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Comparative Study of Methodologies for Web Information System

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Abstract

There are many software development methodology approaches that have been proposed for developing Web application projects. Each methodology has different approaches and implemented for different applications. The Web information space is rapidly growing in the size and the diversity of both its data and its audience. A consequence is that Web Information Systems (WIS) in many applications replace existing traditional (not Web based) information systems. Hence, the complexity of (WIS) increases and the need for an effective design process ask for a rigorous and systematic design approach. Since the nature of WIS differs from the nature of traditional information systems has some essential differences, there is a strong demand for design methodologies specifically oriented towards WIS design. In this paper we briefly describe the WIS design methodologies, (Relationship Management Methodology) RMM, (Object-Oriented Hypermedia Design Methodology) OOHDM, (UML-based Web Engineering) UWE, and particularly Hera. And we also present the specific purposes of the existing web methodologies.

Keywords*: Web Information System, Conceptual Model, Navigation Model Application Model.*

1. Introduction

Recently Web site development is attracting and significant interest among business process. "Intranet" is a typical targeted environment for most web sites. Because of the dynamic nature of web sites, the intention behind such sites is no longer interaction of disseminates information. It interacts with users and processes their business tasks to accomplish their business goals. Thus, analysis and design of these web sites need an approach different from those for Web sites that mainly provided information on users' requests, such as catalogue, directory, and advertisement sites.

The most evident difference between WIS and traditional (non-web) information systems is the large amount of information organized in a web structure. As a consequence, WIS needs solid approaches for conceptual structuring the information space and its access and for engineering and implementing the required access services. Organizing the application's data by offering an appropriate navigation structure helps end-users in finding relevant information in the web hyperspace. This navigation structure should be effectively materialized into a navigation model as an artefact in the design.

2. Web Information System

Web-based information displays many benefits of multimedia technology. Using today's fast broadband connection, it is possible to stream sophisticated content to a computer anywhere in the world. This is an advantage for many people as the information can be received and read wherever and whenever it is convenient for them. A significant amount of interactive multimedia content is now delivered via the internet.

Web-based information system is an information system that uses internet web technologies for delivering information and services, to users. It is a software system whose

main purpose is to publish and maintain data by using hypertext principles.

A web information system usually consists of one or more web applications, specific functionality-oriented components, together with information components and other non-web components.

2.1. Web Information System Design

Ongoing research efforts have resulted in a number of proposed methodologies for WIS design. We discuss RMM, OOHDM, UWE and Hera, although there are more approaches dealing with the design of personalized Web applications. These design methodologies focus on their navigation and adaptation models. Typically, these methodologies consider the design process in process phases and their deliverables models. A typical WIS design methodology has the following phases:

Requirement Analysis: gathering and forming the specification of the user requirements.

Conceptual Design: constructing the Conceptual Model (CM) for the domain.

Navigation Design: building the Navigation Model (NM) as a navigation view of the application.

Adaptation Design: building the Adaptation Model (AM) and defining all associated mechanisms.

Presentation Design: defining the appearance of the navigation units and their behaviour during user inter- action in the Presentation Model (PM). Implementation: implementing application

In the previous section, we saw that a WIS is a broad concept which includes the other types of systems. And we are looking for a methodology to apply to the development of a WIS at other environments, such as multimedia or management systems. There are currently no methodologies oriented towards these systems in existence. Fifteen proposals have been studied. In this paper not all of them can be exhaustively presented. We will present the most significant methods of them in 3.

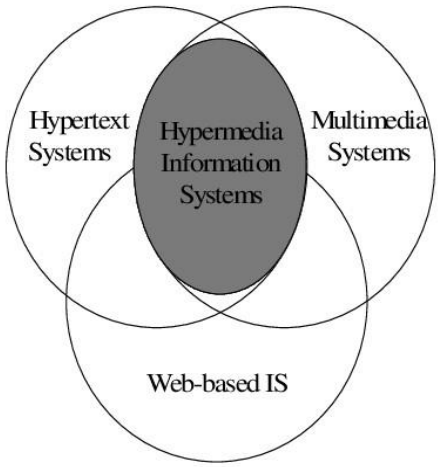


Figure 1. Relationship between Web Information Systems and other systems

2.2. Web Information System Analysis

Content analysis is a widely used research method for objective, systematic and quantitative examination of communication content [2]. The method has been applied not only in the field of traditional communication but also in studies of human-computer interaction such as web-based applications. It can be useful for discovering and gaining insights into users' preferences and behaviours However, applying content analysis to Web-based content faces many challenges such as sampling and coding.

3. Methodology

3.1. RMM – Relationship Management Methodology

RMM is a system development and project management technique used for the design and construction of hypermedia applications. The focus is on modelling the underlying content, the user viewpoints onto this content and the navigational structures that interlink the content. This methodology that converse the navigation design phase and uses the Entity-Relationship (E-R) approach for the conceptual modelling. The Navigation Model in RMM is specified in

the Application Model (AM), which consists of navigation/presentation units (slices) and relationships among them. Slices represent meaningful chunks of information that typically will be displayed within one web page. Slices contain sets of attributes from one or more (related) concepts in the Conceptual Model. [6]

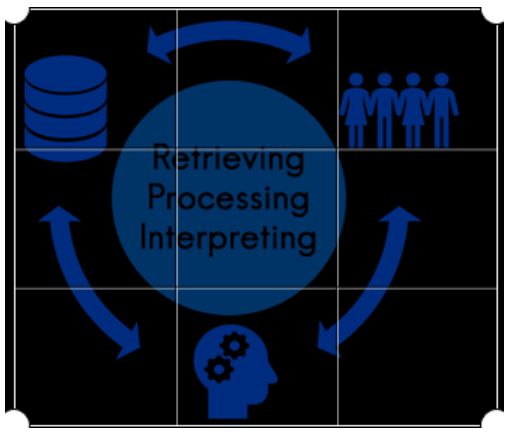


Figure 2. RMM Process Overview

Figure.3 shows a simple example of an E-R diagram that models the entities and relationships that might occur in a banking environment. The consultant entity has a one to many relationship with the customer entity i.e. a consultant has many customers. The main objective in E-R step is to ensure that the important relationships are identified and the links between the objects are explicit as the links represent the main paths an end user will traverse to navigate between objects.

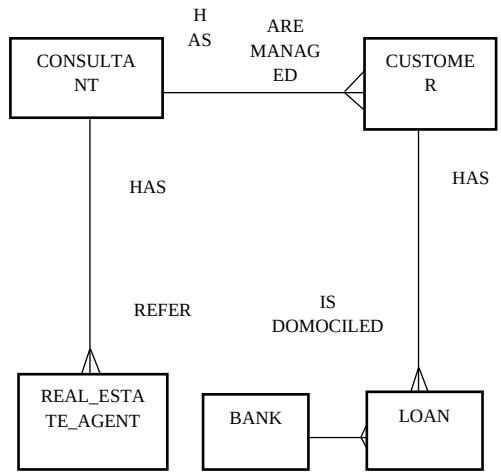


Figure3. Example banking system in Entity relationship Diagram

3.2. OOHDM – Object Oriented Hypermedia Design Methodology

The OOHDM methodology represents an object- oriented approach to WIS design. It includes complex information, and may allow sophisticated navigation behaviour. It uses abstraction and composition mechanisms in an object oriented framework to allow the specification of complex navigation patterns and interface transformations. In OOHDM, a hypermedia application is built in a four-step process.

Domain Analysis: The domain is built using object-oriented modelling principles augmented with some primitives.

Navigational Design: The Navigation Model in OOHDM consists of the Navigation Class Schema and the Navigation Context Schema. The Navigation Class Schema contains navigation classes (nodes) derived from the conceptual classes by selecting and combining attributes from different related conceptual classes. The Navigation Context Schema represents the navigation structure of the application and consists of navigation contexts. The navigation contexts are derived from the

navigation classes, hyperlinks, and access structures and represent collections of navigation classes instances that can be explored in some way (e.g. sequentially).

Abstract Interface Design: It is built by defining perceptible objects in terms of interface classes. These classes are aggregations of primitive ones or other interfaces classes. Interface objects provide navigational objects with a perceptible appearance.

Implementation: The hypermedia application can be implemented by having specified the abstract interface.

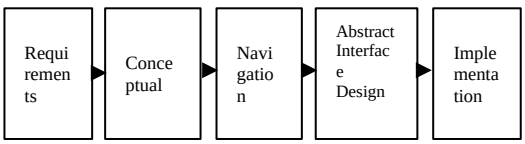
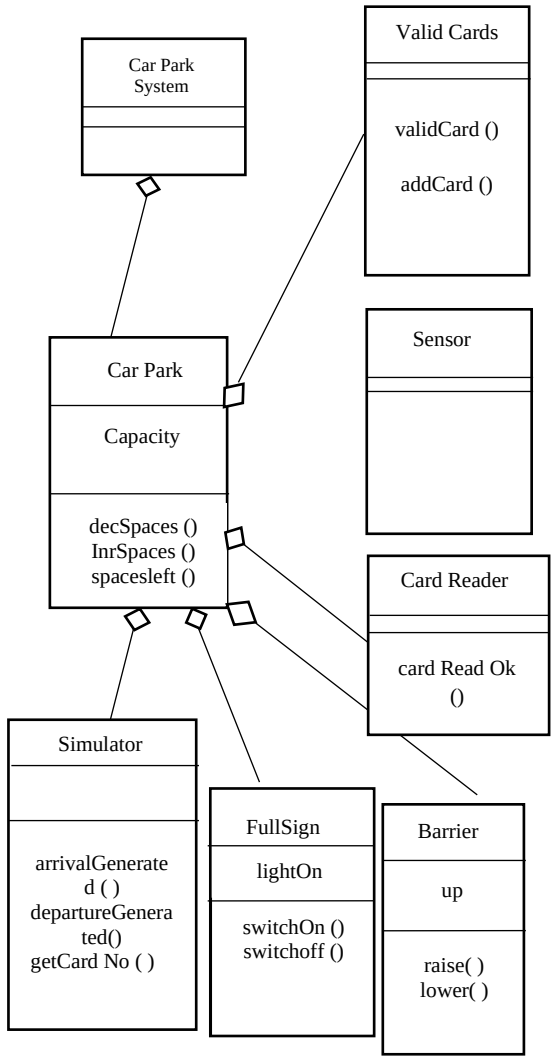


Figure 4. OOHDM Process Overview

In the car park simulation, it is impossible to squeeze into one class diagram all of the known facts. The class diagram in figure 5 shows all of the classes we implement but omits details about attribute types, parameter types and return types. The implementation classes that we need the class diagrams are: Carpark System, Simulator, Exit Barrier and Entrance Barrier.



Fgure5. Car park simulation class diagram

3.3. UWE – UML-based Web Engineering Methodology

UWE is an engineering approach for the development of web applications with focus on systematic design, personalization and semi-automatic generation. UWE describes a

systematic design methodology using exclusively UML techniques, the UML notation and the UML extension mechanism. The UWE approach is used a UML-complaint method of web application design, which is divided into six phases: Requirement Analysis, Conceptual Model, Process Model, Navigation Model, Presentation Model and Architecture Model. The main characteristics of the UWE process are the systematic, semi-automatic, and model-driven and transformation-based support of the development of web systems. UWE supports user modelling and use for a "lightweight" UML profile. UWE is defined as an extension of the UML meta-model. Its Requirements Analysis and Conceptual Design phases follow the Unified Software Development Process, while the Navigation Design and Presentation Design phases produce models with UML and (object Constraint Language) OCL semantics.

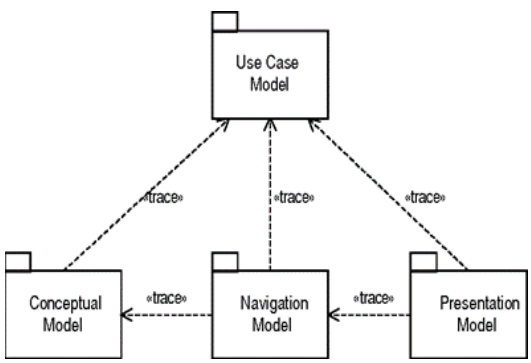


Figure 6. UWE Process Overview

UWE proposes to build a Presentation model to sketch the layout of web application in figure 7. The objective of the presentation model is to show where the user interface views of the storyboard model are presented to the user. [7] The presentation model aims at the design of abstract user interfaces and the design of the user interaction with the web application. It describes and accesses primitives will be presented to the user. Figure.7 shows example of UWE modelling elements for presentation. Example of conference paper home page has conference paper class. This class has paper ID, Submission date, Paper Title, Abstract, Full-Paper (pdf), Review Form and Author name.

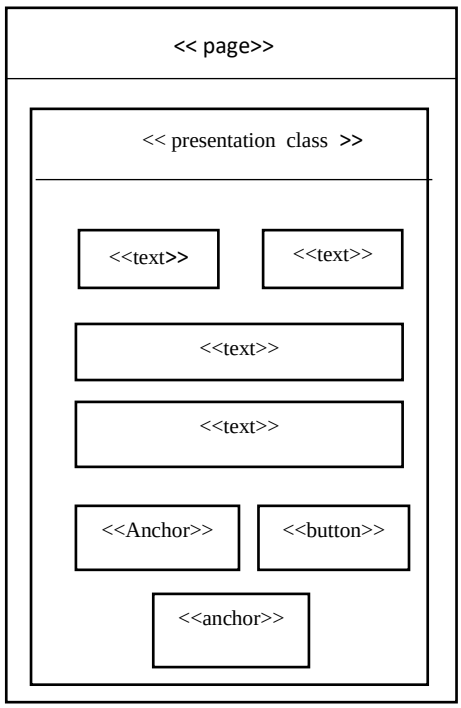


Figure7. Examples of UWE Modelling Elements for Presentation

3.4. HERA

Hera is our design methodology aiming at automated generation of adaptive hypermedia presentations. Hera provides a specification framework supporting the design of a WIS that generates presentations based on the data retrieved from the data repository in response to a user query. The Hera design methodology stems from RMM, the Relationship Management Methodology. Hera is a semantic layer that deals with semantic data integration. There are three layers in Hera:

In CM, the Semantic Layer defines the semantics of the data repository. Since the data repository is virtual. The Integration Model links the semantics of the external sources to the semantics of CM. In AM, the Application Layer

defines abstract hypermedia structure of the data. The Presentation Layer defines the presentations details in terms of the PM that is needed together with the AM definitions. The generation of presentations possibly for different presentation platforms are for in- stance HyperText Markup Language (HTML) or Wireless Markup Language (WML).

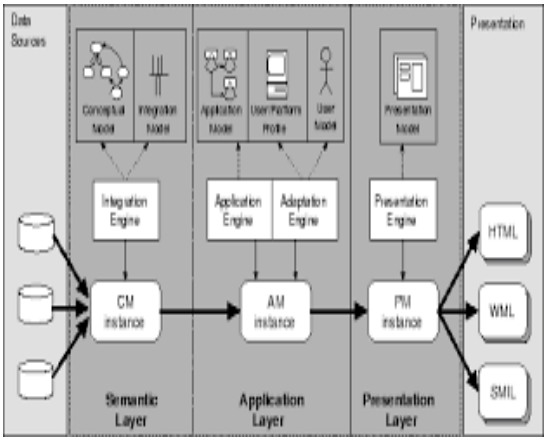


Figure 8. Hera Process

The HERA methodology is used to assess the energy and carbon footprint of highways' traffic flow [8]. The main features of HERA methodology are shown in Figure 9. HERA is based on a bottom-up methodology which combines an average speed consumption model adjusted with a segment gradient and information on the spatial distribution, by road segment, of vehicle activity with data on vehicle type average annual daily traffic (AADT), driving speeds, physical characteristics of the road and the composition of the fleet circulating along these roadway types. Since HERA is designed for interurban traffic, the transient process of traffic emission such as acceleration or deceleration is not captured, being more important for urban areas assessment.

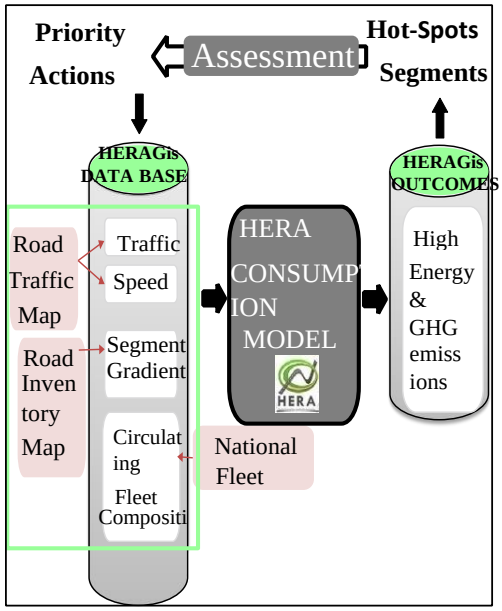


Figure 9. Example of HERA Methodology: Highway Emissions Assessment

4. Comparative Study

As the web engineering has become an established branch of software engineering, there has been substantial activity within web engineering research community. The evolution of web engineering research is analysed in various comparative studies. There are large numbers of models for web like RMM (Relational Management Methodology), OOHDM (Object Oriented Hypermedia Design method), and UWE (UML Based Web Engineering Methodology), Hera. There are some specific aspects and proposes models, techniques and vocabularies. Table shows the specific purpose of these models. OOHDM has had valuable contribution to web engineering research and many of its ideas have become accepted [3].

Table 1. Specific purposes of proposed Models

Methodology	Phases	Focus on
RMM	Navigation	Entity-Relationship(E-R)
OOHDM	Requirement, Conceptual Design, Navigation Design, Abstract Interface Design, Implementation	Hyper media
UWE	SDLC	Visual modeling and systematic design throughout SDLC

5. Conclusion and Future Work

RMM is simplicity and clarity, so it can be easily extended. OOHDM and UWE are object-oriented state-of-the-art methodologies that can be used by WIS designers. Hera is automatic presentation generator. Hera exploits the simplicity of RMM. Hera supports dynamic and static adaption. In this paper, we describe the process of the existing web methodologies and example of these process in specific domain. We also illustrate the specific purposed of these methodologies.

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Blended Learning Based on HTML5 Framework

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Abstract

Most of the lifestyles are been digitized in the form of electronics. The combination of electronic ways of living is used widely in most of the areas and field. The educational areas are also moving into the digital form. Today, COVID 19 is a worldwide phenomenon. So, we try to change the traditional classroom to an online classroom. Nowadays, higher education is trying to run the full e-learning concept to the students in the classrooms. But this type of blended learning is still new to some of the institutions. Some of the techniques nowadays use the technology to put the e-learning methods with the hope of engaging the students with the lesson. It is believed that e-learning is unacceptable to some of the people who are weak in technology. This paper examines the html5 framework that focuses on the pedagogical aspects of online education this paper aims to identify the problems faced using e-lectures into students related to the appropriate ways of learning. After learning, online education is based on pedagogical purposes.

Keywords: online learning, blended learning, theoretical frameworks

1. Introduction

Blended learning is not a new concept. It is a combination of two pedagogical approaches in our view. Their focus merely on optimizing achievement of learning objectives by applying the right learning technologies. The computer has become a need in everyday life. Nowadays, people depend on the computer to do the task. These include students, especially in higher education. Using this technology, most of the higher institutions can enhance student's experience and knowledge. Many kinds of research had been done regarding the usage of e-learning in teaching. The use of technology in learning is called electronic learning or e-learning. E-learning involves not only the students but also the lecturer or teachers. It is believed that the effectiveness of the learning process can affect many factors such as physical conditions, surroundings, environment and weather, subjects, time, etc. But the most important factors are the student's motivation towards the class. Motivated students will more gain knowledge for them. But not all classrooms have motivated students. Figure1.shows the combination of face to face learning and virtual learning.

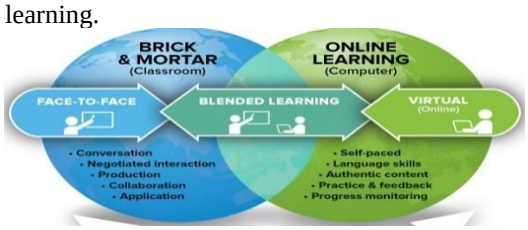

Figure.1. blended learning

1.1. Traditional Classroom

A traditional classroom consists of straight rows of chairs. It is difficult for student interaction, does not promote rote learning. The traditional classroom method is the main method applied during the teaching and learning process. The e-learning is referred to as any electronically assisted instruction that offered via computer and the Internet. There is various meaning could be found on the web referring to e-learning. E-

learning is facilitated by the use of digital tools and content which may include online interaction between the learner and their teacher or instructor. Blended Learning is a combination of face-to-face classes with technology delivered content. Online support is also a form of e-learning and functions. It comes in the form of forums, chat rooms, online bulletin boards, email, or live support. It offers the opportunity for more specific questions and answers, and more immediate answers.

1.2. E-Learning

The term “e-learning” widely refers to as any electronically assisted instruction but is most often associated with instruction offered via computer and the Internet. There are various meanings referred to as e-learning. From MBA websites, it describes e-learning is education offered using electronic delivery methods such as CD-ROMs, video conferencing, websites and e-mail. E-learning is a learning that is facilitated by the use of digital tools and content, which may include online interaction between the learner and their teacher or peers.[4] E-learning has several categories which comprise of:

1. On-Demand e-learning: 'jukeboxes' of content available when required.
2. Live On-Line e-learning: multiple learners in multiple sites simultaneously.
3. Learning Objects: granular 'chunks' of learning material.
4. On-Line Coaching: access to subject matter expertise.
5. Knowledge Bases: database access to learning content in a searchable environment
6. Learning Architectures: structures for developing and delivering E-Learning.
7. Simulation-Based Learning: learning via simulated experience.
8. Blended Learning: combining face-to-face classes with technology delivered content.

For many teachers and lecturers, migrating their teaching material to e-learning is a stony path to deliver courses over the Internet. It is a great deal of original course content that has to be reproduced to meet the requirements of online publication [5]. Currently, it is needed to develop teaching strategies for increasing the student-centeredness of the classroom-based of the course. It may contribute to better preparation for dealing with these types of examination items such as group exercises or group discussion.

Blended instruction does not appear to impair students’ performance and may indeed enhance their appreciation of the concepts in some cases. Also, courses that incorporate online instruction offer a “win-win” situation for accounting programs and professors. This method also offers professors increased flexibility and may operate from home in some cases.

New challenging opportunities are offered to both students and instructors regarding online classes. Online classes can provide an excellent educational environment and offer an effective way to traditional classroom instruction. People still believe that the traditional classroom is the best method of teaching because there is direct contact between teachers and students. A traditional classroom can adopt e-learning to help in the learning process.

The lecturer had used various ways of delivering knowledge. In varying the teaching method, lecturers or instructors brought extra material to get students’ attention and ensuring information is well- delivered. They used whiteboard, handouts, Mentimeter, a flashcard, and mahjong paper to create a creative presentation.

The existence of technology had encouraged the lecturer to use more technological teaching aids such as a computer, presentation software, online material, disc player, etc. Lecturers always put extra effort during the teaching process. This is done to intensify students' interest and to increase their understanding. Some of the solution mentioned above is also known as blended learning which makes e-learning were brought inside the classroom to retain the student’s attention [7]. E-learning could be divided into four categories. These categories are

(i) Knowledge database
(ii) Online support
(iii) Synchronous learning

(iv) Asynchronous learning

1.2.1. Knowledge database

These databases are the most basic form of e-learning.

1.2.2. Online support

It is a form of e-learning and functions. Online support comes in the form of forums, chat rooms, online bulletin boards, email, or live instant-messaging support.

1.2.3. Synchronous Learning

A training (E.g: Zoom or Microsoft Team) is done in real-time with a live instructor facilitating the training. Everyone logs in at a set time and can communicate directly with each other. It lasts for a set amount of time from a single session to serve. This type of training usually takes place via Internet Web sites, audio- or video-conferencing, or live broadcasts to students in a classroom.

1.2.4. Asynchronous Learning

A training (Eg: Google Classroom) is e-learning in the more traditional sense of the word. It involves self-paced learning, either CD-ROM-based or Internet-based. It may include access to instructors through online bulletin boards, online discussion groups, and e-mail. Or, it may be self-contained with links to reference materials in place of a live instructor.

1.3 Effectiveness E-learning in Universities

In a University consisting of undergraduate degree programs, postgraduate programs such as Certificates, Diplomas, Masters, Masters by research, and Ph.D. degrees, typical stakeholders of e-learning include Students, E-learning experts, E-learning system developers, learning technologists, and Lecturers [10]. E-learning systems architecture offers a view of all design elements and functions in any e-learning system. This is a prerequisite of any system development team to engage adequately in requirements elicitation and analysis for the intended system to identify its processes, functionality, interface, and benefits.

2. Background Theory

The e-Learning was developed mainly through the use of HTML5 technologies. This hybrid solution makes the e-Lecture Framework is compatible with almost all current popular platforms and browser environments on all devices. The structure of the Framework was designed to contain two layers: The Core Data layer and the User Interface layer.

In the Core Data layer, there are three types of lecture content: slides, voice-overs, and transcripts are stored in the related folders. An XML file is used to store all the slide information.

In the User Interface layer, an auto-adaptive technology will be used to present the e-lecture content to different platforms. The client-end Web page will be able to detect the connecting platforms/browsers automatically and switch to an HTML5 user interface for browsers that support HTML5 features.

2.1. HTML5 Framework

HTML5 is the latest version of Hypertext Markup Language. It is designed to deliver attractive designs with less code. It includes detailed processing models to encourage more interoperable implementations and introduces markup and application programming interfaces (APIs) for complex web applications [8].
HTML5 frameworks can be broadly classified into three main categories:

- Simple Frameworks – Provide Grids and simple components for use in your web project
- Full Frameworks – Provide the base on which you can build your web project
- Mobile Frameworks – Provide a base for Hybrid mobile app development

The **HTML <audio> element** is used to embed sound content in documents. It may contain one or more audio sources, represented using the src attribute or the <source> element: the browser will choose the most suitable one [3]. It can also be the destination for streamed media, using a Media Stream in figure 2.

```
<audio controls>
<source src=”foo.opus” type=”audio/Ogg; codecs=opus”/>
<source src=”foo.ogg” type=”audio/Ogg; codecs=vorbis”/>
<source src=”foo.mp3" type="audio/MPEG"/>
</audio>
```

Figure 2. Audio with Multiple Source Elements

The framework provides an auto-adaptive user interface to present the e-lecture content, based on this framework can provide the HTML5-based user interface for browsers. The e-Lecture Framework provides two different slides of navigation methods. The first one, the linear method allows users to play all slides from the first to the last automatically. Second, the nonlinear method enables users to navigate between slides manually by selecting a slide. The framework is completely based on client-end technologies. The final e-lecture product is server-independent and can be deployed on any type of Web server, whether an Apache Server on Linux/Unix or IIS (Internet Information Services) on a Windows Server. To achieve the greatest degree of flexibility when I designed the e-Lecture framework, we avoided using any server-side scripts to the final lecture [9].

During the development process, it was also used for JavaScript and Action Script coding. To meet the requirements of HTML5 audio formats among different browsers. The e-lecture slides files were set as a series of JPEG images that can be converted from the original PowerPoint presentations. The pure text format was chosen for the format of the transcript. We choose JPEG and pure text formats as these formats are very common on different operating systems and there are lots of existing tools for users to manipulate their files with these two formats.[2] Several client-end technologies were used in the development including HTML5 audio DOM objects, touch DOM object, AJAX, CSS3.0, etc.

The HTML5-based e-Lecture Framework does not provide a new editing environment for course providers to prepare e-lecture content. The target system was designed to be an HTML5-based open framework, which integrates presentation slides, voice-overs, and transcripts. For course providers, the framework encourages them to use familiar tools, such as Microsoft PowerPoint, Notepad, Sound Recorder, etc., to prepare e-lecture content. For example, a lecturer may wish to combine for students a series of diagrams demonstrating how a process gradually progresses. Lecturers and teachers have supplemented the series of diagrams with a voice-over commentary for each stage to produce a transcript. Also, a summary of the different stages have been created in a series of bullet points of short text, each badged with a small symbol to identify each distinct stage.

The e-Lecture Framework serves as a template to generate new e-lectures. After preparing the e-lecture content, users just need to put it into the related folders, and the e-lecture will be ready to publish. This will save money and time that would be spent on purchasing and learning new software. The final products are lightweight and independent Web folders. They can be easily deployed on existing Web servers. Figure3.

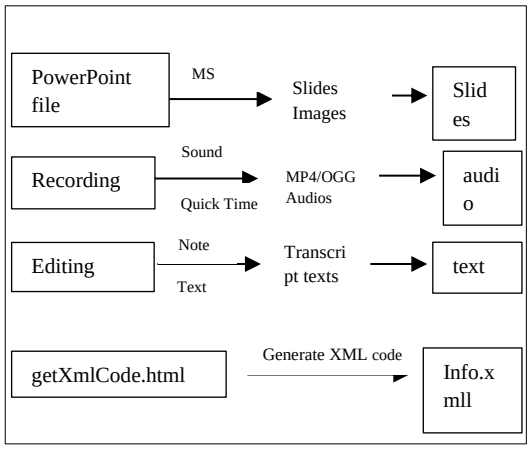

Figure 3. E-lecture Framework

PowerPoint slides are widely used in the traditional teaching and learning environment. The HTML5-based e-Lecture Framework provides an easy method to convert PowerPoint files to a Web version that can be directly published on existing Web servers. This will encourage more lecturers and teachers to carry out their plans to use existing teaching material in an e-learning form. The HTML5-based e-Lecture Framework also provides a free solution for institutions to deploy low-cost e-learning materials quickly.

Developers can use this open framework to create their e-learning-authorizing utilities or develop new plug-ins to enhance their e-lecture framework, such as integrating videos and animations into the e-lecture framework [6]. The e-learning providers then place all their teaching content into the framework and publish the final e-lectures directly into the WebCT modules.

3. Limitations

Some difficulties were encountered during development. The first was choosing a suitable audio format for Web delivery. According to some HTML5 technology resources such as the HTML5 test Web site and Script Junkie Web site, support for HTML5 audio formats varies considerably across browsers. Currently, there is no common audio format that is supported by all HTML5-enabled browsers. Using the audio formats can satisfy the great majority of current popular HTML5-enabled browsers. Another possible audio format to choose is MP3. The HTML5 audio DOM object performed differently across various browsers, too.

4. Conclusion

In this paper, Web technologies HTML5 is used in blended learning. We developed the HTML5-based e-Lecture Framework, which was applied in real e-lecture production. The final result confirms that HTML5 and related open technologies are ready to be widely used in the current e-learning environment. The HTML5-related technologies offer developers more opportunities and also bring greater flexibility to e-learning clients. HTML5 is still a developing technology. A cross-browser standard for HTML5 remains to be established.

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A Brief View of Software Project Management for POS System

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Abstract

Software project management is so important for organizations to better arrange their projects, reduce their costs, shorten time and be more responsive to customer requests. The aim of this research is to focus on selection of software project management using point-of-sales (POS) example. Today, models are very common and are used often for education, testing, research, development, market trends with POS (point-of-sale) etc. With an example of POS system, some features are operated depending on what event is being matched. This report is about how to continue to develop an environment with the basis of a specialized system, which helps project managers to develop a POS software project. By producing a sample report, based on a specific software development model, that model could be implemented in a project POS, this to give the user the possibility to control and navigate certain events in the project. This paper describes the project management aspects for POS system.

Keywords: Software Project, POS, Model, Project Management

1. Introduction

There is in the great interest of organizations to have project managers in current business. Everyone who worked on a project in a technical setting knows this. Moreover, most of project jobs will solve unexpected problems and learning from errors along the way. Project manager will be able to manage and compete with the other projects. Especially software manager has to be able to make a concrete decisions and he/she has talent or create his/her technical skill. There are many considerable things or resources such as within budget, time limitation, man power, output demands and customer needs in a software project. The software project manager should prepare documentation for project milestones. He/she needs to know how to use software tools when the tools will be needed to use in a project task. The researcher argues that the place of visual modeling in software development process is project management [1]. A project manager must have a range of skills including: Leadership, People management (customers, suppliers, managers and colleagues).

This paper presents the brief view of project management deal with some example of point-of-sale (POS) system. The quality of a software product rely on the completion of project process. The task of project management is tend to help managers to generate the administration of each projects or project teams during SDLC (software development life cycle) [2].

1.1. Related Works

The author Halil and Kadir [3] presented that the number of automated project management tools available in the market is increasing rapidly. With significant evolution of these tools, many project managers have started using various software project management tools to manage and support their project activities.

Amber Gillum and Mohammad A. Rob [4] observed about the POS system. POS systems further serve to automate core business functions such as labor management and the generation of financial reports.

Young Hoon Kwak and Frank T. Anbari [5] surveyed that the goal of their research is to better understand project management from the management world, and argues that project management is a legitimate academic discipline by reviewing research trends of its allied disciplines.

2. Point-of-Sales (POS)

A point of sale system, or POS, is the market/store where customer makes a payment for products or services at your store. Every time a customer makes a purchase at your store, they are completing a point of sale transaction.

The POS provides the core component of business like sales, inventory, supplier and customer management. Most of single store retailers are widely used the benefits of POS system. Many are still using a mixture of manual methods and POS system. If the retailer use POS system, they need all requirements concern with POS. We present these requirements as follows:

Software parts of a POS System:

Each POS system contains of software and hardware parts that make executing the daily operations of business easier and faster. It is essential to know how POS operates in their retail store.

Hardware parts of a POS System:

These are the common physical parts required to get POS system installing and running.

Tablet/Monitor:

The user can display the product list view and input/output function from database. He/she also can view sales report and update product data values. The popular devices (e.g. tablets or iPads) can use the replacement of monitor.

Barcode scanning device:

This barcode reader scans the product barcode to add information of product.

Credit card reader:

If the customer pay the money via credit card, the cashier will serve to pay bill with credit card. The retailer must have a bank account for this transaction.

Receipt printer:

The paper voucher may essential for supporting customers for their purchase item list or returns.

Cash drawer:

If the customer pay bill with cash, the cashier need a secure place to keep cash for their transactions.

3. Mechanism in Project Management (POS)

The process of activity of planning, organizing, motivating, and controlling resources, procedures to attain specific missions in todays which is already known as project management. It supports a basis to lead up to the organizational goals. One issue for project management which has the capacity to aid plan, organize, and manage resources. Most of project managers use tools that has a large number of features to customize their customer specified requests. The author [6] observed that the current research knowledge through a systematic review of the literature on the integration of project management and sustainability.

The more suitable tool that managers select, the more the projects will be executed successfully and their company may become more profitable.

In this paper, we emphasize on the aspects of POS system in retail store.

3.1. Requirement Analysis for POS

In this section, we describe the analysis survey of requirements to build a POS system.

3.1.1. Functional Requirement

The following facts are shown as functional requirements.

- The system provides customers purchased receipt/voucher from printer or monitor.
- The fields and data types are specified based on the transactional operation data (i.e. Integer, Text, Date/Time, Numeric, etc.)
- User can search the item name from the database according to customers demand.

- User can add item information.
- User can update item information.
- User can delete item information.
- User can show the item list report.
- User can show the sales report.
- User can register new staff /user / administrator.
- User can add new customer.
- User can update new customer.
- User can view all the sales/purchase records according to product specific ID number.
- User can update password (Admin & Staff).

3.1.2. Non-Functional Requirement

- This POS system is a small-sized business that has features, pricing, setup, and installation differ from businesses of other sizes.
- Typically, system response time is defined to mean the time between when the user initiates an action, and when the computer starts to display the result. In our studies, we have found that response time may be 0.5 – 1.0 second.
- The UI design is implemented for fast and easy to use for user. This UI design includes setting up local standards, proper use of color, using effective layout rules, ensuring adequate screen response, managing complexity, and maintaining consistency.
- The system can save item list into the database safely.
- The system can support all the PC (Personal Computer) Desktop or Laptop.
- The system can create a backup database file after every transaction (sales, purchases, item, and update of authentication details).
- Item information should be added after end of transactions per day.
- Only admin can change the password on behalf of staffs for safety.
- Staffs can only access this system for sales, service and checking reports.

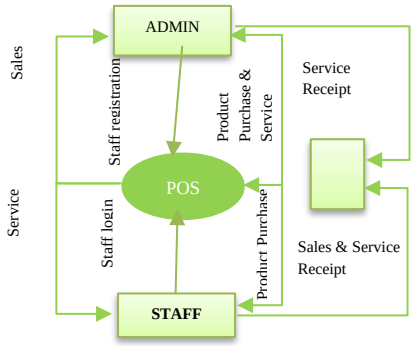

Figure 1. The Task of POS

4. Project Development for POS

This POS system is implemented by using C# programming language with Microsoft Visual Studio 2010 and Microsoft Access for database. This section will be described the implementations of "Point of Sale System".

4.1. Requirements for a Project

During the system development, hardware and software set up are organized as follows.

Hardware Requirement

- ✓ Intel® Core i3
- ✓ RAM 2.00GB

Software Requirement

- ✓ Microsoft Visual Studio
- ✓ Microsoft Access

4.2. Project Demonstration

Figure 2. Main interface form

The admin and user can login his account by using valid username and password in this form.

Figure 3. Admin login form

Figure 3 shows the login form for the administrator. The administrator must enter username and password.

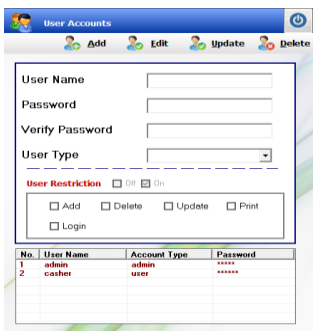

Figure 4. User login form

The above figure (Figure 4) shows User Accounts for Admin and can manage all users.

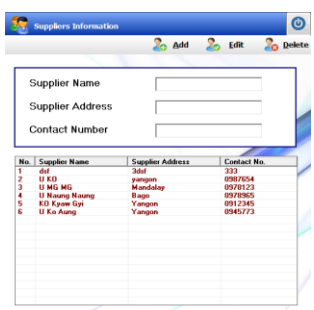

Figure 5. Supplier information form

Figure 5 demonstrates the supplier information form. Supplier information can be seen and new supplier can be added in this form.

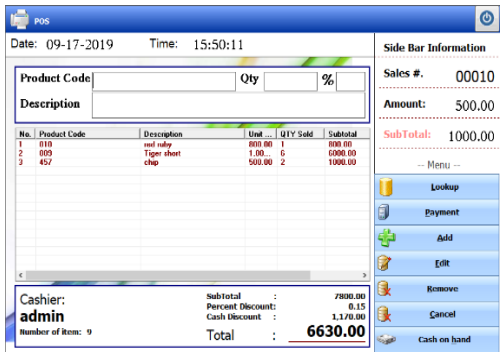

Figure 6. Point of sale system

The above figure shows the POS system for the products' sales.

Figure 7. Sale report form

Figure 7 shows the Sale Report Form. If the users report the admin, he/she can see the sold records. The users can print the reports they sent.

4.3. Ways of the Project Management

This step is to control the appropriate management accomplishment when conditions are essential to decide. Project managers have a choice of four possible ways to get well a project:

• Modify overtime or number of employees.

• Rearrange employees to increase proficiency.

• Reduce performance necessities.
• Discuss additional funding or agenda.

4.3.1. Gantt chart Examples For Effective Project Management

Project team members are constantly sending project manager messages asking him to remind their deadlines. The client can ask the manager that who is responsible for which part of the project, and when. The manager prepare to reply the client for start date and end date with plan chart.

The project planning covers creating work breakdown structures, and then allocating tasks to staff members over time. Project planning includes creation of various timelines and critical paths including Gantt charts, PERT charts, or the like. The principles of managing large software projects with PERT and Gantt charts are considered [7]. Table 1 shows the project team group list with their tasks by phase to phase. Table 2 presents with their time schedule based on their individual tasks. In Figure 8, this gantt chart is drawn by SmartDraw Tool.

Table 1. Project plan list for employees

Functions			Member Name					
			Member(1)	Member(2)	Member(3)	Member(4)	Member(5)	Member(6)
Requirement Analysis	Face-to-Face Interview(T1)					✓	✓	✓
Design	Flowchart(T2)						✓	✓
	Use Case(T3)				✓	✓		
	E-R Diagram(T4)				✓	✓		
	Data Dictionary(T5)				✓	✓		
Implementation	Showing Home Page(T6)		✓	✓	✓			
	Showing Center Lists(T7)	Front-End	✓	✓	✓			
		Back-End				✓	✓	✓
	Showing Course Information List(T8)	Front-End	✓	✓	✓			
		Back-End				✓	✓	✓
	Showing Registration Form(T9)	Front-End	✓	✓	✓			
		Back-End				✓	✓	✓
	Showing about page(T10)		✓	✓				
Testing	Component Testing(T11)		✓	✓	✓	✓	✓	✓
	System Testing(12)		✓	✓	✓	✓	✓	✓
User Service and Installation	First(T13)		✓	✓	✓	✓	✓	✓
	Second(T14)		✓	✓	✓	✓	✓	✓
	Third(T15)		✓	✓	✓	✓	✓	✓
Project Report								

Table 2. Time Schedule

Types of Task						
Task 1						Requirement Analysis
Task 2/3/4/5						Design
Task 6/7/8/9/10						Implementation
Task 11/12						Testing
Task 13/14/15						User service & Installation
	Week 1	Week 2	Week 3	Week 4	Week 5	

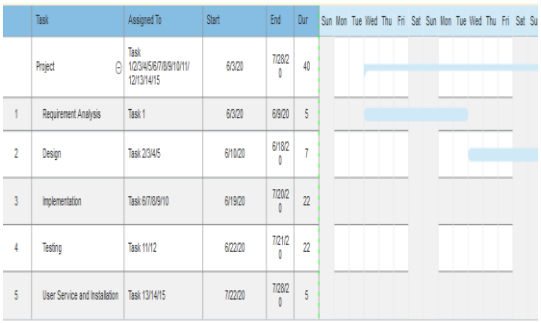

Figure 8. Gantt chart by using SmartDraw tool

5. Conclusion

Nowadays, project management is essential for organizations to better manage their projects, reduce their costs, shorten schedules and be more responsive to customer demands. This paper presents the brief view of project management in POS system for retail store. The POS is a computerized sales management system.

Many tasks in a retail store can be too boring and resource exhaustive. With the accurate POS system, retailers have the ability to simplify critical daily business operations. Modern POS systems do more than just offer flexibility when processing daily transactions.

POS systems are widely used in the retail business. The high quality of project management is required at the beginning for the effective implementation of a POS system.

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