WXES 3182

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Project Title: E-Community

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ABSTRACT

The WXES 3182 report first presents the background information on the project and the introductory presentation of E-Community system, as well as the system implementation, testing and evaluation of the system as a whole, which will comprise of these main modules; the Events and Happenings Module and the Discussion Forum Module will cater the project objectives of developing an online interaction space where people connect to one another for sharing of interests and ideas via the Internet. Methodologies and techniques, used in the researches on solving project limitation and problems and discussions on the systematic approach used in developing the project with emphasis on the chosen Waterfall process model was also written in brevity. Having done the researched literature reviews which include researches and analysis on existing systems, project domains, tools, techniques and methodologies available in developing the E-Community project, I have decided to adopt the Microsoft.NET Framework, together with Visual Studio.NET, to develop my E-Community project in the development, coding and programming phases. A comprehensive analysis on the E-Community system was thoroughly carried out to understand the current problem and also, capturing the functional and nonfunctional requirements and the hardware/software requirements of the project, which was listed down in the report. In conclusion, much consideration have also been taken on the design of the proposed system, which includes integration of all modules into a system that has the functionalities as specified in requirements specification, the system design, user interface design of the modules in the system, in ensuring a smooth system implementation, testing and evaluation towards accomplishing a bug-free, quality web application.

ACKNOWLEDGMENT

I would like to gratefully acknowledge the contributions of the following people for their kindness and support in helping me to achieve the results I have produced thus far in the E-Community project.

First and foremost I would like to express my gratitude to Pn. Hannyzzura, my project supervisor for all her invaluable insight and comments during the first half of the project development into the challenges of analyzing and designing my E-Community project as a whole. It can never be this complete without the strong points given.

I would like to also thank University Malaya for the access to the computer lab facilities, which was indeed, very good and has helped me much in doing my thorough research on E-Community and the tools and methodologies needed to develop the E-Community via the high speed Internet access.

Lastly I would like to acknowledge a few good books which have also, helped me in gaining the essential knowledge for developing my E-Community project; the books are ASP.NET, Web Developer's Guide published by Syngress Publishing Inc and also C#.NET, Web Developer's Guide published by Syngress Publishing Inc.

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1.0 Project Overview

The words E-Community has been bandied about, hyped and interpreted in many ways. But for my purposes, I am going to keep it simple and in context of building my own E-Community.

E-Community is the gathering of people, in an online "space" where they come, communicate, connect, and get to know each other better over time. From that point on, the rest is up to the target audience. The E-Community will be what the host and the members make of it.

Why would I want to build an E-Community for my final year project? People have been using online spaces since the beginning of the Internet to communicate. That includes prior to the World Wide Web, when BBS, or electronic bulletin boards and email loops connected folks across time and space. Many found that they began to form bonds of one sort of another. Today, the online forum service had more than a million distinct communities and forums registered; and many more remain unlisted.

Here are some of the types of activities people have enjoyed through these online connections.

- Socialize - meeting people, playing around, sharing jokes, stories and just taking interest in each other.
- Work together (business) - Distributed work groups within companies and between companies use E-Community to build their team, keep in touch and even work on projects together.

- Work together (community-geographic) – Some have offered local communities ways to communicate and work together. Some have even combined this with ISP service. Community groups such as soccer teams, school groups and others have used E-Community to provide forums for information and discussion, helping bring groups together.
- Work together (issues) – E-communities have been very important to people who share interests in issues and causes. Support groups for people dealing with certain diseases, causes such as the environment, or people studying together, all can form a nucleus for an E-Community.

There has been much speculation on the affect of online activities on our offline lives, ranging from concerns about addiction, to meeting the "loves of our lives" online and getting married. These are examples from all the extremes, but the more relevant question is how we can integrate our offline and online experiences.

In my opinion, there are two ways we can participate in E-communities: "the kind where you're yourself and the kind where you are playing out a fantasy role. It is not very hard to figure out someone's real name. But there are many E-Communities where a member of the community actually can't find out who someone's is in "real life." People are role playing, and playing out a fantasy role. Many game communities are like that.

I personally think that these two kinds of community play very different roles in people's lives. The gaming-oriented communities will affect you emotionally, but they won't tend to integrate into your life as what I would call 'augmented reality' communities do. I define this as "augmented reality" where you're "you," and you're there to integrate with your life - deal with the issues in your life. The fantasy communities are all about escaping from who you are and pretending to be someone else. So much about augmenting reality is more about shaping your life. I think that the augmented reality type of communities have become progressively more entwined in people's lives.

I think that it is good to remember that in many cases, it (E-Community) is another communications channel. The telephone is a communications channel that augments your life, so these communities are sort of like the telephone. But there's also data and sometimes it is asynchronous. I think that both of those trends will continue, and become much more integrated by people into their lives, and just another communications channel and other ways to hook up with people who share a common interest, shared purpose.

I also think the fantasy aspect of communities will become even richer and even more immersive. And it will continue to be a place to escape to for entertainment. In that case, it may not integrate much with your life at all, but it will certainly affect your emotions.

Having said much about my project so what are the steps that I should take to build an E-Community? Here is the overview of the steps I will take to build your own E-community:

- Identify the primary purpose
- Identify the target audience
- Think about which interaction tools would serve the purpose and audience and how to design and structure the space.
- Think about how I would want to host or facilitate my E-Community

1.1 Project Definition

To define my E-Community, the members of my E-Community project can use words on screens to exchange pleasantries and argue, engage in intellectual discourse, conduct commerce, exchange knowledge, share emotional support, make plans, brainstorm, gossip, feud, fall in love, find friends and lose them. I shall say that members in my E-Community do just about everything people do in real life, but we leave our bodies behind. To the millions who have been drawn into it, the richness and vitality of computer-linked cultures is attractive, even addictive. There is no such thing as a single, monolithic, online subculture; it's more like an ecosystem of subcultures, some frivolous, others serious. To name a few examples, the cutting edge of scientific discourse is migrating to E-communities, where you can read the electronic pre-preprinted reports of molecular biologists and cognitive scientists. Also my E-Community can be used to sell a book, rent a room, or plans to conduct a meeting.

I hope my project would help in informing a wider population about the potential significance of cyberspace and the ways E-communities are likely to change our experience of the real world, as individuals and communities.

Computer conferencing emerged, also somewhat unexpectedly, as a tool for using the communication capacities of the networks to build social relationships across barriers of space and time.

The hobbyists who interconnect personal computers via telephone lines to make computer discussion forums systems, have home-grown their part of the Net, a true grassroots use of technology.

The discussion forums turn the bits and bytes into human-readable text. Other people use their computers to leave and retrieve messages, organizing and planning events stored in their personal computer, and you have an E-Community growing in your bedroom.

1.2 Project Objectives

What would I want to accomplish with E-Community, an online interaction space? Who is going to be my target audience? How will participating in the E-Community benefit the members? How will I know that I have succeeded? These are some of the questions to ask in defining my project objectives. By having a clear purpose and objective that makes sense to me, and the members, I can give myself a head start in designing and running a successful E-Community, an online interaction space.

The objectives of E-Community help me in deciding both its structure and what resources (time, information, and expertise) I will need to run it. What most E-Communities' prime objectives have in common is a focus around discussion or interaction between members. But there may also be other elements, which require different tools and design. Also, consider the following project objectives listed in short:

- Planning and organizing "Gathering" places where people converse, meet, get to know each other. Examples range from small spaces for families to large spaces for a wider public.
- Discussing topics such as books, current events and news.

- Planning and organizing (community groups, scout groups, sports teams)
- Teambuilding - strengthening group relationships.
- Relationship building - finding interesting people and getting to know them.
- Work spaces for group meetings, interactions etc.
- Learning spaces (all online, group or individual)
- Information sharing- a place to share ideas.

To further elaborate on my objectives in length, my E-Community can be the right place for sharing of interest among the E-Community members. Group coordination and information sharing is also possible, for example, group of students can use my E-Community as an online space to coordinate a school project. Being an online interaction place, my project can be the ideal place for groups of people who enjoy having conversations and meeting new people. This is a very broad and potentially diverse E-Community, comprising forums that can hold a wealth of topics, alternatives between linear and threaded formats.

To cater the above objectives, that is why I have planned to set up an E-Community that comprise of these main modules; the Events and Happenings Module, the Discussion Forum Module, Classifieds Module(optional), Links Module(optional), Login Module and Administration Module.

1.3 Project Scope

Here is a list of questions to help me define the scope of my project; E-Community.

Questions are in bold, answer clues to the questions are in unordered list and answers to the questions are italicized.

1.3.1 Scope: Results & Outcome

What is the desired outcome for the group?

- Does it have a mission or a vision that I can communicate to potential members?
- Are the benefits measurable and visible to members and potential members?
- Is the outcome determined by the host? Group members? Both?
- If the group is part of a larger organization, is it consistent with organizational goals and culture?
- Is the group's purpose something that can only be done/accomplished online? Will it replace something offline? Or is it some combination?
    - *With great vision it is hoped that the E-Community will bring about immense significance to its members as well as non-members or potential members, highly determined by both the host and the group members. It is also a mission of my project to make it in consistent with the public culture and organizational goals and as it name implies, it is also greatly hoped that the group's purpose is something that can be fully accomplished online but neither it can ever replace something offline.*

1.3.2 Scope: Coverage

Who is the target audience and members?

What kinds of participants (target audience) do I want to draw in or need to participate?

- How would I describe them?
- How motivated are the participants or members to participate? What is "in it for them?"
- Do the members have adequate computer equipment and Internet access to have a satisfactory experience on my system? Am I going to tell them the minimum requirements up front?
- Do I want my E-Community to be public or private? If private, what determines eligibility?
- What is the ideal size for any group? Is there a limit to how many members can participate? Do I have a sense of how my E-Community can expand if there is greater interest?
- Where might I find potential members?
- How might I communicate with the members to market my online interaction space?
- Am I building from an existing pool of participants? Or drawing in new members?
    - ○ *My E-Community project is targeted primarily at UM students specifically Computer Science students. But with the great tools and*

methodologies that I intend to use, the scope of coverage can be further expanded with no imminent problems to all the countries in the world. It is meant to be public driven E-Community and it is suitable for groups of variable sizes; from small to big ones. Therefore, on the question of scope coverage, I would term my project as boundless and it is going to be a great place for online interaction and events planning; thus it is expected that the project will draw in many potential members from all over the countries in the world.

1.3.3 Scope: Type of Member Interactions

What kind of discussions/interactions/events planning do I intend to foster?

- Are they more like ongoing discussions or question & answer?
- Are the events focused or wide-ranging?
- Are they started by the host or by the members?
- Are they intellectual? Social? Sensitive? Controversial?
- Are they focused around information such as documents or other static content?
- Will they generate content/knowledge that needs to be captured?
- Do they need synchronous (same time) and/or asynchronous (different time) interactions?
    - *No doubt my E-Community project is going to be an ongoing discussion and the events module is not explicitly focused but it is definitely wide-ranging and they can be initiated by the host or by the members. It is also definitely intellectual and can also be of social characteristics, sensitive*

or even controversial ones with the exception of extreme ones. And yes it is also part of my objectives for content/knowledge generation focusing around static and dynamic contents in an asynchronous manner.

1.4 Project Limitation and Problems

Here is a list of questions that will help me define the limitation and problems of my project; E-Community. Can members start their own topics, can member who break community guidelines be banned, or can the host track participation information? What if the members started posting vulgar words? These become central issues because of the objectives and the potential size of the E-Community. That is the main reason as to why I am about to include an additional functionality to the discussion forum module to filter vulgar words keyed in by the members of the discussion forum.

Besides the above problems, the advantages of online forums and events module of allowing the building of relationships over time and provides a rich contextual environment for sharing of ideas have its drawbacks too. It is too time consuming, easily open to misinterpretation in the absence of physical cues and feedback, and not attractive to those who do not like to write or have limited reading and writing skills. It self selects in these matters and in many cases, it requires the user to be motivated to log on and participate. It can also be challenging to bring items to closure in online asynchronous forums and events management.

These are the problems and limitations I will face in my E-Community project.

1.5 Project Planning and Schedule

In this section, I will be laying out a Gantt Chart on my project planning and schedule based on the list of activities involved, and this is important in keeping the project on track and the stages of development have been adhered to. These proportions of time need to be allocated to ensure the deadlines for each activity is met with a piece of material that meets the criteria to a high standard.

Listed below are the main activities involved in the development of E-Community.

- Proposal Writing
- Project Planning and Scheduling
- Research
- Requirements Definition
- Design
- Coding and Programming
- Integration and Testing
- Installation and Presentation
- Report Writing and Documentation

Please refer to the Gantt Chart of my project planning and schedule on the following page.

As you will see from the Gantt Chart, it can be figured out that research, report writing and documentation are areas that can be ongoing during the project. Requirements definition, design, coding and programming run in sequence, and, I need to produce a satisfactory design based on requirements definitions and specifications so that the transition to the implementation of my project modules would be less error-prone, thus minimizing the complexity of the coding and programming of the project modules. But I will have to allocate some time to gaining better understanding of the capabilities and feasibilities at the implementation stage of the project while continuing with the design phase of the project. Lastly, there will be a significant amount of movement between the aspects of the project, most probably due to the immense uncertainty of possible implementations.

Figure 1.1 Gantt Diagram

Figure 1.1: Gantt Chart

1.6 Report Layout

This WXES 3182 report consist of 8 Chapters. A summary of all these chapters in the WXES 3182 documentation is as listed as below;

Chapter 1 – Introduction

This chapter presents the background information on the project and the introduction of E-Community system which includes the project definition, project scope, project objectives, project limitation and problems and project planning and schedule.

Chapter 2 – Literature Review

This chapter reviews literatures researched in developing the project which includes researches and analysis on existing systems, project domains, tools, techniques and methodologies available.

Chapter 3 – Methodology

This chapter elaborates further on the methodologies and techniques, used in the researches on solving project limitation and problems and discusses the systematic approach used in developing the project with emphasis on the chosen process model.

Chapter 4 – System Analysis

This chapter seeks thoroughly to understand the current problem and also, capturing the functional and nonfunctional requirements and the hardware/software requirements of the project. Besides, this chapter also analyzes and discusses the adopted system development methodology.

Chapter 5 – System Design

This chapter discusses the design of the proposed system, which includes integration of all modules into a system that has the functionalities as specified in requirements specification, and it also elaborates on the system design, user interface design and the modules of the system.

Chapter 6 – System Implementation

This chapter discusses the implementation of the proposed system, which includes the elaboration of coding approach and styles adopted, in making the project a success.

Chapter 7 – System Testing

This chapter discusses the comprehensive testing of the system upon completion of the coding phase. Bugs are fixed and it also summarizes the unit, and integration testing of the proposed system

Chapter 8 – System Evaluation

This chapter discusses the problems encountered and the solutions to the problems, and also discusses the system strengths and constraints in short, the knowledge and experience gained and also, the future enhancement to the proposed project.

2.0 Introduction

In this chapter I am going to investigate the problems, analyze previous systems on E-Communities, analyzing the tools that are available to help in developing my E-Community.

In order to ensure the success of a system development, a careful planning is essential. So, in developing this project, research has been conducted in several related areas to gather the prerequisite information. The information is gathered through net surfing, reading on books and references.

Considering that, the objectives of my E-Community and the needs of the members will therefore dictate what tools I will use and kind of E-Community I am building. Next I will be highlighting the tools available in developing E-Community. The research areas are focused on the following aspects;

- Existing E-Communities
- Networking
- Operating System
- Web Management System
- Database

2.1 An Overview of the World Wide Web

The Web was built on existing protocols and intended to provide a common interface to other protocols. Because of this design, any valid protocol can be used to transfer files. HTTP, primarily can be used to access Web documents, but other protocols can also be used, such as Gopher and FTP, to enhance the usefulness of the documents. The face of Web publishing is changing rapidly, and the way the structure of Web documents is specified is changing just as quickly. The most common way to structure Web documents is with HTML, but SGML, VRML, and page-layout applications to structure Web documents can also be used.

To stay current with the latest developments on the Web, the Internet standards and specifications proposed by Internet standards groups should be followed, such as the IETF and the W3C.

2.1.1 Analysis on the existing E-Community System

2.1.1.1 Analysis on communityzero.com

URL Address: http://www.communityzero.com

Community zero is an interactive website that allows a group of people to communicate and exchange information over the Internet in their own private and secure area. Within each area, called an online community, participants are provided access to a suite of powerful tools that enable a group to effectively get organized, share knowledge and

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Advantages of the system;

- The user capacity and text storage are unlimited
- Administrative interface provides a series of tools to manage member accounts, communities, broadcast emails and more
- It is free of charge
- Private and secure online communities
- Powerful tools for collaboration and interaction
- Easy to use – no programming knowledge

Disadvantages of the system

- Cookies are required when you want to be a member of Community Zero
- User interface is not user friendly because the layout is too complex .

2.1.1.2 Analysis on smartgroups.com

URL address: http://www.smartgroups.com

Smartgroups is all about making life easier. It's a great, new way of organizing the different groups of people in your life using email and the Internet. Smartgroups keeps you in touch, helps you to share information, manage events and even make group decisions. Anyone can set up and run a group. Smartgroups combines web-based Group information together with email messaging, keeping group members updated of urgent or interesting group issues. All Smartgroups members can control where, when and how they use the service to ensure it exactly fits their lifestyle and different group interests.

Each Smartgroup has a;

- homepage with basic group information
- message area
- event calendar
- files area
- picture albums
- voting area
- classifieds ads
- simple database system
- management area

Group members can email the group, add events and files and create votes and lists (depending on the group policies set up by the group manager). Smartgroups members can create and join as many groups as they like and groups can be publicly visible or totally private.

Advantages of the system

- It is free of charge
- The layout is attractive and the tools are easy to use
- Having policy to prevent you from receiving unsolicited commercial email
- Easy to use – no need programming knowledge or software download
- Provide private and secure online communities

Disadvantages of the system

- Need time to customize the features in the community
- Cookies are required when you want to be a member
- The storage space is limited

2.2 Networking

In Information Technology, networking is the construction, design and use of network, the selection and use of telecommunication protocol and computer software for using and managing the network and the establishment of operation policies and procedures related to the network.

2.2.1 Client/Server

Client/server describes the relationship between two computer programs in which one program, the client, makes a service request from another program, the server, which fulfills the request. Although the client/server idea can be used by programs within a single computer, it is a more important idea in a network. In a network, the client/server model provides a convenient way to interconnect programs that are distributed efficiently across different locations. Computer transactions using the client/server model are very common.

The client/server model has become one of the central ideas of network computing. Most business applications being written today use the client/server model. So does the Internet's main program, TCP/IP. In marketing, the term has been used to distinguish distributed computing by smaller dispersed computers from the "monolithic" centralized computing of mainframe computers. But this distinction has largely disappeared as mainframes and their applications have also turned to the client/server model and become part of network computing.

In the usual client/server model, one server, sometimes called a daemon, is activated and awaits client requests. Typically, multiple client programs share the services of a common server program. Both client programs and server programs are often part of a larger program or application. Relative to the Internet, Web browser is a client program that requests services (the sending of Web pages or files) from a Web server (which technically is called a Hypertext Transport Protocol or HTTP server) in another computer somewhere on the Internet. Similarly, a computer with TCP/IP installed allows client requests for files to be made from File Transfer Protocol (FTP) servers in other computers on the Internet.

Other program relationship models included master/slave, with one program being in charge of all other programs, and peer-to-peer, with either of two programs able to initiate a transaction.

2.2.2 Web Servers

- Specialized software that responds to client requests by providing resources
- When users enter URL into Web browsers, they request specific documents from Web server
- Maps URL to file on server and returns requested document to client
- Communicates with client using HTTP
    - Protocol for transferring requests and files over the Internet
- Is a network servers that manages access to files, folders and other resources over the Internet via the platform-neutral HTTP (HyperText Transfer Protocol)

I'll be elaborating more on the three types of web servers available, they are;

- Internet Information Services (IIS)
- Personal Web Server (PWS)
- Apache Web Server

Table 2.1: Web Servers (IIS, PWS, and Apache)

	IIS (Internet Information Server)	PWS (Personal Web Server)	Apache
Company	Microsoft Corporation	Microsoft Corporation	Apache Software Foundation
Version	5.0	4.0	1.3.20
Released	2/17/00	12/4/97	5/21/01
Platforms	Windows 2000	Windows 95/98/ Millennium Edition (Me)/NT	UNIX, Windows NT/2000, experimentally supports Windows 95/98
Brief description	The most popular Web server for Windows 2000.	A basic Web server for publishing personal Web pages.	Currently the most popular Web server.
Price	Included with Windows 2000.	Freeware. Packaged with Microsoft IIS in NT 4.0 Option Pack. Also included in Windows 98.	Freeware.

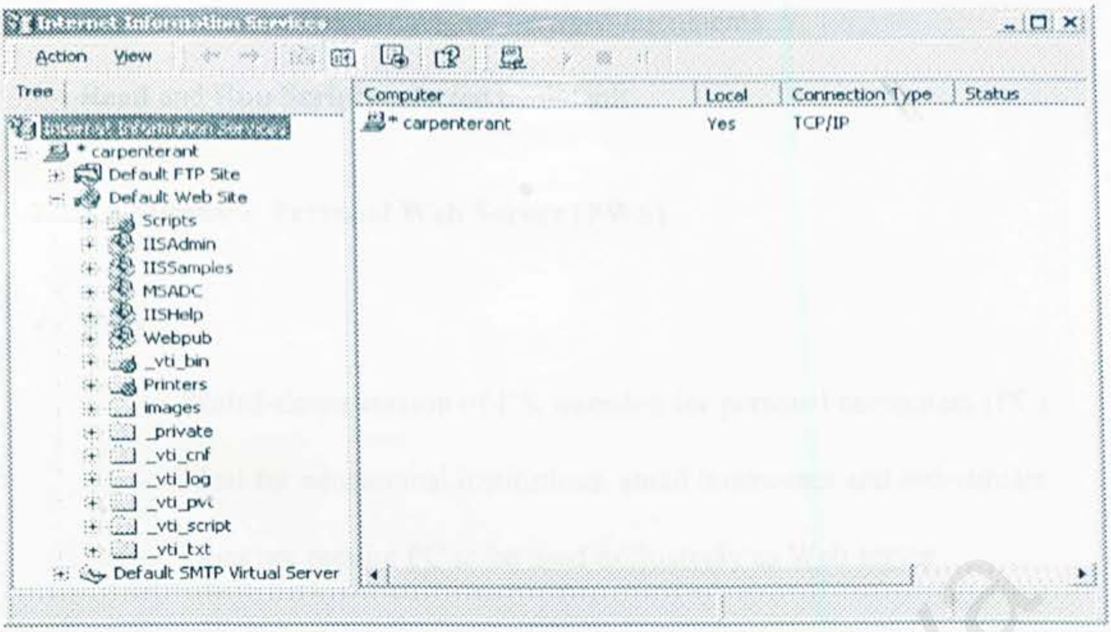
2.2.2.1 Microsoft Internet Information Services (IIS)

- IIS 5.0
  - Enterprise-level Web server

  - Included with Windows 2000
  - Allows computer to serve documents
- Internet Services Manager
  - Open Control Panel, double click Administrative Tools icon, then double click Internet Services Manager icon
  - Administration program for IIS
  - Place documents to be requested in default directory or virtual directory
    - Default: C:\Inetpub\Wwwroot
    - Virtual: alias for existing directory on local machine

Default FTP Site and **Default Web Site**

- Permit transferring documents between computer and server
- HTTP used frequently to request documents
- **Default SMTP Virtual Server**
- Allows for creation of mail server
- Create virtual directory in **Default Web Site**
- Most Web documents reside in **Webpub** directory
- Right click **Webpub**, select **New**, then **Virtual Directory**
- Initiates **Virtual Directory Creation Wizard**
- Guides user through virtual directory creation process



Computer	Local	Connection Type	Status
* carpenterant	Yes	TCP/IP	

Figure 2.1: Internet Services Manager dialog

- Virtual Directory Alias
  - – Enter name for virtual directory
    - Name should not conflict with an existing virtual directory
- Web Site Content Directory
  - – Enter path of directory containing Web documents

Access Permissions

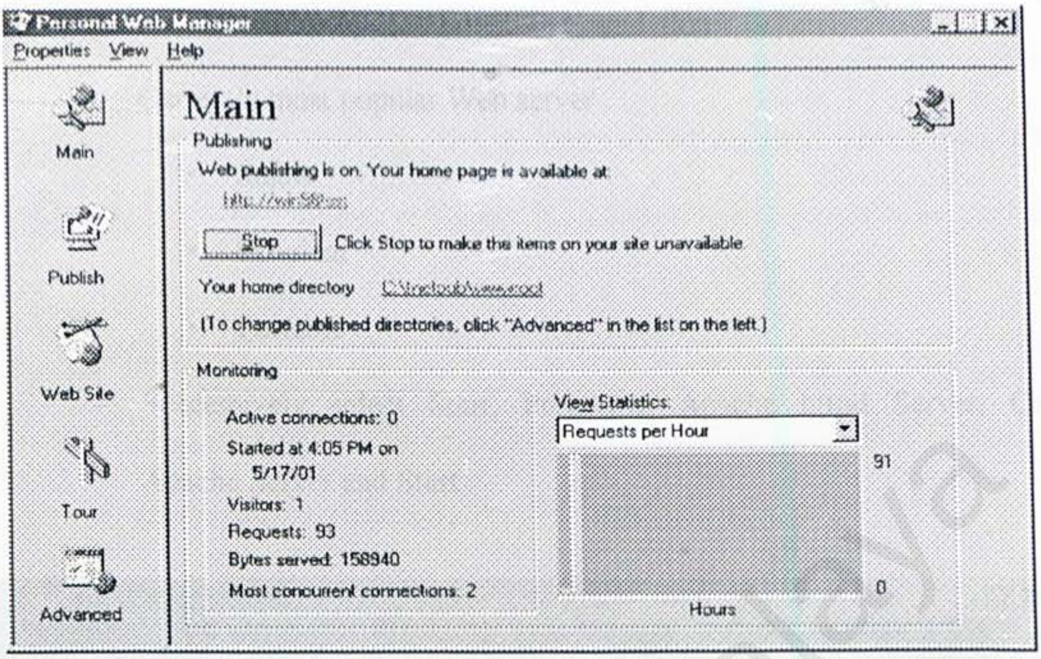
- Presents security level choices
- Select access level appropriate for Web document
- **Read** allows users to read and download files
- **Run Scripts** allows scripts to run in directory
- **Execute** allows applications to run in directory
- **Write** allows Web page to accept user input

- **Browse** allows users to navigate between documents
- **Read** and **Run Scripts** selected by default

2.2.2.2 Microsoft Personal Web Server (PWS)

- PWS
  - Scaled-down version of IIS, intended for personal computers (PC)
  - Ideal for educational institutions, small businesses and individuals
  - Does not require PC to be used exclusively as Web server
- **Personal Web Manager**
  - Administration program for PWS
  - Place documents to be requested in default directory or virtual directory
    - Default: **C:\Inetpub\Wwwroot**
    - Virtual: alias for existing directory on local machine
- **Edit Directory**
  - **Directory** field
    - Enter directory path that contains Web documents
  - **Alias** field
    - Enter name to virtual directory
  - **Access** section
    - Select security level for virtual directory
    - **Read** allows users to read and download files
    - **Execute** allows applications to run in directory
    - **Scripts** allows scripts to run in directory

- **Read** and **Scripts** selected by default



Main

Publishing

Web publishing is on. Your home page is available at:

[illegible]

Click Stop to make the items on your site unavailable.

Your home directory C:\Inetpub\wwwroot

(To change published directories, click "Advanced" in the list on the left.)

Monitoring

Active connections: 0

Started at 4:05 PM on 5/17/01

Visitors: 1

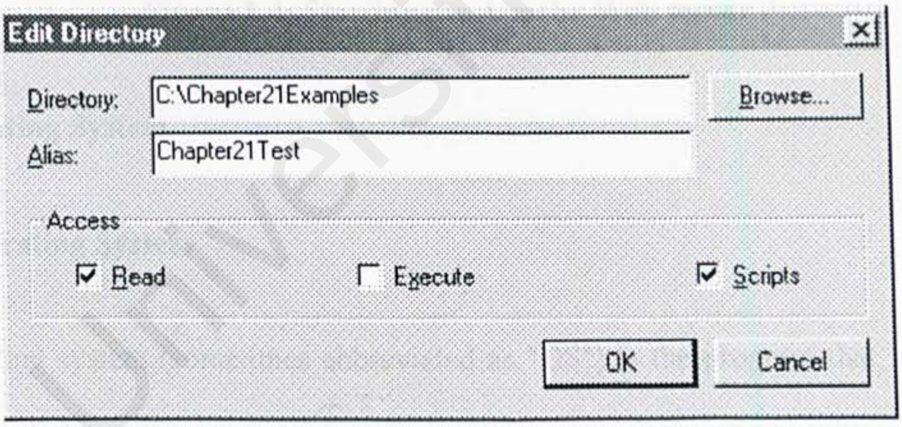
Requests: 93

Bytes served: 158940

Most concurrent connections: 2

View Statistics: Requests per Hour

Figure 2.2: Personal Web Manager dialog



Directory: C:\Chapter21Examples

Alias: Chapter21Test

Access

☑ Read

□ Execute

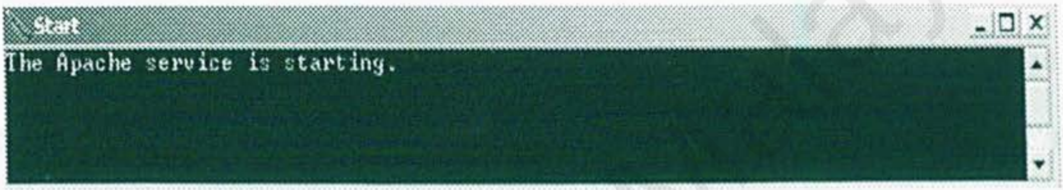
☑ Scripts

Figure 2.3: Creating a virtual directory in PWS in Edit Directory

2.2.2.3 Apache Web Server

- Maintained by Apache Software Foundation
- Currently most popular Web server
  - Stable
  - Efficient
  - Portable
- Successively select Start, Programs, Apache httpd Server, Control Apache Server and Start

O



```
The Apache service is starting.
```

Figure 2.4: Starting the Apache Web server

2.3 Operating System

2.3.1 Operating System

An operating system (sometimes abbreviated as "OS") is the program that, after being initially loaded into the computer by a boot program, manages all the other programs in a computer. The other programs are called applications or application programs. The application programs make use of the operating system by making requests for services through a defined application program interface (API). In addition, users can interact directly with the operating system through a user interface such as a command language or a graphical user interface (GUI).

In a multitasking operating system where multiple programs can be running at the same time, the operating system determines which applications should run in what order and how much time should be allowed for each application before giving another application a turn. It manages the sharing of internal memory among multiple applications. It handles input and output to and from attached hardware devices, such as hard disks, printers, and dial-up ports. It sends messages to each application or interactive user (or to a system operator) about the status of operation and any errors that may have occurred. It can offload the management of what are called batch jobs (for example, printing) so that the initiating application is freed from this work.

On computers that can provide parallel processing, an operating system can manage how to divide the program so that it runs on more than one processor at a time. All major computer platforms (hardware and software) require and sometimes include an operating system. Linux, Windows 2000, Windows 98 and Windows NT are all examples of operating systems.

2.3.1.1 Windows NT

Windows NT is a Microsoft Windows personal computer operating system designed for users and businesses needing advanced capability. NT's technology is the base for the Microsoft successor operating system, Windows 2000. Windows NT (which may originally have stood for "New Technology," although Microsoft doesn't say) is actually two products: Microsoft NT Workstation and Microsoft NT Server. The Workstation is designed for users, especially business users, who need faster performance and a system a little more fail-safe than Windows 95 and Windows 98. The Server is designed for business machines that need to provide services for network-attached computers. The Server is required, together with an Internet server such as Microsoft's Internet Information Server (IIS), for a Windows system that plans to serve Web pages.

Windows NT Workstation: Microsoft says that 32-bit applications run 20% faster on this system than on Windows 95 (assuming both have 32 megabytes of RAM). Since older 16-bit applications run in a separate address space, one can crash without crashing other applications or the operating system. Security and management features not available on Windows 95 are provided. The Workstation has the same desktop user interface as Windows 95.

Windows NT Server: The NT Server is probably the second most installed network server operating system after Novell's NetWare operating system. Microsoft claims that its NT servers are beginning to replace both NetWare and the various UNIX-based systems such as those of Sun Microsystems and Hewlett-Packard.

2.3.1.2 Windows 98

Windows 98 (called "Memphis" during development and previously called "Windows 97" based on an earlier schedule) is a widely-installed product in Microsoft's evolution of the Windows operating system for personal computers. Windows 98 expresses Microsoft's belief that users want and should have a global view of their potential resources and that Web technology should be an important part of the user interface. Although building Microsoft's own Web browser into the user desktop has been an issue in the U.S. Justice Department's suit, Windows 98 was released as planned with its tightly integrated browser.

In Windows 98, Microsoft's Internet Explorer is an integral part of the operating system. Using the Active Desktop of Windows 98, you can view and access desktop objects that reside on the World Wide Web as well as local files and applications. The Windows 98 desktop is, in fact, a Web page with HTML links and features that exploit Microsoft's ActiveX control.

With Windows 98 (or with Internet Explorer 4.0 in Windows 95), you can set up news and other content to be push technology to you from specified Web sites. Windows 98 also provides a 32-bit file allocation table (FAT) that allows you to have a single-partition disk drive larger than 2 Gbytes. Windows 98 is gradually being replaced by Windows 2000, an evolution of the Windows OS, that is designed for personal or small-office professional or business use.

2.3.1.3 Windows 2000

Windows 2000 (W2K) is a commercial version of Microsoft's evolving Windows operating system. Previously called Windows NT 5.0, Microsoft emphasizes that Windows 2000 is evolutionary and "Built on NT Technology." Windows 2000 is designed to appeal to small business and professional users as well as to the more technical and larger business market for which the NT was designed.

The Windows 2000 product line consists of four products:

Windows 2000 Professional, aimed at individuals and businesses of all sizes. It includes security and mobile use enhancements. It is the most economical choice.

Windows 2000 Server, aimed at small-to-medium size businesses. It can function as a Web server and/or a workgroup (or branch office) server. It can be part of a two-way symmetric multiprocessing system. NT 4.0 servers can be upgraded to this server.

Windows 2000 Advanced Server, aimed at being a network operating system server and/or an application server, including those involving large databases. This server facilitates clustering and load-balancing. NT 4.0 servers with up to eight-way SMP can upgrade to this product.

Windows 2000 Datacenter Server, designed for large data warehouses, online transaction processing (OLTP), econometric analysis, and other applications requiring high-speed computation and large databases. The Datacenter Server supports up to 16-way SMP and up to 64 gigabytes of physical memory.

Windows 2000 is reported to be more stable (less apt to crash) than Windows 98/NT systems. A significant new feature is Microsoft's Active Directory, which, among other capabilities, enables a company to set up virtual private networks, to encrypt data locally or on the network, and to give users access to shared files in a consistent way from any network computer

2.3.1.4 Linux

Linux (often pronounced LIH-nuhks with a short "i") is a UNIX-like operating system that was designed to provide personal computer users a free or very low-cost operating system comparable to traditional and usually more expensive UNIX systems. Linux has a reputation as a very efficient and fast-performing system. Linux's kernel (the central part of the operating system) was developed by Linus Torvalds at the University of Helsinki in Finland. To complete the operating system, Torvalds and other team members made use of system components developed by members of the Free Software Foundation for the GNU project.

Linux is a remarkably complete operating system, including a graphical user interface, an X Window System, TCP/IP, the Emacs editor, and other components usually found in a comprehensive UNIX system. Although copyrights are held by various creators of Linux's components, Linux is distributed using the Free Software Foundation's copyleft stipulations that mean any modified version that is redistributed must in turn be freely available.

Unlike Windows and other proprietary systems, Linux is publicly open and extendible by contributors. Because it conforms to the Portable Operating System Interface standard user and programming interfaces, developers can write programs that can be ported to other operating systems. Linux comes in versions for all the major microprocessor platforms including the Intel, PowerPC, Sparc, and Alpha platforms. It's also available on IBM's S/390. Linux is distributed commercially by a number of companies. A magazine, Linux Journal, is published as well as a number of books and pocket references.

Linux is sometimes suggested as a possible publicly-developed alternative to the desktop predominance of Microsoft Windows. Although Linux is popular among users already familiar with UNIX, it remains far behind Windows in numbers of users.

2.4 Database

A database is a collection of data that is organized so that its contents can easily be accessed, managed, and updated. The most prevalent type of database is the relational database, a tabular database in which data is defined so that it can be reorganized and accessed in a number of different ways. A distributed database is one that can be dispersed or replicated among different points in a network. An object-oriented programming database is one that is congruent with the data defined in object classes and subclasses.

Databases contain aggregations of data records or files, such as sales transactions, product catalogs and inventories, and customer profiles. Typically, a database manager provides users the capabilities of controlling read/write access, specifying report generation, and analyzing usage. Databases and database managers are prevalent in large mainframe systems, but are also present in smaller distributed workstation and mid-range systems such as the AS/400 and on personal computers. Structured Query Language is a standard language for making interactive queries from and updating a database such as Microsoft's Access, and database products from Oracle.

2.4.1 Microsoft Access

Using Microsoft Access, I can manage all my information from a single database file. Within the file, I can use:

- Tables to store your data.
- Queries to find and retrieve just the data you want.

- Forms to view, add, and update data in tables.
- Reports to analyze or print data in a specific layout.
- Data access pages to view, update, or analyze the database's data from the Internet or an intranet

2.4.2 Oracle

Oracle (in ancient Greece, someone in touch with the deities; from Latin, oraculum or divine announcement) says it is the world's leading supplier of software for information management but it is best known for its sophisticated relational database products (notably Oracle9i), which are used in Fortune 1000 corporations and by many of the largest Web sites. Oracle's relational database was the world's first to support the Structured Query Language (SQL), now an industry standard.

Oracle targets high-end workstations and minicomputers as the server platforms on which to run its database systems. Along with Sun Microsystems, Oracle has long been a champion of network computers. It now boasts that it was the world's first software company to develop and deploy 100 percent Internet-enabled enterprise software across its entire product line: database, server, enterprise business applications, and application development and decision support tools.

2.4.3 Microsoft SQL Server 2000

Microsoft SQL Server 2000 is a family of products that meet the data storage requirements of the largest data processing systems and commercial Web sites.

The features include:

- Internet Integration.
- Scalability and Availability.
- Enterprise-Level Database Features.
- Data warehousing.

2.4.4 MySQL

MySQL (pronounced "my ess cue el," not "my sequel") is an open source relational database management system (RDBMS) that uses Structured Query Language (SQL), the most popular language for adding, accessing, and processing data in a database. Because it is open source, anyone can download mySQL and tailor it to their needs in accordance with the general public license. MySQL is noted mainly for its speed, reliability, and flexibility. Most agree, however, that it works best when managing content and not executing transactions.

The mySQL relational database system was first released in January, 1998. It is fully multi-threaded using kernel threads, provides application program interfaces (APIs) for C, C++, Eiffel, Java, Perl, PHP, Python, and Tcl, allows for many column types, and offers full operator and function support in the SELECT and WHERE parts of queries.

The development team working on future releases of mySQL plan to unveil mySQL 4.0 in mid-2001. Its features will include a new table definition file format, enhanced replication, and more functions for a full-text search. Later, mySQL developers hope to add fail-safe replication, a port of mySQL to BeOS, and an option to periodically flush key pages for tables with delayed keys. Over time, MySQL plans to be fully ANSI 92/ANSI 99- compliant.

MySQL currently runs on the Linux, UNIX, and Windows platforms. Many Internet startups have been especially interested in mySQL as an alternative to the proprietary database systems from Oracle, IBM, and Informix. Yahoo's news site uses mySQL.

2.5 Web Management System

2.5.1 Web Markup Languages

2.5.1.1 HTML

HTML (Hypertext Markup Language) is the set of markup symbols or codes inserted in a file intended for display on a World Wide Web browser page. The markup tells the Web browser how to display a Web page's words and images for the user. Each individual markup code is referred to as an element (but many people also refer to it as a tag). Some elements come in pairs that indicate when some display effect is to begin and when it is to end.

HTML is a formal Recommendation by the World Wide Web Consortium (W3C) and is generally adhered to by the major browsers, Microsoft's Internet Explorer and Netscape's Navigator, which also provide some additional non-standard codes. The current version of HTML is HTML 4.0. However, both Internet Explorer and Netscape implement some features differently and provide non-standard extensions. Web developers using the more advanced features of HTML 4 may have to design pages for both browsers and send out the appropriate version to a user. Significant features in HTML 4 are sometimes described in general as dynamic HTML. What is sometimes referred to as HTML 5 is an extensible form of HTML called Extensible Hypertext Markup Language (XHTML).

2.5.1.2 DHTML

Dynamic HTML is a collective term for a combination of new Hypertext Markup Language (HTML) tags and options, that will let you create Web pages more animated and more responsive to user interaction than previous versions of HTML. Much of dynamic HTML is specified in HTML 4.0. Simple examples of dynamic HTML pages would include (1) having the color of a text heading change when a user passes a mouse over it or (2) allowing a user to "drag and drop" an image to another place on a Web page. Dynamic HTML can allow Web documents to look and act like desktop applications or multimedia productions.

The features that constitute dynamic HTML are included in Netscape Communications' latest Web browser, Navigator 4.0 (part of Netscape's Communicator suite), and by Microsoft's browser, Internet Explorer 4.0. While HTML 4.0 is supported by both Netscape and Microsoft browsers, some additional capabilities are supported by only one of the browsers. The biggest obstacle to the use of dynamic HTML is that, since many users are still using older browsers, a Web site must create two versions of each site and serve the pages appropriate to each user's browser version.

2.5.1.3 XML

XML (Extensible Markup Language) is a flexible way to create common information formats and share both the format and the data on the World Wide Web, intranets, and elsewhere. For example, computer makers might agree on a standard or common way to describe the information about a computer product (processor speed, memory size, and so forth) and then describe the product information format with XML. Such a standard way of describing data would enable a user to send an intelligent agent (a program) to each computer maker's Web site, gather data, and then make a valid comparison. XML can be used by any individual or group of individuals or companies that wants to share information in a consistent way.

XML, a formal recommendation from the World Wide Web Consortium (W3C), is similar to the language of today's Web pages, the Hypertext Markup Language (HTML). Both XML and HTML contain markup symbols to describe the contents of a page or file. HTML, however, describes the content of a Web page (mainly text and graphic images) only in terms of how it is to be displayed and interacted with. For example, the letter "p" placed within markup tags starts a new paragraph. XML describes the content in terms of what data is being described. For example, the word "phonenum" placed within markup tags could indicate that the data that followed was a phone number. This means that an XML file can be processed purely as data by a program or it can be stored with similar data on another computer or, like an HTML file, that it can be displayed. For example, depending on how the application in the receiving computer wanted to handle the phone number, it could be stored, displayed, or dialed.

XML is "extensible" because, unlike HTML, the markup symbols are unlimited and self-defining. XML is actually a simpler and easier-to-use subset of the Standard Generalized Markup Language (SGML), the standard for how to create a document structure. It is expected that HTML and XML will be used together in many Web applications. XML markup, for example, may appear within an HTML page.

Early applications of XML include Microsoft's Channel Definition Format (CDF), which describes a channel, a portion of a Web site that has been downloaded to your hard disk and is then is updated periodically as information changes. A specific CDF file contains data that specifies an initial Web page and how frequently it is updated. Another early application is ChartWare, which uses XML as a way to describe medical charts so that they can be shared by doctors. Applications related to banking, e-commerce ordering, personal preference profiles, purchase orders, litigation documents, part lists, and many others are anticipated.

2.5.1.4 CFML

CFML (ColdFusion Markup Language) is a Web page markup language that allows a Web site developer to create pages with variable information (text or graphics) that is filled in dynamically (on the fly) in response to variables such as user input. Along with the usual Hypertext Markup Language (HTML) tags that determine page layout and appearance, the page creator uses CFML tags to bring in content based on the results of a database query or user input. CMFL is a proprietary language developed for use with ColdFusion, a product from Allaire.

CFML tags perform all server-side tasks (such as database queries) by condensing complex processes, that would normally require knowledge of programming languages such as Java or C++, into four basic tags: CFQUERY, which is used to submit a structured query language (SQL) request to the database; CFOUTPUT, which is used to display the result of a query; and CFTABLE or CFCOL, which are used to display a preformatted table containing the results of a set of queries. Files created with CFML are saved as ColdFusion templates and use a ".cfm" extension.

2.5.2 Web Technologies

2.5.2.1 Active Server Pages 3.0 (ASP)

With the release of Windows 2000, Active Server Pages 3 was available. Performance was increased considerably by the addition of a step in the execution of the pages that checked for a previously cached version of the compiled page, and the compiler checking for script elements rather than always processing the page line by line. The Windows 2000 operating system and features in IIS5 that included the option to selectively separate out Web applications and processes addressed stability issues. Functionally, it did not have many revolutionary additions (perhaps they were waiting for .NET, which was already on the drawing board at Microsoft), but developers did get several features they had been asking for, such as server-side redirects to replace the Hypertext Transfer Protocol (HTTP)-header client-side implementation, better error handling, and dynamic includes.

2.5.2.2 PHP

In Web programming, PHP is a script language and interpreter that is freely available and used primarily on Linux Web servers. PHP, originally derived from Personal Home Page Tools, now stands for PHP: Hypertext Preprocessor, which the PHP FAQ describes as a "recursive acronym."

PHP is an alternative to Microsoft's Active Server Page (ASP) technology. As with ASP, the PHP script is embedded within a Web page along with its HTML. Before the page is sent to a user that has requested it, the Web server calls PHP to interpret and perform the operations called for in the PHP script.

An HTML page that includes a PHP script is typically given a file name suffix of ".php" ".php3," or ".phtml". Like ASP, PHP can be thought of as "dynamic HTML pages," since content will vary based on the results of interpreting the script. PHP is free and offered under an open source license.

2.5.2.3 ColdFusion

ColdFusion, developed by Allaire which has recently merged with Macromedia, is a popular and sophisticated set of products for building Web sites and serving pages to users. With ColdFusion, a company can build a content database using input templates and combine these with application programs to create a Web site in which pages are developed dynamically as they are served. ColdFusion consists of ColdFusion Studio, which is used to build a site, and ColdFusion Server, which serves the pages to users. ColdFusion Studio is described as "a complete integrated development environment (IDE)" and ColdFusion Server as "a deployment platform."

The most valuable feature for many companies that use ColdFusion is the ability to build Web sites as "piece parts" that can be stored in a database and then reassembled for Web pages, e-mail newsletters, and other uses. ColdFusion provides a visual interface for building Web pages directly or for building the "piece parts." For example, a newspaper with a Web site can have a reporter enter a story, dateline, author, and other information, using a text entry form free of all Web page formatting and structure details or language tags. (The newspaper uses ColdFusion to design the forms and to define the database.) The content entered by the reporter is later gathered and formatted into a Web page when it is requested. The reporter is free from having to understand HTML and other details. ColdFusion is also a popular tool for building e-commerce sites.

ColdFusion has its own page markup language, called ColdFusion Markup Language (CFML). CFML encompasses the Web's Hypertext Markup Language (HTML) and Extensible Markup Language (XML). A just-in-time (JIT) compiler turns the CFML into the pages that get served. Allaire emphasizes that their product set is open and "extensible". Applications can access databases using Microsoft's OLE DB, Open Database Connectivity (ODBC), or drivers that access Oracle and Sybase databases. ColdFusion can be coordinated with distributed applications that use Common Object Request Broker Architecture (CORBA) or Microsoft's Distributed Component Object Model (DCOM) to interact with other network applications.

Allaire also says that ColdFusion is scalable, allowing both the size of a database and the number of users that can be served to grow. For large Web sites, multiple ColdFusion servers can be run together as a cluster.

2.5.2.4 CGI

The common gateway interface (CGI) is a standard way for a Web server to pass a Web user's request to an application program and to receive data back to forward to the user. When the user requests a Web page (for example, by clicking on a highlighted word or entering a Web site address), the server sends back the requested page. However, when a user fills out a form on a Web page and sends it in, it usually needs to be processed by an application program. The Web server typically passes the form information to a small application program that processes the data and may send back a confirmation message. This method or convention for passing data back and forth between the server and the application is called the common gateway interface (CGI). It is part of the Web's Hypertext Transfer Protocol (HTTP).

If a Web site is created and a CGI application is wanted to get control, the name of the application can be specified in the uniform resource locator (URL) that is coded in an HTML file. This URL can be specified as part of the FORMS tags if a form is being created.

The common gateway interface provides a consistent way for data to be passed from the user's request to the application program and back to the user. This means that the person who writes the application program can makes sure it gets used no matter which operating system the server uses (PC, Macintosh, UNIX, OS/390, or others). It's simply a basic way for information to be passed from the Web server about your request to the application program and back again.

Because the interface is consistent, a programmer can write a CGI application in a number of different languages. The most popular languages for CGI applications are: C, C++, Java, and Perl.

An alternative to a CGI application is Microsoft's Active Server Page (ASP), in which a script embedded in a Web page is executed at the server before the page is sent.

2.5.2.5 ASP.NET

ASP+ (also called ASP.NET), is the next generation of Microsoft's Active Server Page (ASP), a feature of their Internet Information Server (IIS).ASP+ allow a Web site builder to dynamically build Web pages on the fly by inserting queries to a relational database in the Web page. ASP+ is different than its predecessor in two major ways: it supports code written in compiled languages such as Visual Basic, C++, C#, and Perl, and it features server controls that can separate the code from the content, allowing WYSIWYG editing of pages. Although ASP+ is not backwards compatible with ASP, it is able to run side by side with ASP applications. ASP+ files can be recognized by their .aspx extension.

2.5.3 Web Application Development Tools

2.5.3.1 Microsoft Visual Interdev 6.0

Visual InterDev is Microsoft's development tool for building a dynamic, data-driven Web site. Whereas Microsoft's FrontPage is an HTML editor aimed at letting non-programmers build the pages for a Web site, Visual InterDev provides the tools for programmers to build a Web site. (FrontPage and Visual InterDev are said to be compatible.) Visual InterDev offers a user interface similar to those for Visual Basic, Visual J++, and Visual Studio. Using Visual InterDev, one can assemble pages that use Microsoft's ActiveX technologies, including Active Server Page (ASP) technology. The developer can build and insert ActiveX control or Java applets. Visual InterDev includes an HTML editor and support for dynamic HTML. The Web site can be integrated with server programs written in any language and access to almost any database using

Microsoft's Universal Data Access, including ActiveX Data Objects, Open Database Connectivity, and OLE DB.

2.5.3.2 Microsoft Visual Studio.NET

Visual Studio .NET is a complete set of development tools for building ASP Web applications, XML Web services, desktop applications, and mobile applications. Visual Basic .NET, Visual C++ .NET, and Visual C# .NET all use the same integrated development environment (IDE), which allows them to share tools and facilitates in the creation of mixed-language solutions. In addition, these languages leverage the functionality of the .NET Framework, which provides access to key technologies that simplify the development of ASP Web applications and XML Web services.

2.5.4 Scripting Languages

2.5.4.1 VBScript

VBScript is an interpreted script language from Microsoft that is a subset of its Visual Basic programming language designed for interpretation by Web browsers. VBScript can be compared to other script languages that can be used on the Web, including Netscape's JavaScript, Sun Microsystem's Tcl, The UNIX-derived Perl and IBM's Rexx.

In general, script languages are easier and faster to code in than the more structured, compiled languages such as C and C++ and are ideal for smaller programs of limited capability or that can reuse and tie together existing compiled programs.

VBScript is Microsoft's answer to Netscape's popular JavaScript. Both are designed to work with an interpreter that comes with a Web browser - that is, at the user or client end of the Web client/server session. VBScript is designed for use with Microsoft's Internet Explorer browser together with other programming that can be run at the client, including ActiveX controls, automation servers, and Java applets. Although Microsoft does support Netscape's JavaScript (it converts it into its own JScript), Netscape does not support VBScript. For this reason, VBScript is best used for intranet Web sites that use the Internet Explorer browser only.

2.5.4.2 JavaScript

JavaScript is an interpreted programming or script language from Netscape. It is somewhat similar in capability to Microsoft's Visual Basic, Sun's Tcl, the UNIX-derived Perl, and IBM's REX. In general, script languages are easier and faster to code in than the more structured and compiled languages such as C and C++. Script languages generally take longer to process than compiled languages, but are very useful for shorter programs.

JavaScript is used in Web site development to do such things as automatically change a formatted date on a Web page, cause a linked-to page to appear in a popup window, cause text or a graphic image to change during a mouse rollover.

JavaScript uses some of the same ideas found in Java, the compiled object-oriented programming derived from C++. JavaScript code can be embedded in HTML pages and interpreted by the Web browser (or client). JavaScript can also be run at the server as in

Microsoft's Active Server Pages before the page is sent to the requestor. Both Microsoft and Netscape browsers support JavaScript, but sometimes in slightly different ways

2.5.5 Browsers

2.5.5.1 Internet Explorer

Microsoft Internet Explorer (MSIE) is the most widely used World Wide Web browser. It comes with the Microsoft Windows operating system and can also be downloaded from Microsoft's Web site. The MSIE browser competes with an earlier browser, Netscape Navigator.

.2.5.5.2 Netscape

Netscape, now part of America Online (AOL), is one of the two most popular Web browsers. Currently, almost all Internet users use either Microsoft's Internet Explorer (MSIE) browser or Netscape, and many users use both. Although Netscape was initially the predominant product in terms of usability and number of users, Microsoft's browser is generally considered superior by many users (although many other users see them as roughly equivalent) and has taken a significant lead in usage.

Netscape's browser originally was called "Navigator," and is still called that in the suite of software, Communicator, of which it is now a part. Navigator was developed in 1995 by a team led by Marc Andreessen, who created Mosaic, the first Web browser that had a graphical user interface, at the University of Illinois' National Center for Supercomputing Applications (NCSA) in 1993.

The latest version of the Netscape browser or the complete Communicator suite can be downloaded from Netscape's Web site at no charge. CD-ROM versions can also be purchased in computer stores and are sometimes distributed freely as promotions.

AOL envisions the Netscape Web site, now transformed into a leading Web portal, as a leading source of revenue through advertising and e-commerce.

2.5.5.3 Opera

Opera is a Web browser that provides some advantages over the two most popular browsers from Netscape and Microsoft. Much smaller in size, Opera is known for being fast and stable. Opera, which is available for BeOS, EPOC, Linux, Mac, OS/2 and Windows, offers the same capabilities of the more popular browsers including integrated searches and Instant Messaging, support for JavaScript, cascading style sheets, and mail. Because Opera is so compact, it is being promoted as the browser of choice for hand-held Internet devices.

Opera for Windows is now free; there is still a purchase fee for other platforms. The free version of Opera contains ads, which are cached weekly to insure Opera's fast speed is maintained. The other versions of Opera do not have ads, which is why Opera charges a modest one-time license fee.

The feature you notice first after installing Opera is a menu or "hotlist" that serves as both a directory to the Web and a bookmark file. The hotlist can be easily removed and you can use the full viewing space to look at multiple Web sites at the same time, either tiling or cascading the windows. You can choose to have the sites you were last looking at restored the next time you open the Opera browser. Opera offers keyboard as well as mouse control of its features. Plug-ins such as RealAudio, RealVideo, and Shockwave can be added. Opera does not support Active-X or Visual Basic.

Opera began in 1994 as a research project for the national phone company in Norway and is now considered to be the third most popular Web browser in use today.

2.6 Conclusion

In this chapter, a complete literature review had been carried out. As a result, it may identify the most compatible tools or methods to be used during the development phase. Besides, all the possibility and consideration also must be taken into account during the analysis phase for the project development.

3.0 Introduction

First I would like to write an overview of the more common system development *Process Models*, used to guide the analysis, design, development, and maintenance of information and web development systems. There are many different methods and techniques used to direct the life cycle of a web development project and most real-world models are customized adaptations of the generic models. While each is designed for a specific purpose or reason, most have similar goals and share many common tasks. I will explore the similarities and differences among these various models and will also discuss how different approaches are chosen and combined to address practical situations.

What are the typical tasks in the Development Process Life Cycle? Professional system developers and the customers share a common goal of building information systems that effectively support business process objectives. In order to ensure cost-effectiveness, quality systems are developed which address an organization's business needs, developers employ some kind of system development *Process Model* to direct the project's lifecycle. Typical activities performed include the following:

- o System conceptualization
- o System requirements and benefits analysis
- o Project adoption and project scoping
- o System design
- o Unit development
- o System integration & testing

- Installation at site
- Site testing and acceptance
- Training and documentation
- Implementation
- Maintenance

What are the process model/life-cycle variations? While nearly all system development efforts engage in some combination of the above tasks, they can be differentiated by the *feedback* and *control methods* employed during development and the *timing of activities*. Most system development *Process Models* in use today have evolved from three primary approaches: *Ad-hoc Developmen*t, *Waterfall Mode*l, and the *Iterative* process.

3.1 Waterfall Model

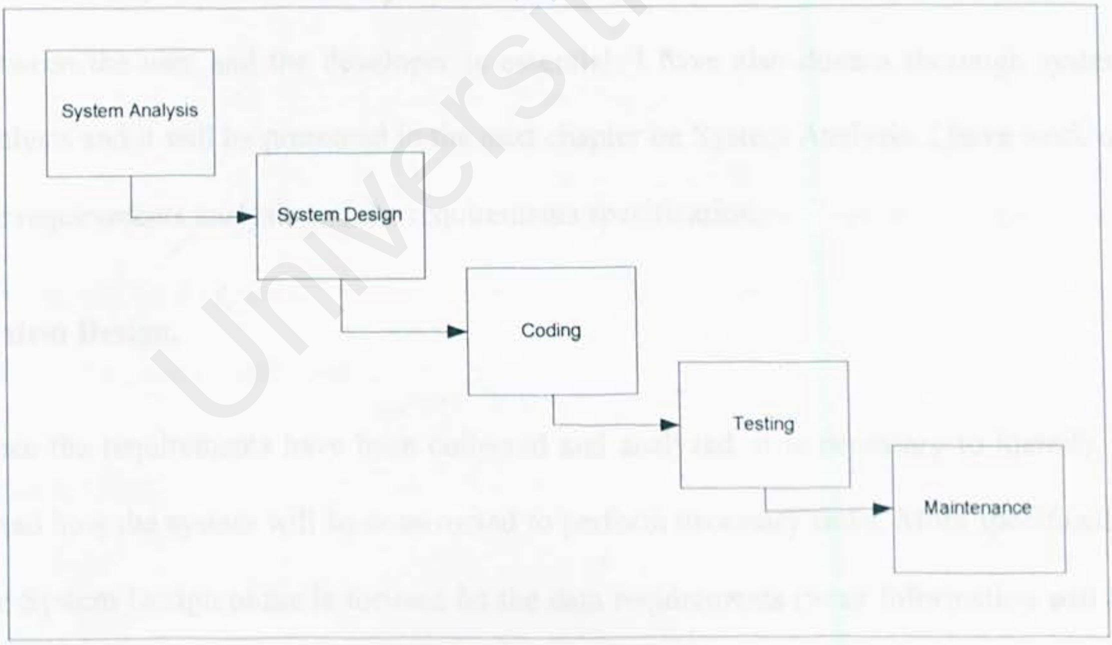


Figure 3.1: The waterfall model

The *Waterfall Model* consists of the following steps:

System Conceptualization.

System Conceptualization refers to the consideration of all aspects of the targeted business function or process, with the goals of determining how each of those aspects relates with one another, and which aspects will be incorporated into the system. As you have read my first chapter on the general objectives, goals and scope of my project I have actually, under careful analysis and thorough research, conceptualize the system I am developing.

Systems Analysis.

This step refers to the gathering of system requirements, with the goal of determining how these requirements will be accommodated in the system. Extensive communication between the user and the developer is essential. I have also done a thorough system analysis and it will be presented in the next chapter on System Analysis. I have work on the requirements analysis and the requirements specification.

System Design.

Once the requirements have been collected and analyzed, it is necessary to identify in detail how the system will be constructed to perform necessary tasks. More specifically, the System Design phase is focused on the data requirements (what information will be processed in the system?), the software construction (how will the application be constructed?), and the interface construction (what will the system look like? What standards will be followed?). This will be presented in my fifth Chapter on System Design.

Coding.

Also known as programming, this step involves the creation of the system development. Requirements and systems specifications from the System Design step are translated into machine readable computer code using various programming tools and methodologies. This will be presented in my sixth chapter on System Development and Implementation.

Testing.

As the system is created and added to the developing system, testing is performed to ensure that it is working correctly and efficiently. Testing is generally focused on two areas: internal efficiency and external effectiveness. The goal of external effectiveness testing is to verify that the system is functioning according to system design, and that it is performing all necessary functions or sub-functions. The goal of internal testing is to make sure that the computer code is efficient, standardized, and well documented. Testing can be a labor-intensive process, due to its iterative nature. This will be further presented in my seventh chapter on System Testing.

Maintenance

Always the system is subject to change upon implementation and therefore, extensive corrective maintenance (corrections of the errors) and perfective maintenance (implementation of certain aspects of system behaviour) and adaptive maintenance (accomodation of changing requirements) is to be performed.

3.2 Why Waterfall Model?

So why do I choose Waterfall Model anyway?

The main reasons are as specified below;

- The *Waterfall Model* is the earliest method of structured system development. Although it has come under attack in recent years for being too rigid and unrealistic when it comes to quickly meeting customer's needs, the *Waterfall Model* is still widely used. It is attributed with providing the theoretical basis for other *Process Models*, because it most closely resembles a "generic" model for software and web development.
- Discourages jumping ahead due to its sequential and linear methodology
- Emphasizes comprehensive planning and good requirements analysis and requirements specifications.
- Measurable objectives
  - Can be used for planning future projects for example I can also plan future enhancements to my project scope.
- For small scale project
  - Based on my project scope, it would require shorter time from requirements to product completion
- When a clear cut goal of the product is reached before the process begins

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- For small scale project
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- When a clear cut goal of the product is reached before the process begins

- Requirements less likely to change, for example in my project, I have defined all the requirements specification(in the upcoming section) and I do not foresee any changes to occur until the final product is implemented.

Besides the above reasons, to further justify my option of adopting the Waterfall model in my project, I would like to highlight the disadvantages of using the other process models;

3.2.1 Problems/Challenges associated with the Iterative Model

- The user community needs to be actively involved throughout the project. While this involvement is a positive for the project, it is demanding on the time of the staff and can add project delay.
- Communication and coordination skills take center stage in project development.
- Informal requests for improvement after each phase may lead to confusion -- a controlled mechanism for handling substantive requests needs to be developed.
- The *Iterative Model* can lead to "scope creep," since user feedback following each phase may lead to increased customer demands. As users see the system develop, they may realize the potential of other system capabilities which would enhance their work.

3.2.2 Problems/Challenges associated with the Prototyping Model

Criticisms of the *Prototyping Model* generally fall into the following categories:

- **Prototyping can lead to false expectations.** *Prototyping* often creates a situation where the user mistakenly believes that the system is "finished" when in fact it is not. More specifically, when using the *Prototyping Mode*l, the pre-implementation versions of a system are really nothing more than one-dimensional structures. The necessary, behind-the-scenes work such as database normalization, documentation, testing, and reviews for efficiency have not been done. Thus the necessary underpinnings for the system are not in place.
- **Prototyping can lead to poorly designed systems.** Because the primary goal of *Prototyping* is rapid development, the design of the system can sometimes suffer because the system is built in a series of "layers" without a global consideration of the integration of all other components. While initial software development is often built to be a "throwaway, " attempting to retroactively produce a solid system design can sometimes be problematic.

3.2.3 Problems/Challenges associated with the Exploratory Model

There are numerous criticisms of the *Exploratory Mode*l:

- It is limited to use with very high-level languages that allow for rapid development, such as LISP.
- It is difficult to measure or predict its cost-effectiveness.

- As with the *Prototyping Model*, the use of the *Exploratory Model* often yields inefficient or crudely designed systems, since no forethought is given as to how to produce a streamlined system.

3.2.4 Problems/Challenges associated with the Spiral Model

Due to the relative newness of the *Spiral Model*, it is difficult to assess its strengths and weaknesses. However, the risk assessment component of the *Spiral Model* provides both developers and customers with a measuring tool that earlier *Process Model*s do not have. The measurement of risk is a feature that occurs everyday in real-life situations, but (unfortunately) not as often in the system development industry. The practical nature of this tool helps to make the *Spiral Model* a more realistic *Process Model* than some of its predecessors.

3.2.5 Problems/Challenges Associated with the Reuse Model

A general criticism of the *Reuse Model* is that it is limited for use in object-oriented development environments. Although this environment is rapidly growing in popularity, it is currently used in only a minority of system development applications.

3.3 Conclusion

Therefore under careful planning and the adoption of the well structured Waterfall Model, it is hoped that my project will complete in time for presentation in the coming months. At the beginning of most projects there is often a great deal of uncertainty about requirements and goals, and it is therefore difficult for me to identify these criteria on a detailed level. Therefore I have done a thorough research in the system analysis stage to define and analyze the system requirements and my project scope to avoid any uncertainty in the project. No doubt, real projects rarely follow the sequential flow that the model proposes but as you can see from the project schedule and planning I have structured in the first chapter, I truly believe that I am on track now and hopefully I will be on track too in the coming stages of my project development.

4.0 Introduction

In order to get an overview of the system requirements of E-Community system, an extensive analysis is needed. This analysis intends to ascertain the functional and non-functional requirements of E-Community system. This phase is the heart of a system development. The purpose of the requirements determination phase is part of system analysis and is to learn exactly what takes place in the current system, to determine and fully document in detail what should take place, and to make recommendations to management on the alternative solutions and their costs. Through the process of fact-finding or requirements determination, I must first define all the functions performed by the current information system. At the same time, I must determine what modifications are needed in the improved version. This analysis also brings out consideration of the development tools to be used, which I will further elaborate in the next section.

4.1 Web Technologies and Development Tools Analysis

After doing a thorough survey on development tools that has been discussed in Chapter 2(Literature Review), a most suitable tool for the system has been decided. These tools include the Operating System, Web Server, Database system, Web application programming language and Web application development tools.

4.1.1 Operating System

- Why I choose Windows 2000 Professional?
  - With Windows 2000 Professional, I can have faster access to information, and able to accomplish tasks more quickly and easily.
  - Windows 2000 Professional makes it easier to:
    - Work with files.
    - Find information.
    - Personalize your computing environment.
    - Work on the Web.
    - Work remotely.
  - For all the computing needs, Windows 2000 Professional provides:
    - Industrial-strength reliability.
    - The highest level of security.
    - Powerful performance

4.1.2 Web Server

- Why I choose Microsoft Internet Information Services as my Web Server?
  - Now I can restart your Internet services without having to reboot your computer.
  - IIS is fully integrated with the Kerberos v5 authentication protocol implemented in Microsoft Windows 2000, allowing you to pass authentication credentials among connected computers running Windows

- I can back up and save my metabase settings to make it easy to return to a safe, known state.
- I can set permissions for Read, Write, Execute, Script, and FrontPage Web operations at the site, directory, or file level.
- IIS 5.0 includes a simplified administration tool called Personal Web Manager (PWM). This tool can help me to administer and monitor my personal publishing site.
- Real-time graphs that display site traffic statistics, such as requests per day, requests per hour, visitors per day, and visitors per hour.
- Full support for Active Server Pages, including performance-enhanced ASP components and new error-handling functionality.
- Administration tools for IIS use the Microsoft® Management Console (MMC). MMC hosts the programs, called snap-ins, that administrators use to manage their servers. I can use IIS snap-in from a computer running Windows 2000 Professional to administer a computer on your intranet running Internet Information Services on Windows 2000 Server.
- IIS 5.0 offers greater protection and increased reliability for my Web applications. By default, IIS will run all of my applications in a common or *pooled* process that is separate from core IIS processes. In addition, you can still isolate mission-critical applications that should be run outside of both core IIS and pooled processes.

- In IIS 5.0, administrators and application developers will have the ability to add custom objects, properties, and methods to the existing ADSI provider, giving administrators even more flexibility in configuring their sites.
- Microsoft Internet Information Services 5.0 complies with the HTTP 1.1 standard, including features such as PUT and DELETE, the ability to customize HTTP error messages, and support for custom HTTP headers.
- Enables remote authors to create, move, or delete files, file properties, directories, and directory properties on your server over an HTTP connection.

4.1.3 Database System

- Why I choose Microsoft Access as my database server?

In addition to being the standard technology for interchanging data on the Web, Extensible Markup Language (XML) is quickly becoming the preferred technology for exchanging data between business software applications. Microsoft Access 2002 provides powerful, intuitive ways of sharing XML data regardless of differences in the platform, data format, protocol, schema, or business rules. By using Access' familiar user interface, I can easily create XML data or schema documents from Jet or SQL Server structures and data. I can also use XML data from other applications in my forms, reports and data access pages. For example, suppose the data is scattered across a wide variety of sources — internal SQL servers, Excel spreadsheets, and other data providers like SAP. Since these sources use XML as their data interchange format, I could create a series of aggregation queries in Access to pull this data into views and then design forms and reports by using those views.

Access also provides methods for easily controlling the data by making it simple to create and apply schemas and style sheets. Access allows me to easily describe and deliver rich, structured XML data to and from any application in a standard, consistent way. For example, I can use Access to create a schema that describes the structure of the data and then send the schema to the vendors so that they know exactly how to expect the data to appear in their invoices. Access is also known for its portability, extensiveness and usability.

4.1.4 Web Application Programming Language

❖ Why I choose Visual C# as my web application programming language?

C# is a simple but powerful programming language intended for writing enterprise applications. The C# language is an evolution of C and C++. It uses many C++ features in the areas of statements, expressions, and operators. C# introduces considerable improvement and innovations in areas such as type safety, versioning, events, and garbage collection. C# provides access to the common API styles: .NET Framework, COM, Automation, and C-style APIs. It also supports unsafe mode, where I can use pointers to manipulate memory that is not under the control of the garbage collector.

4.1.5 Web Application Development Tools

- ❖ Why I choose Microsoft Visual Studio.NET as my development tool and framework?
  - o Rather than just being ASP 4 or an incremental upgrade, ASP.NET is a complete rewrite from the ground up, using all the advanced features .NET makes available.
  - o ASP.NET can take advantage of all that .NET has to offer, including support for around 20 or more .NET languages from C# to Perl.NET, and the full set of .NET Framework software libraries.
  - o Web applications written in ASP.NET are fast, efficient, manageable, scalable, and flexible, but, above all, easy to understand and to code
  - o With ASP.NET I now have a true choice of languages. All the .NET languages have access to the same foundation class libraries, the same type of systems, equal object orientation and inheritance abilities, and full interoperability with existing COM components.
  - o An ASP.NET programmer still only needs a computer with Notepad and the ability to FTP to write ASP code, but now with the .NET Framework command-line tools and the platform's XML-based configuration, this is truer than before!
  - o A .NET developer is shielded from changes in the underlying operating system and API, as the .NET technologies deal with how your code is implemented; and with the Common Type System, I don't have to worry

whether the component I am building uses a different implementation of a string or integer to the language it will be used in.

4.2 Requirement Analysis

In this phase, upon obtaining the facts of the system, I must then analyze and evaluate them in a systematic fashion in order to develop alternative plans to resolve the problems found in the current system. So why do I have to put lots of emphasis on requirement analysis? The one and only reason is to *avoid project failure*. Sounds scary! But it is true. Therefore, it is very important to do a requirement analysis on the project before I can start design my project. In the next section therefore I'll be exploring and investigating the functional and non-functional requirements, and also hardware/software requirements of my proposed E-Community.

4.2.1 Functional Requirements

Functional requirement describes an interaction between the system and its environment. Since the requirement describes a system's behavior, hence the functional requirement also explains how the system should behave given certain stimuli. In short, the functional requirement may explicitly state what the system should do. The functional requirements of the E-Community system are as specified below;

- My E-Community project is going to be a great place for online interaction and events organization.

- E-Community is going to be place for ongoing discussions and the events module is not explicitly focused but it is definitely wide-ranging and they can be initiated by the host or by the members.
- The Events and Discussion modules are also definitely intellectual and can also be of social characteristics, sensitive or even controversial ones with the exception of extreme ones.
- For security purposes it is also a functional requirement to assign access and security rights to different levels of users by means of having the user logins and passwords and this will help in managing the website, making the site safer and assuring privacy to all members.
- Members can post links data to the links module to be viewed by other visitors upon successful logins
- Links information may contain the links URL and description fields
- Members can post classifieds data to the classifieds module to be viewed by other visitors upon successful logins.
- Members can also participate in threaded conversations by posting messages to the discussion module
- Messages may be edited or deleted by their author himself or the administrator.
- Members can post events data to the events module to be viewed by other visitors upon successful logins
- Event information may contain the event name, date and description fields as well as location.

- A sign up module is to allow user to sign up as a new member of E-Community system. Users need to fill up some information on a web form to request for a username and password which will be used in authentication and authorization process.

.2.2 Non-Functional Requirements

Jon-Functional requirements will define the constraints imposed on the E-Community ystem and restrictions on the designers of E-Community. It will also include the system roperties such as response time and the memory requirements and so on. Besides, it vill also specify the products process standards, which must be followed. The non-unctional requirements of the E-Community system are as specified below;

- *Flexibility* – The system should have the capability to take advantage of new technologies and resources.
- *Reliability* – Reliability is referred to the expectation of a system to perform its intended function accurately. Thus, the system should be reliable in performing its functions and operations.
- *User Friendliness* – The system should be able to build a flow of navigation that helps users in navigating to related URL with little efforts through hyperlinks and procedure steps. User interface should be user friendly to enhance the interaction between the users of the system.
- *Response Time* – In order to provide an efficient E-Community system, it should provide a fast response times to users.

- *Robustness* – Robustness is referred to the ability of E-Community to continue operation in spite of unexpected problems.
- *Usability* – The system should be developed in such a way that it is easy to use. It will enhance and support rather than limit or restrict the office processes. Interfaces must be self explanatory and consistent with other application in the environment.
- *Modularity* – Key factor in producing a good program. The system is broken into sections or modules so that functions of objects could be distinct from one another. This characteristic eases the testing and maintenance. In the system design, modularity of program sections is applied from the very beginning because this will lead to easy modification and enhancements in the future.
- *Manageability* – The sections within the system should be easy to handle to ensure the maintenance can be done regularly. Besides, evolutionary of the system will be done easily.

4.2.3 Hardware/Software Requirements

Table 4.1: Hardware and Software Requirements of E-Community System

	Server Requirement	**Client Requirement**
Hardware Requirement	▪ Pentium or AMD with 600 MHz and above computer ▪ At least 256 MB of RAM ▪ Minimum 5 GB Hard disk (depending on the number of users) ▪ Network Connection with recommended bandwidth of 10Mbps or more ▪ Standard input and output devices	▪ Pentium or AMD with 133 MHz and above computer ▪ At least 32 MB of RAM ▪ Standard input and output devices
Software Requirement	▪ Windows 2000 Professional ▪ IIS 5.0 ▪ Microsoft Access 2000	▪ Any platform with Graphical User Interface ▪ Internet Explorer 5.0 and above

4.3 Conclusion

This chapter includes all the analysis done on the functional and non-functional requirements, also hardware/software requirements for E-Community and also the web technologies and development tools analysis. The requirement specification and analysis phase give more precise description of the functionality and the constraints on the system after feasibility studies on the overall available technologies. It is an important phase to ensure that the project will meet the real requirement of the project and to reduce the misunderstanding and misinterpretation of the whole system.

5.0 Introduction

A good system design should make for easy development of a project. A poor system design can result in frustration both on behalf of the developers and the users. It is imperative to consider the 'big picture' before starting on the project. System Design is a plan to build a system that meets the requirements and to ultimately achieve the system's goals and objectives. Good design is the key to successful project. This is a stage in the system development process where the requirements for the system are translated into the system characteristics.

5.1 Architecture Design

In this stage, the subsystem making up the system and their relationships is identified and documented. E-Community system is designed to leverage the client/server architecture and extends it to the web. This large system is decomposed into subsystem that provide some related set of facilities. Thus, architecture design is the initial design process of identifying these subsystems and establishing a framework for the subsystem control and communications. As part of the architectural design process, some of the activities such as system structuring are usually necessary.

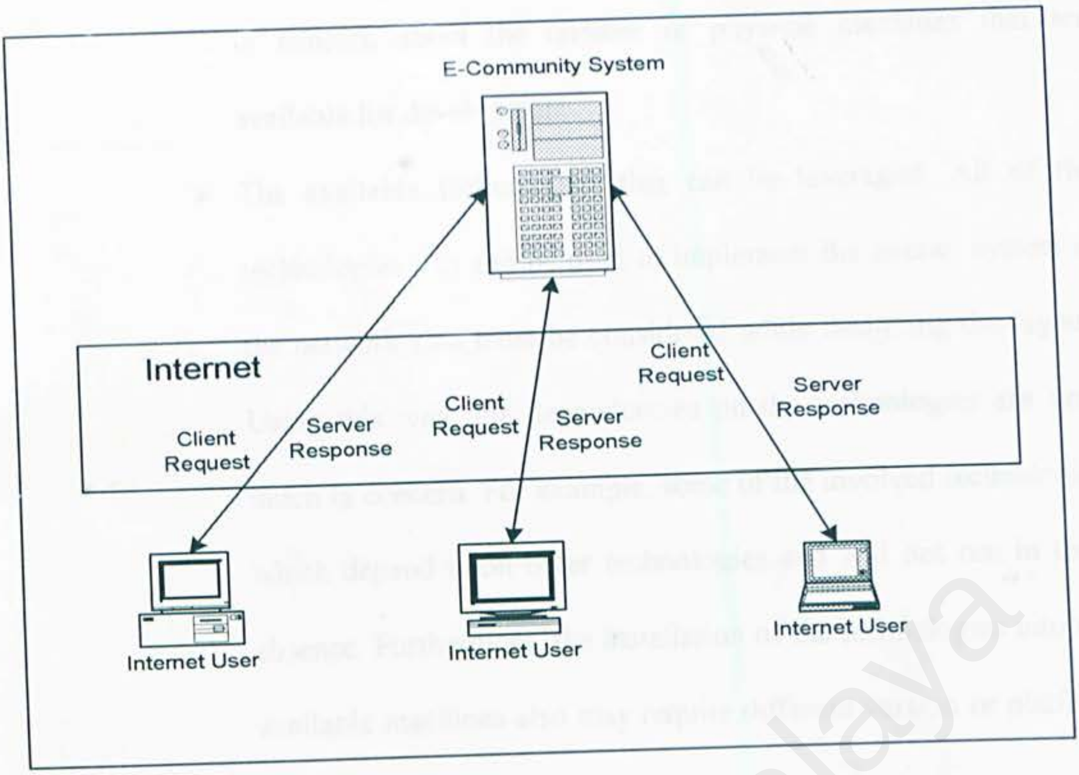


Figure 5.1: Overview of E-Community System Architecture

5.2 Network Setup Design

For the network setup designing, these are a few consideration need to be taken into account;

- the ability of the network setup to suit or conform to the overall environment architecture that is going to be used.
- The availability of hardware resource and current network layout. The issue of the capability of each available machine must be brought into consideration. It includes the machine's processing power, storage space, and working memory. Besides, it also needs

to concern about the number of physical machines that are available for development.

- The available technologies that can be leveraged. All of the technologies that can be used to implement the overall system in the network also must be considered while designing the layout. Using this way, the dependencies on the technologies are very much in concern. For example, some of the involved technologies which depend upon other technologies and will not run in their absence. Furthermore, the installation of the technologies into the available machines also may require different version or platform type.
- Time and effort for design implementation. Amount of time and effort required to implement the network layout also must be taken into consideration. It may save a lot of effort to incorporate the machines that have the required software already installed in the design of the layout. Using this way, more concerns will be put into the other important aspects of the system.

After considering all the above specified points, the network layout of E-Community system is best described in the figure below;

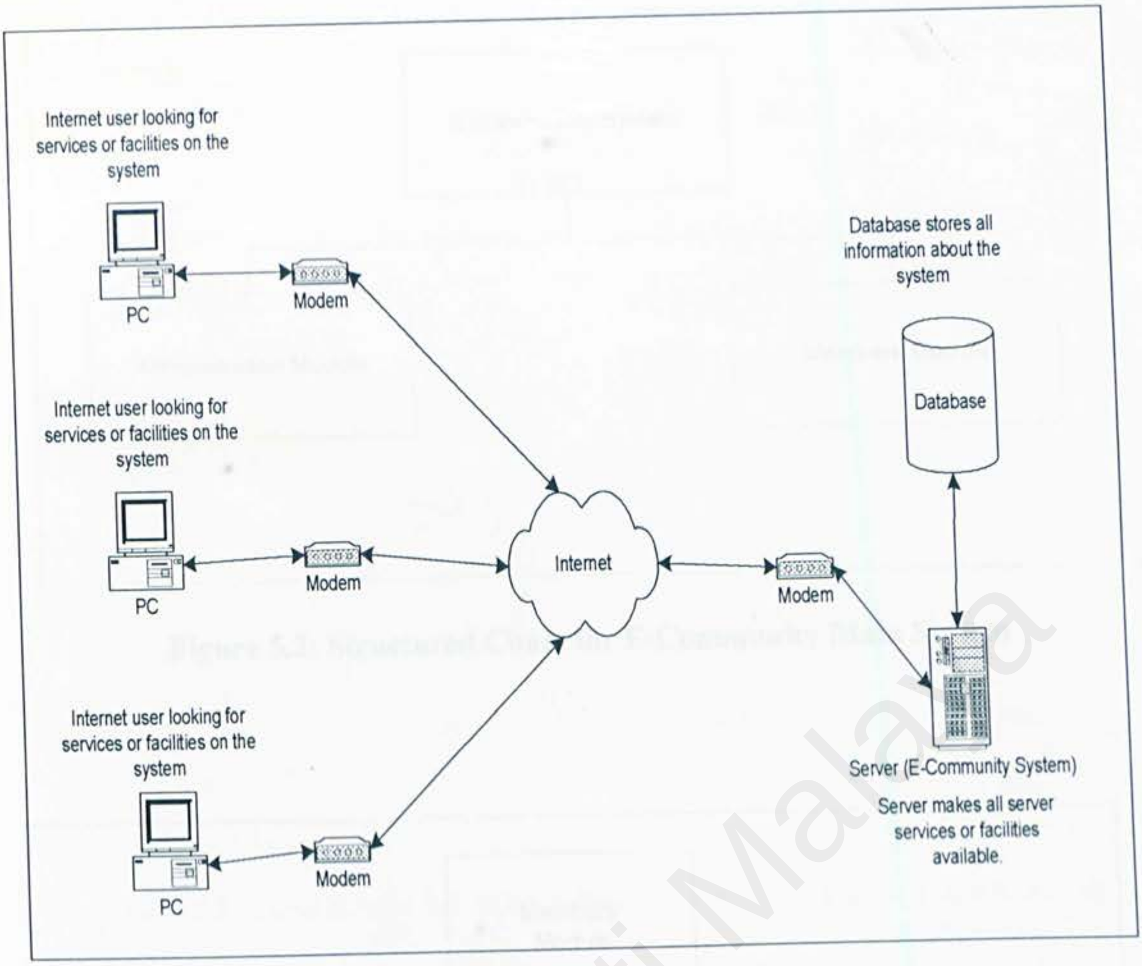

Internet user looking for services or facilities on the system
PC
Modem
Internet user looking for services or facilities on the system
PC
Modem
Internet user looking for services or facilities on the system
PC
Modem
Internet
Modem
Database stores all information about the system
Database
Server (E-Community System)
Server makes all server services or facilities available.

Figure 5.2: Network Design of E-Community System

5.3 System Structuring

This system is structured into a number of principal subsystems where a subsystem is an independent unit. Decomposing a system into a set of interacting subsystem is an important phase. Structured chart is used to depict high level extraction of the specified system. The usage of structured chart is to describe the interaction between independent subsystems.

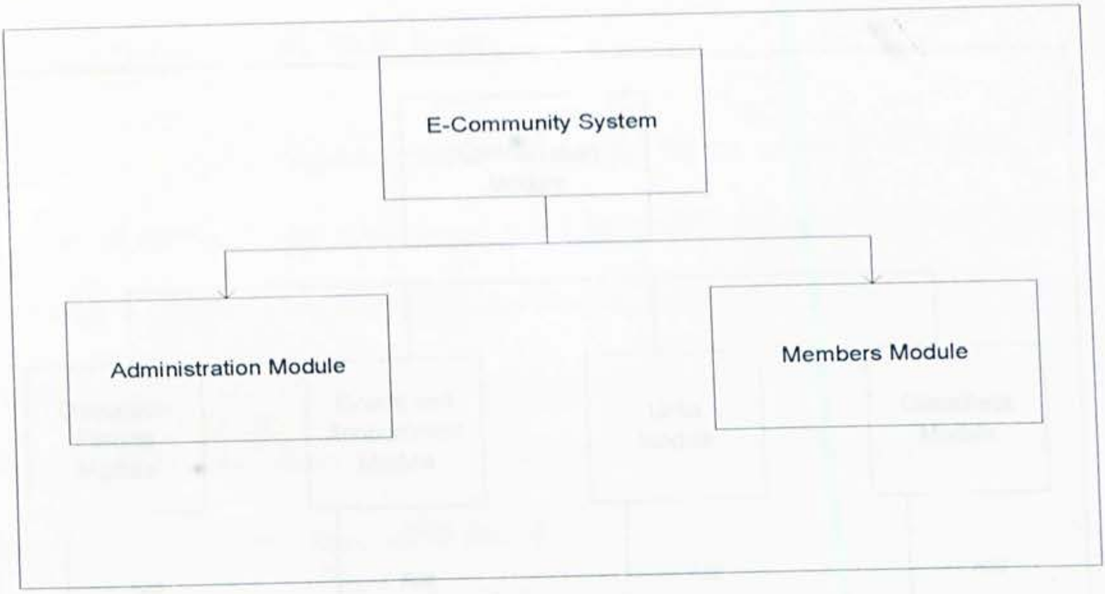


Figure 5.3: Structured Chart for E-Community Main System

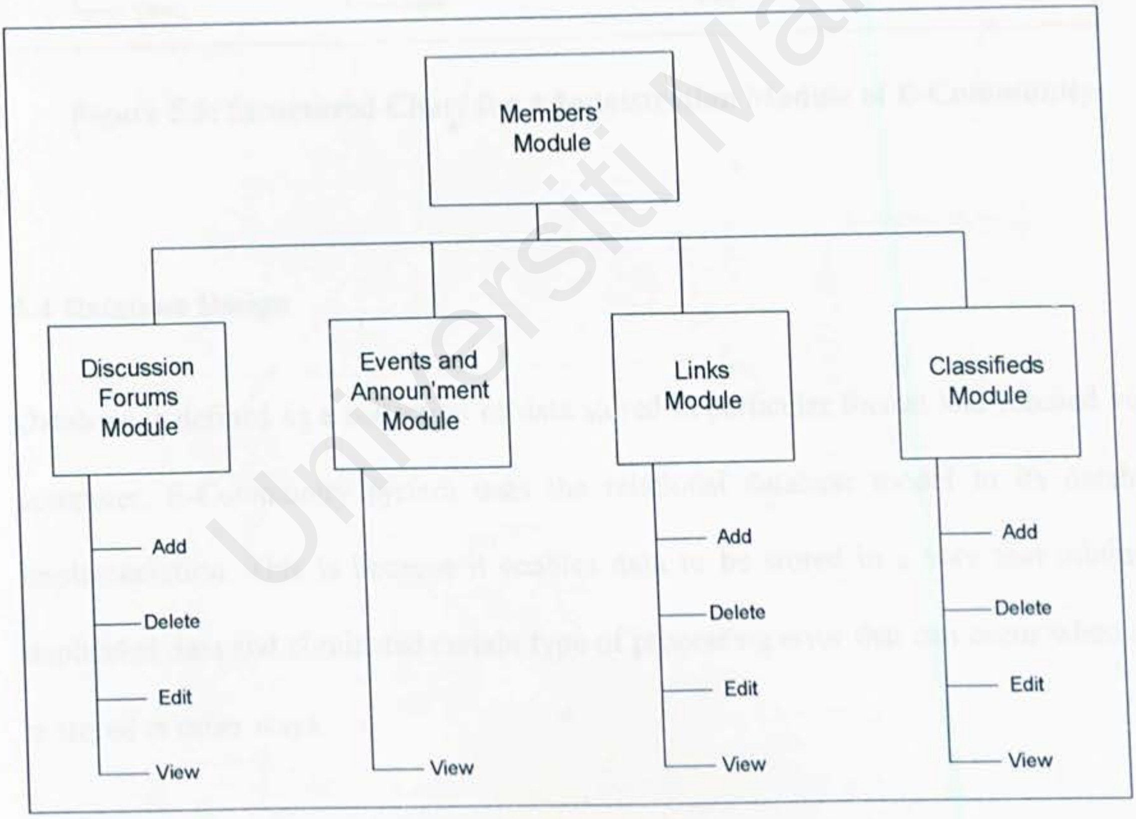


Figure 5.4: Structured Chart for Members Module of E-Community

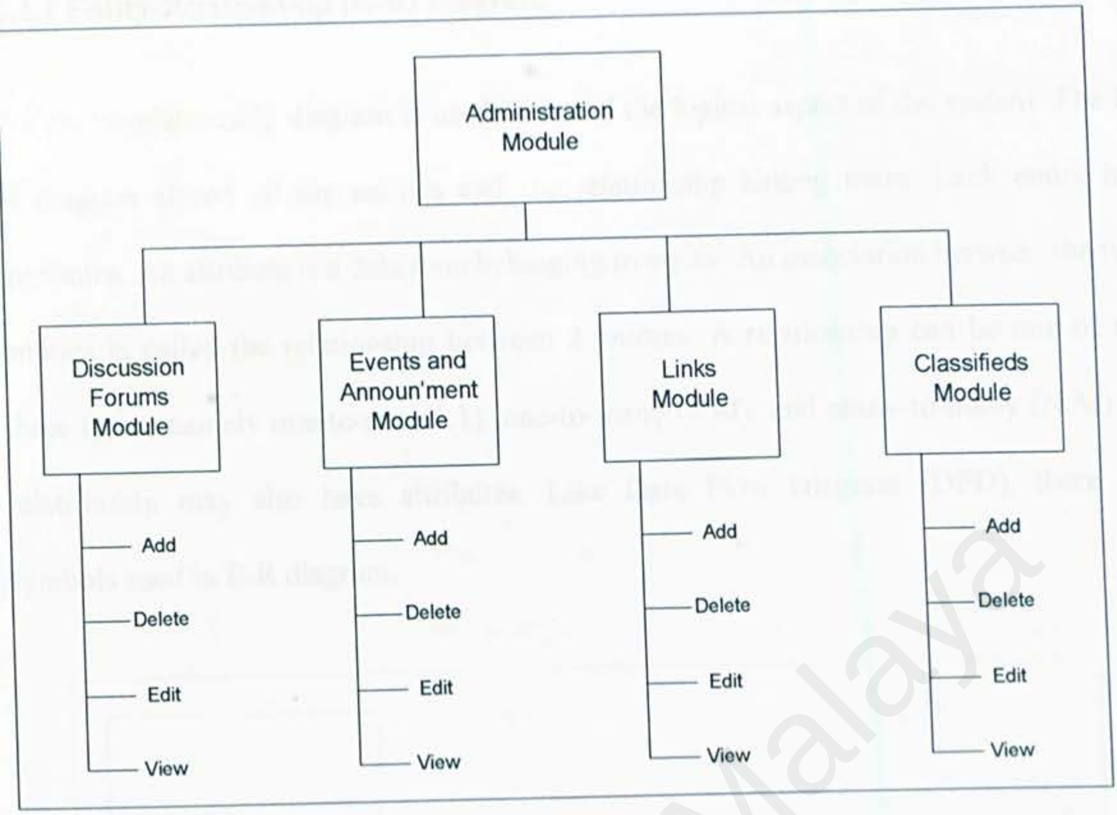


Figure 5.5: Structured Chart for Administration Module of E-Community

5.4 Database Design

Database is defined as a collection of data stored in particular format and reached via a computer. E-Community system uses the relational database model in its database implementation. This is because it enables data to be stored in a way that minimize duplicated data and eliminated certain type of processing error that can occur when data is stored in other ways.

5.4.1 Entity-Relationship (E-R) Diagram

An entity-relationship diagram is used to model the logical aspect of the system. The E-R diagram shows all the entities and the relationship among them. Each entity has attributes. An attribute is a data item belonging to entity. An association between the two entities is called the relationship between 2 entities. A relationship can be one of the three types, namely one-to-one (1:1), one-to-many (1:M), and many-to-many (N:M). A relationship may also have attributes. Like Data Flow Diagram (DFD), there are symbols used in E-R diagram.

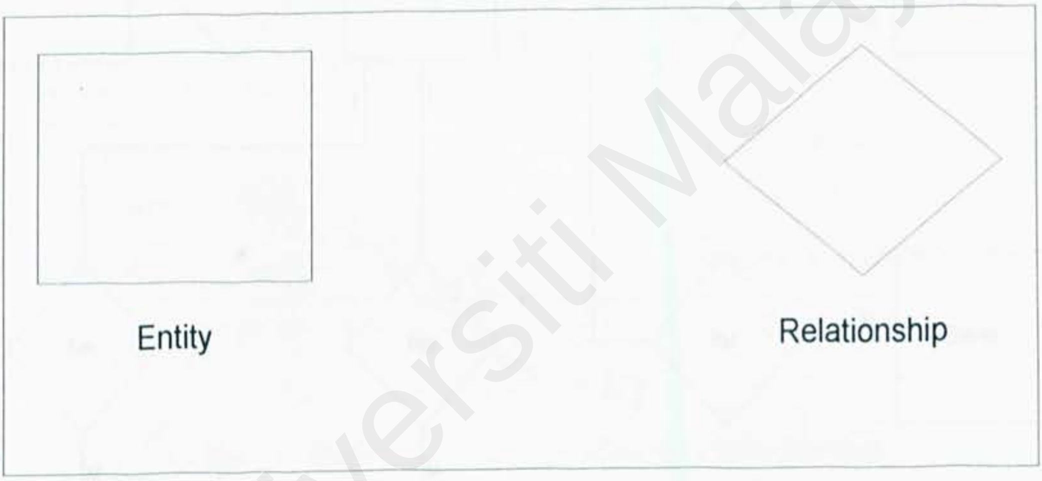


Figure 5.6: Symbols of E-R Diagrams

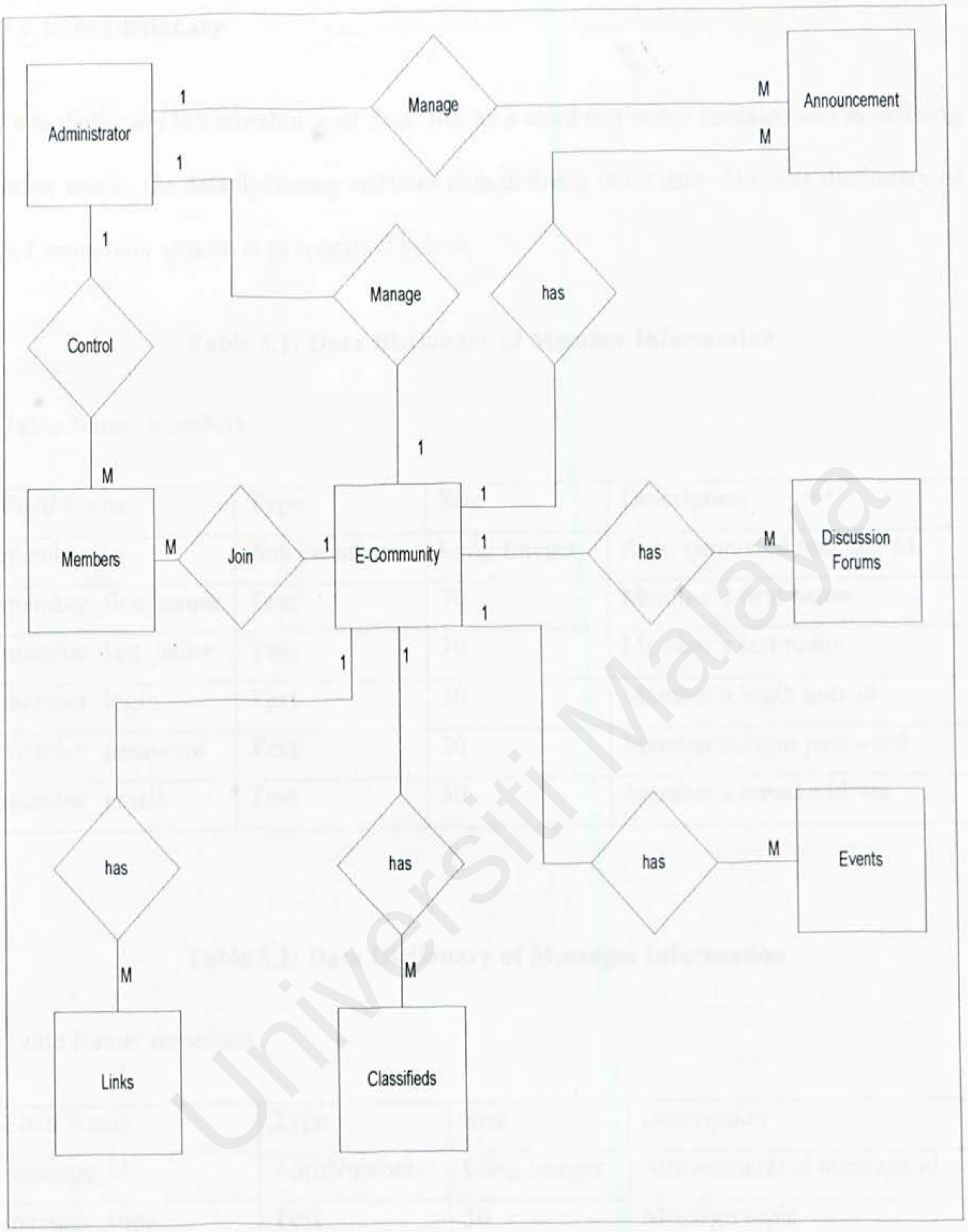


Figure 5.7: Entity-Relationship (E-R) Diagram of E-Community system

5.5 Data Dictionary

Data dictionary is a storehouse of data. Just as a word dictionary contains words defining other words, the data dictionary contains data defining other data. The data dictionary of E-Community system is as specified below;

Table 5.1: Data Dictionary of Member Information

Table Name: members

Field Name	Type	Size	Description
member_id	AutoNumber	Long Integer	Auto-generated member id.
member_first_name	Text	30	Member's first name
member_last_name	Text	30	Member's last name
member_login	Text	30	Member's login user id
member_password	Text	20	Member's login password
member_email	Text	30	Member's email address

Table 5.2: Data Dictionary of Messages Information

Table Name: messages

Field Name	Type	Size	Description
message_id	AutoNumber	Long Integer	Auto-generated message id.
message_topic	Text	30	Message topic
message_author	Text	30	Message author
message_content	Text	100	Content of message
forum_id	Number	Long Integer	Forum's id

Table 5.3: Data Dictionary of Discussion Forum Information

Table Name: forums

Field Name	Type	Size	Description
forum_id	AutoNumber	Long Integer	Auto-generated forum id.
forum_name	Text	50	Forum's name
forum_description	Text	100	Forum's description

Table 5.4: Data Dictionary of Events Information

Table Name: events

Field Name	Type	Size	Description
event_id	AutoNumber	Long Integer	Auto-generated events id.
event_name	Text	50	Event's name
event_desc	Text	100	Event's description
event_location	Text	50	Event's location

Table 5.5: Data Dictionary of Classified Advertisement Information

Table Name: ads

Field Name	Type	Size	Description
ad_id	AutoNumber	Long Integer	Auto-generated classified id.
ad_category_id	Text	50	Category id
ad_title	Text	50	Advertisement's title
ad_location	Text	50	Advertisement's location
ad_text	Text	150	Advertisement's description
ad_price	Number	Long Integer	Advertisement's price
ad_contact	Text	30	Contact number

Table 5.6: Data Dictionary of Announcement's articles Information

Table Name: articles

Field Name	Type	Size	Description
article_id	AutoNumber	Long Integer	Auto-generated articles id.
article_title	Text	50	Article's name
article_desc	Text	100	Article's description

Table 5.7: Data Dictionary of Links Information

Table Name: links

Field Name	Type	Size	Description
link_id	AutoNumber	Long Integer	Auto-generated links id.
link_name	Text	50	Link's name
link_desc	Text	100	Link's description
link_url	Text	50	Link's location

5.6 Data Flow Diagrams

Data Flow Diagrams (DFD) provides a general view of the processes provided by the system to both the end-user as well as the system designer. System designer can identify data flow in this system through this diagram and this is very important. Shown below are the DFD symbols used;

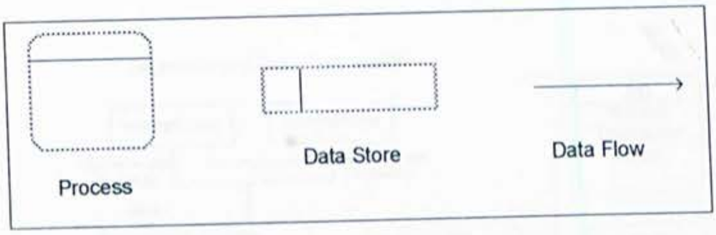


Figure 5.8: Symbols of Data Flow Diagrams

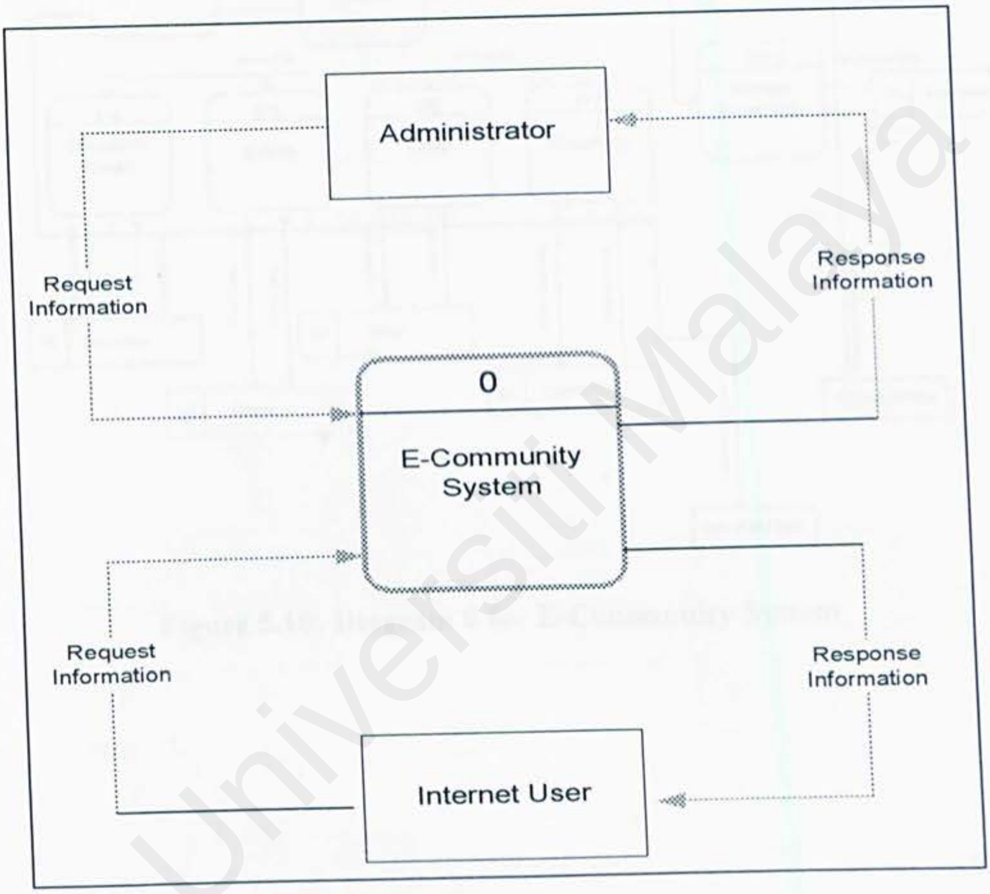


Figure 5.9: Context Diagram for E-Community System

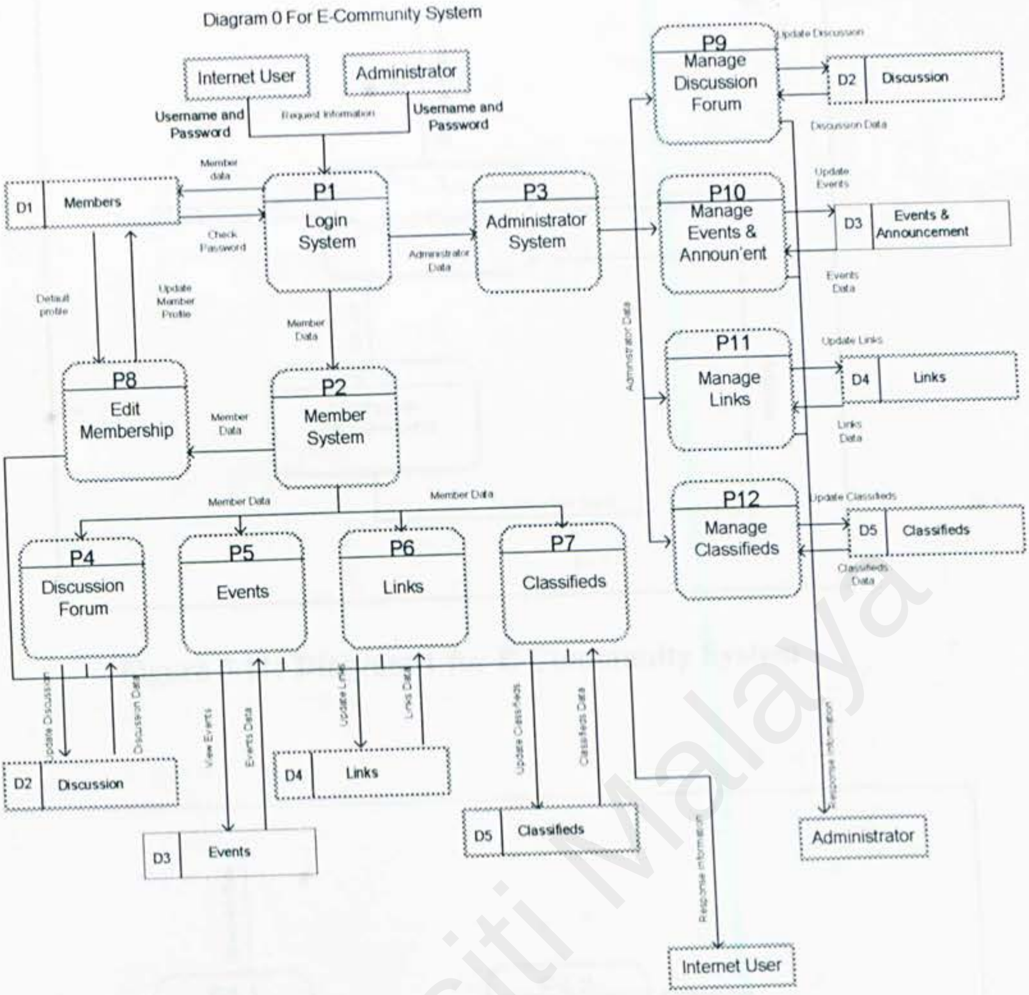


Figure 5.10: Diagram 0 for E-Community System

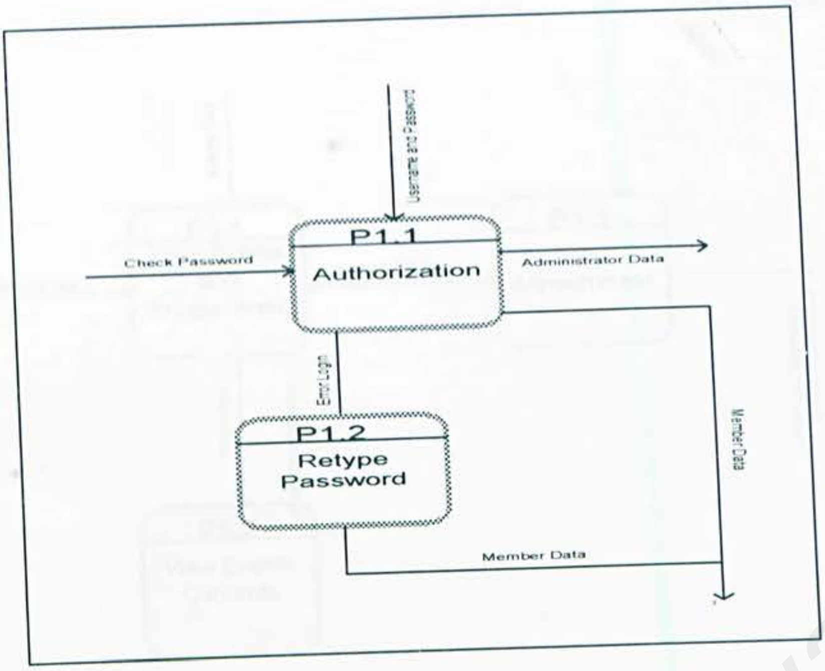


Figure 5.11: Diagram 1 for E-Community System

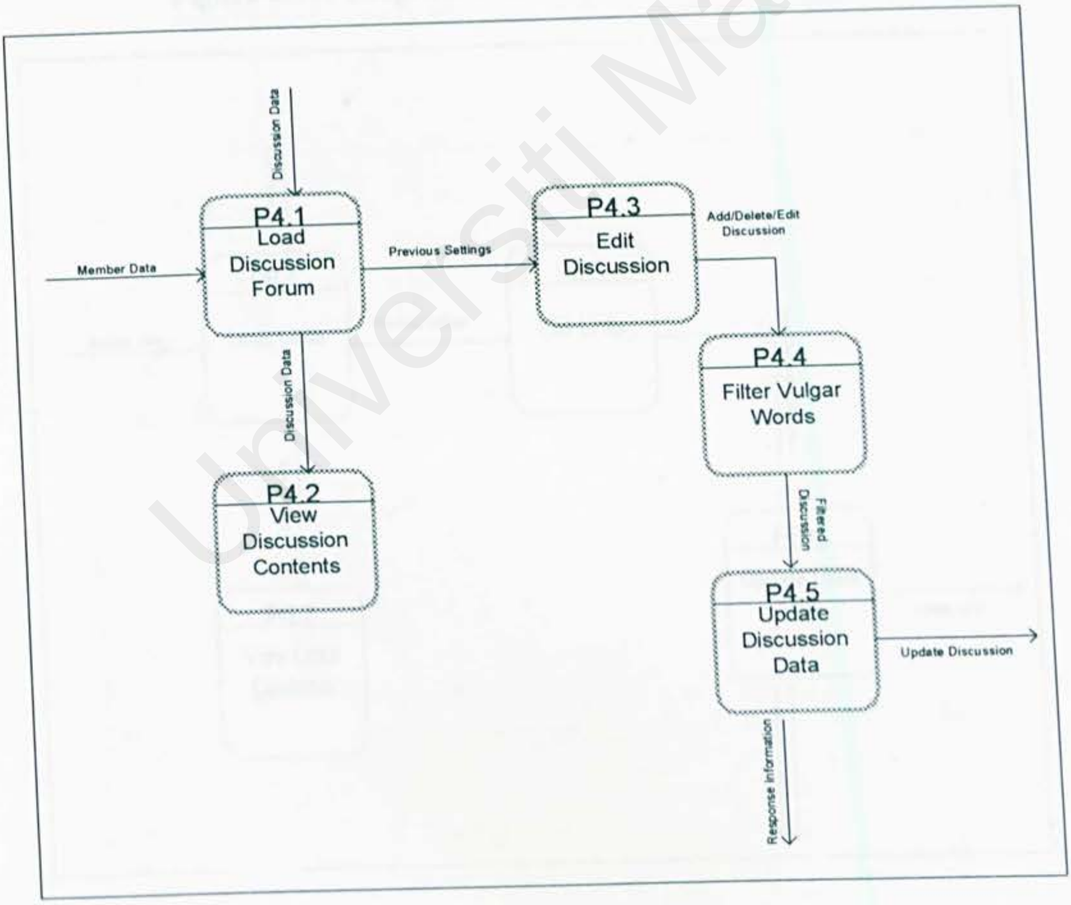


Figure 5.12: Diagram 4 for E-Community System

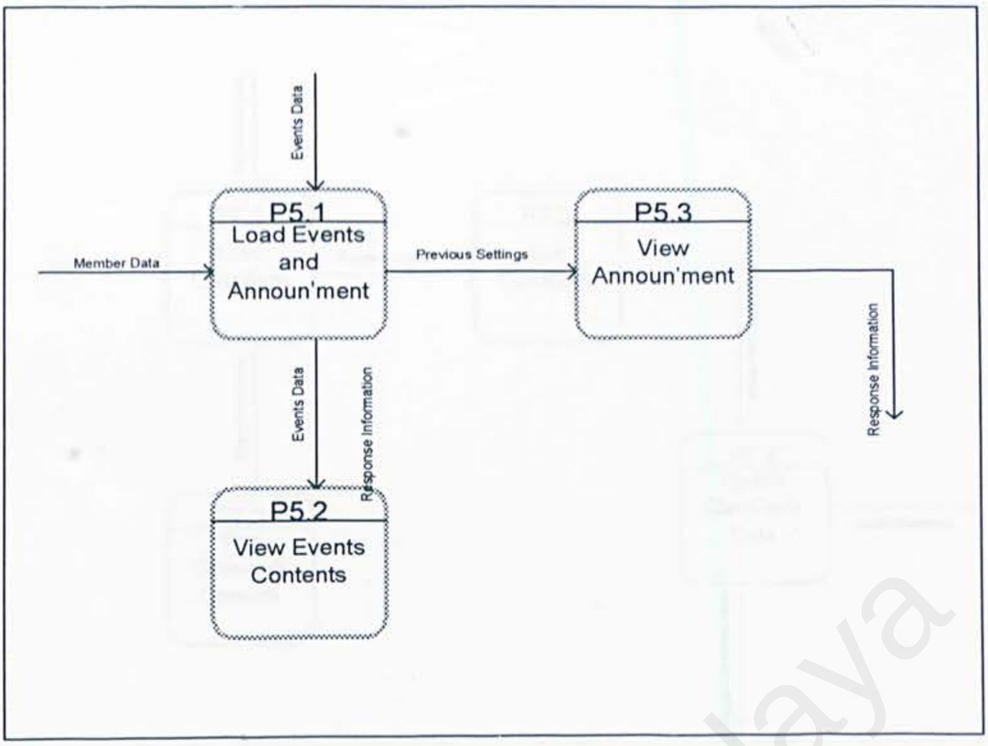


Figure 5.13: Diagram 5 for E-Community System

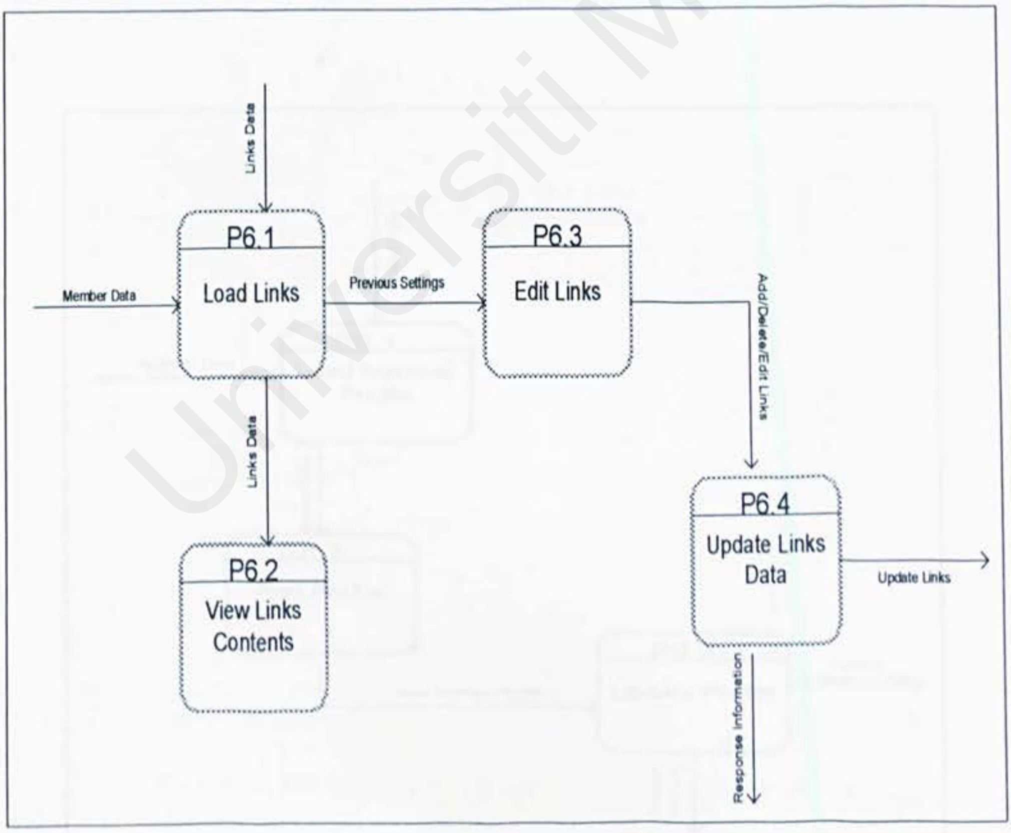


Figure 5.14: Diagram 6 for E-Community System

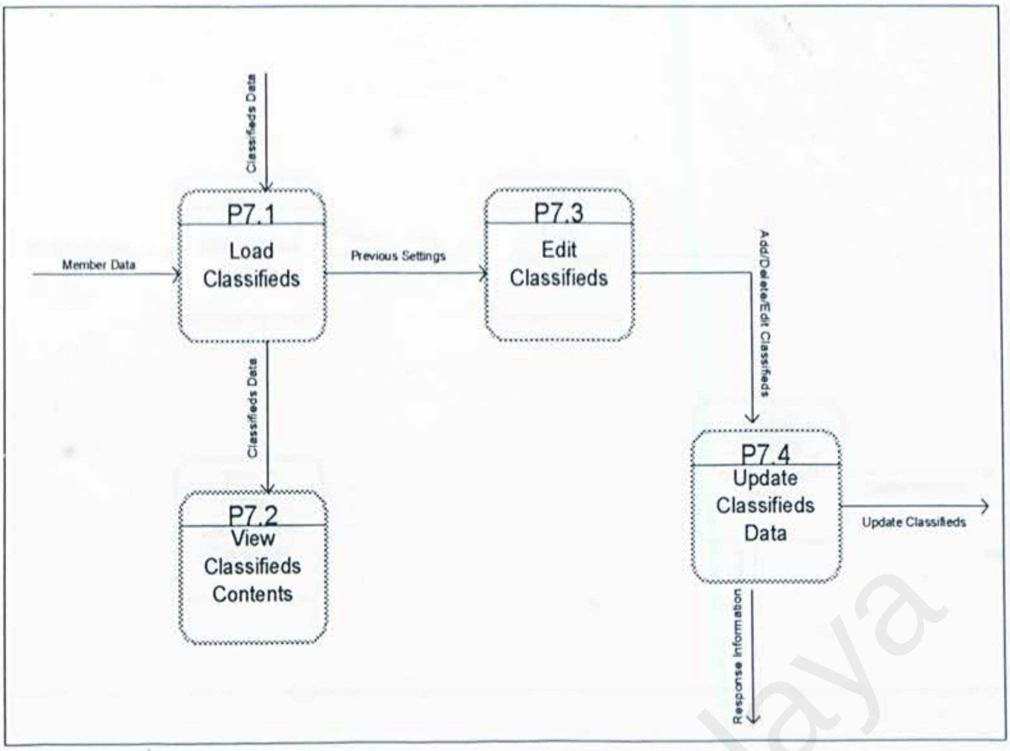


Figure 5.15: Diagram 7 for E-Community System

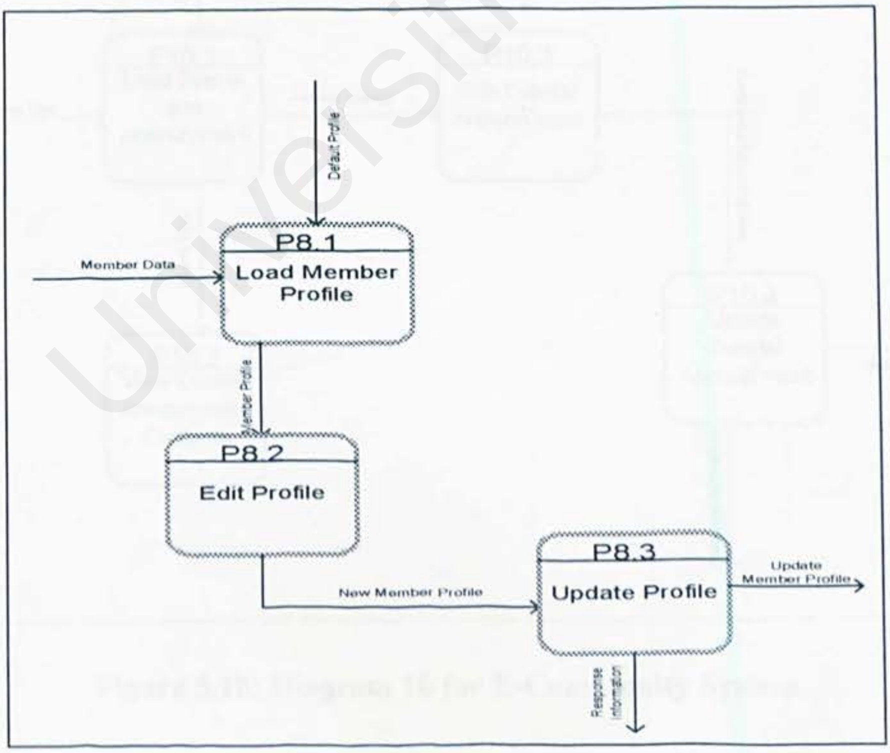


Figure 5.16: Diagram 8 for E-Community System

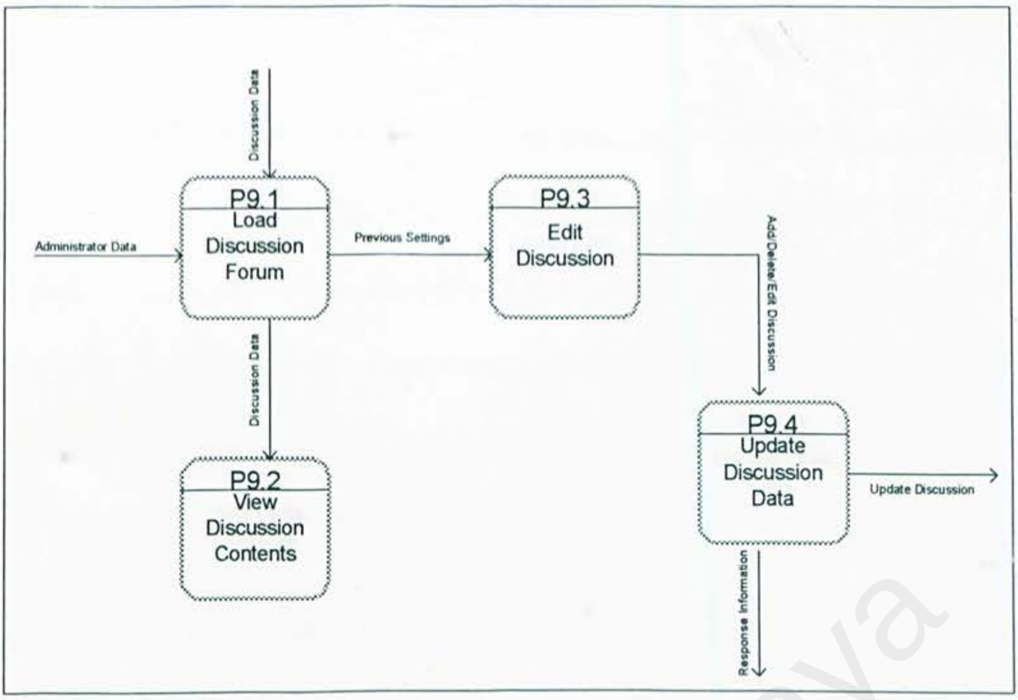


Figure 5.17: Diagram 9 for E-Community System

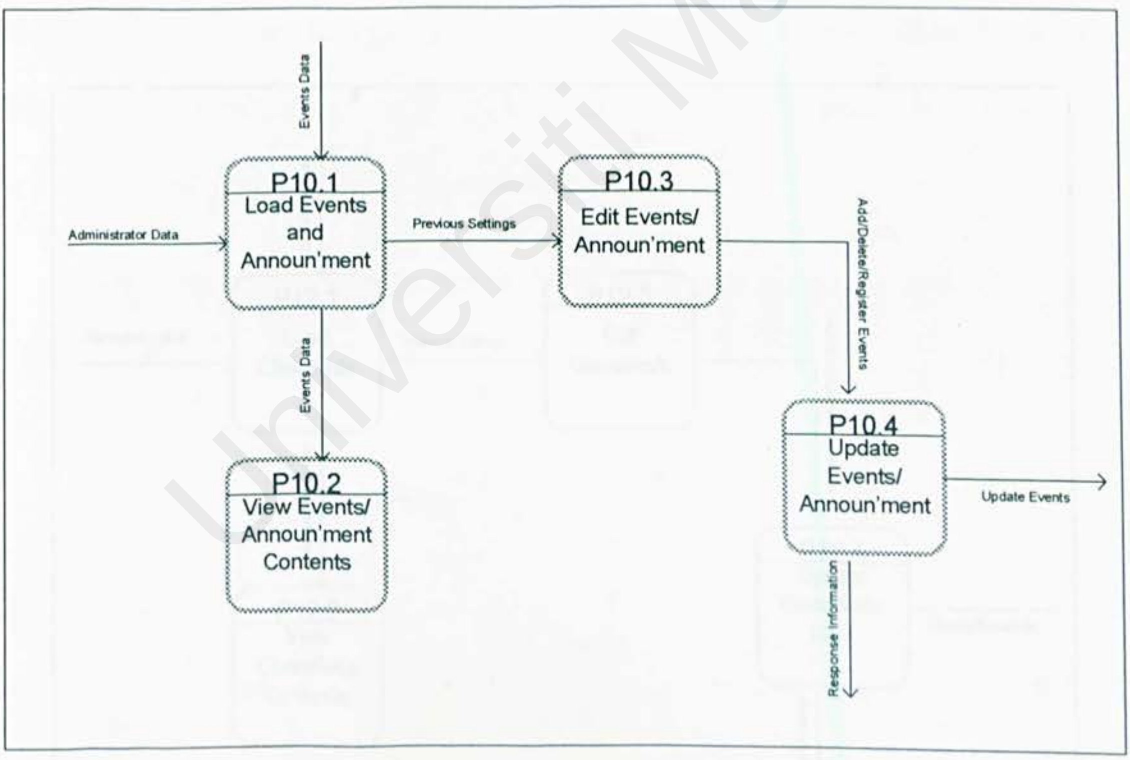


Figure 5.18: Diagram 10 for E-Community System

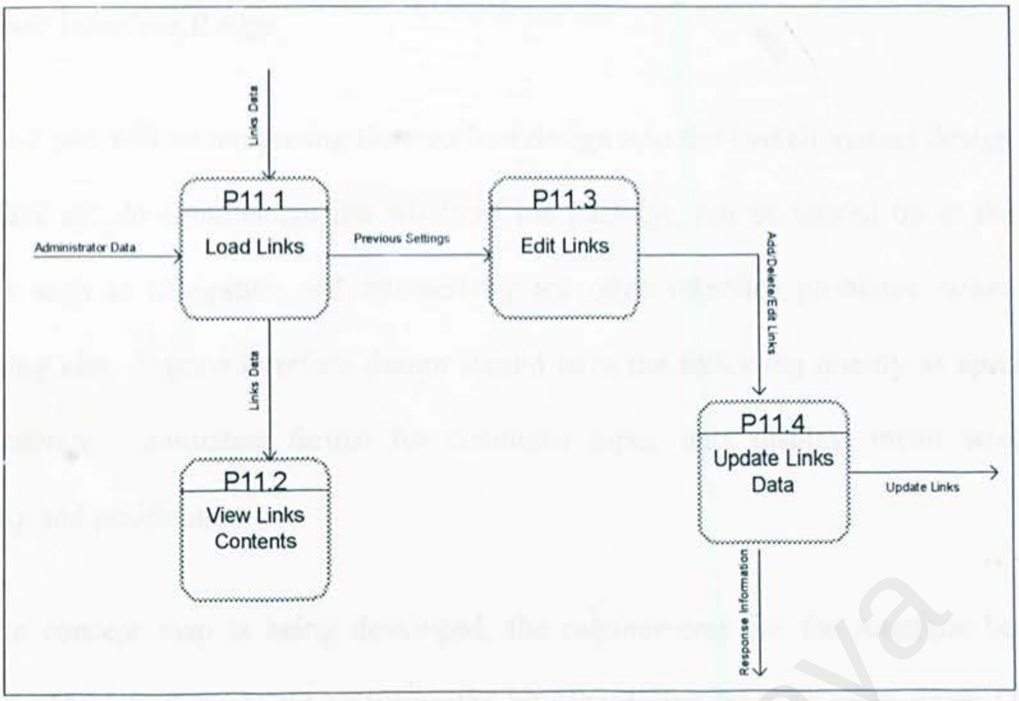


Figure 5.19: Diagram 11 for E-Community System

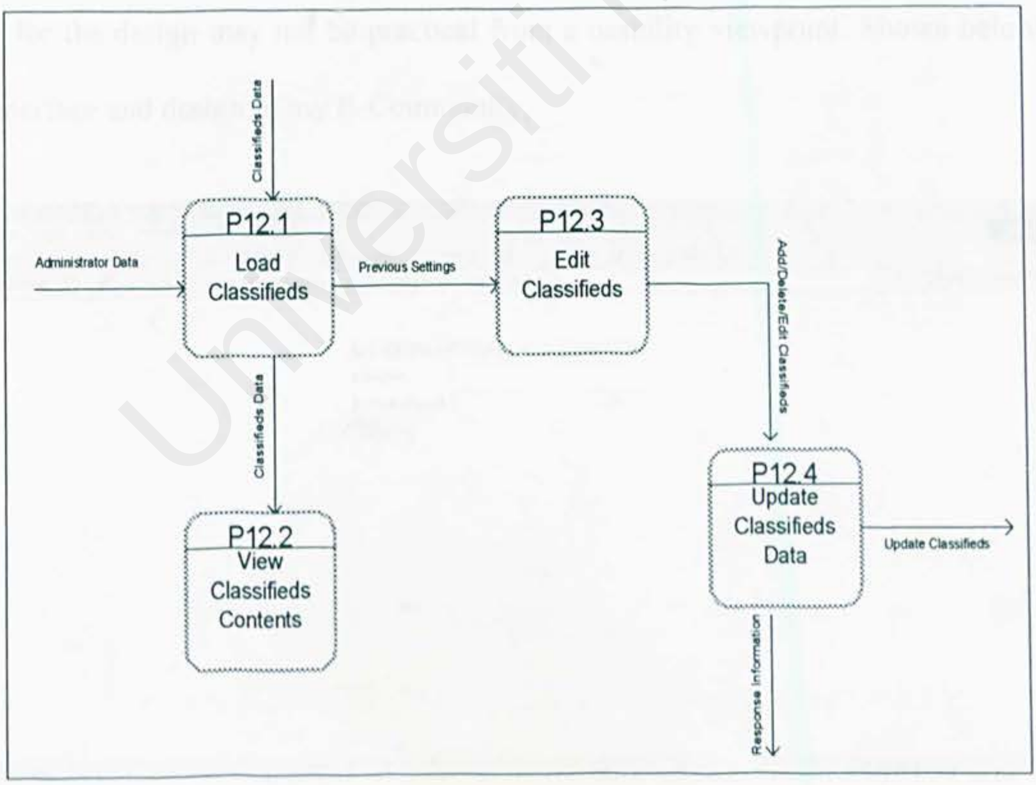


Figure 5.20: Diagram 12 for E-Community System

5.7 User Interface Design

The last part will be integrating the interface design into the overall system design. The interface should complement the whole of the package, not be tacked on at the end. Issues such as navigation and interactivity are often interface problems rather than anything else. A good interface design should have the following quality as specified; *Consistency* – consistent format for command input, data display, menu selection, placing and positioning.

As the concept map is being developed, the requirements for the interface become clearer. The interface should be integrated into the design from an early stage. One of the best ways to do this is to mock-up the look and feel of the package on screen or on paper. The colors, placement of elements and so on, need to be considered. Some of the ideas for the design may not be practical from a usability viewpoint. Shown below are the interface and design of my E-Community;

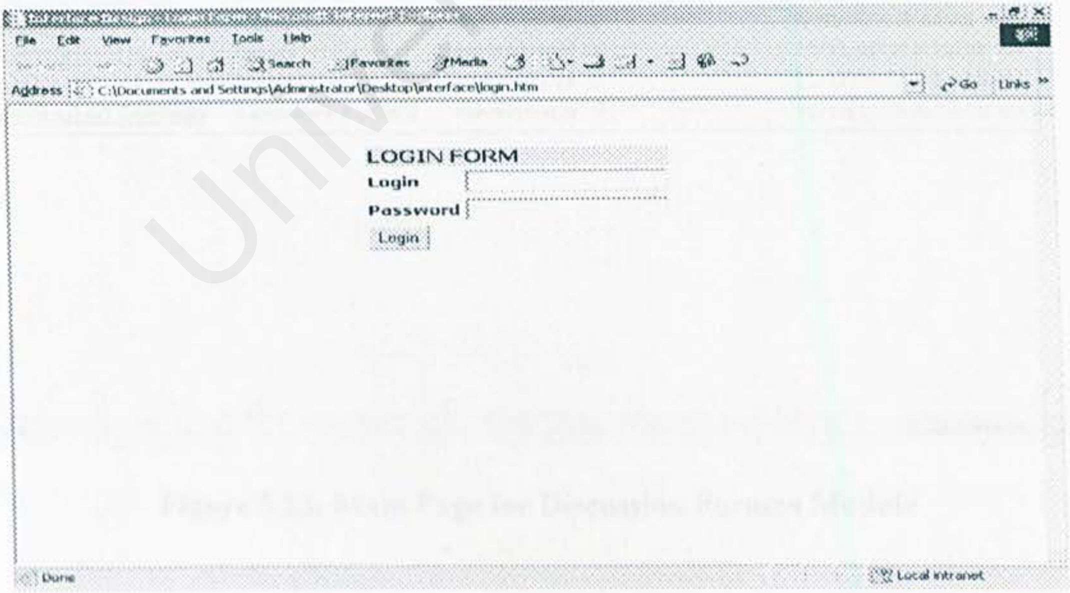
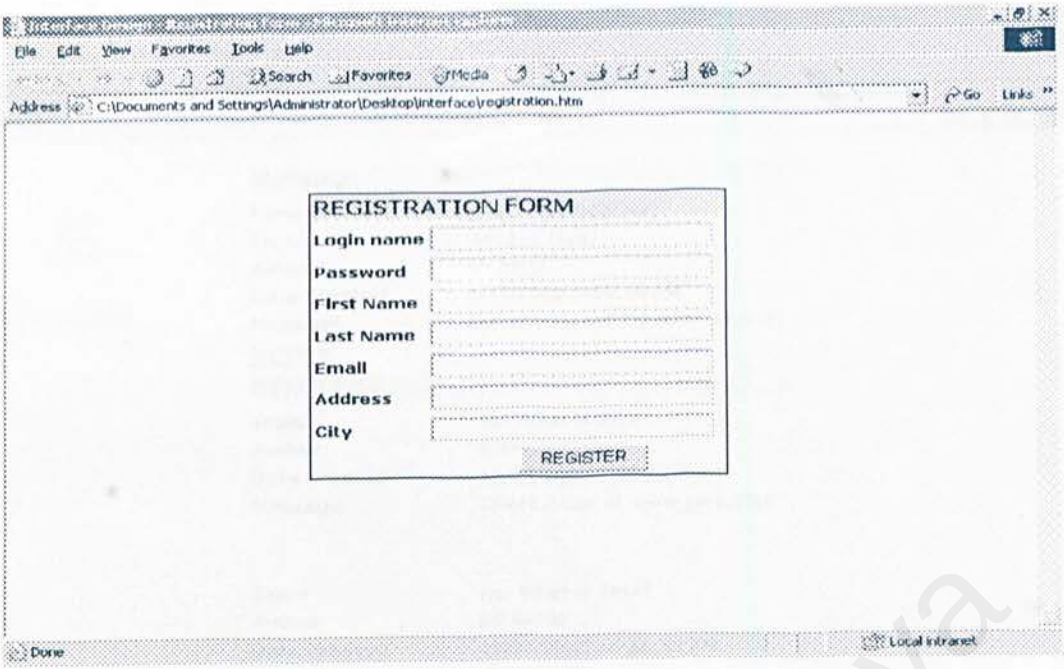

File Edit View Favorites Tools Help
Search Favorites Media
Address C:\Documents and Settings\Administrator\Desktop\interface\login.htm
Go Links »
LOGIN FORM
Login
Password
Login
Done
Local intranet

Figure 5.21: Login Form for E-Community System



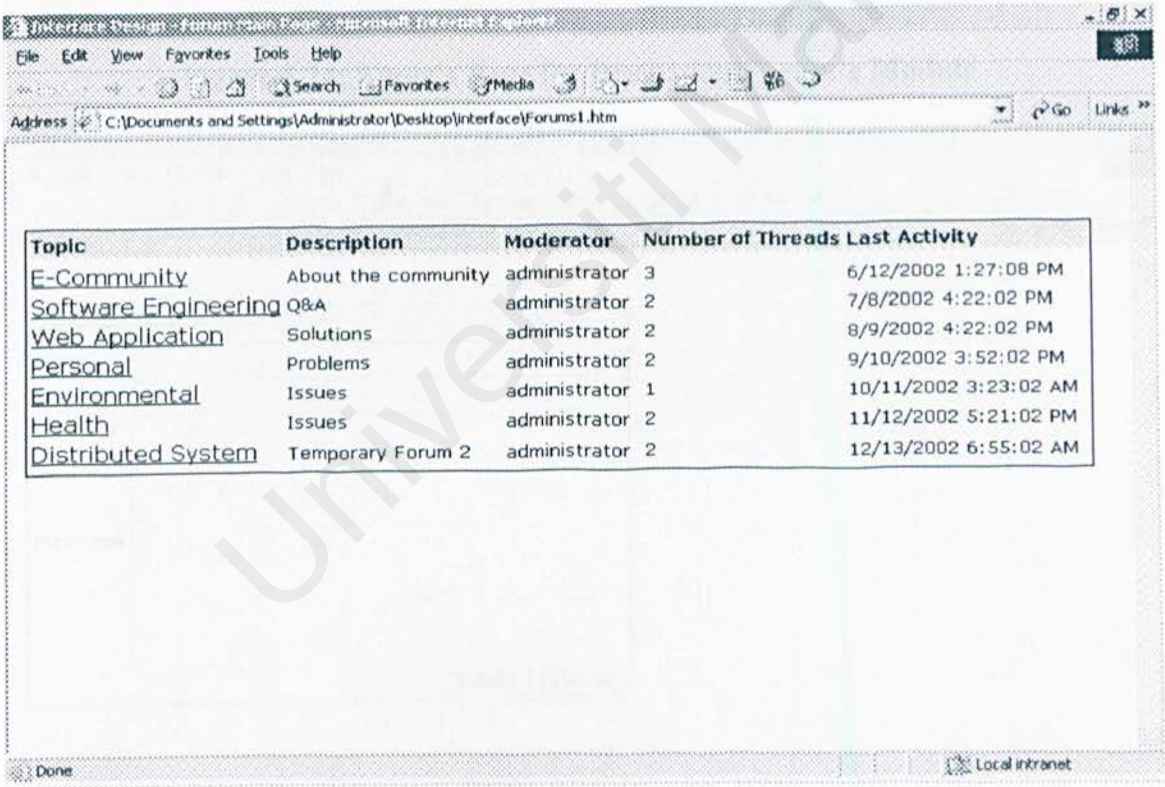
File Edit View Favorites Tools Help
Search Favorites Media
Address C:\Documents and Settings\Administrator\Desktop\interface\registration.htm
Go Links
Done
Local intranet

REGISTRATION FORM

Login name	
Password	
First Name	
Last Name	
Email	
Address	
City	

REGISTER

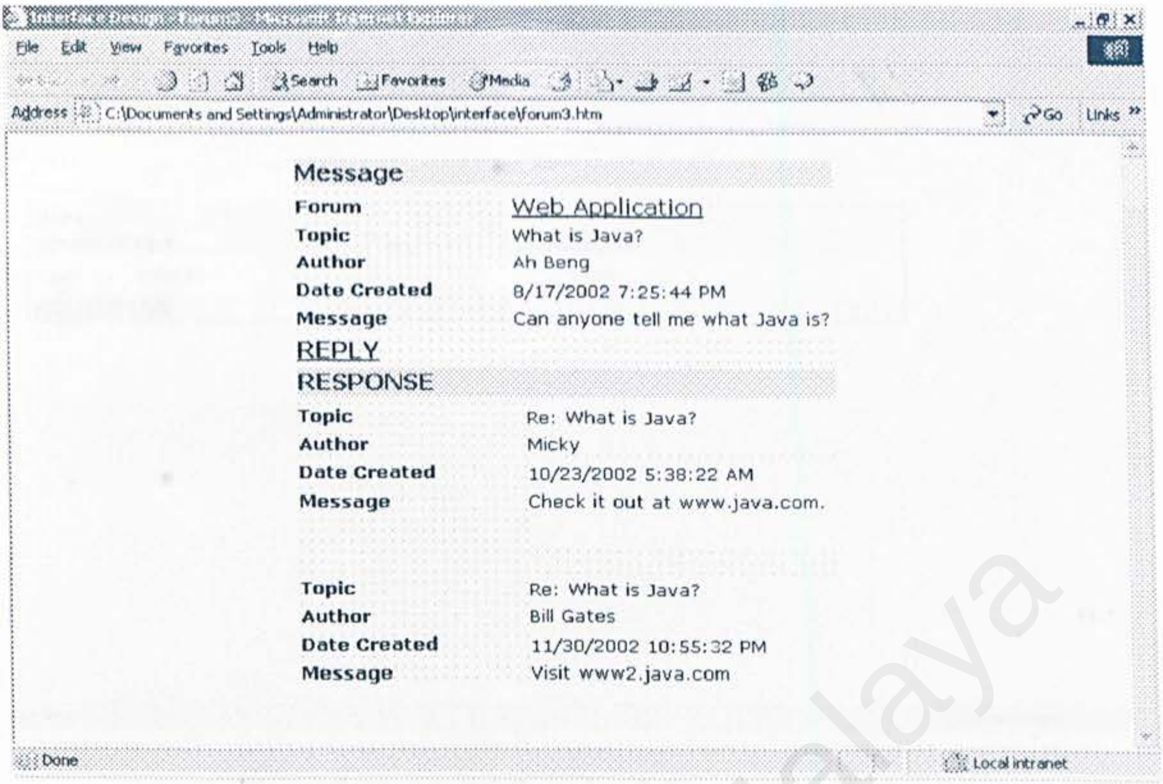
Figure 5.22: Registration Form for E-Community System



File Edit View Favorites Tools Help
Search Favorites Media
Address C:\Documents and Settings\Administrator\Desktop\interface\Forums1.htm
Go Links
Done
Local intranet

Topic	Description	Moderator	Number of Threads	Last Activity
E-Community	About the community	administrator	3	6/12/2002 1:27:08 PM
Software Engineering	Q&A	administrator	2	7/8/2002 4:22:02 PM
Web Application	Solutions	administrator	2	8/9/2002 4:22:02 PM
Personal	Problems	administrator	2	9/10/2002 3:52:02 PM
Environmental	Issues	administrator	1	10/11/2002 3:23:02 AM
Health	Issues	administrator	2	11/12/2002 5:21:02 PM
Distributed System	Temporary Forum 2	administrator	2	12/13/2002 6:55:02 AM

Figure 5.23: Main Page for Discussion Forums Module


File Edit View Favorites Tools Help
Search Favorites Media
Address C:\Documents and Settings\Administrator\Desktop\interface\forum3.htm
Go Links
Done
Local intranet

Message

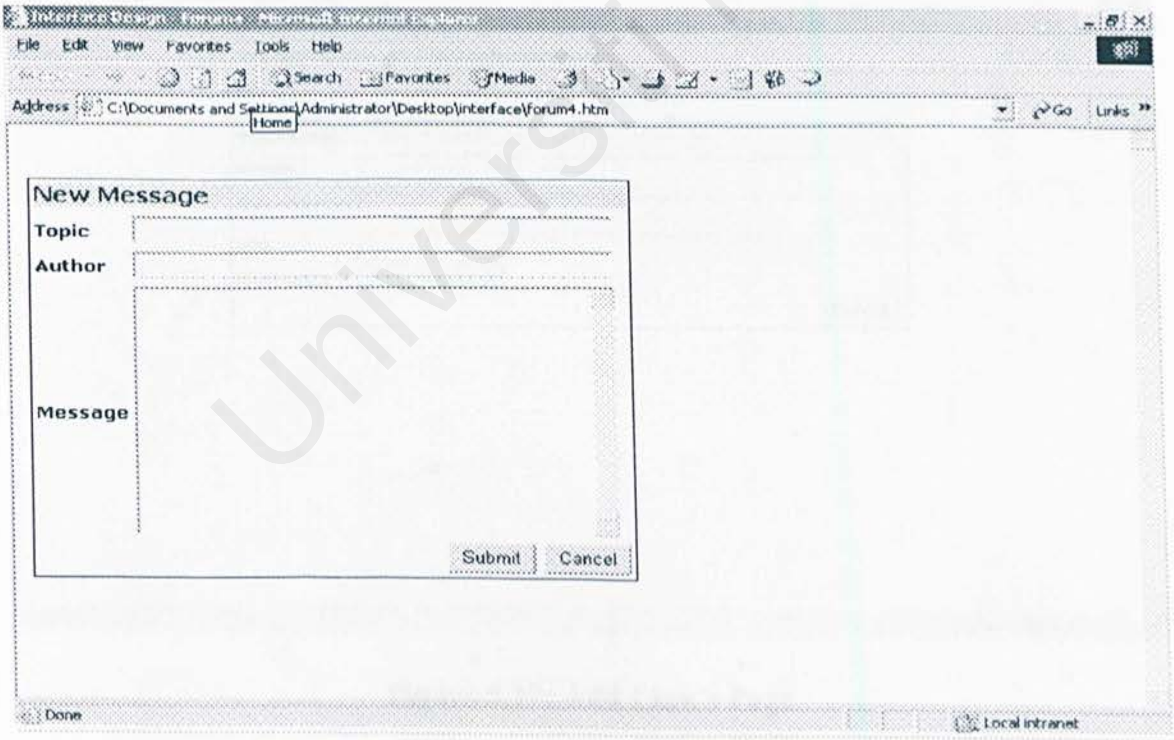
Forum	Web Application
Topic	What is Java?
Author	Ah Beng
Date Created	8/17/2002 7:25:44 PM
Message	Can anyone tell me what Java is?

REPLY

RESPONSE

Topic	Re: What is Java?
Author	Micky
Date Created	10/23/2002 5:38:22 AM
Message	Check it out at www.java.com.
Topic	Re: What is Java?
Author	Bill Gates
Date Created	11/30/2002 10:55:32 PM
Message	Visit www2.java.com

Figure 5.24: Topic's Page for Discussion Forum's Module


File Edit View Favorites Tools Help
Search Favorites Media
Address C:\Documents and Settings\Administrator\Desktop\interface\forum4.htm
Home
Go Links
Done
Local intranet

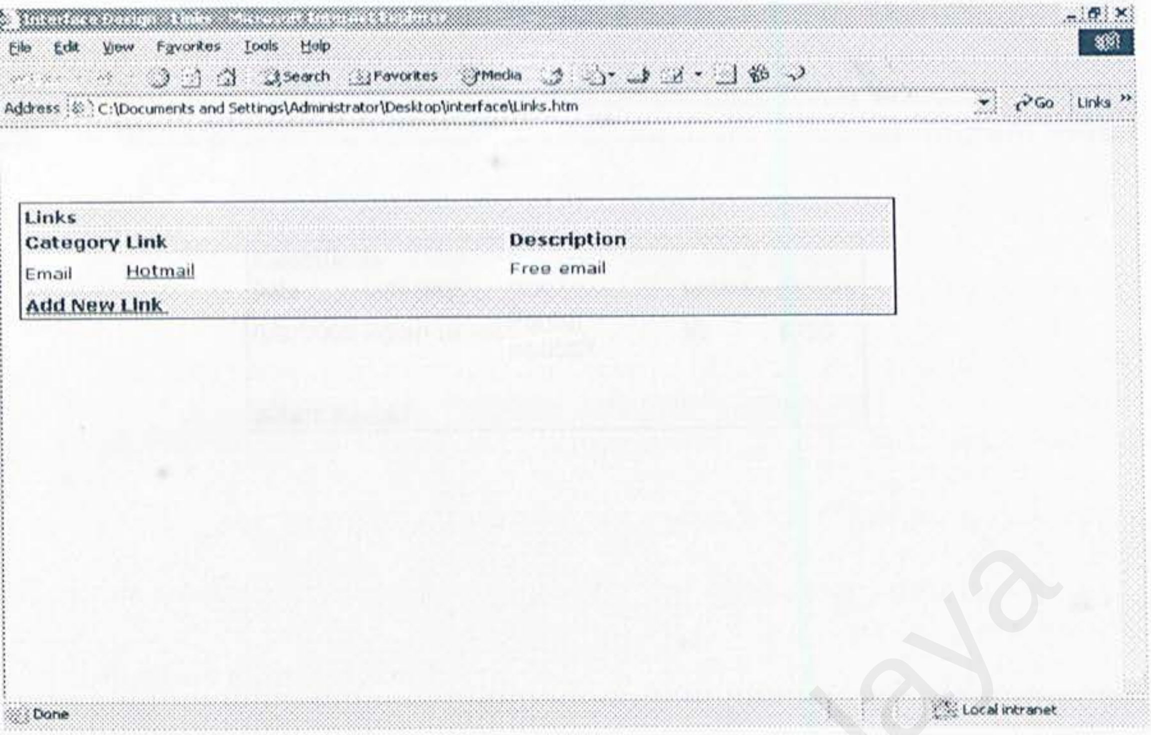
New Message

Topic

Author

Message

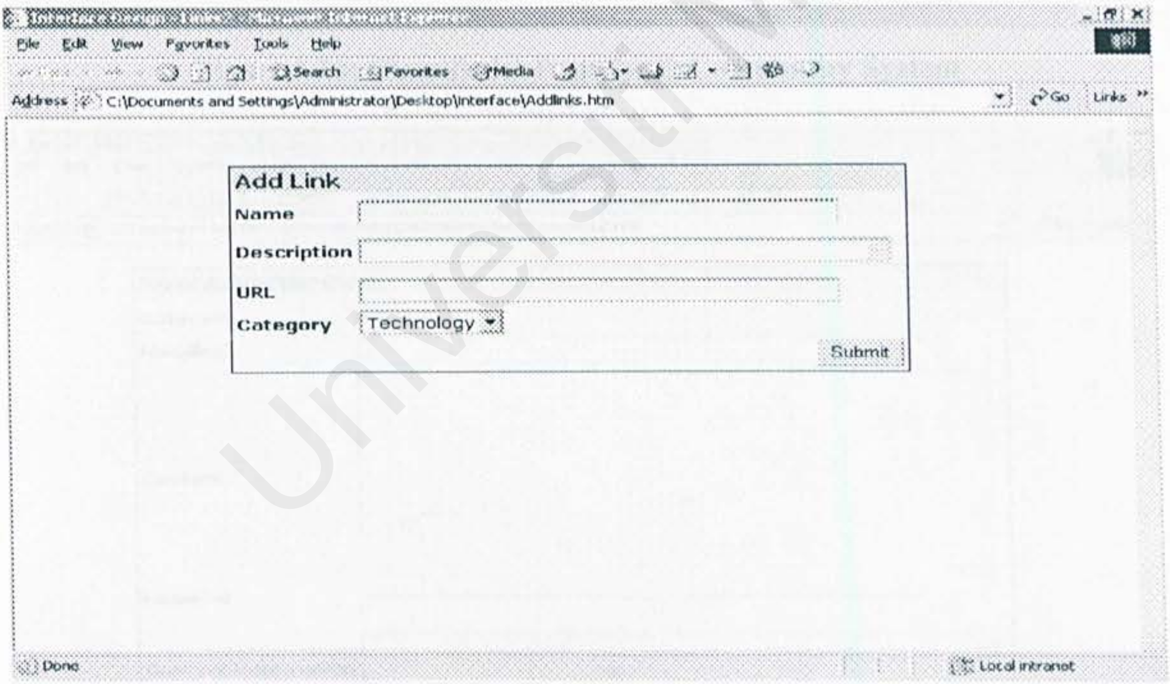
Figure 5.25: New Message's Form



Address C:\Documents and Settings\Administrator\Desktop\interface\Links.htm

Links		
Category	**Link**	**Description**
Email	Hotmail	Free email
Add New Link		

Figure 5.26: Links' Page for E-Community System



Address C:\Documents and Settings\Administrator\Desktop\interface\Addlinks.htm

Add Link

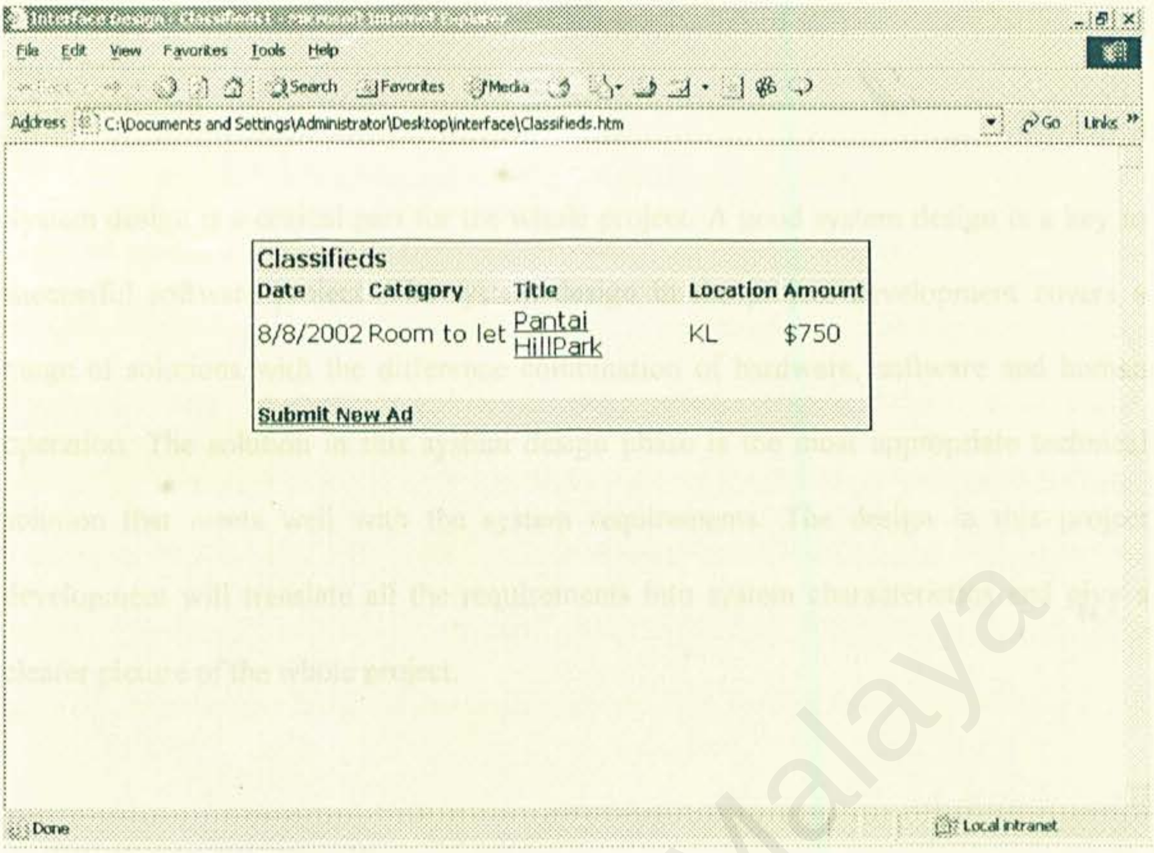
Name

Description

URL

Category Technology

Figure 5.27: Add Link's Page



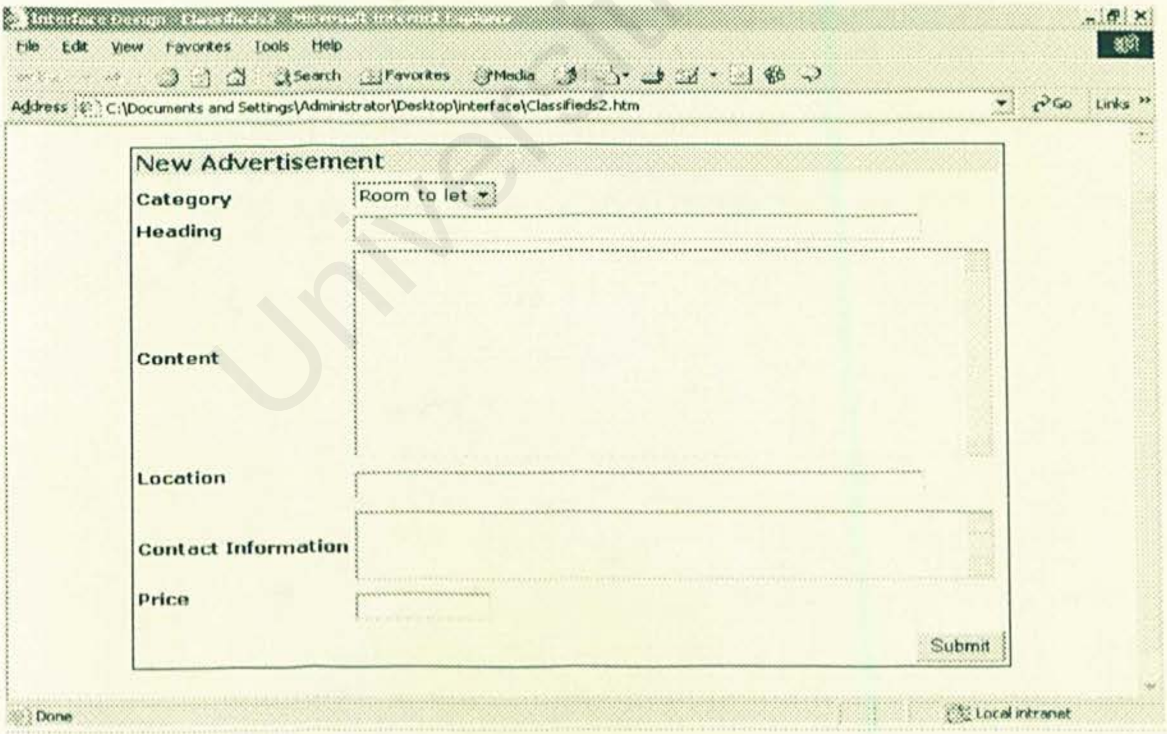
C:\Documents and Settings\Administrator\Desktop\interface\Classifieds.htm

Classifieds

Date	Category	Title	Location	Amount
8/8/2002	Room to let	Pantai HillPark	KL	$750

Submit New Ad

Figure 5.28: Classifieds' Page for E-Community System



C:\Documents and Settings\Administrator\Desktop\interface\Classifieds2.htm

New Advertisement

Category: Room to let

Heading

Content

Location

Contact Information

Price

Submit

Figure 5.29: New Advertisement's Page

5.8 Conclusion

System design is a critical part for the whole project. A good system design is a key to successful software project. The system design in the project development covers a range of solutions with the difference combination of hardware, software and human operation. The solution in this system design phase is the most appropriate technical solution that meets well with the system requirements. The design in this project development will translate all the requirements into system characteristics and give a clearer picture of the whole project.

6.0 Introduction

In a nutshell, system implementation is the construction of the application and the delivery of the application into the production phase. It is the phase that integrates the designed modules or functions to develop a system based on given requirements. System implementation includes building and testing its contained modules and sub modules involving system requirements and design into program codes. In order to achieve that, appropriate tools and languages are needed to code the programs. A number of software was chosen in this case. This phase at times involves some modification to the previous design. The project was also developed using bottom-up approach, which involves building the functions and procedures and then the high-level software modules.

6.1 Development Environment

The use of dynamic and suitable hardware and software can help accelerate the development of construction of any system. The overall tools used for the development of the project are and to ensure adequate performance, the .NET Framework has the following minimum and recommended system requirements for client and server applications.

6.1.1 Operating System Requirements

The .NET Framework is supported on the following platforms.

Table 6.1: Operating System Requirements

Scenario	**Operating System**
Client	Microsoft® Windows® 98
	Microsoft® Windows® 98 Second Edition
	Microsoft® Windows® Millennium Edition
	Microsoft® Windows NT® 4.0 Workstation with Service Pack 6.0a or later
	Microsoft® Windows NT® 4.0 Server with Service Pack 6.0a or later
	Microsoft® Windows® 2000 Professional
	Microsoft® Windows® 2000 Server
	Microsoft® Windows® 2000 Advanced Server
	Microsoft® Windows® XP Home Edition
	Microsoft® Windows® XP Professional

	Note On all these systems, Microsoft® Internet Explorer 5.01 or later and Microsoft® Windows® Installer 2.0 or later are also required.
Server	Microsoft® Windows® 2000 Professional with Service Pack 2.0 Microsoft® Windows® 2000 Server with Service Pack 2.0 Microsoft® Windows® 2000 Advanced Server with Service Pack 2.0 Microsoft® Windows® XP Professional

6.1.2 Hardware Requirements

Table 6.2: Hardware Requirements

Scenario	Required Processor	Recommended Processor	Required RAM	Recommended RAM
Client (Windows Forms and Windows	Pentium 90 MHz*	Pentium 90 MHz or faster	32 MB*	96 MB or higher

Services)				
Server	Pentium 133 MHz*	Pentium 133 or faster	128 MB*	256 MB or higher

*Or the minimum required by the operating system, whichever is higher.

6.2 System Coding

After each function is done, testing is done to check whether it works. Then, error checking will be inserted to make sure that if the occurred errors can be detected.

6.2.1 Coding Approach

The project was developed modularly, mainly by using the bottom-up approach. The approach develops the functions and procedures before proceeding to the higher-level modules. Below here are examples of the coding approach I have adopted in ASP.NET ;

6.2.1.1 Declaring Server Controls

ASP.NET server controls are identified within a page using declarative tags that contain a runat="server" attribute. The following code declares three <asp:label runat="server"> server controls and customizes the text and style properties of each one individually.

```
<%@ Page Language="C#" %>
<html>
   <body>
```

```
    <h3><font face="Verdana"> Forums </font></h3>
    declare the &lt;asp:label&gt; server control and
    manipulate its properties within a page.
    <p>
    <hr>
    <asp:label id="Topic" font-size="16" font-bold="true" forecolor="red"
runat=server>Topic</asp:label>
    <br>
    <asp:label id="Message" font-size="20" font-italic="true" forecolor="red"
runat=server>Message</asp:label>
    <br>
    <asp:label id="Date" font-size="24" font-underline="true" forecolor="red"
runat=server>Date</asp:label>
   </body>
</html>
```

6.2.1.2 Manipulating Server Controls

Programmatically I can identify an individual ASP.NET server control within a page by providing it with an id attribute. You can use this id reference to programmatically manipulate the server control's object model at run time. For example, the following codes demonstrates how a page developer could programmatically set an <asp:label runat="server"> control's Text property within the Page_Load event.

```
<html>
  <script language="C#" runat="server">
    void Page_Load(Object Src, EventArgs E) {
       Message.Text = "You last accessed this page at: " + DateTime.Now;
    }
  </script>
  <body>
    <h3><font face="Verdana">.............................</font></h3>
    // manipulate the &lt;asp:label&gt; server control within
     the Page_Load event to output the current time.
    <p>
    <hr>
    <asp:label id="Message" font-size="24" font-bold="true" runat=server/>
   </body>
 </html>
```

6.2.1.3 Handling Control Action Events

ASP.NET server controls can optionally expose and raise server events, which can be handled by and accomplished by declaratively wiring an event to a control (where the attribute name of an event wireup indicates the event name and the attribute value indicates the name of a method to call). For example, the following code example demonstrates how to wire an OnClick event to a button control.

```
<html>
<script language="C#" runat="server">
```

```
void EnterBtn_Click(Object Src, EventArgs E) {

Message.Text = "Hi " + HttpUtility.HtmlEncode(Name.Text) + ", welcome to

ECommunity!";
 }
</script>
<body>
     <h3><font face="Verdana">...........................</font></h3>
     <p>
     //access a &lt;asp:textbox&gt; server control within the "Click"
     //event of a &lt;asp:button&gt;, and use its content to modify the text of a
&lt;asp:label&gt;.
     <p>
     <hr>
     <form action="controls.aspx" runat=server>
       <font face="Verdana">
         Please enter your name: <asp:textbox id="Name" runat=server/>
                         <asp:button text="Enter" Onclick="EnterBtn_Click"
 runat=server/>
         <p>


         <asp:label id="Message"  runat=server/>
       </font>
     </form>
   </body>
```

```
</html>
```

6.2.1.4 Handling Multiple Control Action Events

Event handlers provide a clean way to structure logic within an ASP.NET page. For example, the following codes demonstrates how to wire and handle four button events on a single page.

```
<html>

  <script language="C#" runat="server">

    void AddBtn_Click(Object Src, EventArgs E) {

      if (AvailableFonts.SelectedIndex != -1) {

        InstalledFonts.Items.Add(new ListItem(AvailableFonts.SelectedItem.Value));

        AvailableFonts.Items.Remove(AvailableFonts.SelectedItem.Value);

      }

    }

    void AddAllBtn_Click(Object Src, EventArgs E) {

      while (AvailableFonts.Items.Count != 0) {

        InstalledFonts.Items.Add(new ListItem(AvailableFonts.Items[0].Value));

        AvailableFonts.Items.Remove(AvailableFonts.Items[0].Value);

      }

    }

    void RemoveBtn_Click(Object Src, EventArgs E) {

      if (InstalledFonts.SelectedIndex != -1) {

        AvailableFonts.Items.Add(new ListItem(InstalledFonts.SelectedItem.Value));
        InstalledFonts.Items.Remove(InstalledFonts.SelectedItem.Value);
      }
    }
    void RemoveAllBtn_Click(Object Src, EventArgs E) {
      while (InstalledFonts.Items.Count != 0) {
        AvailableFonts.Items.Add(new ListItem(InstalledFonts.Items[0].Value));
        InstalledFonts.Items.Remove(InstalledFonts.Items[0].Value);
      }
    }
  </script>
  <body>
    <h3><font face="Verdana">………………………………</font></h3>
    <p>
```

That’s the ways to handle multiple control action events raised from different &lt;asp:button&gt; controls.

```
    <p>
    <hr>
    <form action="controls.aspx" runat=server>
      <table>
        <tr>
          <td>
          </td>
          <td>
            <!-- Filler -->
```

```
  </td>
  <td>
   Installed Fonts
  </td>
 </tr>
 <tr>
  <td>
   <asp:listbox id="ClassCategories" width="100px" runat=server>
     <asp:listitem>Education</asp:listitem>
     <asp:listitem>Business</asp:listitem>
     <asp:listitem>Jobs</asp:listitem>
     <asp:listitem>For Sale</asp:listitem>
     <asp:listitem>To let</asp:listitem>
   </asp:listbox>
  </td>
  <td>
   <!-- Filler -->
  </td>
  <td>
   <asp:listbox id="LinkCats" width="100px" runat=server>
      <asp:listitem>Jobs</asp:listitem>
      <asp:listitem>Design</asp:listitem>
      <asp:listitem>Arts</asp:listitem>
   </asp:listbox>
```

```
      </td>
     </tr>
     <tr>
      <td>
       <!-- Filler -->
      </td>
      <td>
       <asp:button text="<<" OnClick="RemoveAllBtn_Click" runat=server/>
       <asp:button text="<" OnClick="RemoveBtn_Click" runat=server/>
       <asp:button text=">" OnClick="AddBtn_Click" runat=server/>
       <asp:button text=">>" OnClick="AddAllBtn_Click" runat=server/>
      </td>
      <td>
       <!-- Filler -->
      </td>
     </tr>
    </table>
   </form>
  </body>

</html>
```

6.2.1.5 Performing Page Navigation

Page navigation among multiple pages is a common scenario in virtually all Web applications. The following code demonstrates how to use the <asp:hyperlink runat=server> control to navigate to another page (passing custom query string parameters along the way). The code then demonstrates how to easily get access to these query string parameters from the target page.

```
<html>
  <script language="C#" runat="server">
    void Page_Load(Object Src, EventArgs E) {
      Random randomGenerator = new Random(DateTime.Now.Millisecond);
      int randomNum = randomGenerator.Next(0, 3);
      switch(randomNum) {
        case 0:
          Name.Text = "Admin";
          break;
        case 1:
          Name.Text = "Moderator";
          break;
        case 2:
          Name.Text = "User";
          break;
      }
```

```
        AnchorLink.NavigateUrl = "controls_navigationtarget.aspx?name=" +
System.Web.HttpUtility.UrlEncode(Name.Text);
    }
  </script>
  <body>
    <h3><font face="Verdana">Performing Page Navigation (Scenario 1)</font></h3>
    <p>
This code demonstrates how to generate a HTML Anchor tag that will cause the client to
navigate to a new page when he/she clicks it within the browser.
    <p>
    <hr>
    <p>
    <asp:hyperlink id="AnchorLink" font-size=24 runat=server>
      Hi <asp:label id="Name" runat=server/> please click this link!
    </asp:hyperlink>
  </body>
</html>
```

Again not all page navigation are initiated through hyperlinks on the client in my ECommunity application. Client-side page redirects or navigations can also be initiated from the server by an ASP.NET page developer by calling the Response.Redirect(url) method. This is typically done when server-side validation is required on some client input before the navigation actually takes place.

The following code demonstrates how to use the Response.Redirect method to pass parameters to another target page. It also demonstrates how to easily get access to these parameters from the target page.

```
<html>
   <script language="C#" runat="server">
      void EnterBtn_Click(Object Src, EventArgs E) {
         // Navigate to a new page (passing name as a querystring argument) if
         // user has entered a valid name value in the <asp:textbox>
         if (Name.Text != "") {
           Response.Redirect("Controls_NavigationTarget.aspx?name=" +
System.Web.HttpUtility.UrlEncode(Name.Text));
         }
         else {
           Message.Text = "The value in Name* is required!";
         }
      }
   </script>
   <body>
     <h3><font face="Verdana">……………………………….</font></h3>
      <p>
This code demonstrates how to navigate to a new page from within a &lt;asp:button&gt;
click event, passing a &lt;asp:textbox&gt; value as a querystring argument (validating
first that the a legal textbox value has been specified).
```

```
    <p>
    <hr>
    <form action="registration.aspx" runat=server>
      <font face="Verdana">
        Please enter your name: <asp:textbox id="Name" runat=server/>
                        <asp:button text="Enter" Onclick="EnterBtn_Click"
runat=server/>
        <p>
        <asp:label id="sName" forecolor="red" font-bold="true" runat=server/>
      </font>
    </form>
  </body>
</html>
```

6.2.1.6 The RequiredFieldValidator Control.

Given an excerpt, the user is expected to enter two values. If he or she skips any one of the values and clicks the Submit button, the system will report the error. Please notice that I do not require any extra code for performing this validation.When the Submit button is clicked, the form will be sent to the server, and the server will do the automatic validation.The code for this application, as shown below, is self-explanatory

```
<!— Required Field Validator —>
<html><head</head>
```

```
<title> Required Field validator</title><body>
<form runat="server"><br> Choose login name:
<asp:TextBox id="txtName" rows="1 " width="50" runat="server"/>
<asp:RequiredFieldValidator id="validTxtName"
runat="server" controlToValidate="txtName"
errorMessage="Name must be entered" display="static">
</asp:RequiredFieldValidator></br>
Choose Password
<asp:TextBox id="txtH" width ="30" runat="server" />
<asp:RequiredFieldValidator id="validTxtH" runat="server"
controlToValidate="txtH" errorMessage="Hours must be entered"
display="static">
</asp:RequiredFieldValidator></br>
<asp:Button id="btnSubmit" runat="server" text="Submit" />
</form></body></html>
```

6.2.1.7 Performing Custom Validation

The CustomValidator server control calls a user-defined function to perform validations that the standard validators can't handle. The custom function can execute on the server or in client-side script. For client-side custom validation, the name of the custom function must be identified in the ClientValidationFunction property. The custom function must have the form

```
 function myvalidator(source, arguments)
```

Note that source is the client-side CustomValidator object, and arguments is an object with two properties, Value and IsValid. The Value property is the value to be validated and the IsValid property is a Boolean used to set the return result of the validation.

For server-side custom validation, place custom validation in the validator's OnServerValidate delegate.

The following codes shows how to use the CustomValidator control

```
<html>
<head>
  <script language="C#" runat=server>
     void ValidateBtn_OnClick(object sender, EventArgs e) {
        if (Page.IsValid) {
           lblOutput.Text = "Page is valid!";
        }
        else {
           lblOutput.Text = "Page is not valid! :-(";
        }
     }
     void ServerValidate (object source, ServerValidateEventArgs value) {
        // even number?
        try {
           int num = Int32.Parse(value.Value);
           if (num%2 == 0) {
              value.IsValid = true;
```

```
            return;
          }
        }
        catch (Exception) { }
        value.IsValid = false;
      }
  </script>
</head>
```

6.2.1.8 User Controls

In addition to the built-in server controls provided by ASP.NET, I can easily define my own controls using the same programming techniques that I have already learned for writing Web Forms pages. In fact, with just a few modifications, almost any Web Forms page can be reused in another page as a server control (note that a user control is of type System.Web.UI.UserControl, which inherits directly from System.Web.UI.Control). A Web Forms page used as a server control is named a user control for short. As a matter of convention, the .ascx extension is used to indicate such controls. This ensures that the user control's file cannot be executed as a standalone Web Forms page (you will see a little that there are a few, albeit important, differences between a user control and a Web Forms page). User controls are included in a Web Forms page using a Register directive:

```
<%@ Register TagPrefix="EC" TagName="SearchModule" Src="SearchModule.ascx"
%><%@ Register TagPrefix="EC" TagName="LinksModule" Src="LinksModule.ascx"
```

```
%><%@ Register TagPrefix="EC" TagName="EventsModule"
Src="EventsModule.ascx" %><%@ Register TagPrefix="EC"
TagName="ForumsModule" Src="ForumsModule.ascx" %><%@ Register
TagPrefix="EC" TagName="ClassifModule" Src="ClassifModule.ascx" %>
```

The TagPrefix determines a unique namespace for the user control (so that multiple user controls with the same name can be differentiated from each other). The TagName is the unique name for the user control (can choose any name). The Src attribute is the virtual path to the user control--for example “ForumsModule.ascx" or "/ECommunity/ForumsModule.ascx". After registering the user control, I can place the user control tag in the Web Forms page just as you would an ordinary server control (including the runat="server" attribute):

```
<EC:Message runat="server"/>
```

The following code shows a user control imported into another Web Forms page.

```
<%@ Page Language="C#" %>
<%@ Register TagPrefix="EC" TagName="Links" Src="LinksModule.ascx" %>
<html>
<body style="font: 10pt verdana">
  <h3>Forums User Control</h3>
  <EC:Message runat="server"/>
</body>
</html>
```

```
<%@ Control language="c#" Codebehind="LinksModule.cs" AutoEventWireup="false"
Inherits="ECommunity.LinksModule" %>
<table width="100%" cellspacing="0" cellpadding="0">
  <tr>
    <td class="StylesColumnTD" width="12" valign="top"><img src="a.gif"></td>
    <td class="StylesColumnTD" width="100%" align="center"><font
class="StylesColumnFONT">Links</font></td>
    <td class="StylesColumnTD" width="12" valign="top" align="right"><img
src="b.gif"></td>
  </tr><tr>
  <td colspan="3">

  <table id="Links_holder" runat="Server" class="FormTABLE">
    <tr>
      <td class="ColumnTD"><asp:LinkButton EnableViewState=false
id="Links_Column_link_name" Text="" CommandArgument="l.lname"
onClick="Links_SortChange" cssclass="ColumnFONT" runat="server"/></td>
    </tr>
    <tr id=Links_no_records runat="server">
     <td class="DataTD" colspan="1"><font class="DataFONT">No
records</font></td>
    </tr>
    <tr>
    <td><asp:Repeater EnableViewState=false id=Links_Repeater runat="server">
```

```
   <HeaderTemplate>
     </td></tr>
   </HeaderTemplate>
   <ItemTemplate>
     <tr>
      <td class="DataTD"><asp:HyperLink EnableViewState=false
id=Links_link_name NavigateUrl='<%#  DataBinder.Eval(Container.DataItem,
"l_linurl")+"?" +""%>' cssclass="DataFONT" runat="server">
<%#Server.HtmlEncode(DataBinder.Eval(Container.DataItem, "l_lname").ToString())
%> </asp:HyperLink>&nbsp;</td>
     </tr>
   </ItemTemplate>
  </asp:Repeater></td>
  </tr>
 </table></td>
 </tr>
 <tr><a href="Links.<%
Response.Write(ViewState["Links_Extension"].ToString());%>"><font color="red"
face="arial" size=1>More...</font></a>
</font></td>
  <td class="StylesColumnTD" width="12" valign="bottom" align="right"><img
src="a.gif"></td>
 </tr>
</table>
```

When a Web Forms page is treated as a control, the public fields and methods of that Web Form are promoted to public properties (that is, tag attributes) and methods of the control as well.

```
<%@ Register TagPrefix="EC" TagName="Forums" Src="Forums.ascx" %>
<html>
 <script language="C#" runat="server">
   void SubmitBtn_Click(Object sender, EventArgs E) {
      MyMessage.Text = "Message text";
      MyMessage.Color = "black";
   }
 </script>
<body style="font: 10pt verdana">
 <h3>……………………</h3>
 <form runat="server">
   <EC:Message id="MyMessage" Text="message" Color="black" runat="server"/>
   <p>
   <asp:button text="Change Properties" OnClick="SubmitBtn_Click" runat=server/>
 </form>
</body>
</html>
<script language="C#" runat="server">
  public String Color = "black";
  public String Text = "Message";
```

```
</script>
<span id="Message" style="color:<%=Color%>"><%=Text%></span>
```

In addition to promoting public fields to control properties, the property syntax may be used. Property syntax has the advantage of being able to execute code when properties are set or retrieved. The following codes demonstrates an Address user control that wraps the text properties of TextBox controls within it. The benefit of doing this is that the control inherits the automatic state management of the TextBox control for free.

Encapsulating events in a user control, user controls participate in the complete execution lifecycle of the request, much the way ordinary server controls do. This means that a user control can handle its own events, encapsulating some of the page logic from the containing Web Forms page.

User controls allow me to easily define custom controls using the same programming techniques as for writing Web Forms pages. As a matter of convention, an .ascx file name extension is used to indicate such controls. This ensures that a user control file cannot be executed as a standalone Web Forms page. User controls are included into another Web Forms page using a Register directive, which specifies a TagPrefix, TagName, and Src location.

After the user control has been registered, a user control tag may be placed in a Web Forms page as an ordinary server control (including the runat="server" attribute).

The public fields, properties, and methods of a user control are promoted to public properties (tag attributes) and methods of the control in the containing Web Forms page.

User controls participate in the complete execution lifecycle of every request and can handle their own events, encapsulating some of the page logic from the containing Web Forms page.

User controls should not contain any form controls but should instead rely on their containing Web Forms page to include one if necessary.

User controls may be created programmatically using the LoadControl method of the System.Web.UI.Page class. The type of the user control is determined by the ASP.NET runtime, following the convention filename_extension.

The strong type for a user control is available to the containing Web Forms page only if a Register directive is included for the user control (even if there are no user control tags actually declared).

6.2.1.9 Data Binding

ASP.NET introduces a new declarative data binding syntax. This extremely flexible syntax permits me to bind not only to data sources, but also to simple properties, collections, expressions, and even results returned from method calls. The following shows some examples of the new syntax.

Simple property Member: <%# memberID %>

Collection members: <asp:ListBox id="ListMember" datasource='<%# arrayMembers %>' runat="server">

Expression Contact: <%# (member.First Name + " " + member.LastName) %>

Although this syntax looks similar to the ASP shortcut for Response.Write -- <%= %> -- its behavior is quite different. Whereas the ASP Response.Write shortcut syntax was evaluated when the page was processed, the ASP.NET data binding syntax is evaluated only when the DataBind method is invoked.

DataBind is a method of the Page and all server controls. When you call DataBind on a parent control, it cascades to all of the children of the control. So, for example, DataList.DataBind() invokes the DataBind method on each of the controls in the DataList templates. Calling DataBind on the Page -- Page.DataBind() or simply DataBind() -- causes all data binding expressions on the page to be evaluated. DataBind is commonly called from the Page_Load event.

Using DataBinder.Eval , the ASP.NET framework supplies a static method that evaluates late-bound data binding expressions and optionally formats the result as a string. DataBinder.Eval is convenient in that it eliminates much of the explicit casting the developer must do to coerce values to the desired data type. It is particularly useful when data binding controls within a templated list, because often both the data row and the data field must be cast.
With the standard ASP.NET data binding syntax, I must first cast the type of the data row in order to retrieve the data field, IntegerValue. Next, this is passed as an argument to the String.Format method.

```
<%# String.Format("{0:c}", ((DataRowView)Container.DataItem)["IntegerValue"]) %>
```

This syntax can be complex and difficult to remember. In contrast, DataBinder.Eval is simply a method with three arguments: the naming container for the data item, the data field name, and a format string. In a templated list like DataList, DataGrid, or Repeater, the naming container is always Container.DataItem. Page is another naming container that can be used with DataBinder.Eval.

```
<%# DataBinder.Eval(Container.DataItem, "IntegerValue", "{0:c}") %>
```

The format string argument is optional. If it is omitted, DataBinder.Eval returns a value of type object, as shown in the following;

```
<%# (bool)DataBinder.Eval(Container.DataItem, "BoolValue") %>
```

It is important to note that DataBinder.Eval can carry a noticeable performance penalty over the standard data binding syntax because it uses late-bound reflection. Use DataBinder.Eval judiciously, especially when string formatting is not required.

```
 <%@ Import namespace="System.Data" %>
<html>
<head>
   <script language="C#" runat="server">
      void Page_Load(Object sender, EventArgs e) {
         if (!Page.IsPostBack) {
            DataTable dt = new DataTable();
            DataRow dr;
            dt.Columns.Add(new DataColumn("IntegerValue", typeof(Int32)));
            dt.Columns.Add(new DataColumn("StringValue", typeof(string)));
            dt.Columns.Add(new DataColumn("DateTimeValue", typeof(DateTime)));
            dt.Columns.Add(new DataColumn("BoolValue", typeof(bool)));
            for (int i = 0; i < 9; i++) {
                dr = dt.NewRow();
                dr[0] = i;
                dr[1] = "Item " + i.ToString();
                dr[2] = DateTime.Now;
                dr[3] = (i % 2 != 0) ? true : false;
                dt.Rows.Add(dr);
            }
            dataList1.DataSource = new DataView(dt);
            dataList1.DataBind();
        }
    }
  </script>
</head>
<body>
  <h3><font face="Verdana">…………………</font></h3>
  <form runat=server>
    <asp:DataList id="dataList1" runat="server"
        RepeatColumns="3"
        Width="80%"
        BorderColor="black"
        BorderWidth="1"
        GridLines="Both"
        CellPadding="4"
    CellSpacing="0"
    >
    <ItemTemplate>
        Date post: <%# DataBinder.Eval(Container.DataItem, "DateTimeValue",
"{0:d}") %>
        <p>
        Amount: <%# DataBinder.Eval(Container.DataItem, "IntegerValue",
"{0:N2}") %>
        <p>
        Content: <%# DataBinder.Eval(Container.DataItem, "StringValue") %>
        Validity Date: <asp:CheckBox id=chk1 Checked='<%#
(bool)DataBinder.Eval(Container.DataItem, "BoolValue") %>' runat=server/>
        <p>
    </ItemTemplate>
    </asp:Datalist>
  </form>
</body>
</html>
```

6.2.1.10 The Global.asax File

In addition to writing UI code, I also add application level logic and event handling code into my Web applications. This code does not handle generating UI and is typically not invoked in response to individual page requests. Instead, it is responsible for handling higher-level application events such as Application_Start, Application_End, Session_Start, Session_End, and so on. I author this logic using a Global.asax file located at the root of a particular Web application's virtual directory tree. ASP.NET automatically parses and compiles this file into a dynamic .NET Framework class--which extends the HttpApplication base class--the first time any resource or URL within the application namespace is activated or requested.

The Global.asax file is parsed and dynamically compiled by ASP.NET into a .NET Framework class the first time any resource or URL within its application namespace is activated or requested. The Global.asax file is configured to automatically reject any direct URL request so that external users cannot download or view the code within.

In Application or Session-Scoped Events, I can define handlers for events of the HttpApplication base class by authoring methods in the Global.asax file that conform to the naming pattern "Application_EventName(AppropriateEventArgumentSignature)".

```
<script language="C#" runat="server">
namespace ECommunity
{
   using System;
   using System.Collections;
   using System.ComponentModel;
   using System.Web;
   using System.Web.SessionState;
   using ecom.DAL;
```

```
/// <summary>
///  Summary description for Global.
/// </summary>
public class Global : System.Web.HttpApplication
{
   protected void Application_Start(Object sender, EventArgs e)
   {

Application["ConnectionString"]=System.Configuration.ConfigurationSettings.AppSettings["sECommunityDBConnectionString"];
    Application["ClientsKeys"]=new ClientsKeys();
   }
   protected void Session_Start(Object sender, EventArgs e)
   {
   }
   protected void Application_BeginRequest(Object sender, EventArgs e)
   {
   }
   protected void Application_EndRequest(Object sender, EventArgs e)
   {
   }
   protected void Session_End(Object sender, EventArgs e)
   {
   }
```

```
      protected void Application_End(Object sender, EventArgs e)
       {
       }
      protected void Application_Error(Object sender, EventArgs E) {
       Context.ClearError();
       Response.Redirect("errorpage.htm");
    }
  }
}
<html>
<script language="C#" runat="server">
    void Page_Load(Object sender, EventArgs e) {
       Response.Write("In Page.Load()...<br>");
    }
    void Session_Click(Object sender, EventArgs e) {
       Session.Abandon();
       Response.Redirect("default.aspx");
    }
    void Error_Click(Object sender, EventArgs e) {
       throw new Exception();
    }
 </script>
 <body>
  <form runat="server">
```

```
    <input type="submit" Value="Refresh This Page" runat="server"/>
    <input type="submit" OnServerClick="Session_Click" Value="End This Session"
runat="server"/>
    <input type="submit" OnServerClick="Error_Click" Value="Generate An Error"
runat="server"/><p>
    <hr>
  </form>
  </body>
</html>
```

errorpage.htm

```
<html>
<body>
//custom error page that will be displayed to clients anytime an unhandled exception
occurs //during the current web application. This can be configured via the web.config
file.
</body>
</html>
```

Web.config

```
<configuration>
 <system.web>
  <globalization requestEncoding="UTF-8" responseEncoding="UTF-8" />
 </system.web>
</configuration>
```

The first time the page is opened, the Start event is raised for the application and the session:

```
void Application_Start(object sender, EventArgs e) {
// Application startup code goes here
}
void Session_Start(object sender, EventArgs e) {
 Response.Write("Session is Starting...<br>");
 Session.Timeout = 1;
}
```

The BeginRequest and EndRequest events are raised on each request. When the page is refreshed, only messages from BeginRequest, EndRequest, and the Page_Load method will appear. Note that by abandoning the current session (click the "End this session" button) a new session is created and the Session_Start event is raised again. In Application or Session-scoped objects, static objects, .NET Framework classes, and COM components all can be defined in the Global.asax file using the object tag. The scope can be appinstance, session, or application. The appinstance scope denotes that the object is specific to one instance of HttpApplication and is not shared.

```
<object id="id" runat="server" class=".NET Framework class Name"
scope="appinstance"/>
<object id="id" runat="server" progid="COM ProgID" scope="session"/>
<object id="id" runat="server" classid="COM ClassID" scope="application"/>
```

6.2.1.11 Web configuration

The configuration capabilities provided by ASP.NET enable me to configure almost every aspect of ASP.NET and the way that your applications are processed. It provides this ability through the use of the machine.config file and web.config files.These files are processed in a hierarchical manner with each higher-level file overriding previous settings. All settings are cached, and when a change is detected in the configuration files, the configuration is then recached.

When using the configuration files to configure ASP.NET, various tags, subtags, attributes, and options are used. Each of these enables me to control built-in configuration options or create new configuration options as you see fit. By using the available options, I can control everything from application variables down to compilation options.

The configuration files used by ASP.NET are formatted in XML and are case-sensitive. I need to use the correct formatting for these files is critical if I want my configuration to work correctly. All values within my configuration are accessible by using one of the three methods listed in the “Retrieving Settings” section.

```
<configuration>
   <!-- store the database connection info here -->
   <appSettings>
      <add key="sECommunityDBConnectionString"
value="Provider=Microsoft.Jet.OLEDB.4.0;User ID=Admin;Data
```

```
Source=C:\Inetpub\wwwroot\ECommunity\ECommunity.mdb;Persist Security
Info=False" />
   </appSettings>
  <system.web>
   <!--  DYNAMIC DEBUG COMPILATION
       Set compilation debug="true" to enable ASPX debugging.  Otherwise, setting this
value to
       false will improve runtime performance of this application.
       Set compilation debug="true" to insert debugging symbols (.pdb information)
       into the compiled page. Because this creates a larger file that executes
       more slowly, you should set this value to true only when debugging and to
       false at all other times. For more information, refer to the documentation about
       debugging ASP .NET files.
   -->
   <compilation
      defaultLanguage="c#"
      debug="true"
   />

   <!--  CUSTOM ERROR MESSAGES
      Set customError mode values to control the display of user-friendly
      error messages to users instead of error details (including a stack trace):

      "On" Always display custom (friendly) messages
```

```
        "Off" Always display detailed ASP.NET error information.
        "RemoteOnly" Display custom (friendly) messages only to users not running
        on the local Web server. This setting is recommended for security purposes, so
        that you do not display application detail information to remote clients.
    -->
    <customErrors
    mode="RemoteOnly"
    />

    <!--  AUTHENTICATION
        This section sets the authentication policies of the application. Possible modes are
"Windows", "Forms",
        "Passport" and "None"
    -->
    <authentication mode="Windows" />

    <!--  APPLICATION-LEVEL TRACE LOGGING
        Application-level tracing enables trace log output for every page within an
application.
        Set trace enabled="true" to enable application trace logging.  If
pageOutput="true", the
        trace information will be displayed at the bottom of each page.  Otherwise, you
can view the
        application trace log by browsing the "trace.axd" page from your web application
        root.
    -->
    <trace
      enabled="false"
      requestLimit="10"
      pageOutput="false"
      traceMode="SortByTime"
              localOnly="true"
    />

    <!--  SESSION STATE SETTINGS
      By default ASP .NET uses cookies to identify which requests belong to a
particular session.
      If cookies are not available, a session can be tracked by adding a session identifier
to the URL.
      To disable cookies, set sessionState cookieless="true".
    -->
    <sessionState
        mode="InProc"
        stateConnectionString="tcpip=127.0.0.1:42424"
        sqlConnectionString="data source=127.0.0.1;user id=sa;password="
        cookieless="false"
        timeout="20"
    />
```

```
  <!-- GLOBALIZATION
       This section sets the globalization settings of the application.
  -->
  <globalization
       requestEncoding="utf-8"
       responseEncoding="utf-8"
  />
</system.web>
</configuration>
```

6.2.1.12 Customizing Error Pages

Depending on the circumstances, I might want to handle application errors in different ways. For example, at development time I probably want to see the detailed error pages that ASP.NET provides to help you identify and fix problems. However, once an application is being served in a production environment, I probably do not want to display detailed errors to the ECommunity users or members. I can use ASP.NET to specify whether errors are shown to local clients, to remote clients, or to both. By default, errors are shown only to local clients (those clients on the same computer as the server). I can also specify a custom error page to redirect clients to if an error occurs.

Custom errors are enabled in the Web.config file for an application. For example:

```
<configuration>
```

```
    <system.web>
        <customErrors defaultRedirect="errorpage.htm" mode="remoteonly" />
    </system.web>
</configuration>
```

This configuration enables local clients to see the default ASP.NET detailed error pages but redirects remote clients to a custom page, genericerror.htm. This page could be an .aspx page as well. ASP.NET passes the path of the page on which the error occurred to the error page as a QueryString argument. Note that if the execution of the error page generates an error, a blank page is sent back to the remote client.

```
<%@ Page Language="C#" Description="Error page"%>
<html>
<head>
<title>Error page</title>
</head>
<body>
<h1>Error page</h1>
Error originated on: <%=Request.QueryString["ErrorPage"] %>
</body>
</html>
```

Note: Only files mapped to the aspnet_isapi.dll extension in IIS generate these errors. Files not served through the aspnet_isapi.dll are not processed by ASP.NET and generate IIS errors.

The following table describes the configuration attributes and values for the <customerrors> tag.

Attribute Description

Mode Indicates whether custom errors are enabled, disabled, or only shown to remote computers. Values: On, Off, RemoteOnly (default).

DefaultRedirect Indicates the default URL to which a browser should be redirected if an error occurs. This attribute is optional.

The Mode attribute determines whether errors are shown to local clients, remote clients, or both. The effects of each setting are described as follows;

Table 6.3: Effects of Custom Error Settings

Mode	Local Host request	Remote Host request
On	Custom error page	Custom error page
Off	ASP.NET error page	ASP.NET error page
RemoteOnly	ASP.NET error page	Custom error page

6.2.2 Coding Style

C# is a modern object-oriented language and offer a great varieties and complexities in the styles of programming, as it varies from one programmer to another, but yet it display a unique and the simpler way of presenting and documenting the codes. The Microsoft .NET Framework software development kit (SDK) and a text editor are all I need to begin programming in C#. The Windows family of operating systems supplies several adequate editors including Notepad. Microsoft sells a feature rich development environment for developing .NET applications:Visual Studio .NET. I can use C# in development of console applications, graphical user interface (GUI) applications, and Web-based applications. A command-line compiler, csc.exe, is supplied with the .NET Framework SDK. I use it to compile console applications.

Every C# program must have a static Main method, which is the entry point of the program. C# does not support global functions, so Main must be a class method. My coding style would include using namespaces to group related classes together. The using keyword allows me to reference a class object without prefixing it with the full namespace. I can also use source code control comments to document my program classes and methods for other programmers that may call my code in the near future.

6.2.2.1 Variable Declarations

```
int x;
String s;
String s1, s2;
Object o;
```

C# supports two data types: value types and reference types. Value types are allocated on the stack and include primitive types such as numerics, Booleans, characters, and strings. Structures and Enums are also value types. Reference types are allocated on the stack and are typically instances of class objects. C# does not support pointers.

Statements

```
Response.Write("Welcome!");
```

Comments

```
// Members log in event

/*

Filename : default.cs

This is the startup page

*/
```

Properties are method calls that appear to be member variables. Properties hide the underlying data type allowing me to change the implementation without the need to change code that uses the property. Indexers allow me to use array syntax to access a list of objects contained inside another class. Like properties, indexers hide the underlying implementation allowing me to change it without the need to change code that uses the indexer.

Implementing indexers that support the IEnumerator interface allows me to use the for-each looping syntax to access the list objects of the indexer. I can use delegates to call subscribed method calls when a triggering event happens. Delegates are similar to callback functions in Microsoft Windows programs or function pointers in C++.

A single cast delegate invokes a single subscribed method.A multicast delegate invokes more than one subscribed method. Events are a type of a delegate that is provided for me in the .NET Framework. Methods subscribing to an event always provide the same set of arguments.This differs from delegates in that each delegate provides a unique signature for its subscribed methods.

6.2.2.2 Accessing Indexed Properties

```
String s = Request.QueryString["Name"];

String value = Request.Cookies["key"];
```

6.2.2.3 Declaring Indexed Properties

```
// Default Indexed Property

public String this[String name] {

   get {
      return (String) lookuptable[name];
   }

}
```

6.2.2.4 Declaring Simple Properties

```
public String name {
 get {

   ...

   return ...;

 }

 set {

   ... = value;

 }

}
```

6.2.2.5 Declare and Use an Enumeration

```
// Declare the Enumeration
public enum MessageSize {
   Small = 0,
   Medium = 1,
   Large = 2
}
```

6.2.2.6 Enumerating a Collection

```
foreach ( String s in forums ) {
...
}
```

6.2.2.7 Declare and Use Methods

```
// Declare a void return function
void voidfunction() {
...
}
```

```
// Declare a function that returns a value
String stringfunction() {
...
```

```
    return (String) val;

}

// Declare a function that takes and returns values

String parmfunction(String a, String b) {

...

    return (String) (a + b);

}

// Use the Functions

voidfunction();

String s1 = stringfunction();

String s2 = parmfunction("Thank you", "You are already log in!");
```

6.2.2.8 Arrays

```
    String[] a = new String[3];

    a[0] = "1";

    a[1] = "2";

    a[2] = "3";

    String[][] a = new String[3][3];

    a[0][0] = "1";

    a[1][0] = "2";

    a[2][0] = "3";
```

6.2.2.9 Initialization

```
String s = "Welcome";

int i = 1;
```

C# supports the control structures you normally find in a modern language: if-else conditional, for loop, do while loop, while loop, and the switch statement. The test expression in an if-else statement must evaluate to a Boolean value. Numeric test expressions are not supported as they are in C/C++. The switch statement does not support falling through to the next case statement as it does in C/C++.

6.2.2.10 If Statements

```
if (Request.QueryString != null) {
 ...
}
```

6.2.2.11 While Loops

```
int i = 0;

while (i<10) {

 Console.WriteLine(i.ToString());
 i += 1;

}
```

I use exception handling return and trap errors in C# programs.Exception handling uses the try-catch-finally syntax. Try blocks define the code that may throw exceptions. One or more catch blocks trap and handle exceptions of various types.The finally block is always executed regardless of whether an exception was thrown and is typically used to free resources. Because the .NET Common Language Runtime (CLR) may throw exceptions even if I don't, I should catch exceptions somewhere near the top of my call chain to be sure that the program will continue running.

6.2.2.12 Exception Handling

```
try {

   // Code that throws exceptions
} catch(OverflowException e) {
   // Catch a specific exception

} catch(Exception e) {

   // Catch the generic exceptions

} finally {

   // Execute some cleanup code
}

public void ValidateNumeric(object source, ServerValidateEventArgs args) {

   try{
     Decimal temp=Decimal.Parse(args.Value);
     args.IsValid=true;
```

```
    }catch{

    args.IsValid=false; }

}
```

6.2.2.13 String Concatenation

```
// Using Strings

String s1;

String s2 = "Welcome";
s2 += " ";
s1 = s2 + " !!!";
```

6.2.2.14 Event Handler Delegates

```
void Button_Click(Object sender,

            EventArgs E) {

...

}
```

6.2.2.15 Declare Events

```
// Create a public event

public event EventHandler MyEvent;

// Create a method for firing the event

protected void OnMyEvent(EventArgs e) {
    MyEvent(this, e);

}
```

6.2.2.16 Add or Remove Event Handlers to Events

```
Control.Change += new EventHandler(this.ChangeEventHandler);

Control.Change -= new EventHandler(this.ChangeEventHandler);
```

6.2.2.17 Casting

```
MyObject obj = (MyObject)Session["Some Value"];

IMyObject iObj = obj;
```

6.2.2.18 Conversion

```
int i = 3;
String s = i.ToString();

double d = Double.Parse(s);
```

6.2.2.19 Class Definition with Inheritance, Implementing an interface

C# is an object-oriented language and as such supports inheritance and polymorphism.

Inheritance means I can create a new type of object B that inherits all of the

characteristics of an existing object A. Polymorphism means that this new object B can

choose to inherit some

characteristics and supply its own implementation for others.

```
namespace ECommunity
{
using System;
using System.Collections;
using System.ComponentModel;
using System.Data;
using System.Data.OleDb;
using System.Drawing;
using System.Web;
using System.Web.SessionState;
using System.Web.UI;
using System.Web.UI.WebControls;
using System.Web.UI.HtmlControls;

public class AdmMemberList : System.Web.UI.Page

{
 //AdmMemberList CustomIncludes begin
 protected CCUtility Utility;
 //Search form Search variables and controls declarations
 protected System.Web.UI.WebControls.Button Search_search_button;
 protected System.Web.UI.WebControls.TextBox Search_member_login;
 protected System.Web.UI.WebControls.TextBox Search_member_first_name;
protected System.Web.UI.WebControls.TextBox Search_member_last_name;
//Grid form members variables and controls declarations
protected System.Web.UI.HtmlControls.HtmlTableRow members_no_records;
protected int members_CountPage;
protected CCPager members_Pager;protected
System.Web.UI.WebControls.LinkButton
public AdmMemberList()
{
 this.Init += new System.EventHandler(Page_Init);
}
```

Class and Class Member Access Modifiers & Visibility

Public	- Accessible from anywhere
protected	- Accessible from this class or any class derived from this class
internal	- Accessible within current program (assembly) only
protected internal	- Accessible within current program (assembly) or any class derived from this class
private (default)	- Accessible only within current class

6.3 CONCLUSION

This chapter has precisely described the system implementation phase for the system. System implementation is a phase that integrates the designed modules or functions to develop a system based on the given requirements. This phase includes the building and testing its contained modules and sub-modules, involving system requirements and design conversion into program codes. The usage of suitable hardware and software tools can help to achieve the development objectives for the system. In the Development Environment Section, the hardware and software tool that were used for this system development are listed and explained clearly.

To implement the system design into a full-integrated system can effective system coding style and coding approach must be chosen and used. This phase marks the start of coding and not developing of the system. In the system coding section, the coding style and coding approach for each scripting languages is precisely described and explained.

During this phase, some modifications of design have been done to make the system more usable and powerful. In the next chapter, the system testing will be carried out. The objectives of testing and types of testing that has been done will be precisely explained.

7.0 Introduction

The main function of testing is to establish the presence of defects in a program and to judge whether the program is usable in real application. Nevertheless, testing can only demonstrate the presence of errors. It cannot show that there is no error in the program. Therefore, a more suitable approach must be chosen to reduce the possibility of errors in a program.

Bottom-up approach is adopted in system testing for E-Community. Each module at the lowest level of the system hierarchy is tested individually. Then, all the tested modules would be related to the next module testing. This approach is repeated until all the modules are tested successfully.

7.1 Testing Process

In general, the testing process of E-Community can be shown in the following figure. All the details will be further explained in subsequent sub-sections.

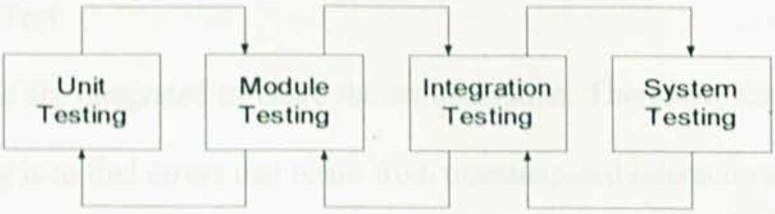


Figure 7.1: Testing Process of E-Community

7.2 Types of Testing

7.2.1 Unit Testing

Unit test is the process to test the individual component to ensure that they function properly. Each component is tested independently without the interference from other system components. Unit test is performed concurrently with the development process.

7.2.2 Module Testing

Module testing is performed without other system modules. A module consists of a collection of dependent components to perform a particular task or function. Different possible test cases are applied to the module and the test results would be verified. Unusual results will be analyzed and they would help in debugging sub-modules in order to produce the desired output.

7.2.3 Integration Test

Integration test is needed when all modules are integrated. The main focus in integration test is to navigate the interfaces repeatedly to detect any interface mismatch problem.

Several important aspects are checked to ensure that the flow of the data in ELONS is well organized and are user friendly to all the system users.

7.2.4 System Test

The sub-systems are integrated to make the entire system. Therefore, the main purpose in system testing is to find errors that result from unanticipated interactions between sub-systems. Besides, it is used to validate whether the system meets its functional and non-functional requirement.

Problems might occur by the time the new developed system is integrated to existing system. There are few possibilities that might lead to this mismatch of both new and old system

Finally, a performance test is performed to compare the integrated modules with the non-functional system requirements. These requirements include security, interoperability, flexibility and reliability.

7.3 Integration Test case examples

In this integration testing, the system modules were tested to detect the system error and mistake, which also includes all unit testing is clearly summarized in short given in the table below. There are 5 main modules in this system, links, classifieds, forums, events and the administration modules, comprehensive analysis on the test results have been conducted in making sure that the system has fulfilled the specification as required and completely bug free. All the tests are done carefully, systematically and chronologically as documented in the table below to ensure a smooth program flow in the E-Community web application.

Table 7.1: Analysis of Test Results and Solutioms

No	Test Procedure	Analysis of Test result and solution
1	Load default.aspx which has been pre-set as the startup page for the E-Community project.	Checking out the controls, and navigational bars. Desired output is displayed. Successful and no errors.
2	Try login process. Enter username and password and	Checking the login module to see if it's working as expected and the desired output is

	click login button to initiate the login event	displayed. Successful and no errors.
3	Click on Links navigational button	Links page is displayed. To check the correctness of navigational links.
4	Click Add New Link hyperlink	The Add link page is displayed as desired. To check the correctness of hyperlinks
5	Enter values. First, try with invalid values or try submitting an incomplete form.	The check the correctness of custom validations as been programmed. A message will appear to indicate the error at a strategic position where the users will get to see the errors that they face. Overall this test is successful and there is no errors displayed.
6	Next, still in the same module, try submit the form with complete values and valid values and press submit button.	The check the correctness of the insert module after passing the validation rules. This test is successful and there is no errors displayed.
7	Try key in a invalid value in the search textbox provided and click the search button.	To check the correctness of the binding function, and with the invalid or unmatched keywords, the no_records object will be set to visible. Overall this test is successful and no errors is found
8	Try key in valid values in the search textbox provided and	This is also to check the correctness of the binding function, and with the valid values

	click the search button to initiate the search function.	keyed in, the no_records.visible will be set to false and the matched record will be displayed overall this test is also successful and no errors is found.
9	Click on Classifieds navigational button	Classifieds page is displayed. To check the correctness of navigational links.
10	Click Submit New Classifieds hyperlink	The Add Classifieds page is displayed as desired. To check the correctness of hyperlinks
11	Enter values. First, try with invalid values or try submitting an incomplete form.	The check the correctness of custom validations as been programmed. A message will appear to indicate the error at a strategic position where the users will get to see the errors that they face. Overall this test is successful and there is no errors displayed.
12	Next, still in the same module, try submit the form with complete values and valid values and press submit button.	The check the correctness of the insert module after passing the validation rules. This test is successful and there is no errors displayed.
13	Try key in a invalid value in the search textbox provided and click the search button.	To check the correctness of the binding function, and with the invalid or unmatched keywords, the no_records object will be set to visible. Overall this test is successful and no

		errors is found
14	Try key in valid values in the search textbox provided and click the search button to initiate the search function.	This is also to check the correctness of the binding function, and with the valid values keyed in, the no_records.visible will be set to false and the matched record will be displayed overall this test is also successful and no errors is found.
15	Click on Forums navigational button	Forums page is displayed. To check the correctness of navigational links.
16	Choose any forum name and enter the forum.	The chosen forum name page is displayed as desired. To check the correctness of hyperlinks
17	Try click a new thread or to reply to any messages as displayed in the forum name key in new thread or response	The add messages page is displayed as desired and in this test, no errors is found and overall, this test is also very successful
18	Enter values. First, try with invalid values or try submitting an incomplete form.	The check the correctness of custom validations as been programmed. A message will appear to indicate the error at a strategic position where the users will get to see the errors that they face. Overall this test is successful and there is no errors displayed.
19	Next, still in the same module,	The check the correctness of the insert

	try submit the form with complete values and valid values and press submit button.	module after passing the validation rules. This test is successful and there is no errors displayed.
20	Try key in vulgar words which have been hard-coded into the system as a public function.	All the vulgar words are filtered as desired and not displayed for other users to view so the function is working perfectly good.
21	Try key in a invalid value in the search textbox provided and click the search button.	To check the correctness of the binding function, and with the invalid or unmatched keywords, the no_records object will be set to visible. Overall this test is successful and no errors is found
22	Try key in valid values in the search textbox provided and click the search button to initiate the search function.	This is also to check the correctness of the binding function, and with the valid values keyed in, the no_records.visible will be set to false and the matched record will be displayed overall this test is also successful and no errors is found.
23	Click on Membership navigational button	Membership page is displayed. To check the correctness of navigational links.
24	Do necessary profiles updates and press the update button	Passing the validation rules, the redirect to default page is displayed as desired. To check the correctness of redirectional links upon successful updates of member profiles.

25	Enter values and try with invalid values or try submitting an incomplete form.	The check the correctness of custom validations as been programmed. A message will appear to indicate the error at a strategic position where the users will get to see the errors that they face. Overall this test is successful and there is no errors displayed.
26	Click on the Administration module.	The administration menu is displayed and access rights is only given to administrators overall this test is also successful and no errors are found.
27	Click Announcement and Hot events hyperlink	The Announcement and hot events page is displayed as desired. To check the correctness of hyperlinks
28	Click Add New hyperlink	The Add Events page is displayed as desired. To check the correctness of hyperlinks
29	Enter values. First, try with invalid values or try submitting an incomplete form.	The check the correctness of custom validations as been programmed. A message will appear to indicate the error at a strategic position where the users will get to see the errors that they face. Overall this test is successful and there is no errors displayed.
30	Next, still in the same module, try submit the form with	The check the correctness of the insert module after passing the validation rules. This

	complete values and valid values and press submit button.	test is successful and there is no errors displayed.
31	Click Cool Links Management hyperlink	The Cool links page is displayed as desired. To check the correctness of hyperlinks
32	Click Add New Link hyperlink	The Add link page is displayed as desired. To check the correctness of hyperlinks
33	Enter values. First, try with invalid values or try submitting an incomplete form.	The check the correctness of custom validations as been programmed. A message will appear to indicate the error at a strategic position where the users will get to see the errors that they face. Overall this test is successful and there is no errors displayed.
34	Next, still in the same module, try submit the form with complete values and valid values and press submit button.	The check the correctness of the insert module after passing the validation rules. This test is successful and there is no errors displayed.
35	Try edit and approve the links that have not been approved yet to activate the link to be displayed in the default page	This checked link approval will be displayed without any errors as desired by the application, overall the test is successful and there is no errors shown .
36	Click forums management hyperlink	The Forums management page is displayed as desired. To check the correctness of hyperlinks

37	Click Add New Forum hyperlink	The Add New Forum page is displayed as desired. To check the correctness of hyperlinks
38	Enter values. First, try with invalid values or try submitting an incomplete form.	The check the correctness of custom validations as been programmed. A message will appear to indicate the error at a strategic position where the users will get to see the errors that they face. Overall this test is successful and there is no errors displayed.
39	Next, still in the same module, try submit the form with complete values and valid values and press submit button.	The check the correctness of the insert module after passing the validation rules. This test is successful and there is no errors displayed.
40	Click edit/delete forums hyperlink	The Edit Delete Forums link page is displayed as desired. To check the correctness of hyperlinks and the testing of its functionalities are successful as the messages can be edited with full control by the administrator and also, can be deleted from the system.
41	Click Classifieds Management hyperlink	The Classifieds page is displayed as desired. To check the correctness of hyperlinks
42	Click Add New Link hyperlink	The Add New Classifieds page is displayed as desired. To check the correctness of

		hyperlinks
43	Enter values. First, try with invalid values or try submitting an incomplete form.	The check the correctness of custom validations as been programmed. A message will appear to indicate the error at a strategic position where the users will get to see the errors that they face. Overall this test is successful and there is no errors displayed.
44	Next, still in the same module, try submit the form with complete values and valid values and press submit button.	The check the correctness of the insert module after passing the validation rules. This test is successful and there is no errors displayed.
45	Try edit or update the classifieds and also try delete the unwanted classifieds.	This is to check the correctness of the update and delete function of the module and overall this test is successful and no error is found.
46	Click Membership Management hyperlink	The membership management page is displayed as desired. To check the correctness of hyperlinks
47	Click Add New hyperlink	The Add member page is displayed as desired. To check the correctness of hyperlinks
48	Enter values. First, try with invalid values or try submitting an incomplete form.	The check the correctness of custom validations as been programmed. A message will appear to indicate the error at a strategic

		position where the users will get to see the errors that they face. Overall this test is successful and there is no errors displayed.
49	Next, still in the same module, try submit the form with complete values and valid values and press submit button.	The check the correctness of the insert module after passing the validation rules. This test is successful and there is no errors displayed.
50	Try click the export to excel hyperlink.	To check the correctness of the changes made to HTML header to specify Excel's MIME content type and overall this test is also very successful and no errors is found.
51	Try key in an invalid value in the search textbox provided and click the search button.	To check the correctness of the binding function, and with the invalid or unmatched keywords, the no_records object will be set to visible. Overall this test is successful and no errors is found
52	Try key in valid values in the search textbox provided and click the search button to initiate the search function.	This is also to check the correctness of the binding function, and with the valid values keyed in, the no_records.visible will be set to false and the matched record will be displayed overall this test is also successful and no errors is found.

7.4 Conclusion

In this chapter, the software testing of the proposed system has been described in each sub titles. Software testing phase accounts for the largest percentage of technical effort in the system development. It is a critical part of its quality controls assurance. It represents the complete and extensive review and challenge on the application design, specification and codes.

The objective of this testing is to detect and debug the uncovered errors. During the testing phase, several steps are carried out. Unit testing, integration testing and system testing are planned and executed. Unit and integration testing focus on functional verification of component and incorporation components into a program structure. System testing is designed to reveal bugs not possibly attributed to independent components or units. It is used to validate software once it has been incorporated to longer and sophisticated system. This testing is carried out on the entire integrated system as one unit. Three steps are carried out to complete the testing including function testing, performance testing and acceptance testing. Testing is done throughout the development of this system. Testing can be done even during the development phase or the testing and integration phase. When error is detected, the debugging process will be carried out to track down the cause of the error for further corrections based on the errors logs.

In the next chapter, the system evaluation for this system will be carried out. This evaluation is done by the end user for this system to ensure the system is capable and usable. It will also clearly describe the problem encountered and solution during the system during system strengths, constraints, current and future enhancements for this system.

8.0 Introduction

System evaluation is a process of evaluating the capability and usability of developed system. Evaluation is shown as part of this final phase of the system development life cycle. The process involves several steps includes evaluation by end users, identifying the system strengths, limitations and future enhancements. In this chapter, it also highlights the knowledge gained, the problems encountered during the development of the system and the solutions taken to overcome these problems. Evaluation from the end user also helps to detect errors and limitations of the system.

8.1 Problems encountered and solutions

In any system development, problems will be encountered throughout. During the research and development of this system, several setbacks have been encountered to challenge the ongoing activities. These problems along with solution approaches are highlighted in the following sections.

8.1.1 Problems in system design

A good directory requires extensive studies to be carried out in the several aspects. In the case of the system initiation research of this online community, complete knowledge about the role, requirement, and the data that should be included. I have done a comprehensive research on the database design as well as the program flow design throughout the design and coding phase and necessary changes have been made to accommodate new functionalities and requirements

8.1.2 System Implementation Challenges

Most problems faced during the stage of system development of this system are caused by inconsistency and difficulties of particular development tool. One of the problems which I face with configuration files, some options available within the configuration files are not available within an application. One good example of this is the use of compilation options. If I am not working at this level of configuration, then there are still several advantages to using the configuration files. They provide a single reference point for configuration, configuration options are cached and load quickly, and they enable you to distribute changes to static variables within my application easily. Sometimes I don't understand what some of the configuration options do. But, fortunately, there are two resources, the first is Microsoft's MSDN site, which contains all of the ASP.NET documentation. The second is hands-on practice. If want to learn everything about a configuration option, I have to try it myself in as many ways as possible, for which I have done for the past 2 months in my application development. One more mistake I always do and which I would like to remind anyone who starts coding the web configuration is to make sure that the case guidelines are followed strictly for working with configuration files. If configuration isn't working correctly, a good thing to look at is the case formatting of the configuration files. Some times the error could be caused by a very small silly mistake.

8.2 Evaluation by end-user

A questionnaire has been conducted to collect the evaluation from system end users. The questionnaire is attached in Appendix B. The targeted end users for this system include students in Universiti Malaya and public users. The sample of end users is consists of Computer Science students of Universiti Malaya.

From the questionnaire, 100% of respondents said that the system is user friendly and care-to-use. They did not encounter any problem when using the system. They can understand the instructions and information. That is given in system such as search tips. They can understand the error message that prompted to them when they attempt to submit an uncompleted form. The questionnaire result shows that this system has fulfilled end user's expectations. They can perform their talk completely using this system such as they can successfully search for a particular discussion topic.

Lastly, 10% of the respondents said that the interface design of system main page does not really attract their attention. The interface design for this system is simple and not many animation or fancy design is added because the system is for academic usage and the main purpose of the system is to provide the latest and current information to users, a place for collaboration and not multimedia-oriented, and though simple, the interface offers smooth program flow.

8.3 System Strengths

8.3.1 Easy to use interface

This system is developed based on the efficient and user friendly concept. Simple form, button, instructions, navigation bar are used to make this system easy to use. Combo boxes are provided to reduce and assist user and task in particular data entry, manipulation actions and searching. The ease of use will enable every member to maximize the functionalities given and provided by the system.

8.3.2 Reliability

There are many programming languages and platforms in the commercial software industry, but few of them attempt to provide both a reliable language and a robust runtime or infrastructure. The most successful language that we have seen in the commercial software industry is the Java™ language and the Java Virtual Machine™, which have brought the software-development community much satisfaction. Fortunately, Microsoft is positioning .NET as the next big thing. Microsoft .NET requires type safety. Unlike C++, every class in .NET is derived from the mother of all classes, Object, which supports runtime type-identification features, content-dumping features, and so on. The CLR must recognize and verify types before they can be loaded and executed. This decreases the chances for rudimentary programming errors and prevents buffer overruns, which can be a security weakness. Traditional programming languages don't provide a common error- handling mechanism. Microsoft .NET supports exceptions in the CLR, providing a consistent error - handling mechanism. Put another way: exceptions work across all .NET-compatible languages. When you program in C++, you must deallocate all heap-based objects that you have previously allocated. If you fail to do this, the allocated resources on your system will never be reclaimed even though they are no longer needed. And if this is a server application, it won't be robust because the accumulation of unused resources in memory will eventually bring down the system. Similar to Java, the .NET runtime tracks and garbage-collects all allocated objects that are no longer needed.

8.3.3 Highly integrated modules

All the modules and sub modules in this system are highly integrated where data change and updates in any one module can be detected and copied to another modules. This reduces data entry and management time. For example, once the system entrant has registered and keyed in the password, the application state is maintained and the user will have access to all modules granted to him, only the modules which he/she is authorized to use and to manipulate the data in the modules given.

8.3.4 Multi entrant search modules/secure data integrity

Data integrity is an important issue in all database related system, especially online system. This system guarantees highly secured data integrity. Any record in any one module with existing related record in other modules cannot be deleted. Duplicated records and invalid data types are also handled effectively in the system. For example, once a user has registered for this system as system entrant, he/she is not allowed to register for second time. The system will detect this data duplication. This will guarantee that the data for particular event will not be replaced by another entrant.

8.3.5 Performance

In a client/server model like my E-Community application, it is typical for a client to acquire and hold on to a connection to the server until all requests are fulfilled. While this works fine in small- to medium -scale applications, this solution is not scalable across a large enterprise. As soon as the number of clients reaches a certain threshold, the server becomes the bottleneck as database connections eat up network and CPU resources.

ADO.NET moves away from the client/server model by promoting the use of disconnected datasets. When a client requests some data, the data is retrieved, it's transferred to the client, and—as soon as possible—the connection is torn down. Since the connection between the client and the data source is short-lived, this technique allows more clients to request information from the server, thus solving the problem of limited connections. You might think that setting up and tearing down connections is not a good idea since the cost of establishing a connection is usually high. This is a concern only in the absence of connection pooling. ADO.NET automatically keeps connections to a data source in a pool, so when an application thinks it is tearing down a connection, it's actually returning it to the resource pool. This allows connections to be reused, avoiding the cost of reconstructing new connections from scratch. ADO.NET has enhanced its predecessor by growing out of the client/server model and into the distributed components model. By using disconnected datasets as the paradigm for data exchange, ADO.NET is much more scalable than its predecessors. Because ADO.NET is mainly about disconnected datasets, the system benefits from improved performance and scalability. The database server is no longer a bottleneck when the number of connection requests goes up.

8.3.6 Informative messages

The system provides the information message when user attempt to perform illegal actions such as entering invalid email address, forget to key in password or never key in data in the required field textboxes. These messages are very much needed in making sure that the system will always appear to be very user-friendly so that the system appearance and its associated functionalities does not make any difference to both new and old experienced user of the system.

8.4 System Constraints

8.4.1 Multimedia Enhanced User Interface

Although my E-Community web application has met all the objectives and all the functional and non-functional requirements, I still feel that some extra enhancements can be made to my E-community application, such as enhancing the user interface of the application. Though not relevant to the objective of the E-Community project, I believe multimedia enhanced user interface would make the site more attractive to users and to all members of E-Community. More animations in Flash, Shockwave should be included and fortunately in my application which is adopting the .NET technologies can easily integrate a flash object into the application. So this will make the site more interesting and captivating to all users. Besides, I believe more attractive animated graphics should be added to the site in parallel with the current graphic design technologies.

8.5 Future enhancements

System constraints should be addressed to enhance the functionally and features of this system in the future. The current version as the online ECommunity system can be updated with some enhancement features discussed in the following section.

As mentioned before, ECommunity is still not fine enough to work at its full efficiency. Some refining work needs to be done to the system to increase its usability and reliability. The aspects to be refine and some suggestions to upgrade the system are as below:

8.5.1 Graphing data and modeling statistics module

The system will automatically generate a graph from the statistics of usage of the system for clearer view and better understanding of users' preference of the system. This will allow administrators to analyze the users' preference of the site and to make improvements to the site based on users' preference of the site. In doing so, administrators will always be able to keep the site updated and very much likeable among all E-Community members.

8.6 Knowledge and experience gained

Throughout the development of this system much valued knowledge was gain. During the whole period of the project from the first phase till the last phase in the SDLC, much new and exciting knowledge has been made available to the other of this system much as the Waterfall Development Method.

During the whole development system, much knowledge on system implementation have been gained such as web-based programming techniques, advanced database manipulation programming, web interface design. The knowledge is useful for the future and will also help in the area of research which I am planning to specialize for my masters program in developing web-based e-commerce application.

After the development of this system, there is also improvement in skills at finding into and solving problems besides an enriching experience in problem solving and acquiring the ability to work independently.

During the research and studies on user requirement, the interview experience was gained. The way on how to produce a good questionnaire also has been learned. Throughout the system development, better documentation such as user manual, questionnaires analysis and writing skills were also obtained also the time management skills and keeping up to datelines during the system development were polished and improved.

8.7 Conclusion

E-community has been successfully in attaining its objectives to develop an effective online community system. The system integrates all its modules to provide a highly effective, usable and capable online community system as stated in proposal.

In any system development, problems will be encountered throughout. During the Research and Development of the system, several setbacks have been encountered to challenge the ongoing activities. These problems along with solutions approaches are highlighted in the problems encountered and solutions sections.

This system has achieved the development objectives with several system strengths. The questionnaire shows that is system has fulfilled end-user's expectations and easy to use. However, there are several limitations in the system and it was anticipated to be enhanced with more powerful functions and features in the future. In the system constraints and future enhancement sections, the limitations and enhancements for this system are discussed and explained precisely.

During the development of this system, a lot of useful knowledge and experience have been gained. Knowledge on programming and designing were improved. The experience on conduct a questionnaire was gained during the end-user evaluation.

9.0 Conclusion

E-Community is a place for everyone to actively participate in life in a way that's impossible for them offline. E-Community is a lot of work. If I don't love it - if I am not utterly fascinated by the concept – I wouldn't have proposed and started one project like this. I will have to encounter heartaches and headaches and find it to be an incredibly tough, but I truly believe I will learn a lot along the way and find it to be enormously rewarding. I hope that this report will serve the purpose of sharing my experiences I can give to everyone; a realistic idea of what it's like to plan, analyze, and to design an E-Community. It is anticipated that I will face several or more challenges ahead during the development, coding and programming face of my E-Community project, to get the system up and running. The E-Community system site can be like a magnet for warm, intelligent, caring people who are always here and willing to pitch in and help anyone with anything in the discussion forums module. It can also be the place for everyone to organize events and happenings, strengthening group relationships, and finding interesting people and getting to know them. Besides, to highlight a few more advantages of the E-Community system, it can also be a form of online learning spaces, work spaces for interactions, and information sharing- a place to share ideas.

After months of hard work, this system has been successfully developed. The system objectives stated in the system proposed is achieved and attained. The system integrates all the modules and sub modules to fulfill the functional and non-functional requirement. However, there are some limitations in current version of the near future. This has created under opportunity for individual who is innovative and interested to further modify and tailor this system based on their needs. Throughout the system development, much unvalued and useful knowledge have been gained. The technique on web-based programming, interface design, database manipulation and programming and scripting programming were learned. Much new experience on conduct an interview and questionnaire were gained during the system study phase. It is hope that with its strengths and limitations balanced, this version of E-community will be able to provide its features for the university and target group users and implement the use on information base and as to how it is to be capitalized and put to good use for everyone especially to the members of E-Community.

Appendices

1.0 USER MANUAL (E-COMMUNITY WEB APPLICATION)

1.1 Introduction

E-Community is an online system that make collaboration between members of a community to be more effective and serve as a great place or platform for everyone to share ideas and to give suggestions, for example in asynchronous , threaded discussion forums. Members get to engage in one-to-one conversation and have strong attachment to each other. The relationship is the primary focus and participants are likely to engage in synchronous message exchanges. Members would generate much of the content that is exchanged, and the conversation can proceed in an atmosphere of autonomy.

1.2 Hardware and Software Requirements

Table 1: Software Requirements

Scenario	**Operating System**
Client	Microsoft® Windows® 98
	Microsoft® Windows® 98 Second Edition
	Microsoft® Windows® Millennium Edition
	Microsoft® Windows NT® 4.0 Workstation with Service Pack 6.0a or later
	Microsoft® Windows NT® 4.0 Server with Service Pack 6.0a or later
	Microsoft® Windows® 2000 Professional

	Microsoft® Windows® 2000 Server Microsoft® Windows® 2000 Advanced Server Microsoft® Windows® XP Home Edition Microsoft® Windows® XP Professional **Note** On all these systems, Microsoft® Internet Explorer 5.01 or later and Microsoft® Windows® Installer 2.0 or later are also required.
Server	Microsoft® Windows® 2000 Professional with Service Pack 2.0 Microsoft® Windows® 2000 Server with Service Pack 2.0 Microsoft® Windows® 2000 Advanced Server with Service Pack 2.0 Microsoft® Windows® XP Professional

Table 2: Hardware Requirements

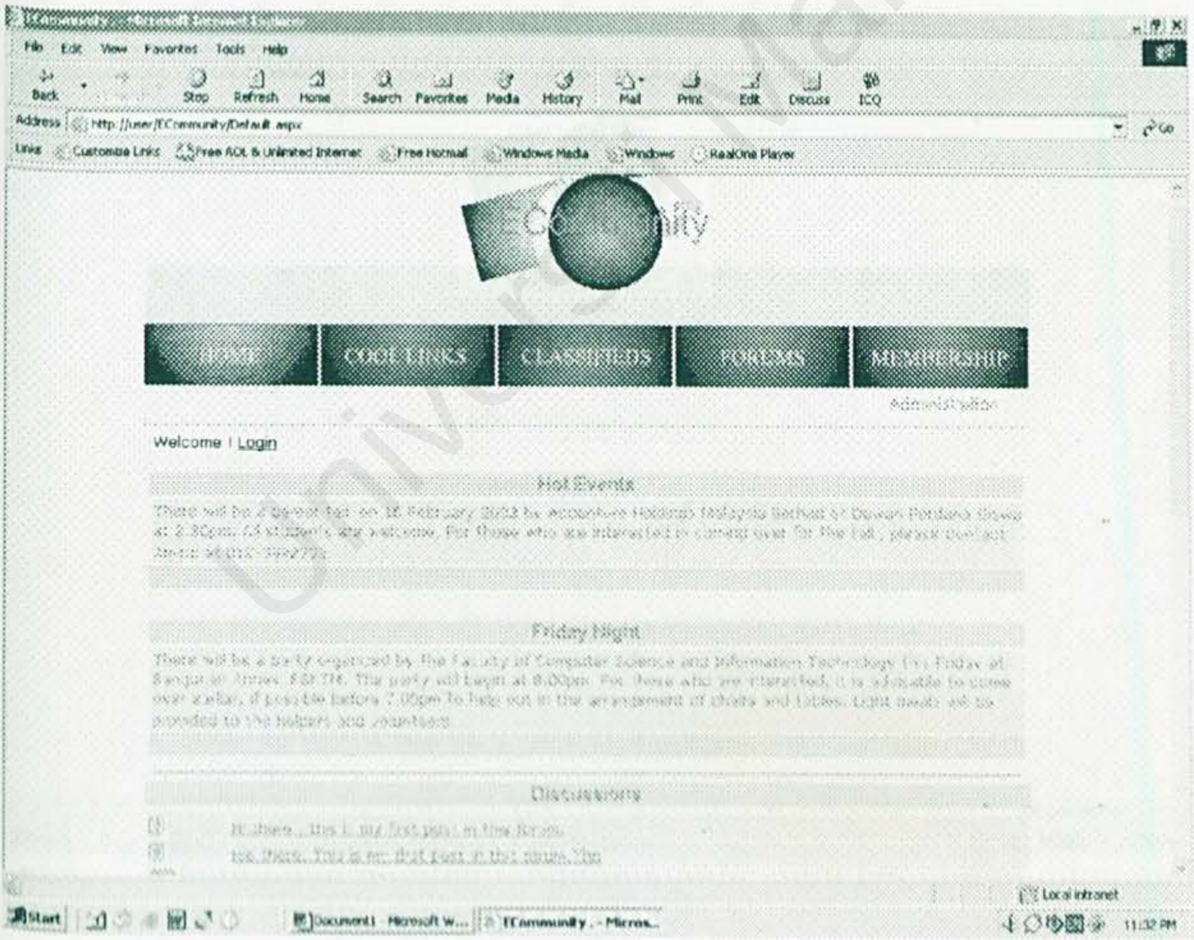
Scenario	Required Processor	Recommended Processor	Required RAM	Recommended RAM
Client (Windows Forms and Windows Services)	Pentium 90 MHz*	Pentium 90 MHz or faster	32 MB*	96 MB or higher
Server	Pentium 133 MHz*	Pentium 133 or faster	128 MB*	256 MB or higher

*Or the minimum required by the operating system, whichever is higher.

1.3 Getting Started

This is the default page for E-Community web application, default.aspx. The default page can be accessed at http://localhost/ECommunity/Default.aspx. In this page, the logo can be seen and also the navigational bars. This page can also be accessed by all internet clients and does not require any login. All internet clients will get to see all the latest post from ECommunity members in the Discussion forums, Links and the Classifieds module whereas the Events module is host-driven.

The figure below shows the default page for ECommunity application;



Address http://user/ECommunity/Default.aspx

Welcome ! Login

Hot Events

There will be a career fair on 18 February 2002 by Accenture Holdings Malaysia Berhad at Dewan Perdana Siswa at 2.30pm. All students are welcome. For those who are interested in [illegible] for the talk, please contact Annie at 012-3982779.

Friday Night

There will be a party organized by the Faculty of Computer Science and Information Technology this Friday at Banquet Annex FSKTM. The party will begin at 8.00pm. For those who are interested, it is advisable to come over earlier, if possible before 7.00pm to help out in the arrangement of chairs and tables. Light meals will be provided to the helpers and volunteers.

Discussions

Hi there , this is my first post in the forum.

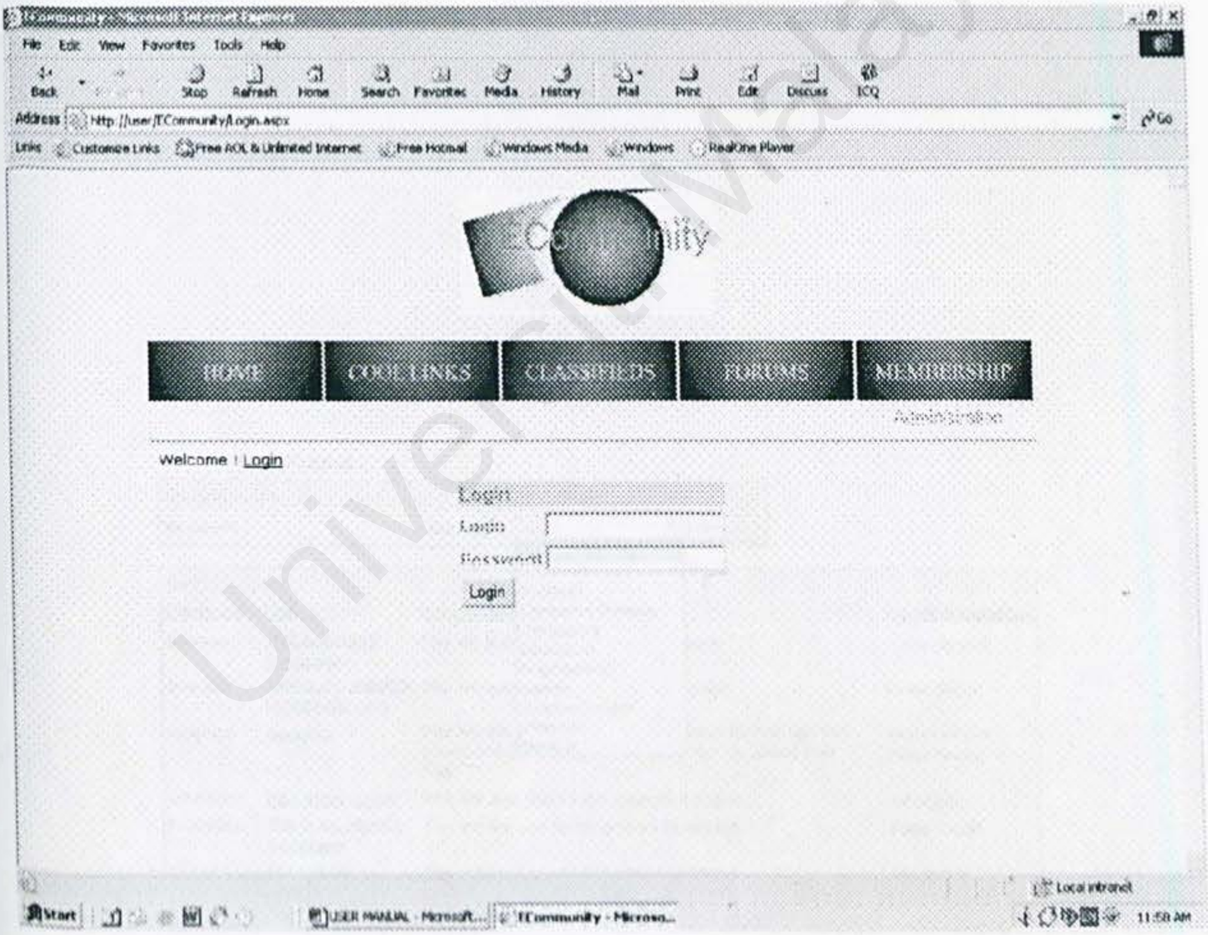
Hi there. This is my first post in this forum. The

Figure 1: Default page

1.4 Members' Section

1.4.1 Login page

The figure below shows the login page for the member. Members are supposed to login before performing any tasks , eg, posting message to a forum or posting a new link.



ICommunity - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Stop Refresh Home Search Favorites Media History Mail Print Edit Discuss ICQ
Address http://user/ICommunity/Login.aspx
Links Customize Links Free AOL & Unlimited Internet Free Hotmail Windows Media Windows RealOne Player
ICommunity
HOME
COOL LINKS
CLASSIFIEDS
FORUMS
MEMBERSHIP
Administration
Local intranet
Start
USER MANUAL - Microsoft...
ICommunity - Microso...
11:58 AM

Welcome ! Login

Login

Login

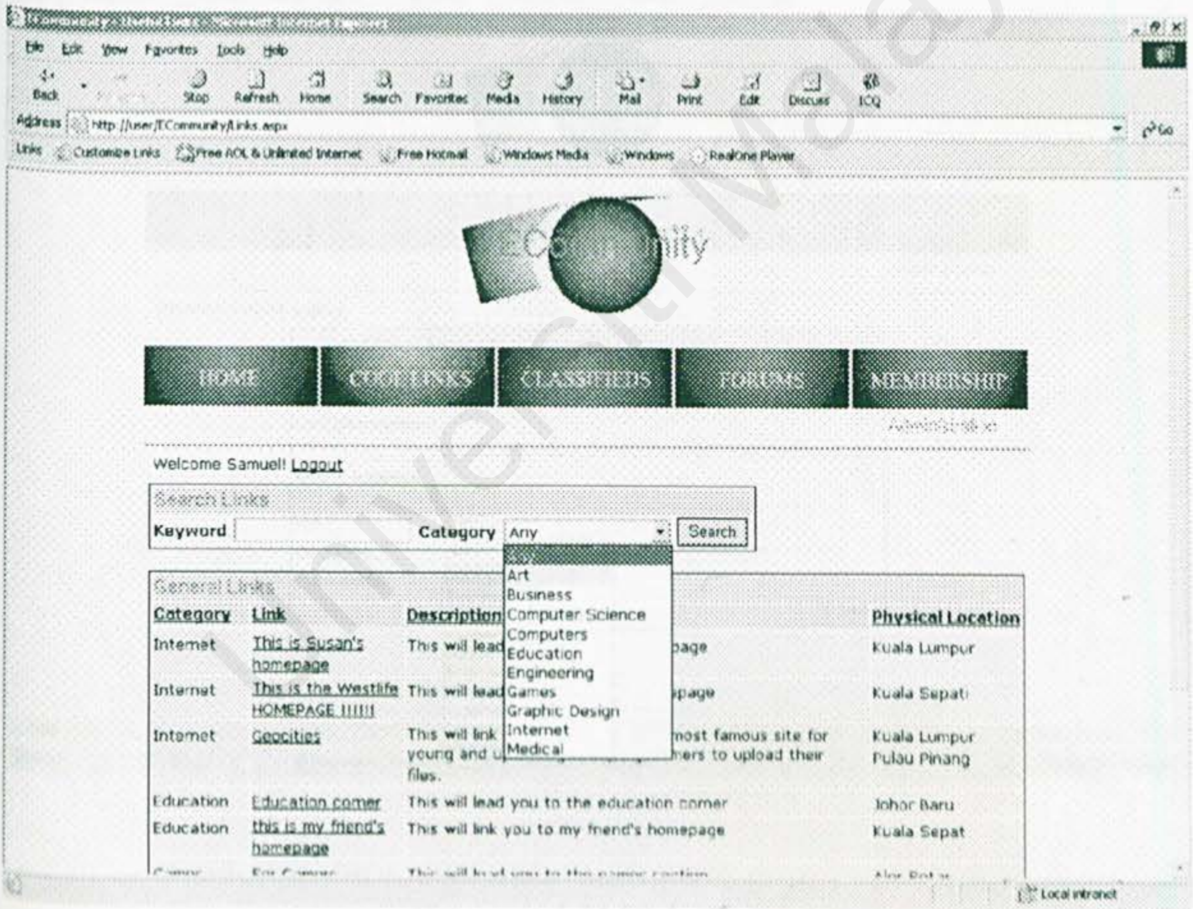
Password

Login

Figure 2: Login page

1.4.2 Cool Links Module

The figure below shows the cool links aspx page once the cool links navigation button is pressed. This module will allow user to submit new links for other members to navigate. Clicking on the link hyperlink will redirect the user to the specified link in a new window and the description column will describe the link in more details. There is also a search module to help users search for the key terms as been typed in the text box provided or through the categories drop down list box.



Welcome Samuel! Logout

Search Links

Keyword

Category Any

Any
Art
Business
Computer Science
Computers
Education
Engineering
Games
Graphic Design
Internet
Medical

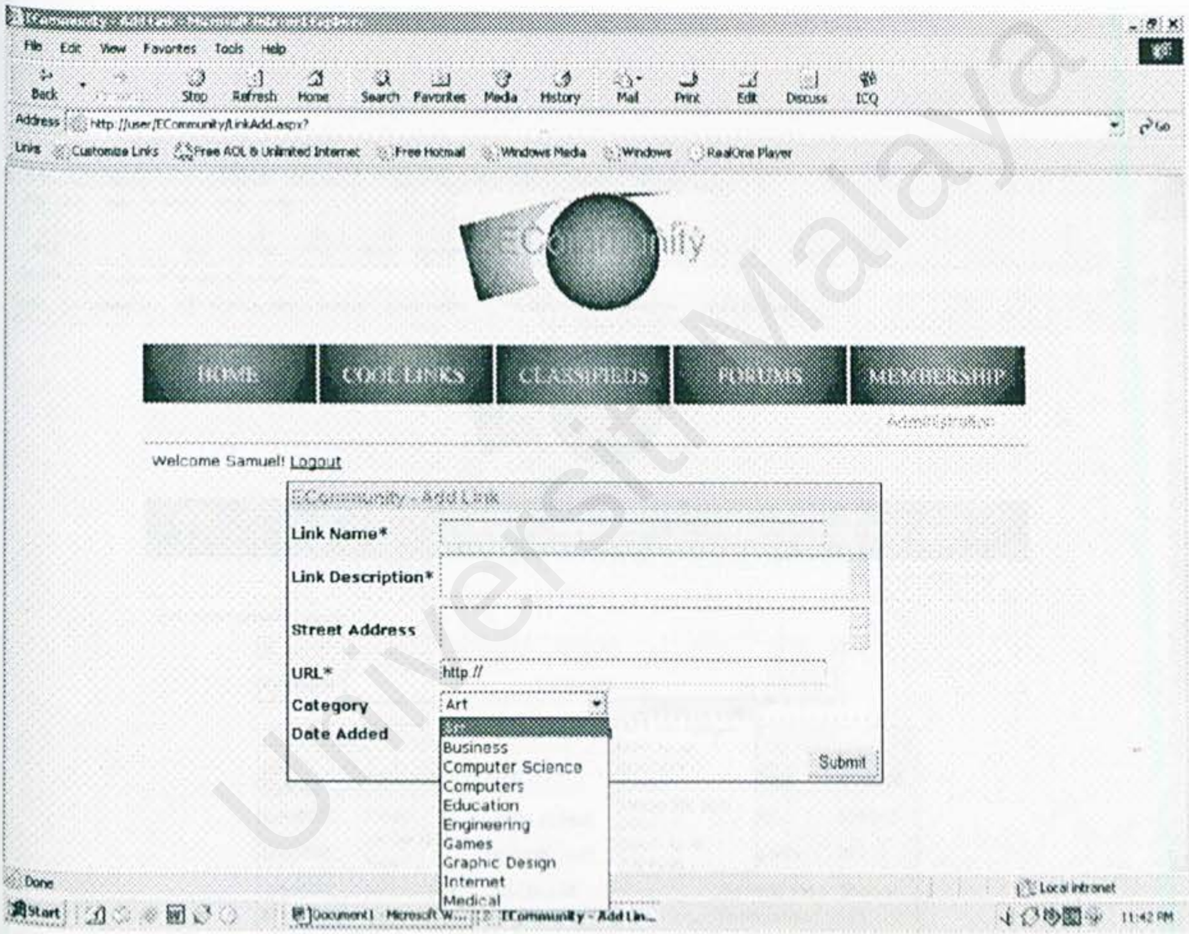
General Links

Category	Link	Description	Physical Location
Internet	This is Susan's homepage	This will lead … page	Kuala Lumpur
Internet	This is the Westlife HOMEPAGE !!!!!!	This will lead … page	Kuala Sepat
Internet	Geocities	This will link … most famous site for young and u… ers to upload their files.	Kuala Lumpur Pulau Pinang
Education	Education corner	This will lead you to the education corner	Johor Baru
Education	this is my friend's homepage	This will link you to my friend's homepage	Kuala Sepat

Figure 3: Cool Links Page

1.4.3 Adding a new link

This is still in the links module. Once user is log in, they will be allowed to add a new link, which is subject to approval from the administrator of the website. Users are supposed to key in values in the required field textboxes (asterisk) or otherwise, the users will not be able to add a new link to the site. An error message will prompt the users and notify the users of the errors that have been made.


File Edit View Favorites Tools Help
Back Stop Refresh Home Search Favorites Media History Mail Print Edit Discuss ICQ
Address http://user/ECommunity/LinkAdd.aspx?
Links Customize Links Free AOL & Unlimited Internet Free Hotmail Windows Media Windows RealOne Player
ECommunity
HOME
COOL LINKS
CLASSIFIEDS
FORUMS
MEMBERSHIP
Administration
Done
Local intranet
Start
Document1 - Microsoft W...
ECommunity - Add Lin...
11:42 PM

Welcome Samuel! Logout

ECommunity - Add Link

Link Name*

Link Description*

Street Address

URL* http://

Category Art

Date Added

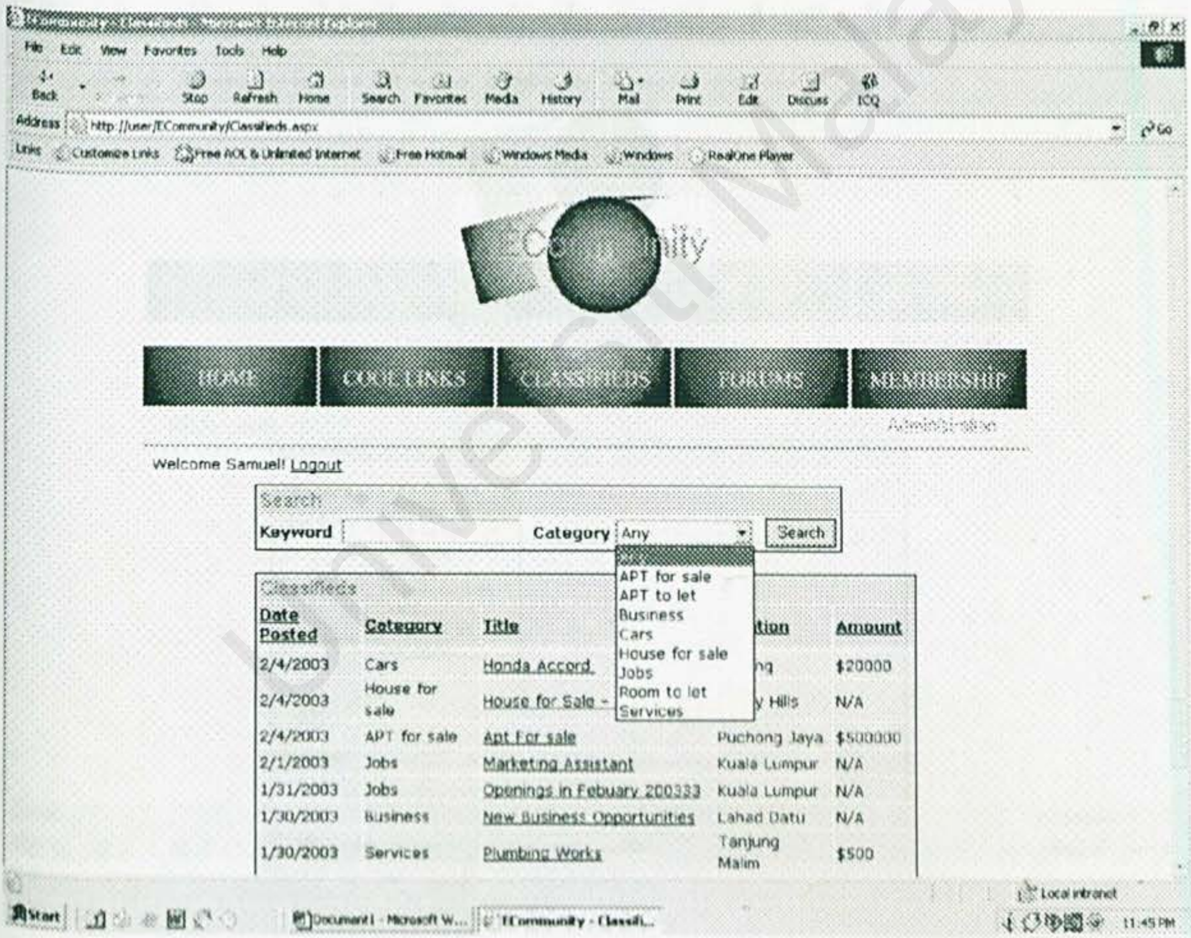
Submit

Art
Business
Computer Science
Computers
Education
Engineering
Games
Graphic Design
Internet
Medical

Figure 4: Add Links Page

1.4.4 Classifieds Module

The figure below shows the classifieds aspx page once the classifieds navigation button is pressed. This module will allow user to submit new classifieds for other members to navigate. There is also a search module to help users search for the key terms as been typed in the text box provided or through the categories drop down list box.



Welcome Samuel! Logout

Keyword

Category Any

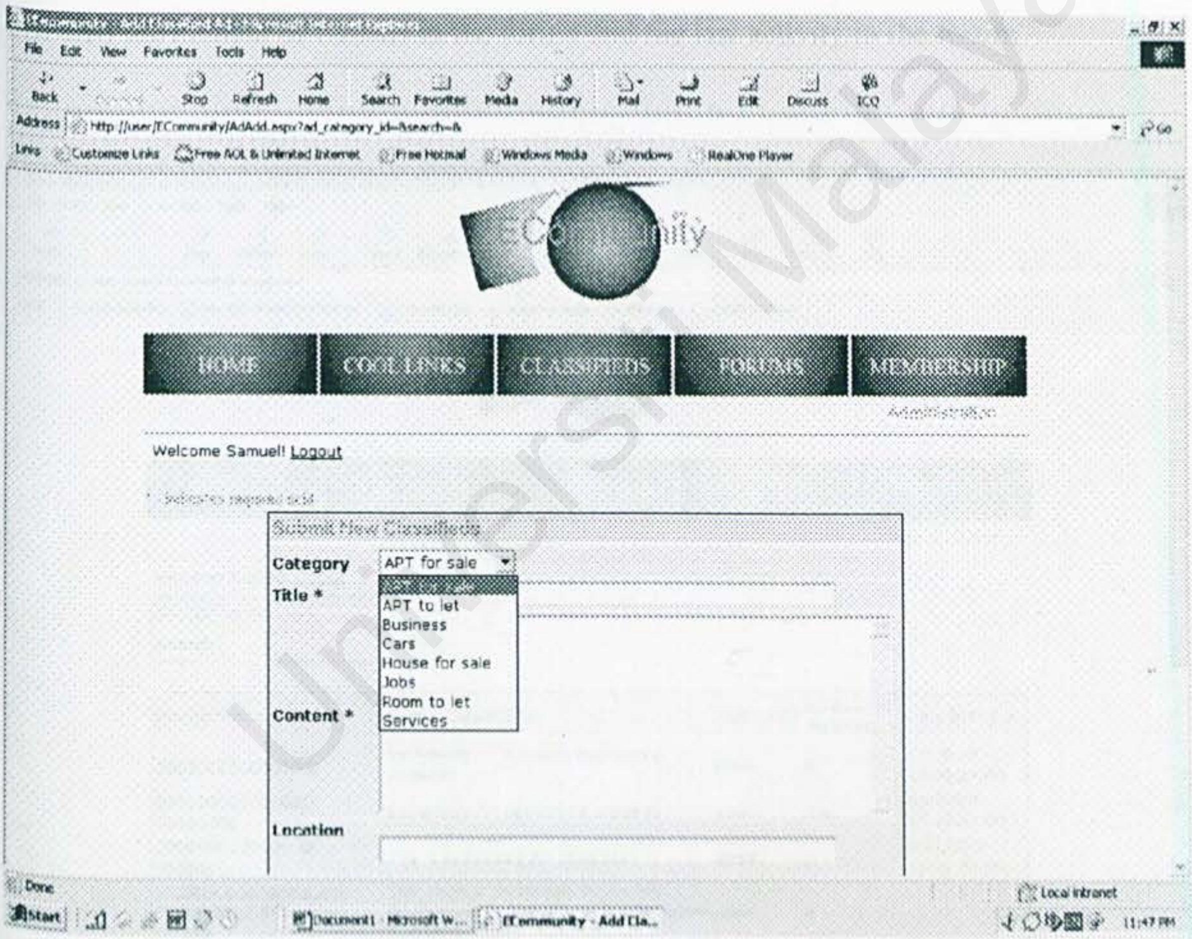
APT for sale
APT to let
Business
Cars
House for sale
Jobs
Room to let
Services

Date Posted	Category	Title	tion	Amount
2/4/2003	Cars	Honda Accord	nq	$20000
2/4/2003	House for sale	House for Sale -	y Hills	N/A
2/4/2003	APT for sale	Apt For sale	Puchong Jaya	$500000
2/1/2003	Jobs	Marketing Assistant	Kuala Lumpur	N/A
1/31/2003	Jobs	Openings in Febuary 200333	Kuala Lumpur	N/A
1/30/2003	Business	New Business Opportunities	Lahad Datu	N/A
1/30/2003	Services	Plumbing Works	Tanjung Malim	$500

Figure 5: Classifieds main page

1.4.5 Add New Classifieds

This is still in the classifieds module. Once user is log in, they will be allowed to add a new classifieds. Users are supposed to key in values in the required field textboxes (asterisk) or otherwise, the users will not be able to add a new classifieds to the site. An error message will prompt the users and notify the users of the errors that have been made.


File Edit View Favorites Tools Help
Back Stop Refresh Home Search Favorites Media History Mail Print Edit Discuss ICQ
Address Http://user/ECommunity/AdAdd.aspx?ad_category_id=&search=&
Go
Links Customize Links Free AOL & Unlimited Internet Free Hotmail Windows Media Windows RealOne Player
ECommunity
HOME
COOL LINKS
CLASSIFIEDS
FORUMS
MEMBERSHIP
Administration
APT to let
Business
Cars
House for sale
Jobs
Room to let
Services
Done
Local intranet
Start
Document1 - Microsoft W...
ECommunity - Add Cla...
11:47 PM

Welcome Samuel! Logout

* Indicates required field

Submit New Classifieds

Category APT for sale

Title *

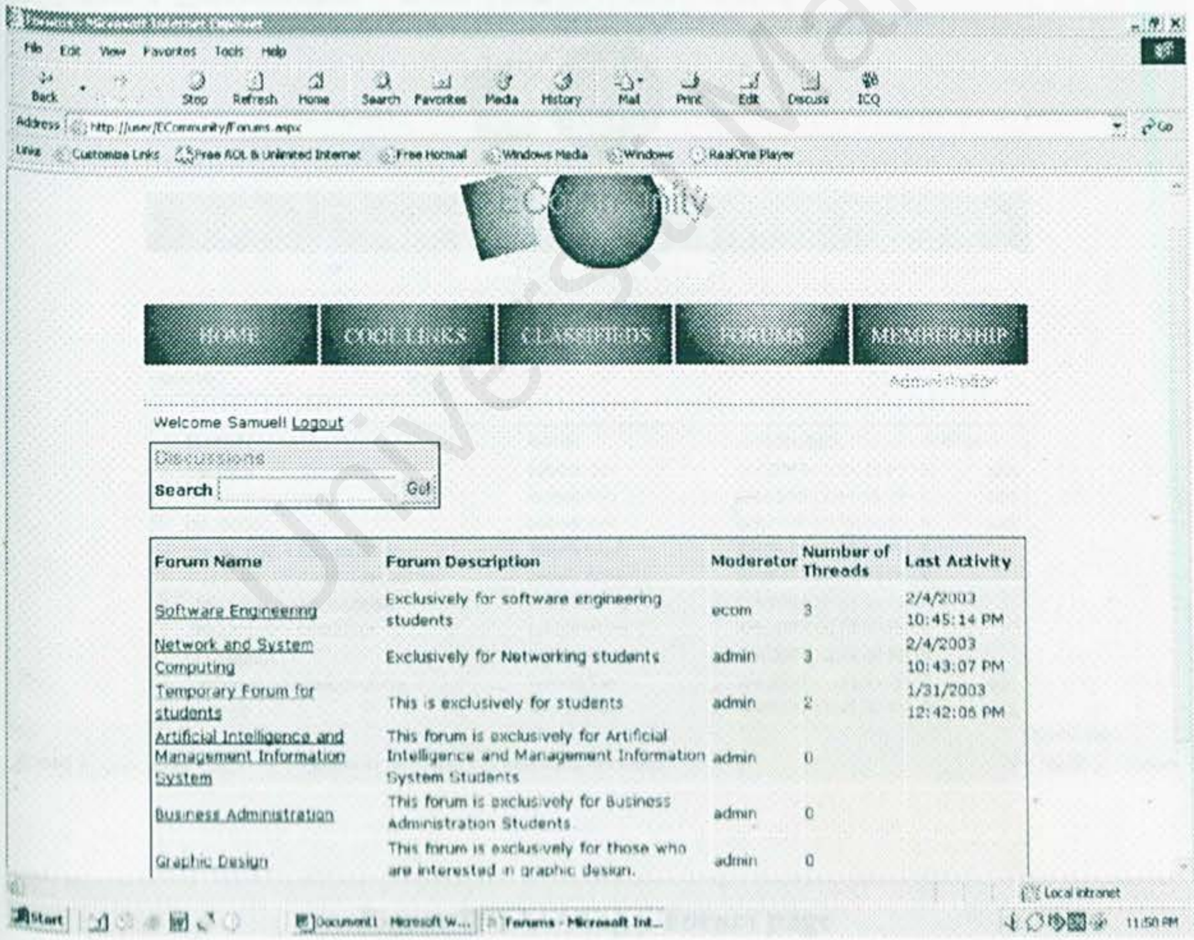
Content *

Location

Figure 6: Add Classifieds Page

1.4.6 Forums Module

The figure below shows the forums aspx page once the forums navigation button is pressed. There is also a search module to help users search for the key terms as been typed in the text box provided. First, the users will have to choose a forum name to join before posting any messages. As can be seen from the figure below, the forums name given are Software Engineering and Network and computer system, and etc. Users also get to see the forum description to see if they are of interest to the forum's main topic, and also the number of threads in the forum and the last activity in the forum.


File Edit View Favorites Tools Help
Back Stop Refresh Home Search Favorites Media History Mail Print Edit Discuss ICQ
Address http://user/ECommunity/Forums.aspx
Go
Links Customize Links Free AOL & Unlimited Internet Free Hotmail Windows Media Windows RealOne Player
HOME
COOL LINKS
CLASSIFIEDS
FORUMS
MEMBERSHIP
Discussions
Search
Go!
Local intranet
Start
Document1 - Microsoft W...
Forums - Microsoft Int...
11:50 PM

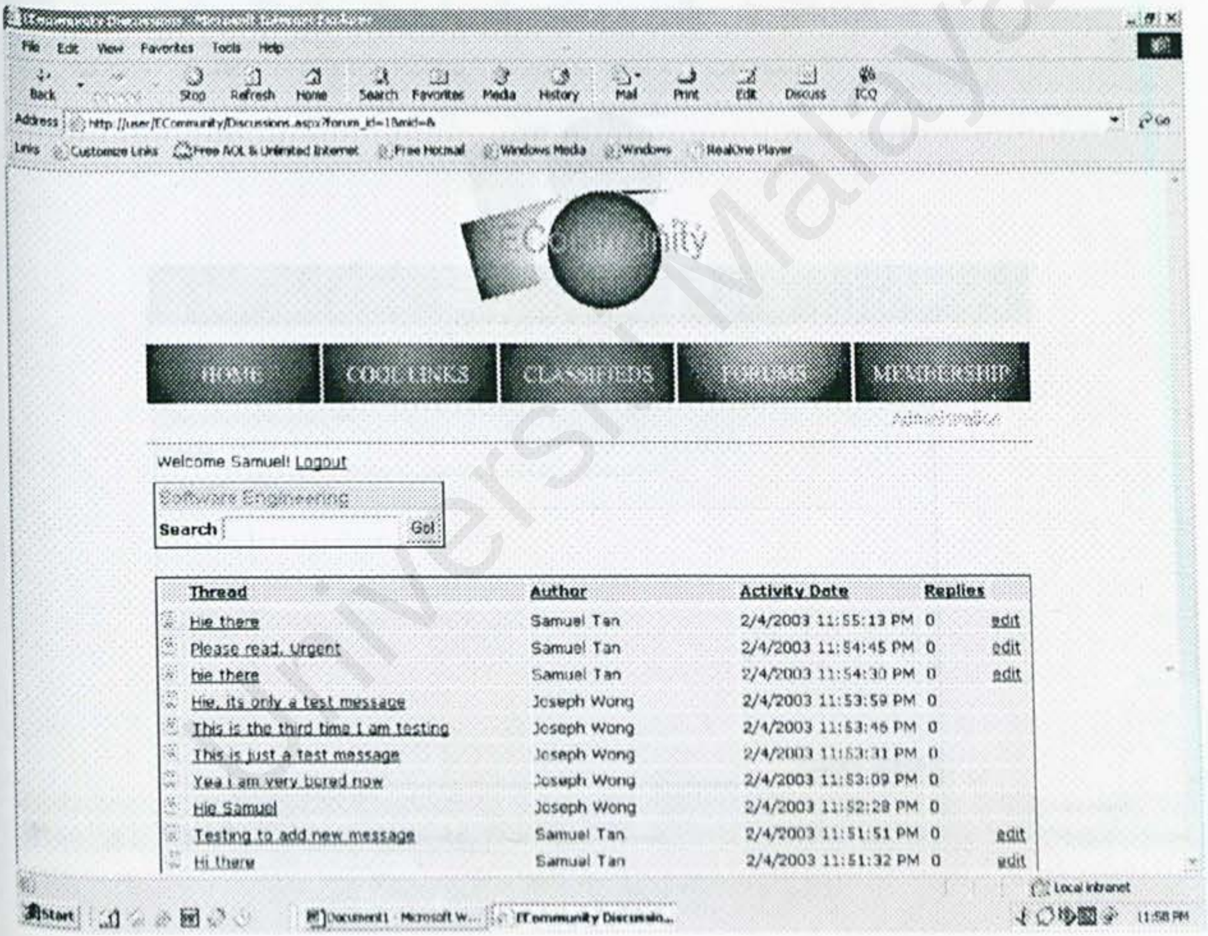
Welcome Samuel! Logout

Forum Name	Forum Description	Moderator	Number of Threads	Last Activity
Software Engineering	Exclusively for software engineering students	ecom	3	2/4/2003 10:45:14 PM
Network and System Computing	Exclusively for Networking students	admin	3	2/4/2003 10:43:07 PM
Temporary Forum for students	This is exclusively for students	admin	2	1/31/2003 12:42:06 PM
Artificial Intelligence and Management Information System	This forum is exclusively for Artificial Intelligence and Management Information System Students	admin	0	
Business Administration	This forum is exclusively for Business Administration Students	admin	0	
Graphic Design	This forum is exclusively for those who are interested in graphic design.	admin	0	

Figure 7: Forums Main Page

1.4.7 Choosing a Forum name

Once user has chosen the forum name, then he/she is allowed to post a new message to the forum or to view messages posted by other users and to reply them at the same time. The figure below shows the page once the user has chosen the forum name. As can be seen below, users get to see the threads, the author and the activity date and also the number of replies in that particular thread.


File Edit View Favorites Tools Help
Back Forward Stop Refresh Home Search Favorites Media History Mail Print Edit Discuss ICQ
Address http://user/ECommunity/Discussions.aspx?forum_id=1&mid=&
Go
Links Customize Links Free AOL & Unlimited Internet Free Hotmail Windows Media Windows RealOne Player
ECommunity
HOME
COOL LINKS
CLASSIFIEDS
FORUMS
MEMBERSHIP
Administration
Search
Go!
Local intranet
Start
Document1 - Microsoft W...
ECommunity Discussio...
11:58 PM

Welcome Samuel! Logout

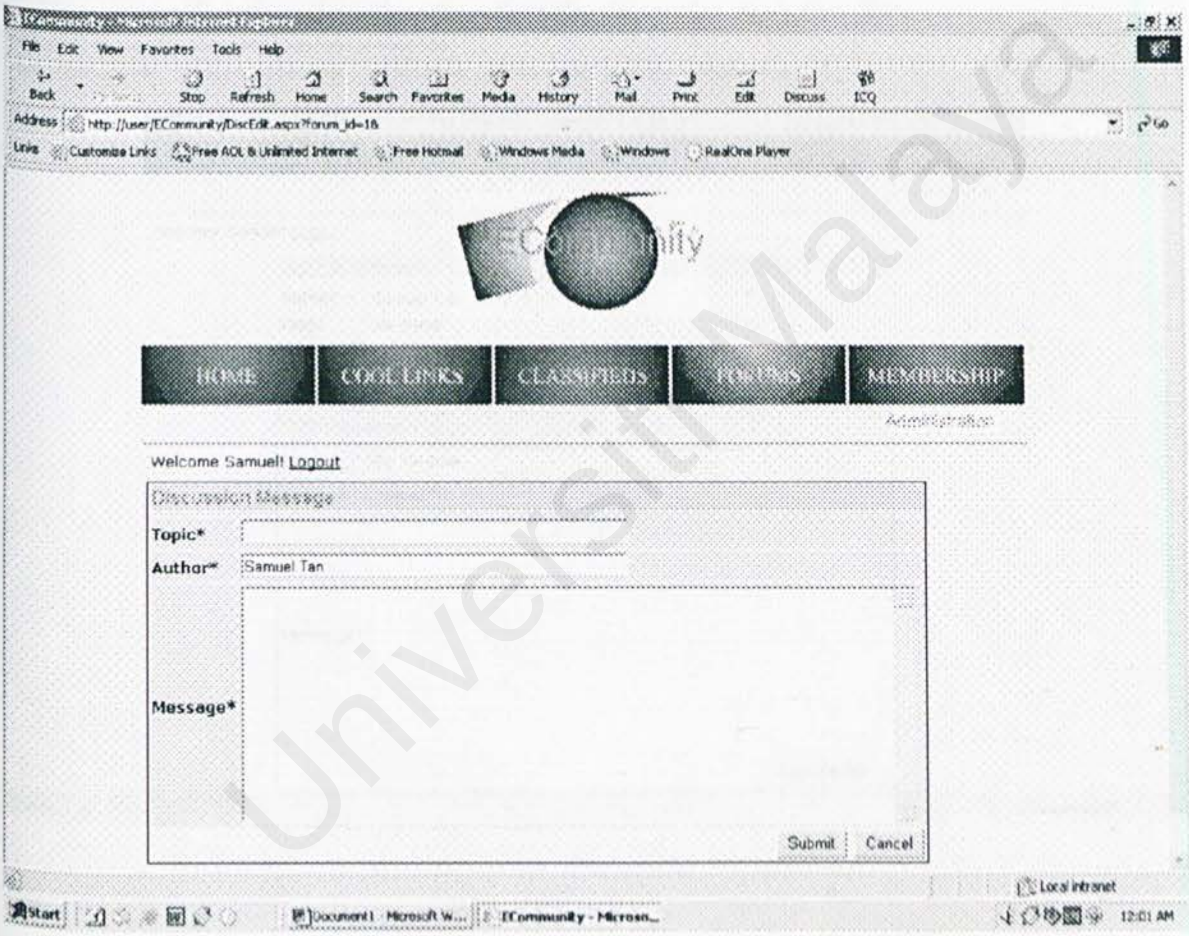
Software Engineering

Thread	Author	Activity Date	Replies	
Hie there	Samuel Tan	2/4/2003 11:55:13 PM	0	edit
Please read. Urgent	Samuel Tan	2/4/2003 11:54:45 PM	0	edit
hie there	Samuel Tan	2/4/2003 11:54:30 PM	0	edit
Hie, its only a test message	Joseph Wong	2/4/2003 11:53:59 PM	0	
This is the third time I am testing	Joseph Wong	2/4/2003 11:53:46 PM	0	
This is just a test message	Joseph Wong	2/4/2003 11:53:31 PM	0	
Yea I am very bored now	Joseph Wong	2/4/2003 11:53:09 PM	0	
Hie Samuel	Joseph Wong	2/4/2003 11:52:28 PM	0	
Testing to add new message	Samuel Tan	2/4/2003 11:51:51 PM	0	edit
Hi there	Samual Tan	2/4/2003 11:51:32 PM	0	edit

Figure 8: Choosing a Forum page

1.4.8 Adding a new thread to the forum

This will allow the users to post a new thread to the forum as can be seen from the figure below. Users must key in value in the textboxes in asterisk, otherwise an error message will prompt the users of the mistakes and will not allow users to add a new thread.



File Edit View Favorites Tools Help
Back Stop Refresh Home Search Favorites Media History Mail Print Edit Discuss ICQ
Links Customize Links Free AOL & Unlimited Internet Free Hotmail Windows Media Windows RealOne Player
HOME
COOL LINKS
CLASSIFIEDS
FORUMS
MEMBERSHIP
Administration
Submit
Cancel
Local intranet
Start
12:01 AM

Address http://user/ECommunity/DiscEdit.aspx?forum_id=18

Welcome Samuel! Logout

Discussion Message

Topic*

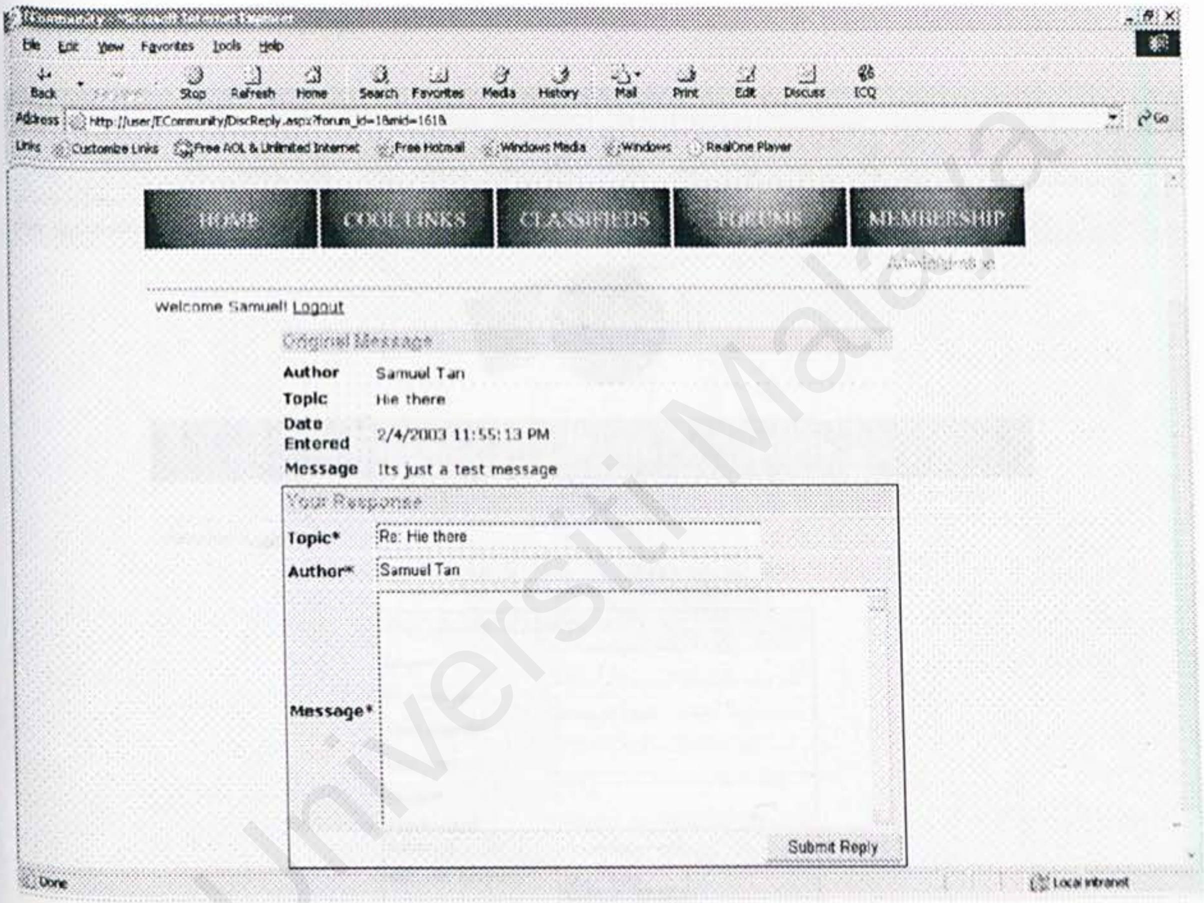
Author* Samuel Tan

Message*

Figure 9: Add New Thread page

1.4.9 Replying to a thread in the forum

Users can also get to select a thread and view the message posted and then, reply the thread as can be seen from the figure below.



File Edit View Favorites Tools Help
Back Forward Stop Refresh Home Search Favorites Media History Mail Print Edit Discuss ICQ
Address http://user/ECommunity/DiscReply.aspx?forum_id=1&mid=161&
Go
Links Customize Links Free AOL & Unlimited Internet Free Hotmail Windows Media Windows RealOne Player
HOME
COOL LINKS
CLASSIFIEDS
FORUMS
MEMBERSHIP
Administrator
Done
Local intranet

Welcome Samuel! Logout

Original Message

Author	Samuel Tan
Topic	Hie there
Date Entered	2/4/2003 11:55:13 PM
Message	Its just a test message

Your Response

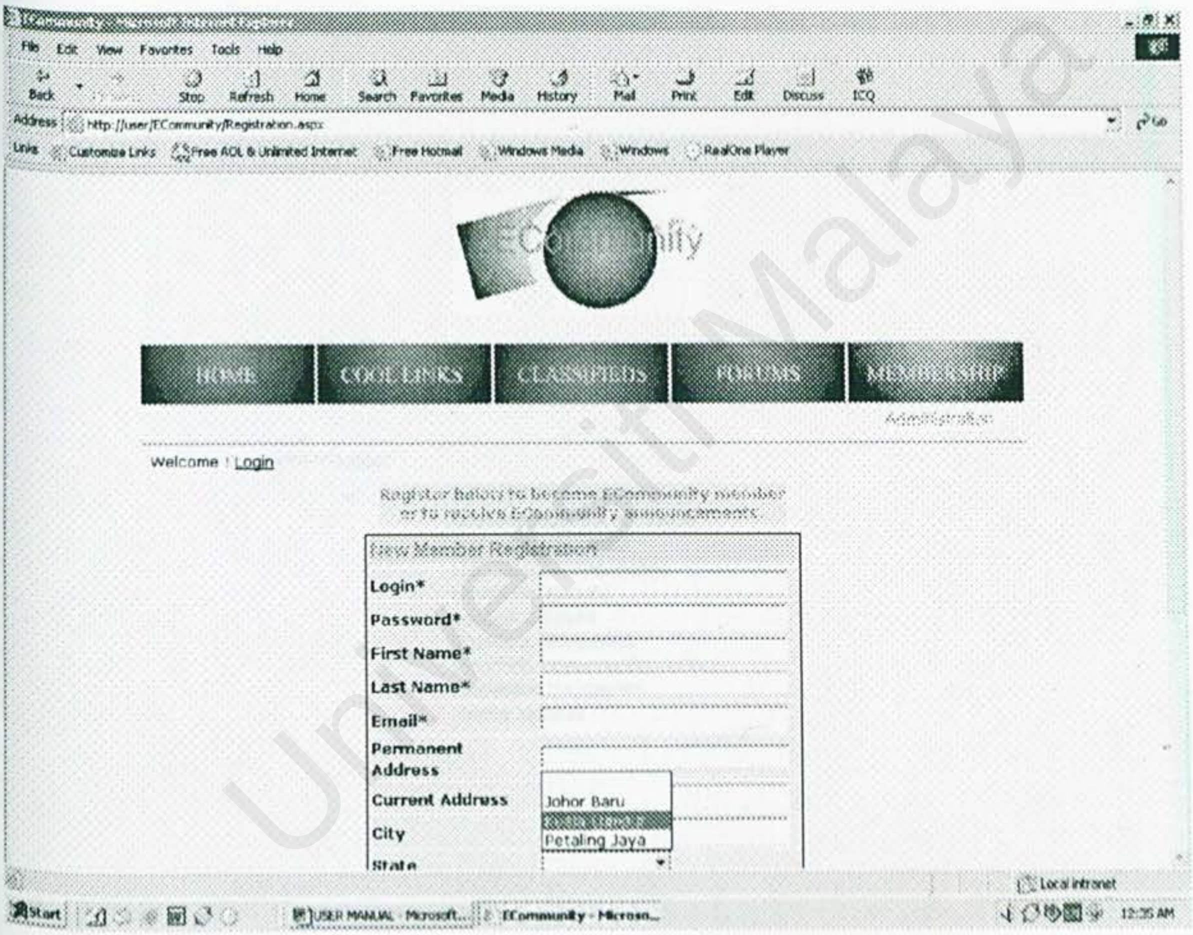
Topic*	Re: Hie there
Author*	Samuel Tan
Message*	

Submit Reply

Figure 10: Reply to a thread page

1.4.10 Registration Module

This is the registration module for new members to E-Community. New members are supposed to fill in the required field (asterisk) or otherwise an error message will be displayed and will prompt the users to key in the required field in the respective textboxes as provided. A figure of the registration module can be seen as below.


File Edit View Favorites Tools Help
Back Stop Refresh Home Search Favorites Media History Mail Print Edit Discuss ICQ
Address http://user/ECommunity/Registration.aspx
Go
Links Customize Links Free AOL & Unlimited Internet Free Hotmail Windows Media Windows RealOne Player
HOME
COOL LINKS
CLASSIFIEDS
FORUMS
MEMBERSHIP
Administration
Local intranet
Start
USER MANUAL - Microsoft...
ECommunity - Micros...
12:35 AM

Welcome ! Login

Register below to become ECommunity member or to receive ECommunity announcements.

New Member Registration

Login*

Password*

First Name*

Last Name*

Email*

Permanent Address

Current Address

City

Johor Baru
[illegible]
Petaling Jaya

State

Figure 11: Registration page

1.5 Administrator's Section

1.5.1 Administration Menu

The figure below shows the administration menu. Only user that is login as an administrator will get the privilege to manipulate the database through the administration menu as can be seen below.

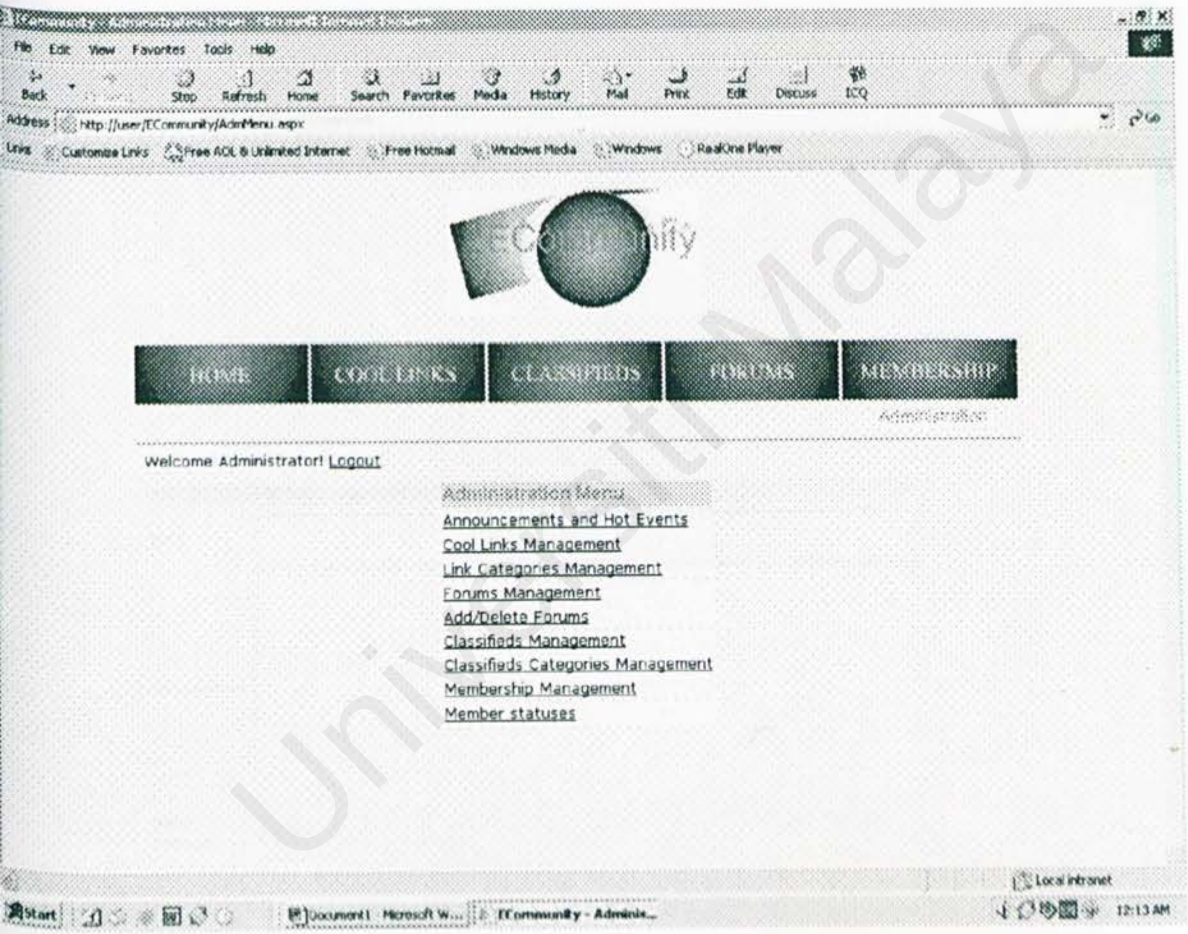
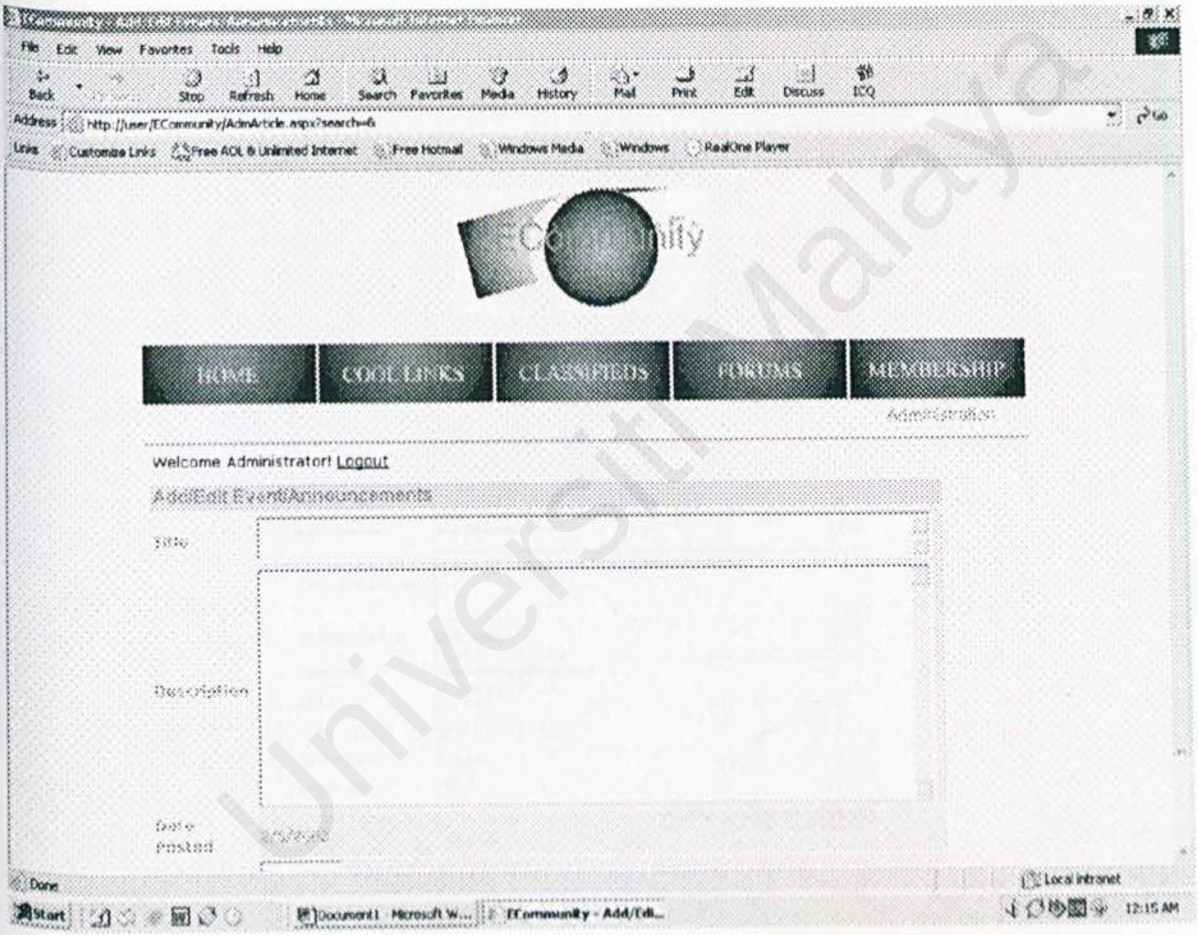

File Edit View Favorites Tools Help
Back Stop Refresh Home Search Favorites Media History Mail Print Edit Discuss ICQ
Address http://user/ECommunity/AdmMenu.aspx
Links Customize Links Free AOL & Unlimited Internet Free Hotmail Windows Media Windows RealOne Player
ECommunity
HOME
COOL LINKS
CLASSIFIEDS
FORUMS
MEMBERSHIP
Administration
Welcome Administrator! Logout
Administration Menu
Announcements and Hot Events
Cool Links Management
Link Categories Management
Forums Management
Add/Delete Forums
Classifieds Management
Classifieds Categories Management
Membership Management
Member statuses
Local intranet
Start
Document1 - Microsoft W...
ECommunity - Adminis...
12:13 AM

Figure 12: Administration Menu Main Page

1.5.2 Announcement and Hot events module

This will allow administrator to add new hot events or any important announcements to all members of E-Community. Administrators also get to edit the hot events and announcements easily as can be seen from the figure below.



File Edit View Favorites Tools Help
Back
Stop
Refresh
Home
Search
Favorites
Media
History
Mail
Print
Edit
Discuss
ICQ
Address http://user/ECommunity/AdmArticle.aspx?search=6
Go
Links Customize Links Free AOL & Unlimited Internet Free Hotmail Windows Media Windows RealOne Player
ECommunity
HOME
COOL LINKS
CLASSIFIEDS
FORUMS
MEMBERSHIP
Administration
Done
Local intranet
Start
Document1 - Microsoft W...
ECommunity - Add/Edi...
12:15 AM

Welcome Administrator! Logout

Add/Edit Event/Announcements

Title

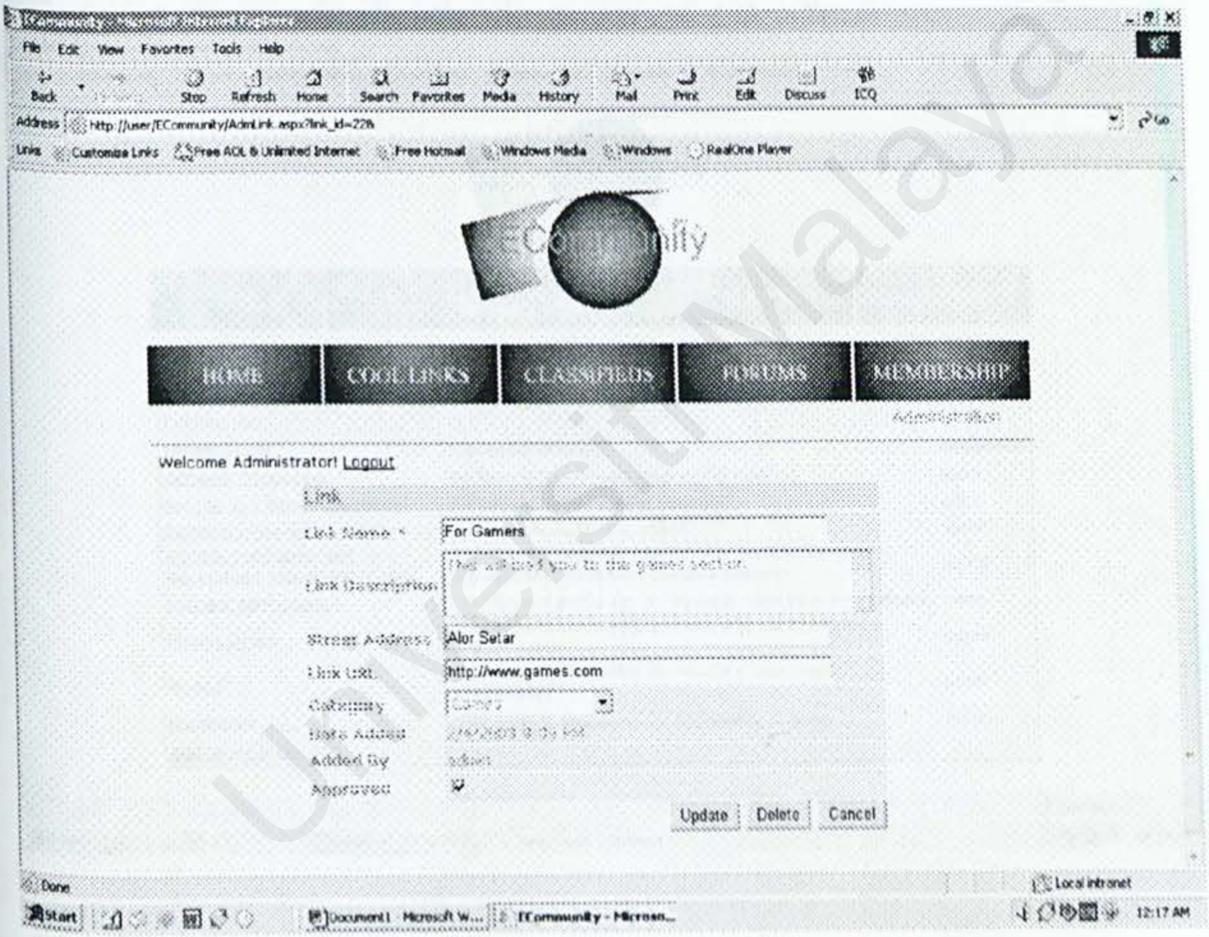
Description

Date Posted

Figure 13: Add New Hot events/Announcements Page

1.5.3 Cool links management module

This is the cool links management module for administrators. Administrator get to approve links posted by members, add new link or to edit the links posted by members, as can be seen from the figure below.



Address http://user/ECommunity/AdmLink.aspx?link_id=228

Welcome Administrator! Logout

Link

Link Name * For Gamers

Link Description This will lead you to the games section.

Street Address Alor Setar

Link URL http://www.games.com

Category Games

Date Added [illegible]

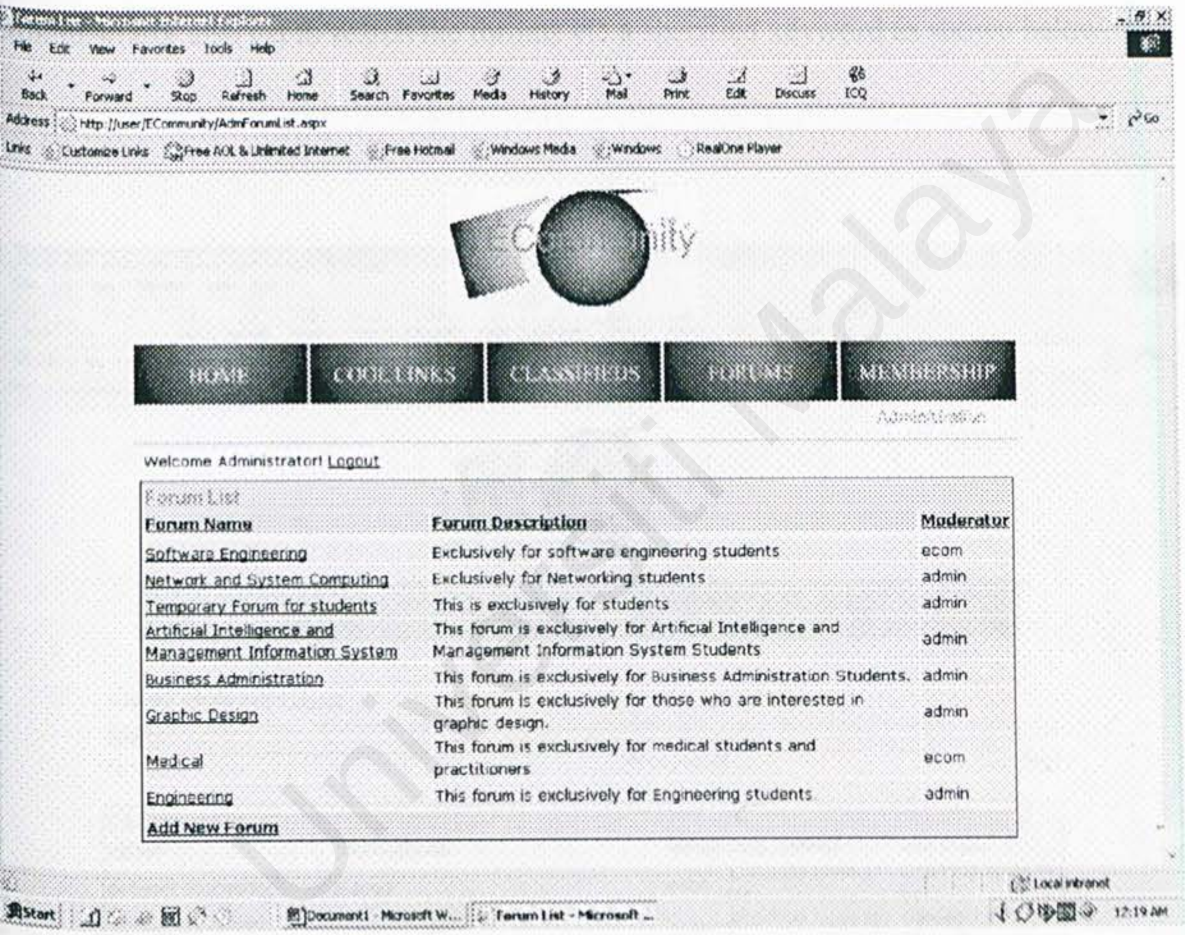
Added By admin

Approved ☑

Figure 14: Editing Links Page

1.5.4 Forums Management

This will allow the administrators to add a new forum to the E-Community site and also to preset the moderator for the specified forum



File Edit View Favorites Tools Help
Back Forward Stop Refresh Home Search Favorites Media History Mail Print Edit Discuss ICQ
Address http://user/ECommunity/AdmForumList.aspx
Go
Links Customize Links Free AOL & Unlimited Internet Free Hotmail Windows Media Windows RealOne Player
ECommunity
HOME
COOL LINKS
CLASSIFIEDS
FORUMS
MEMBERSHIP
Administrative
Local intranet
Start
Document1 - Microsoft W...
Forum List - Microsoft ...
12:19 AM

Welcome Administrator! Logout

Forum List

Forum Name	Forum Description	Moderator
Software Engineering	Exclusively for software engineering students	ecom
Network and System Computing	Exclusively for Networking students	admin
Temporary Forum for students	This is exclusively for students	admin
Artificial Intelligence and Management Information System	This forum is exclusively for Artificial Intelligence and Management Information System Students	admin
Business Administration	This forum is exclusively for Business Administration Students.	admin
Graphic Design	This forum is exclusively for those who are interested in graphic design.	admin
Medical	This forum is exclusively for medical students and practitioners	ecom
Engineering	This forum is exclusively for Engineering students	admin

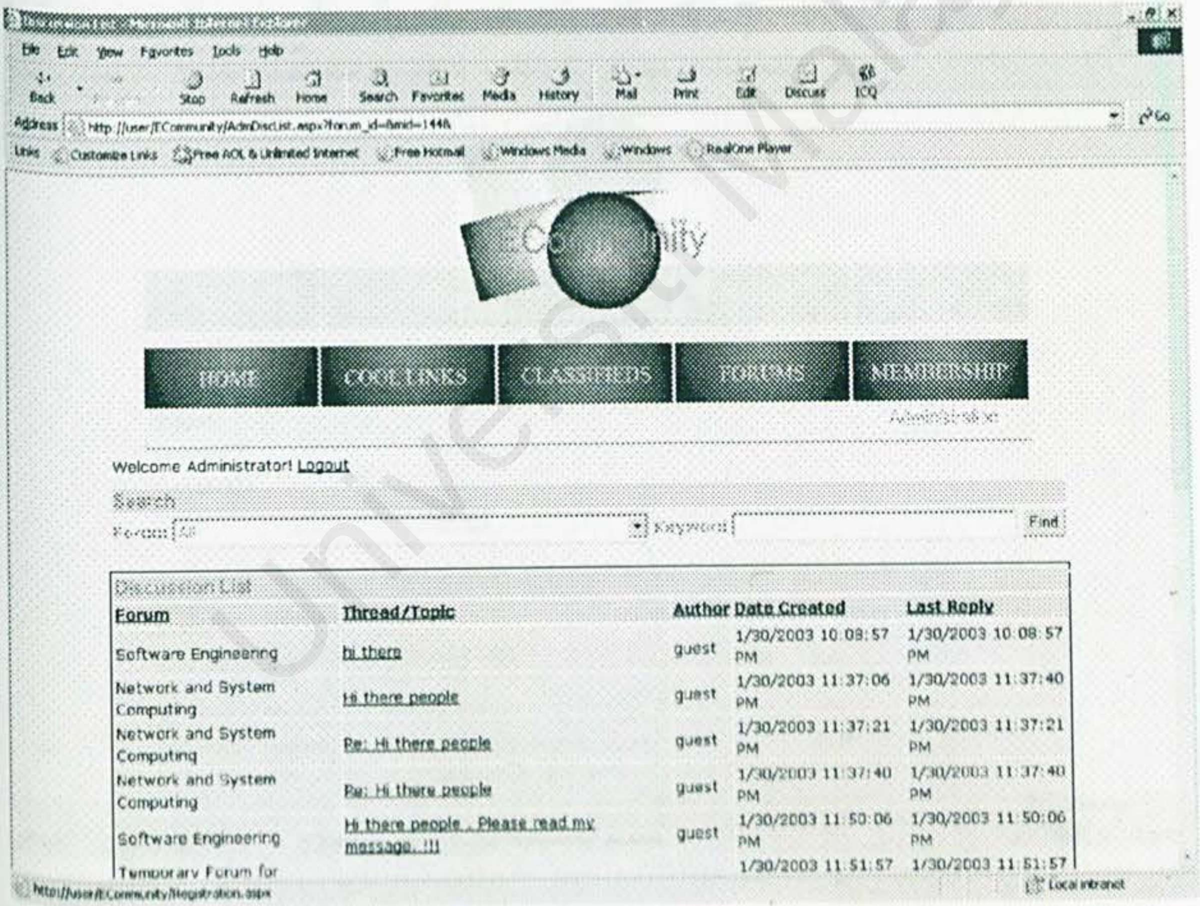
Add New Forum

Figure 15: Add Forums Page

1.5.5 Edit/Delete Forums Module

This will allow administrators the full privilege of editing the discussion forums by editing or deleting the forums in the E-Community site. It can be done easily by just clicking on the thread link as can be seen below and edit or to delete the specified thread.

Administrator also get to search the forums via a specified keyword as shown below.



File Edit View Favorites Tools Help
Back Stop Refresh Home Search Favorites Media History Mail Print Edit Discuss ICQ
Address http://user/ECommunity/AdmDiscList.aspx?forum_id=&mid=1446
Go
Links Customize Links Free AOL & Unlimited Internet Free Hotmail Windows Media Windows RealOne Player
E-Community
HOME
COOL LINKS
CLASSIFIEDS
FORUMS
MEMBERSHIP
Administrator
http://user/ECommunity/Registration.aspx
Local intranet

Welcome Administrator! Logout

Search

Forum: All Keyword: Find

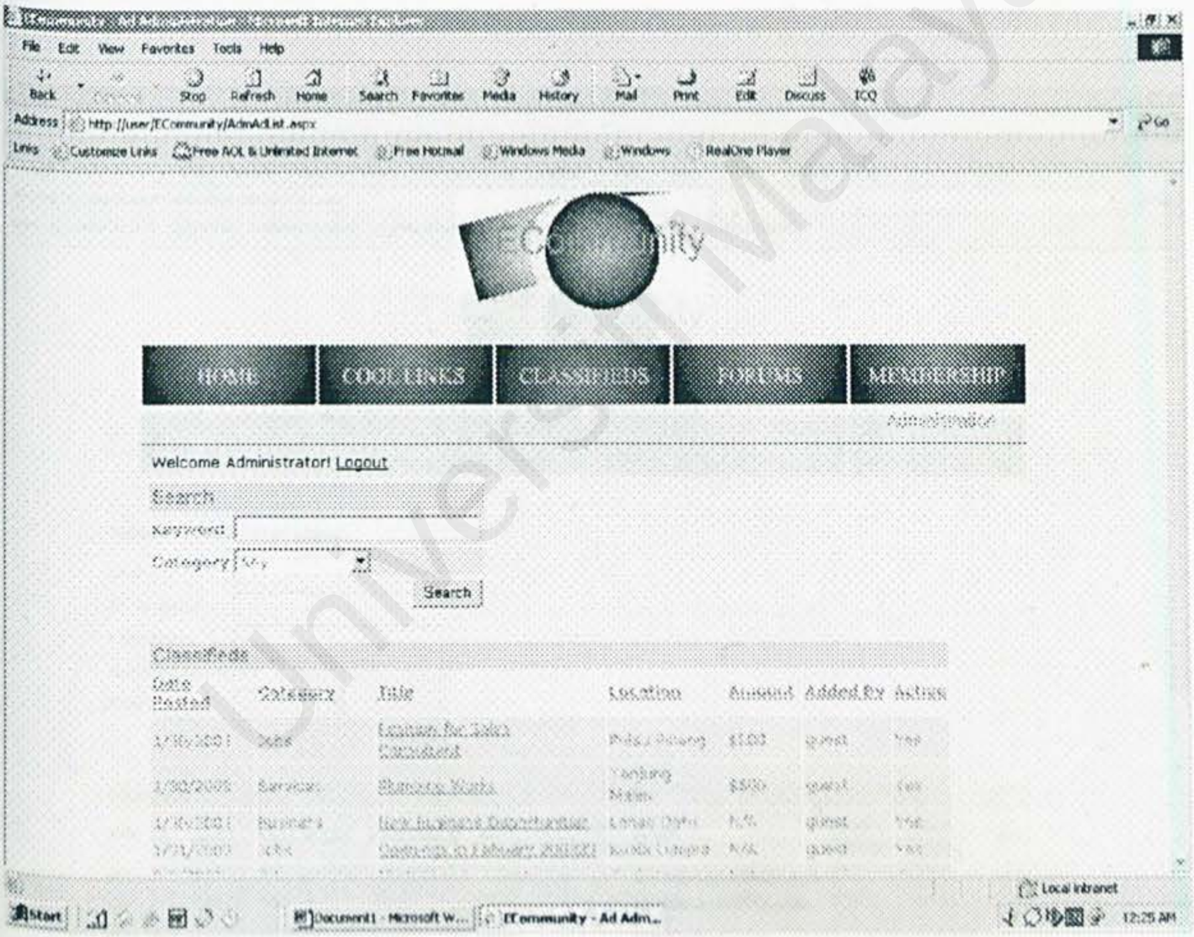
Discussion List

Forum	Thread/Topic	Author	Date Created	Last Reply
Software Engineering	hi there	guest	1/30/2003 10:08:57 PM	1/30/2003 10:08:57 PM
Network and System Computing	Hi there people	guest	1/30/2003 11:37:06 PM	1/30/2003 11:37:40 PM
Network and System Computing	Re: Hi there people	guest	1/30/2003 11:37:21 PM	1/30/2003 11:37:21 PM
Network and System Computing	Re: Hi there people	guest	1/30/2003 11:37:40 PM	1/30/2003 11:37:40 PM
Software Engineering	Hi there people , Please read my message. !!!	guest	1/30/2003 11:50:06 PM	1/30/2003 11:50:06 PM
Temporary Forum for			1/30/2003 11:51:57	1/30/2003 11:51:57

Figure 16: Edit/Delete Forums Page

1.5.6 Classifieds Management Module

This is the classifieds management module which the administrators will get to add, edit or to delete a specified classified posted by members. Administrators also get to search the classifieds module through a chosen category or keywords to simplify classifieds management.



File Edit View Favorites Tools Help
Back Forward Stop Refresh Home Search Favorites Media History Mail Print Edit Discuss ICQ
Address http://user/ECommunity/AdmAdList.aspx
Go
Links Customize Links Free AOL & Unlimited Internet Free Hotmail Windows Media Windows RealOne Player
ECommunity
HOME
COOL LINKS
CLASSIFIEDS
FORUMS
MEMBERSHIP
Administration
Local intranet
Start
Document1 - Microsoft W...
ECommunity - Ad Adm...
12:25 AM

Welcome Administrator! Logout

Search

Keyword:

Category: Any

Search

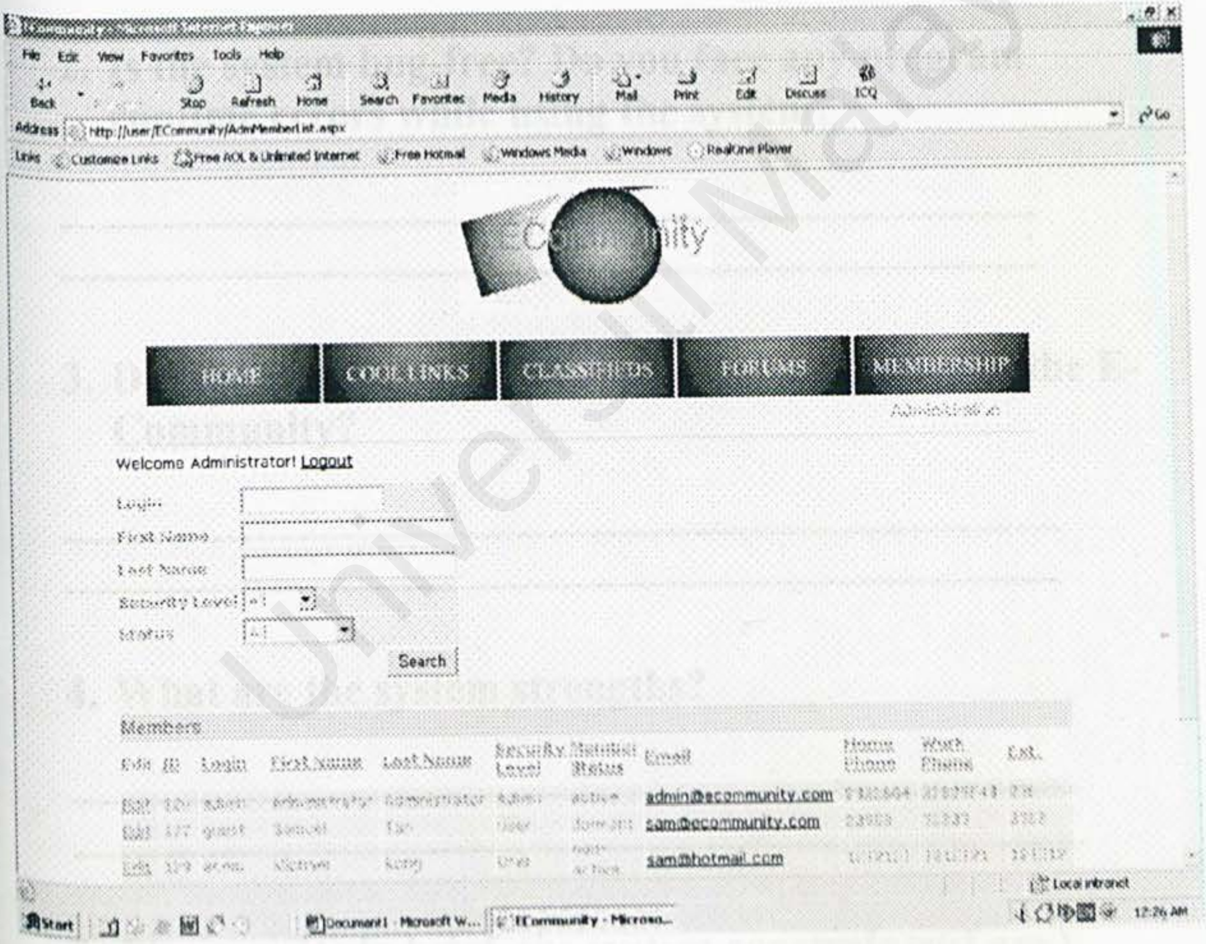
Classifieds

Date Posted	Category	Title	Location	Amount	Added By	Action
[illegible]	Jobs	[illegible] for Sales Consultant	Pulau Pinang	$100	guest	Yes
1/30/2003	Services	[illegible] Works	Tanjung Malim	$500	guest	Yes
[illegible]	Business	New Business Opportunities	[illegible]	N/A	guest	Yes
1/31/2003	Jobs	Openings in February 2003	Kuala Lumpur	N/A	guest	Yes

Figure 17: Classifieds Management Page

1.5.7 Membership management module

This is the membership management module which allow administrators to edit or to delete members from E-Community. To simplify membership management, administrators will get to search the whole members table through first name, last name, login name, filter through security levels and also the status of a member in ECommunity



File Edit View Favorites Tools Help
Back
Stop
Refresh
Home
Search
Favorites
Media
History
Mail
Print
Edit
Discuss
ICQ
Address http://user/ECommunity/AdmMemberList.aspx
Go
Links Customize Links Free AOL & Unlimited Internet Free Hotmail Windows Media Windows RealOne Player
ECommunity
HOME
COOL LINKS
CLASSIFIEDS
FORUMS
MEMBERSHIP
Administration
Local intranet
Start
Document1 - Microsoft W...
ECommunity - Microso...
12:26 AM

Welcome Administrator! Logout

Login

First Name

Last Name

Security Level All

Status All

Search

Members

Edit	ID	Login	First Name	Last Name	Security Level	Member Status	Email	Home Phone	Work Phone	Ext.
Edit	[illegible]	admin	Administrator	Administrator	Admin	active	admin@ecommunity.com	[illegible]	[illegible]	[illegible]
Edit	177	guest	Samuel	Tan	User	dormant	sam@ecommunity.com	[illegible]	[illegible]	[illegible]
Edit	[illegible]	[illegible]	[illegible]	[illegible]	User	not active	sam@hotmail.com	[illegible]	[illegible]	[illegible]

Figure 18: Membership Management Page

E-Community Survey and Evaluation Form

Faculty: ______________________

Year: ___________

Course/Major: ______________________

1. **Do you face any problem in using the ECommunity system? If so, please state in brevity**

   ----

2. **Is the system bug-free? Do you face any program runtime errors while using the system?**

   ----

3. **Did the system fulfill your needs as a member of the E-Community?**

   ----

4. **What are the system strengths?**

   ----

5. **Please write in brief, the system constraints(if any).**

11.0 References

Andrew Troelsen. (2001). *C# and the .NET Platform.* Apress

Celeste Robinson, Alan Simpson. (2001). *Mastering Access 2002 Premium Edition.* Sybex

David S. Platt. (2001). *Introducing Microsoft .NET.* Microsoft Press

Douglas J. Reilly. (2002). *Designing Microsoft ASP.NET Applications.* Microsoft Press

Ed Tittel, Chelsea Valentine, Lucinda Dykes. (2002). *Mastering XHTML Premium Edition.* Sybex.

Hersh Bhasin. (2002). *Microsoft ASP.NET Professional Projects.* Premier Press

Mesbah Ahmed et al. (2002). *ASP.NET Web Developer's Guide.* Syngress Publishing

Michael D. Thomasson. (2000). *ASP 3 Fast & Easy Web Development.* Premier Press

12.0 Bibliography

Alberto Manuel Ricart, Stephen Asbury. (2000). *Active Server Pages 3 Developer's Guide.* M&T Books.

Bob Reselman. (2000). *Active Server Pages 3.0 By Example.* Que

D.M. Silverberg. (2002). *Advanced Web Sites Made Easy: The Simple Way to Build Databases and Other Applications with HTML/OS.* Top Floor Publishing.

Evangelos Petroutsos. (2000). *ASP 3 Instant Reference.* Sybex

Jim Buyens. (2000). *Web Database Development Step By Step.* Microsoft Press.

Tobias Martinsson. (2000). *ActivePerl with ASP and ADO.* John Wiley & Sons