

# Web-based Content Management System for Academic Purposes

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## ABSTRACT

*The explosive growth of the World Wide Web has increase the technology for information dissemination. Beside that, the growth of development software becomes an important and the quick development tool for web development could assist non-IT user to use the web as communication medium. In education, teaching and learning using Internet is one of main important medium for lecturer or instructor to provide teaching materials, post announcement, provide online quiz and etc. The Faculty of Electrical and Electronic Engineering, as it name implies, not all faculty member familiar with web development even some of them never ever know how to use the web as medium, due to the these contributed factor, Interactive Web-Builder (I-WEB) is a web-based system application which runs on Internet Information Services (IIS) developed to assist academicians to create a personal website or create a web for teaching and learning purposes. IWeb is a fully dynamic system and provides user-friendly interface to facilitate user to create and manage the web online. The system also utilizing concept Web-Creating-Web (WCW) to develop the structure of the system for users whose are experienced or inexperienced in web development methods. The development processes have successfully developed using ASP.NET and Microsoft Access as prototype database. The system provides solution for dynamic templates, editor and file manager. The system shows dynamic templates to enable target users to create their web space from a variety of pre-prepared web templates, while file manager manages files more conveniently in hosting server in comparison with the conventional File Transfer Protocol (FTP). Having this student-to-lecturer interface, the interactive between lecturer and students are more effective and convenient.*

## Keywords

*Interactive web, file sharing, web-based, online, ASP.Net*

## 1.0 INTRODUCTION

Interactive Web-Builder (I-WEB) is a web-based system that makes use of the .NET framework to implement the structure of the system as well as increasing the robustness, deployment, and high-performing web-

applications with the capabilities provided by the .NET framework v1.1.

Unlike any other existing web-builders which normally offers their services to all aspects of users, the proposed system (I-WEB) is primarily concern lecturers and instructor of an academic organization especially in engineering faculty, with the intention for them to make use of the web-space provided. IWEB introduced an online-based system where lecturers and tutors can utilize the website provided either for academic purposes or personal purposes. This system does not only involve lecturers and tutors but also students as well. Since the usage of this system strongly depends on the users (lecturers or tutors), there is no need to have system administrator to keep track of the flow of the system, maintaining the database and etc. Hereby, lecturers and tutors have his own responsibilities in utilizing the web-space provided with all the accommodated features in this system and also have full control over the interaction between them and the system. Besides that, students will benefit from this system upon the completion of this website created by the lecturers and tutors. Student can gain access to any of the lecturers' websites online, either just for viewing purposes to retrieve desired information. Their access to the system shall be authorized by the system administrator.

With all the features offered in the proposed system, it is hoped that lecturers, tutors and students can fully utilize the web-space provided according to their preferences and gain as much benefits as possible out of it.

Since the target users of this system are lecturers, tutors and students, the objectives of this system can be classified into two main sections which are the lecturers and tutors and the students point of view. The main purpose of this system is to solve the problems faced by lecturers and tutors in any ways and also to eliminate any inconveniences throughout the academic session. From the lecturers and tutors point of view, with the existence of this system, they can utilize the web-space provided to share information, notes, articles, CV and etc. with the templates and its user friendly interface, so that it can easily minimize the design time. Besides that, lecturers and tutors do not require great programming skills in order to build the website. As from the students' point of view, the system can increase accessibility of lecturers' or

tutors' websites to students, either personally or academically.

The scopes of study consist of four main parts which are the web manager, file manager, the easy file sharing and also the web templates. The web manager is responsible to manage the entire website created by target users (lecturers or tutors). With this, target users have an option to use the HTML Editor to customize their own web pages. Due to the reason that this HTML Editor is a client side web application, it is suitable if JavaScript is used for development because JavaScript is a compact, object-based scripting language that supports client side web applications. As for the file manager and the easy file sharing modules implemented using the ASP.NET environment. Having this feature as part of the system, lecturers / tutors are able to upload and share files such as additional academic-related materials. The management of the files is more convenient in the hosting server compared to the traditional way of sharing files, File Transfer Protocol (FTP). Whereas for the web templates, it is developed using the tools provided in ASP.NET environment, which is considered as part of the special functionalities we have in this system, lecturers or tutors can select to implement their own web space with a variety of pre-prepared web templates.

## 2.0 RELATED WORK

There are many existing web builders that were developed nowadays. However, these web builders have the option for small or big businesses purposes as well as for personal purposes. Three out of the best web builders have been chosen to be reviewed. Since the target users for the proposed system mainly are lecturers and tutors of an academic organization, these existing web builders is reviewed from the academic organization perspectives.

Brinkster is a premier web-hosting company that delivers high quality, feature packed services [1]. It has been enabling the success of individuals, developers, and also small to medium sized business since 1999. Some of the features provided is allow users to select an option for the category for the website, either for personal or business purposes. Besides this, a number of dynamic templates are provided as a starting point for users to design the web. Users can also add or modify a page (navigation menu) with the "Edit Page" tab and to edit the content of the created page with the "Edit Content" tab. lastly, this web site can be previewed before getting it published.

However, the other web builder is the Freewebs. It is a hosting company that provides a free web hosting in a simplified method [2]. Web publishing process has been simplified to suit those who are experienced in web development and also those who are not. Some of the features provided by Freewebs are that it allows selection of category either personal or business. Dynamic templates are also provided for users to select according to their choice. By clicking on the "Edit" button, the page content and the display can be modified with the help of

the editor. There is also an option offered to upload song as the background music of the web page created (only for premier users). It requires only three simple steps to design a website with basic structure and an additional of three steps for extra services (add visitor feedbacks; promote your website and setup e-commerce). However, complex processing and functionalities made developing process harder and loading time is longer.

As for SiteStudio, it is a web builder under on of the services offered by "OurInternet", a web hosting company established since 1998, which focuses on not just hardware aspect but to make customers' dream come alive on the Internet[3]. SiteStudio Web Builder is a browser-based solution for website design and construction. SiteStudio featuring approximately twenty layouts are provided with a few color schemes to suit users' preference. The pages can be easily added dynamically by the "Add A Page" button. There is also a variety of pages can be made or add or edit according to a specific sequence of steps. With the "Site Setting" option, it allows users to edit settings for their entire website (change language, edit security info, change website color and style) whereas with the "Site Map" option where users can navigate around their pages as they are developing. User also will be able to select if the website is meant for personal or business purposes. However, it is not user-friendly and incomprehensive interface; scattered tabs make modification tasks harder.

The Microsoft .NET platform is used as the implementation language. ASP.NET (Web Studio) using C#. The main objective of using this language is to show that the web service built is language independent [4]. Thus, any of the components offered by Microsoft .NET technology can be used. It is Object Oriented Programming (OOP) concept, which means it, it is easily maintained and enhanced in the future [5].The language chose from the Microsoft .NET family in order to complete one of the modules in the project will be depending on the suitability of the language.

Microsoft ASP.NET is the latest Microsoft programming framework that allows rapid development of powerful web applications [6]. Microsoft .Net is a high level programming model and it contains extensive toolsets. ASP.NET has many features that are good for both the programmers and end users. It includes multiple language support, memory leak and crash protection, powerful database which driven more functionality and efficient web applications.

In this ever changing IT world, data management has been a very significant issue to look upon compared to the past. With the exponential growth of companies relying on the Internet to maintain and to keep their business ever growing from one phase to another, this has contributed to the essential need to store and manage data in a more effective way. A review of a few types of data management software has been made, focusing on their features, capability, strength and weaknesses as well.

MySQL was developed and supported by a group name MySQL AB. Its main goal here is to make an excellent data management available and affordable to all [7].

MySQL is the world's most popular open source database, which is highly used by Open Source users such as Linux users out there. In fact, MySQL database server is available under the General Public License (GNU) without needing a license fee at all. MySQL architecture makes it very fast and easy to customize. The unique separation of the core server from the storage engine makes it possible to run with strict transaction control or with fast transactionless disk access. Among the brief features provided in the MySQL database Server such as ANSI SQL syntax support, cross-platform support, independent storage engines, transactions, flexible security systems, including SSL support, query caching, replication, full-text indexing and searching, embedded database library, etc.

Microsoft Access is one of the products developed by the Microsoft Company. It provides a powerful set of tools that is sophisticated enough for professional developers yet easy to learn [8]. With Microsoft Access, an organization can create, organize, access, and share information easier. The key benefits that can be obtained are such as it use information from a variety of formats and programs, reduce errors and get help when you need it and it also it share information with confidence.

XML is a markup language for documents containing structured information [9]. In fact XML is a meta-language for describing markup languages. In other words, XML provides a facility to define tags and the structural relationships between them. XML offers a list of benefits when it comes to data management. Its simplicity made information coded in XML is easy to read and comprehensive, plus it can be processed easily by computers. It is also extensibility where there is no fixed set of tags. New tags can be created as needed by users. Besides that, it also separates content from presentation because XML tags describe meaning but not presentation. Multiple views or presentations of the same content are easily rendered. The tree structure of XML documents allows documents to be compared and aggregated efficiently element by element.

### 3.0 METHODOLOGY

The Software Development Life Cycle (SDLC) consists of six phases such as Planning Phase, Requirements Definitions, Design Phase, Development Phase, Integration and Testing Phase and finally the Maintenance Phase are implemented in completing this project. In planning phase, it is very important to organize and locate time in an efficient way thus reaching the milestones as planned.

In the designing phase where all the requirements of this project is listed out and therefore proceed to design. During the development phase, various existing technologies are being explored and learnt and how useful they are in producing a well-organized, systematic and advance system. It is through literature review conducted in planning phase of this project that manages to choose the best tool to complete this project successfully namely

ASP.NET as the main programming tool, Microsoft Access for database and other useful tools.

The main domain of this system involves the essential features and functionalities of this system. I-WEB System is similar to a Content Management System (CMS). It is similar to the CMS in the sense that it enables one to add or manipulate content on a website and allows the users (who may not know HTML) to manage the creation, modification, and removal of content from a website. I-WEB can be categorized into several subcomponents which are the Web Builder, Online Organizer and the File Manager.

Figure 1 shows a context diagram of I-WEB including all the parties involve in I-WEB. This includes the lecturers, tutors, students and the website itself. Hereby, upon login, lecturers or tutors can perform tasks such as to manage their web space and web files in a user-friendly interface. They can enter or update their information in their own website and upload files with any extension. One can creates a web page by making use of the web builder in I-WEB. Besides that a lecturer or tutor can post up an announcement (calendar events) and to check voting polls information. As for students, their interaction with the website created by the lecturer and I-WEB are the ability to view the permitted website content and also to obtain the shared files by their respective lecturers or tutors. The student can take part in the Vote Issue. Besides that, there are also implicit interaction between I-WEB and the website that yet to be created by the lecturers or created website. This involves that I-WEB will assist lecturers or tutors in constructing web pages and I-WEB will perform any updates made in the web pages. For a better understanding, please refer to Figure 2, Data Flow Diagram

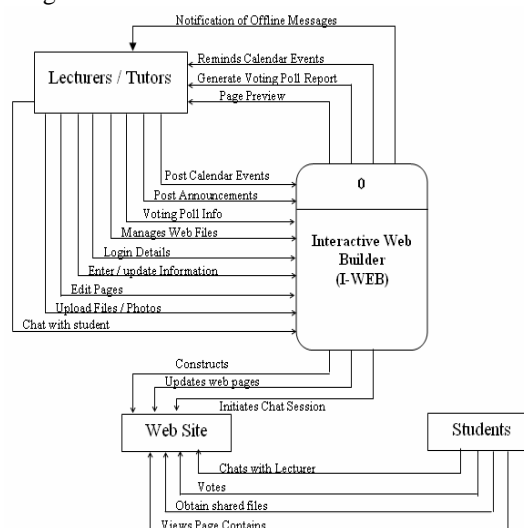


Figure 1: Context diagram

Through the user-friendly interface Microsoft Access has, the database admin in charge of creating a new database from scratch for IWEB within simple steps. Upon completion, tables will be created for each entity.

For instance, Lecturer, Student, News, Announcement and etc. This process involves a few important criteria such as the Primary Key settings, Field Properties, and Foreign Key limitation enforcements as well. Relationships between tables can be created through one of the features in Microsoft Access. With this, a clearer view on the relations between each entity can be obtained and this leads to a better understanding on I-WEB system (Refer to Figure 3).

Interface development is as important as other parts as well, as it gives users the first impression of the system. Furthermore, the interface is also the area where users interact with the system. Therefore it should be as attractive enough yet simple.

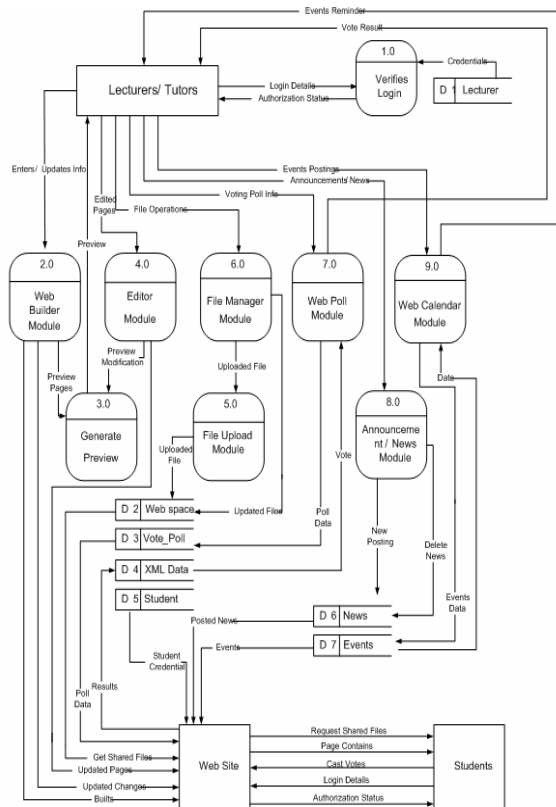


Figure 2: Data flow diagram

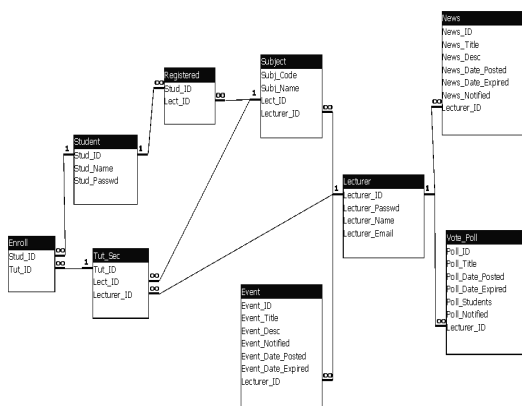


Figure 3: Entity relationship diagram

## 4.0 IMPLEMENTATION

In development phase, intensive programming is performed to complete the modules as scheduled. The first step is of course to get prepared with the necessary development tools and environment as well. The aim of this phase is to complete each and every module, making sure they are interactive enough and functioning efficiently. Apart from this, all potential problems and bugs should be taken into consideration as well to eliminate any inconvenience in the future.

Among all the tools used in I-WEB system are ASP.NET, Javascript, Internet Information Services (IIS) version 6.0, Microsoft Access and also Adobe® Photoshop version 7.0.

The Microsoft Access 2004 is selected as the main database tool after detail research on the types of available database tools. Since Microsoft Access 2004 is already bundled in the Microsoft Office package, through proper installation, this software can be obtained easily.

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During the deployment phase, the goal of the deployment and stabilization process is to identify and resolve as many issues as possible to minimize the number of recurring problems. In this phase, compilation of information from the interim milestone is reviewed as well. The focus should be on the problems encountered to determine the relationship between the actions taken and those successes and failures. The deployment phase concludes the active implementation process. After the successful completion of system deployment, post implementation review is organized, to measure performance, review results and fine-tune long term goals. This establishes the base for further improvements to the implemented system. Deployment system in the web server system has to be stored in the appropriate server for processing and testing are being carried out on this sever to ensure that all configurations are set properly and all deployments have been conducted successfully. Modifications will be made to the servers which do not fulfill the testing requirement or do not produce expected testing results.

Quality Assurance (QA) is an essential phase in software development. Software QA involves the entire software development process - monitoring and improving the process, making sure that any agreed-upon standards and procedures are followed, and ensuring that problems are found and dealt with. In this phase, all occurrences of bugs or unwanted conditions can be removed as soon as they are discovered. Figure 4 show an example of error occurred during debugging.

Server Error in '/web/' Application.

Operation must use an updateable query.

Description: An unhandled exception occurred during the execution of the current web request. Please review the stack trace for more information about the error and where it originated in the code.

Exception Details: System.Data.SqlClient.SqlException: Operation must use an updateable query.

Source Error:

```
Line 128:         cmd.Parameters.Add("@id", SqlDbType.Int).Value = User.Identity.Name;
Line 129:         //ExecuteNonQuery(sql);
Line 130:         cmd.ExecuteNonQuery();
Line 131:         cmd.Close();
Line 132:         cmd.Dispose();
```

Source File: e:\pub\wwwroot\iwebnews.aspx.cs Line: 130

Stack Trace:

```
[WebException (0x80040002): Operation must use an updateable query.]
System.Data.OleDb.OleDbCommand.ExecuteNonQueryInternal(Int32) +41
System.Data.OleDb.OleDbCommand.ExecuteNonQuery(String sql) [AggregateException] +174
System.Data.OleDb.OleDbCommand.ExecuteNonQuery(Object executeResult) +92
System.Data.OleDb.OleDbCommand.ExecuteNonQuery(CommandBehavior behavior, Object executeResult) +45
System.Data.OleDb.OleDbCommand.ExecuteReaderInternal(CommandBehavior behavior, String method) +110
System.Data.OleDb.OleDbCommand.ExecuteReader() +44
web_news_btnNewsPost_Click(Object sender, EventArgs e) in e:\inetpub\wwwroot\web\news.aspx.cs:130
System.Web.UI.WebControls.Button.OnClick(EventArgs e) +38
System.Web.UI.WebControls.Button.System.Web.UI.WebControls.IPostBackEventHandler.RaisePostBackEvent(String eventArgument) +57
System.Web.UI.Page.RaisePostBackEvent(IPostBackEventHandler sourceControl, String eventArgument) +18
System.Web.UI.Page.RaisePostBackEvent(NameValueCollection postData) +57
System.Web.UI.Page.ProcessRequestMain() +1292
```

Figure 4: Error during debugging

The outputs for the interface design are as below:

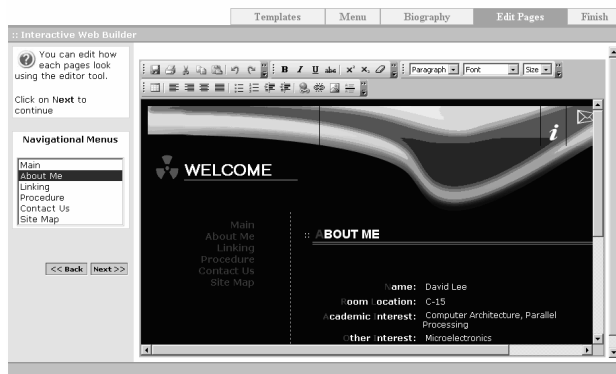


Figure 5: Interface Design ( High-Tech Design)



Figure 6: Interface Design (Professional Design)

## 5.0 CONCLUSION

Throughout the phases of I-WEB project, the modules for this IWEB were successfully completed as scheduled, with the expected results and simultaneously ensuring the functionalities of each module are at the top. The objectives of this project which are to utilize the web-space provided by an academic organization , to minimize designing time and to ease the job of lecturers or tutors, both having knowledge in programming or not at all have achieved. Throughout the process of building this system, many challenges and problems arose were dealt with

professionally with the help of various sources. The learning curve ranges from all different aspects.

Interactive Web Builder (I-WEB) is designed for flexibility and user friendly purposes. It is intended to simplify the process of creating and maintaining a fully function able web site. Although there are similar web builders available in the market, however, some web builders are not as user friendly and efficient.

I-WEB, which target users are lecturers and tutors, is not only an interactive web builder but also a system that offers other useful web services as well. With the existence of IWeb system, the target users can fully utilize the web-space provided to them in a more convenient, timesaving and professional way, which will then increase the overall work performance. With this, lecturers and tutors will be able to gain as much benefits as possible from this system and simultaneously experiencing a great revolution in creating and managing their websites, thus giving a chance to target users to enjoy the features and maximizing the work performance for all academic organizations in Malaysia.

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