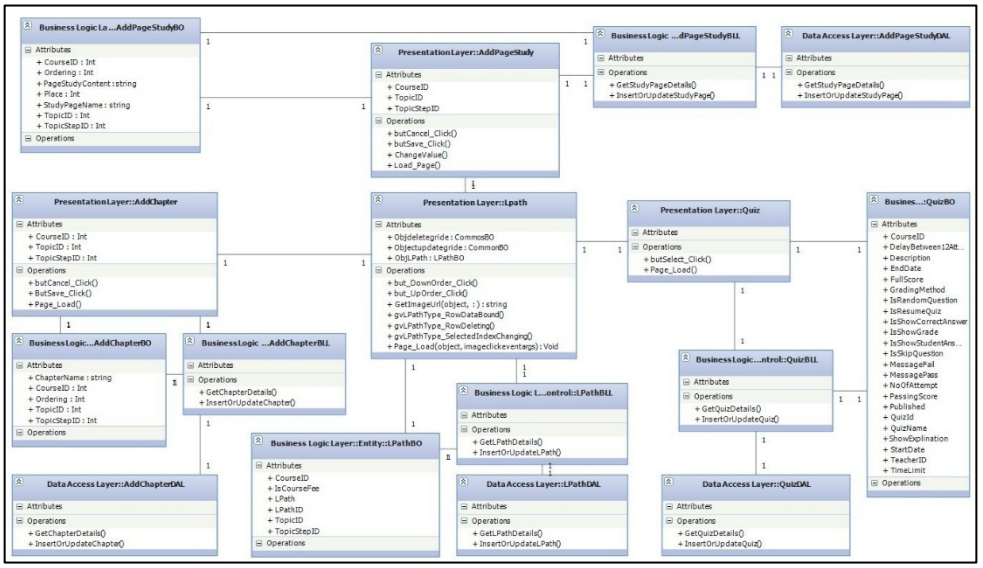


Fig.6. Class diagram of add content of the topic

### 4.1.3 Sequence Diagram

A sequence diagram refers to exchanging of the messages in organized way among objects in a scenario. To complete this phase, all use case diagrams must be transferred into a sequence diagram. The inflow of each event in the scenario is transformed to the sequence diagram that includes basic, exception and alternative flow. Afterword, the SDD document is constructed.

### 4.2 Deployment Diagram

A deployment diagram shows the structure of a system's physical components and the interactions between software and hardware. Figure 7 below, shows the deployment diagram of the system.

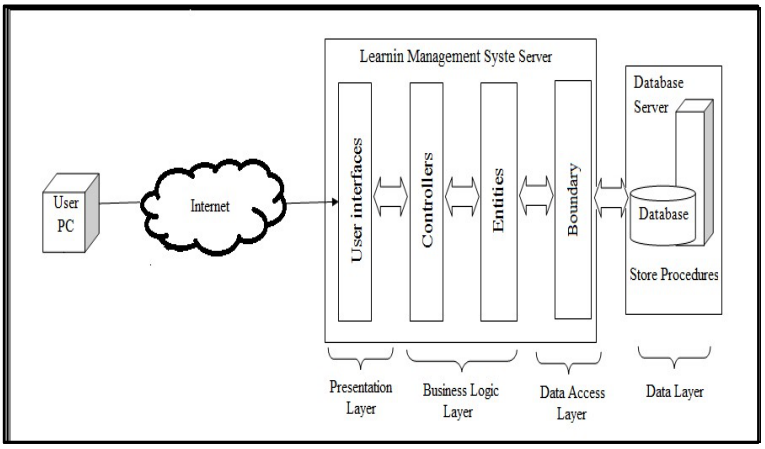


Fig.7. Deployment Diagram

This section discussed the analysis; design implementation and testing the proposed system. In the analysis phase five use cases have been created in order to cover all features. In addition, the package diagram, class diagram and sequence diagram are created. In the design phase, the four tiers architecture has been used to build the architecture of the system. In the implementation phase, the new proposed features have been implemented for the four different users. Each user has it is own privileges as explained in the literature review. The last phase in this section is testing phase, the method that has been used for testing the system is black box method.

## 5. CONCLUSION

The objective of this project was to create a system where the LMS could connect with COLUMS. Key features of the COLUMS include staff management, progress with historic information and student database, student admission and transactions, accounting, transportation, maintenance, examination management, departmental activities, and more.. After the integration the system is also support for selecting the course to study online, with easy and fast way to enroll to the course, each course will contain number of topics, can arrange any number of topics in each week depend on start date and end date of the topic, each topic contain one lesson which have three item one of them is the section used to organize and arrange the contain of the lesson depend on the teacher's way of giving his subject. The second part is study page, which is contain the knowledge of the course, the third part of the lesson is the quiz with variety of options as well as you can some extra feature to the course like announcement, dropbox, homework, document and chat room.

## Conflicts Of Interest

None.

## Funding

None.

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