

**AN ONLINE SERVICE FOR RURAL COMMUNITY
DEVELOPMENT**

TRAINING CENTER OF KAMPONG TRADISI

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**AN ONLINE SERVICE FOR RURAL COMMUNITY
DEVELOPMENT
TRAINING CENTER OF KAMPONG TRADISI**

A thesis submitted to the Graduate School in partial fulfillment of the requirements
for the degree Master of Science (Information and Communication Technologies)

Universiti Utara Malaysia

By

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Abstract

Kampong (Kg) Tradisi is one of villages in a rural area in the northern Malaysian state of Kedah. One of the development initiatives in this village is a training center established to provide basic IT skills training for the village community. The current procedure lacks an efficient mechanism to update the latest available information about community, information accessibility and delivery issues. This study objective was to design and develop an online service for Kg. Tradisi training center to help in community development and training and overcome the current obstacles. Implementing this solution can enhance information and knowledge sharing between community and development organizations besides time and cost efficiency.

Dedication

I dedicate this humble work to my father and mother; the spring of loyalty, affection, and dedication. They raised me on the principles of virtue, to my dear brothers and sisters; who spared no effort helping me during my school years.

I dedicate this work also for my "My Uncle", Mr. Mohammad Al-Tehe Abu Lorasance, "My Uncle", and Dr. Marwan Al-Zoubi

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CHAPTER 1: INTRODUCTION

1.1 Background

The adoption of information and communication technology (ICT) and use of online applications are seen as important ways for many currently marginalized communities, such as in rural areas of the developing world, to improve their social and economic standing. An important area of research is the design and implementation of computer applications to meet the needs of these communities.

Rural communities in developing countries face many constraints; good communication poor infrastructure. Medical information for preventive healthcare, education for the entire community, and agricultural advice are examples of important communication services that can directly improve the well-being of the community (Akinsola *et.al.*, 2005).

Access and communications also improve commerce and increases efficiency of business transactions. A user directory service can complement a basic communications service by helping to organize the information sources these communities are linked to. (Sin *et. al*, 2004).

Directory services present a means to describe existing resources of any organization or community that can be dynamically discovered and used, and are gradually more being adopted by organizations and communities (Kuechler, 2003).

1.2 Problem Statement

Rural planning and development agencies are always of high concern on developing and training rural communities. In order to achieve that these agencies need to collect necessary information and data about these communities in order to be able to make development and planning decisions.

Kampong (Kg) Tradisi is one of villages in a rural area in the northern Malaysian state of Kedah. This village area is being developed by Kedah regional development authority which belongs to ministry of rural and regional development. One of the development initiatives in this village is a training center established to provide basic IT skills training for the village community.

The training center established partnership with many Malaysian telecommunication companies like Maxis to provide the training courses and staff for the center. The village community individuals can join and register in any course they like. The courses provided by this center are ranging from basic windows skills to Microsoft office and internet applications usage.

The current procedure followed by this training center in collecting community data and publishing important notes and announcement to the community face several drawbacks:

The current procedure lacks an efficient mechanism to update of the latest available information about community individuals and also development concerned companies besides the current procedure does not allow individuals to access their information by themselves in order to manage or edit their data.

There is also a weakness in the current procedure in the announcement and publishing mechanism since there is no guarantee on delivering the announcement to all community individuals. Beside that current procedure needs a greater effort and human resource in both collecting community data and publishing announcements to them.

The World Wide Web provides some of these capabilities as an extremely flexible description repository that is widely accessible. Directory services help to address these issues by providing a mechanism for the structured description of a resource.

1.3 Research Questions

The research questions of this study can be summarized in two questions as follow:

1. What are the current procedures followed by Kg. Tradisi Training Center to notify its individuals about courses and how they register?
2. What are the requirements of the proposed web based directory solution?

1.4 Study Objectives

This study objective was to design and develop an online directory services for Kg. Tradisi training center to help in community development and training. The study objectives in details are as follow:

1. Study the current situation in Kg. Tradisi training center and collect the requirements of the proposed system.
2. Design and develop the directory service prototype based on the requirements collected. This directory service will provide the following functionalities:
 - a. Provide a centralized listing of all community individuals and training center staff.
 - b. Allow directory lookups to find information on any person listed in the directory.
 - c. Provide an easy environment for users to register and self-manage their account.
3. Test the prototype's usability by distributing a questionnaire to both trainees and the training center staff to measure the usability of the system.

1.5 Scope of the study

This study has focused on developing a directory service for Kg. Tradisi community training center as a rural community to help in its development efforts.

1.6 Significance of the study

Successfully designing and implementing the proposed solution of this study can return many benefits to the community and to the development agencies:

- Provides easy and reliable access of information for community individuals
- Enhance information and knowledge sharing between community and participating organizations
- Provides a time and cost effective mechanism for publishing and announcing to the rural community
- Provide better services for rural people

1.7 Report Structure

Chapter two presents a review on the literature of directory services systems and previous efforts in developing and implementing such systems, web based systems concepts, and ICT in rural development and enabling technologies and implementation issues.

Chapter three focuses on the methodology used in implementing this project in order to achieve the study objectives, while chapter four and five highlight the project findings.

Chapter four discusses the findings of this study based on the results of implementing the proposed system using the methodology described in the previous chapter.

Chapter five emphasizes on the project limitations, future recommendations and concludes the findings of this project.

1.8 Summary

In this chapter a brief background about the study, problem statement, objectives, scope and contribution of the project were presented. This chapter gave a clear picture about the proposed solution of this study and the expected output from it which is a web based personal directory to be used by the management of kg. Tradisi Training Center and the trainees to notify trainees about upcoming events and courses and collect trainees' biographies and personal data.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Based on the fact that the proposed solution of this study is considered as a web based application to support rural development efforts, this study presented a brief review on the role of ICT and mobile specifically in the rural development first. Then moved to the Mobile applications concepts in general and differentiated between the technologies used for developing such application and the similar technologies. A review on the mobile applications current situation and status has been added. Finally, a focused review on the web applications architectures and implementation issues has been conducted.

2.2 ICT and Rural Development

In rural areas, introducing ICTs for poverty alleviation is affected by the general circumstances of these regions. For instance, these regions are plagued by paucity or absence of public facilities such as a reliable electricity supply, access roads and water facilities as shown in Figure 1-1.

There is also a scarcity of technical personnel in these areas which has implications for maintenance and repair of technical problems that arise from equipment placed in

these areas. In addition, these kinds of areas may have difficult topological conditions and this makes wired infrastructure both costly and sometimes infeasible. Moreover, the climatic conditions prevalent in rural regions

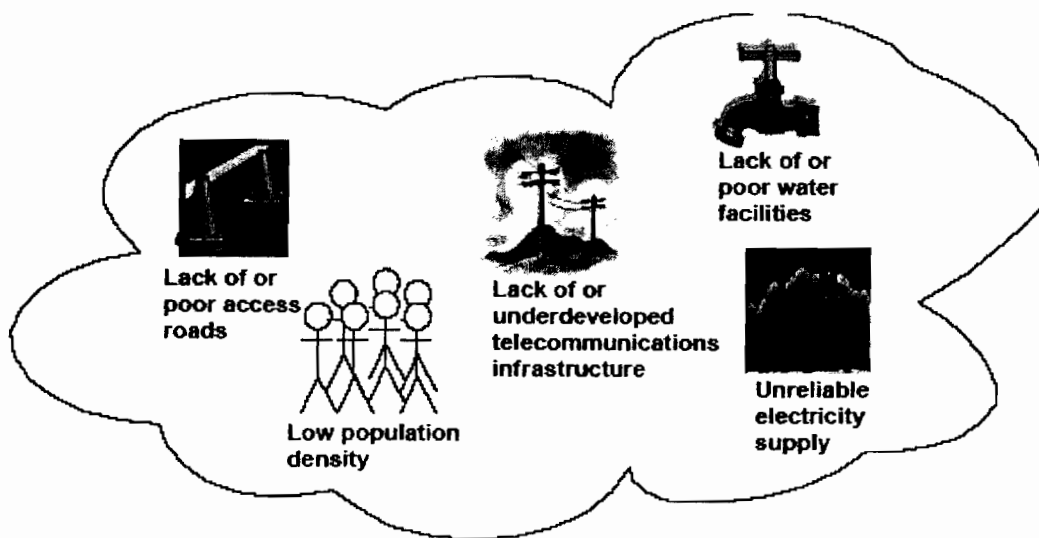


Figure 1-1: Rural areas conditions

May place demands on the equipment installed in these areas. For an example, the constant tripping and restoration of the electricity supply can damage computer equipment although this may be reduced by use of a Uninterrupted Power Supply (UPS) device; essentially a backup power supply.

Furthermore, rural areas have a low per capita income level and a low level of economic activity as well as a low population density. Communication in these areas is crucial but often there are very few telephones in these areas leading to a high

calling rate per telephone. There is also a need to have a basic level of literacy and training in order for ICTs to be successful in these areas.

Most importantly, relevant content is critical to the success of any rural application. Possible areas for software technology to uplift rural communities could be multimedia applications, telemedicine applications, education and government applications as well as e-commerce applications. In South Africa, one of the poorest provinces is the Eastern Cape which still has many rural and underdeveloped areas. Most of the conditions described above are true of this province and, for these reasons; it is in this province that the project at hand takes place. Generally, the consensus is that ICTs can be used in innovative ways to include and empower marginalized communities. The following section discusses how ICTs have been used in real development initiatives around the globe for this purpose.

The significance of knowledge for development is well known (World Bank, 1999). Knowledge is a vital basis of human and economic development. Technological revolution in ICTs in the North has led to the appearance of a knowledge economy but the failure of developing countries to take full advantage of the benefits of this revolution is a major barrier to their participation in this knowledge economy. Knowledge transfer through education and training has been a fundamental concern of rural development plans over the years. Latest developments in ICTs offer great potential to support and improve education and training for development.

Information and communication activities are a primary component of any rural development activity. While education and training expand cognitive skills, it is

information that gives content to knowledge. The significance of information for development is definite but important issues bound whose reality the information reflects, who is able to make use of that information and for what purpose.

Rural information systems have conventionally alerted to deliver information to the rural poor and providing information about rural areas to policy makers, but it is now acknowledged that past systems have been mostly unsuccessful in addressing the needs of the rural poor. The spreading of agricultural information in particular is growing beyond just transmitting messages (Ashley and Maxwell, 2002).

There is a new highlighting on the information gaining and enabling the rural poor to demand information specific to their particular business needs. Communication experts increasingly identify the enormous potential of ICTs to support and enhance these changes.

In arguments about the role and potential of ICTs for rural development, it is helpful to differentiate between knowledge gaps that refer to uneven distribution of technical knowledge and information problems, both of which contribute to underdevelopment. ICTs have the prospective to address both these obstacles to rural development by easing enhanced knowledge sharing and information exchange. However successful application of these technologies requires better understanding of both the potential of the technologies in question and the social, political and cultural environment in which they could be used (Ellis and Biggs, 2001).

Recent debates on the prospective role of ICTs for rural development lean to be constrained by a natural common lack of understanding between technology drivers and development agencies. As a result, ICT applications in developing countries stay largely unaware by recent developments in the wider development literature and equally a lot of development agencies have failed to effectively mainstream strategies to bind the potential of ICTs.

ICTs have the potential to support and enhance rural development initiatives in the following key areas (Chapman and Slaymaker, 2002):

- **Managing, storing, and sharing information**

ICTs present exceptional information storage capacity, increases in processing power and speed, together with remarkable reductions in costs. ICTs can ease the improvement of on hand information management processes by improving ease of access, transparency, accountability, efficiency, speed of delivery and providing new information sharing chances through affordability, accessibility and ease of use. ICTs can assist address high-quality control concerns of better administrative efficiency by improving vacant official information systems operated by local government and development agencies and also ease enhanced cataloguing, storing and sharing of locally related information.

The comprehensive multimedia capabilities of new technologies put forward the potential for storage and presentation of information in formats more appropriate to local contexts and therefore encourage greater integration of different information

systems. Above all ICTs present potential for decentralization of information systems, decreasing dependency and empowering the rural poor by transferring control over information and knowledge.

- **Access to more information, especially public information.**

The context of rural development has changed quickly in recent years. Globalization and continuing liberalization of agriculture have significantly changed the market and institutional environment in rural areas. In order to be able to deal with and adjust to these changes the rural poor require improved access to information regarding market chances and information about their rights and the roles and responsibilities of institutions supposedly designed to benefit them.

In terms of market opportunities, rising agricultural technologies are increasingly information intensive and the rural poor must now manage with increasingly complicated input and output markets. Most smallholders and the rural institutions that represent them are poorly equipped to cope with the vagaries of the open market. Improving the information management and decision-making capacity of these institutions is necessary if they are to 'make markets work for the poor'.

ICTs present huge potential in support of improved education and training and need to be harnessed to build long term decision making capacity in rural areas. ICTs can also support improved provision of short-term information required by the rural poor for livelihood strategies.

Additionally the poor are increasingly expected to take on responsibility for management and financing of rural services e.g. water supplies and to participate in recently decentralized systems of governance. In order to participate effectively the poor require more and better information about their rights and the roles, responsibilities, structure and services of institutions supposedly designed to benefit them. ICTs offer great potential to boost the benefits and reduce the opportunity costs of participation.

- **Creating linkages for partnerships in information sharing.**

As noted above ICTs can assist empower the poor to take control of their knowledge environment. This can lead to improved sharing of information locally resulting in better choices for livelihood strategies e.g. cataloguing and sharing experience between farmers. Local information exchange can help the rural poor categorize as groups, articulate needs, defend interests and increase bargaining power.

ICTs can help pro-poor institutions listen to the poor, engage in more meaningful dialogue and build consensus and mutual understanding around development objectives. ICTs provide realistic opportunities for enhanced information exchange between different groups and new and innovative knowledge partnerships.

2.3 Web-based Applications Characteristics

The attributes of web-based applications are network intensive, content- driven,

continuous evolution, immediacy, security and aesthetics or graphic design (Pressman, 2001). Since web applications are reside on the Internet, it enables for open worldwide communication, therefore it must serve the needs of a diverse community of clients.

In many cases, the primary function of web application is to use hypermedia to present text, graphics, audio and video content to the end-user. Unlike conventional application software that evolves over a series of planned, chronological spaced releases, web applications evolve continuously. Web-based applications have an immediacy that is not found in other type of software (Norton, 1999).

For the last decade Hypertext Markup Language (HTML) has been the dominant standard for creation of web application content and structure. However as the size and complexity of applications grow, a new standard, extensible markup language (XML) has been adopted for the next generation of web applications (Nijaz, 2000).

2.4 Usability Testing

In accordance to Jokela et al., (2000) usability can be defined as a software quality attributes. Similarly, usability is also defined as an extent to which the product can be used by the user to achieve specified goals. Ravden and Johnson (1989) defined usability as the extent to which an end-user is able to carry out required tasks successfully, and without difficulty, using the computer application system.

Usability, in turn can be decomposed into a number of attributes. According to Nielsen (1993), usability is a multidimensional concept that is traditionally associated with five attributes: learnability, memorability, efficiency, errors, and subjective satisfaction.

According to Nielsen (1998) the dimensions of usability are:

- Effectiveness: the accuracy and completeness with which users achieve specified goals
- Efficiency: the resources expended in relation to the accuracy and completeness with which users achieve goals.
- Satisfaction: the comfort and acceptability of use. However, the generally accepted meaning is that a usability attribute is a precise and measurable component of the abstract concept that is usability. To achieve user's satisfaction, the provider should improve accessibility property (Nielsen, 1993; and Holcomb et al., 1991). Many usability problems resemble issues identified during the early stage of web site development for PC computers (Ramsay and Nielsen, 2000).

However, good user interface design can alleviate some of the usability problems for users. Drawing from their experience in developing Web access to an information system for web-based application, Colafigi et al. (2001) recommended several design guidelines for web application, including:

- Use short links (hyper links).

- Include backward navigation.
- Minimize the level of menu hierarchy.
- Include headlines for each web page.

2.5 Case Studies

2.5.1 Case Study: Kentucky Association of School Business Officials

The use of an outdated system was making extra work for the Kentucky Association of School Business Officials (KASBO). They found their use of paper registrations was inefficient and time-consuming. Also, sending mail through the post office wasn't only expensive; it lacked the instant response KASBO required for registration. By using RegOnline they saved themselves frustration, time, and money.

CHALLENGE

The paper registration process lagged in response time. Out of 200 spots available in a class they could get 250 paper registrations back all registered for the same class. This was an impossible situation. It was time consuming to sort through all the paper registrations to simply figure out who was registered for the class. It was also impossible to decide who should be signed up first and who would have to reschedule. This made extra work for KASBO and the registrants were disappointed and often angry they didn't get into the class they wanted.

SOLUTION

Using RegOnline had a tremendous impact on KASBO's business. First, by switching from a paper registration process to RegOnline they decreased their workload by 35%-40%. They no longer had to keep track of everyone through paper registrations. RegOnline gave them instant information on who was registered for the class. Using RegOnline's software let KASBO have a set amount of places in their classes and the class would simply disappear when it was full. This took away the disappointment and time-consuming process of contacting the overflow of registrants who weren't aware of the class being full.

Secondly, by using emails from RegMail they saved the cost of postage and mailing printed registration information and marketing materials. Sending a RegMail notification as soon as registration opens gave the registrants instant access to the classes. They could also give preferential treatment to the registrants with a KASBO membership. By giving members access to classes before other registrants, KASBO made the membership more valuable and increased that revenue stream.

Other benefits followed as well. By using RegOnline's food choice functionality they saved \$10,000 dollars in food costs on their large annual event; transversely saving them the embarrassment of not having enough food at the event. RegOnline's reporting features gave access to the registration information for all KASBO employees. This cut down confusion and miscommunications throughout the company. The badge printing feature helped them regulate the class attendance only

giving the student the room number that they needed. This cut down on students switching classes mid-day and helped teachers make sure they had enough handouts and seating for all the attendees.

RESULTS

RegOnline gave KASBO the tools to streamline their registration process. By using the many features that RegOnline provides they were able to rid themselves of an old system that cost them frustration, time, and money. The instant registration information they gathered and processed saved them 35% to 40% of their workload and KASBO continues to use RegOnline features that benefit their business.

2.5.2 Washington State University Area Health Education department

Washington State University's extension office needed to reduce workload and increase attendee satisfaction at its Area Health Education department events without hiring additional staff or committing to an expensive contracted registration provider. The organization turned to RegOnline to automate its registration process, saving more than 400 staff hours annually, reducing cost and preventing attendee confusion and complaints.

CHALLENGE

Area Health Education (AHE) coordinates five conferences each year, within seven weeks of each other. The registration process for all 350 attendees at each conference

was extremely manual. First registration forms would flow in by mail, fax, or over the phone and someone would enter that information into a database. Then another employee would call in credit card payments over the phone for approval. Finally confirmation letters would be printed through a mail merge process and mailed.

This process took too long. Registration forms quickly piled up, and mistakes were common. At the events AHE faced frustrated attendees at onsite check-in. With similar events being held in the same location on the same day, attendees were showing up at the wrong conference, and with no way to look up attendees over multiple events, event staff became quickly frustrated and overwhelmed.

AHE needed a better solution, but it had one more problem: Since events are only one piece of its business it needed a program that would be easy use and a program that did not require a contract or complicated pricing.

SOLUTION

Washington State University and AHE decided to go with a web-based, event registration system to solve its problems. It turned to RegOnline to do four things:

Automate event registration online: AHE provided an online event registration option for the first time in 2008, allowing both exhibitors and attendees to register, set preferences and pay online.

Accept payments online: AHE works with five different clients each with their own bank account. If the registration payments were paid directly to the University system

they could be delayed in getting to the right accounts. To avoid that, the organization had RegOnline accept payments for them and send checks directly to the extension office each month.

Provide accurate, real-time reporting: AHE used RegOnline to provide accurate reporting to better track customers at every event. Through this function, they provided event organizers with access to real-time customer data at events, compared events using cross-event reporting and distributed up-to-the-minute information via a web link to vendors, committee members and staff.

Provide web-based platform without obligation: AHE used RegOnline's standard, pay-as-you-go agreement to avoid long-term contracts and complicated pricing structure, allowing the organization to implement the system immediately.

RESULTS

After its first event on RegOnline, AHE found that 50% of exhibitors and attendees had used the online registration option. That automation reduced workload by an estimated 14 minutes per registration or an astounding 408 hours of annual staff time.

In addition to the time saved during the registration process AHE no longer has confused attendees waiting in line onsite. AHE was able to quickly access registration data across multiple events and easily confirm that attendees were paid in full.

The reporting functions enabled AHE to quickly access results for each conference and compare events with cross-event reporting. Real-time, “smart link” reports provided new visibility into performance for committee members and staff.

2.6 Infrastructure and Rural Development in Malaysia

Malaysia has achieved substantial success in its rural development, especially in reducing the incidence of poverty in both rural and urban. In the process, the rural areas have been developed with infrastructures, utility, social amenities, health and school facilities and etc to support the economic development of the country as well as increasing the quality of life of her populace. The productivity and incomes of the rural people, or more specifically the agriculture sector, the mainstay of the rural economy, have steadily increased. Rural development continues to be one of the main focus of the Malaysian Government under the 9th Malaysia Plan (2006 – 1010).

More significantly, the development that has taken place since independence in 1957, and especially since the launching of the new Economic Policy (NEP) in 1971, has generated a feeling among a large number of the rural people that they are part of the nation’s growth and modernization process, and that they have not been neglected or marginalized. Needless to say rural development in almost synonymous with poverty eradication.

Infrastructure and rural development in Malaysia is part and parcel of a well planned and executed process. At the macro level Malaysian national development has always been guided by a series of long term Outline Perspective Plans (OPP). Thus far three

OPP's have been implemented guided consecutively by the philosophy of the New Economic Policy (NEP 1971-1990), the National Development Policy (NDP 1991-2000) and the National Vision Policy (NVP 2001 -2010). These OPP's are in turn implemented through a series of five year development plans; the current being the Ninth Malaysia Plan (2006-2010).

Agricultural development and modernization programmes together with massive social and economic infrastructural build up haven been taking place in rural Malaysia since the 1960s. These programmes provide the basic infrastructure and are designed to ensure that farmers make use of other essential support services, and to expose farmers to new ideas and values that would enhance development and modernization in agriculture.

From the First (1966-70) to the Fourth Malaysia Plan (1981-85) a major portion of the rural development expenditure, had been channeled towards rural modernization programmes, namely new planting and replanting of tree crops such as rubber, drainage and irrigation of padi land, and new land development and settlement schemes. Rural modernization programmes have introduced modern technologies into the various agricultural activities such as rubber small-holdings and padi farming.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

Research methodology is more than just collections of method to perform a research; it is a systematic way to solve the research problem (Kothari, 1985). The research methods refer to the methods and techniques used by the researcher in performing the research, for example data collection technique, data processing techniques and instruments.

The research methodology used in this study is an agreeable method, excellently chosen, described and accepted among many researchers in Information System Research Design (Vaishnavi & Kuechler, 2006). The research is conducted in several steps. The following Figure 3.1 illustrates the major steps of the design research methodology.

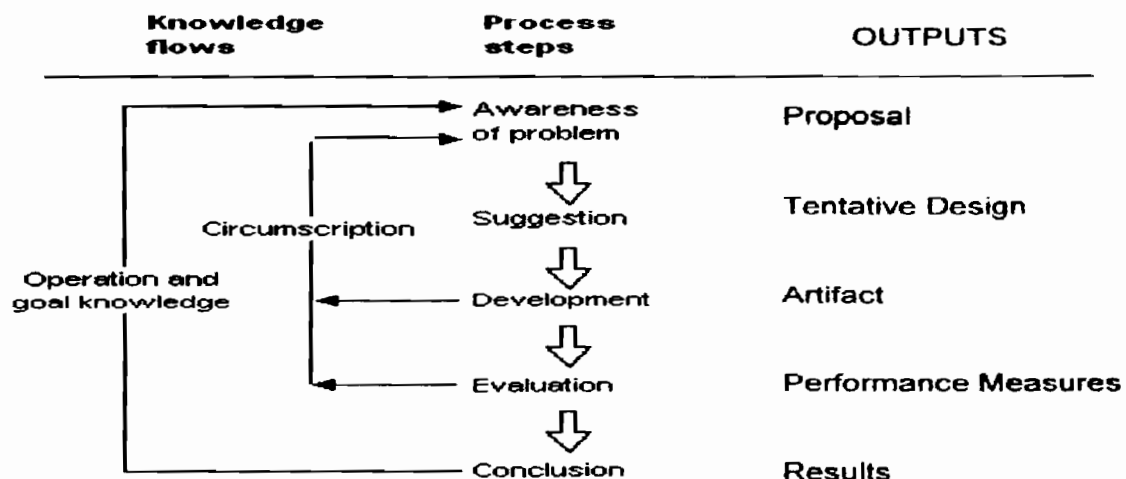


Figure 3.1: The General Methodology of Design Research

3.2 Awareness of Problem

Awareness of Problem is a phase of exploring potential research topics in a chosen domain, and the understanding of the problem which needs to be solved. In fact, the selection of domain was decided during this phase. Through discussion and related reviews of similar systems, a general idea of what should be included in the system was decided.

Data gathering is also part and partial of awareness of the problem. Thus, the study used data which is documented and obtained from management office of Kampung Tradisi Training Center for the center's current registration and notification procedures followed by the center. Data was in paper form and cover all information about the parts involved in the implementing the system.

This phase of the methodology is usually conducted through a series of meetings and workshops with the business management and business users. These meetings initiate the development process by establishing a mutual understanding of the objectives, scope, user requirements and assess the feasibility of the development project.

Firstly to come out with the objective of this research listed in Chapter 1, we have to understand the research domain. For this research, the research domain is Kampung

Tradisi Training Center, for the first three weeks of the research schedule; literature review had been carried out. During the literature review stage, ideas, information, issues and problems related to the web based directory services system and were gathered. The information gathered and collected was reviewed from books, proceedings, journals, white paper, reports and news.

After getting this information, a structured interview with the person who is in-charge of kampong tradisi training center, was conducted. The objectives of the interview are:

- 1 . To gather information about the design issues should be considered in Directory Services System.
- 2 . To determine how currently the Training Center management notifies the community and trainees about new events and functions and whether there is any existing system for that or not.
- 3 . To understand the functions and business needs of the training center management from the new system.

3.3 Suggestion

In order to develop a well-design system, one of the major influences on the quality of the systems developed is the software development approach adopted. A methodology consists of an approach to software development (e.g. object orientation), a set of

techniques and notation (e.g. the Unified Modeling Language-UML) that support the approach to structure the development process and unifying set of procedures.

In this system development, the researcher used the object oriented approach. As information systems requirements are becoming increasingly complex, the use of object orientation approach is more necessary. Object oriented offers conceptual structures that support the sub-division in the system. It also aims to provide a mechanism to support the reuse of program code, design and analysis design.

Tentative design follows the proposal. The design of the system includes UML diagrams, and a sketch of the system's architecture. The UML diagrams involved are use case diagram, class diagram and sequence diagrams. The following section illustrates the design of the system.

In designing the structure of the system, we have used the Object Oriented approach to view the whole of the system processes. The Rational Rose 2000 Enterprise Edition's software was chosen as a tool to view the diagrams which are use case diagrams, use case specifications and sequence diagrams and all of the system structure (See Chapter 4). Rational Rose 2000 is the best, simple and easy tools for system structure development phase.

3.4 Development

After designing the system, this research will proceed with the development of the prototype system. The completed design will be translated into program code. In this phase, the researcher will use the object oriented programming to create all the components of web based directory service System and codes all source codes of client and server components to access and retrieve data from databases.

The system was completely developed using .NET technology (2.0 .NET Framework) using VS 2005 (VB.net) as IDE. Microsoft SQL Server 2005 (the evaluation version) was used to build the system database to store all staff and notifications information.

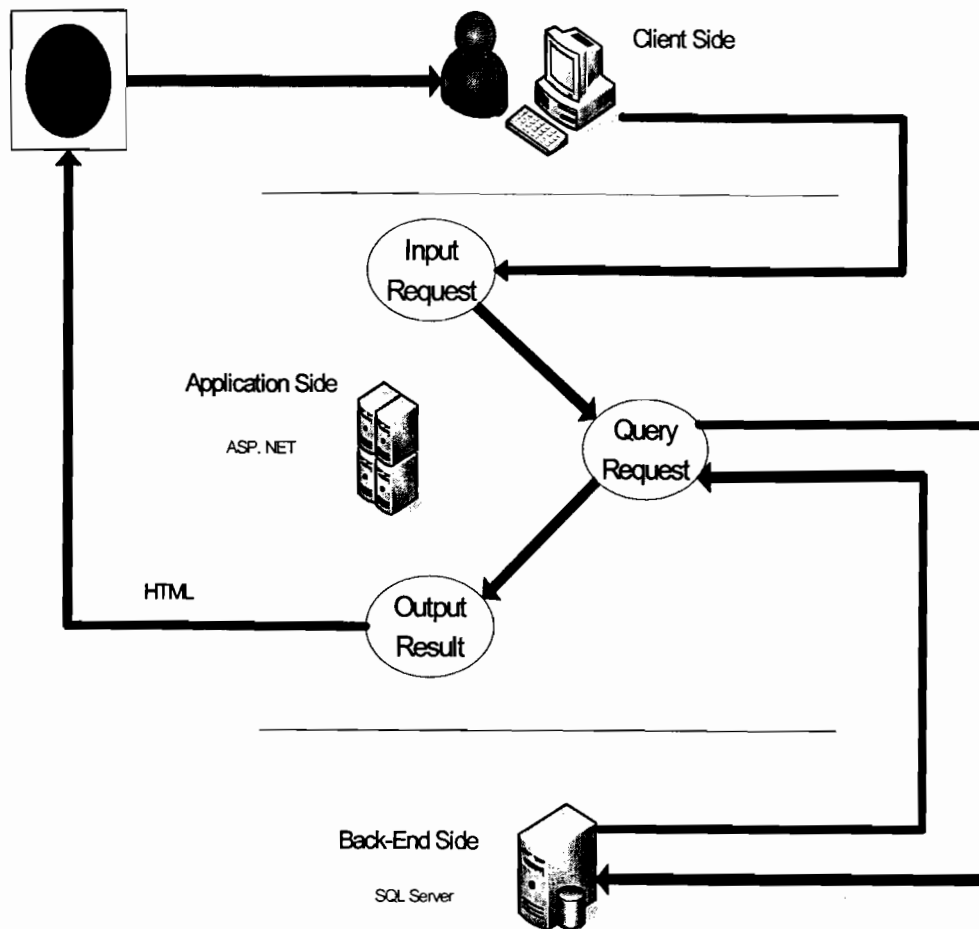


Figure 3-2: System Architecture

3.5 Evaluation

The evaluation was performed to determine the level of functionality and operability of the system after the system has been developed; it is tested based on the list of requirements in for the system (see Table 4.1). The aim is to see the level of functionality and operability of the prototype system. The evaluation and its results can be seen as in Table 4.1 according to the system requirements.

3.6 Summary

This chapter has discussed the methodology that was used in this project, where the methodology was grouped according to four phases was based on the project objectives as follows:

1. Awareness of the problem Phase
2. Suggestion Phase
3. Development Phase
4. Evaluation Phase

In **Awareness of the problem Phase**, ideas, information, issues and problems related to the Online Services System were gathered. Gather necessary requirement and compile.

In **Suggestion Phase**, development of elements were implemented in software then these are the main focus of requirements analysis.

In **Development Phase**, the interactions among system components and the system functionalities were identified.

In **Evaluation Phase**, the Online Services System was tested and the problem encountered will be analyzed to ensure it will provide correct services.

CHAPTER 4: THE ONLINE SERVICE SYSTEM DESIGN

4.1 Introduction

This chapter will cover the design and implementation of the Directory Service System. The chapter will start with the system requirements (functional requirements) collected from the end users of the system. Then this chapter will touch the system architecture followed by the designing of the graphical user interface of the prototype system as long as the system database.

4.2 System Requirements

Based on the objectives and the definition of the Use Cases, the following are the requirements for this system. The requirements for this system are organized according to different aspects of the system that are, system performance and functionality. The complete list of the system requirements (the functional requirements) are shown in Table 4-1.

Table 4-1: System Functional Requirements

Requirement	Description
Requirement 1	The system should allow the administrator to add, delete, update and view the available courses in the system.
Requirement 2	The system should allow the administrator to add, delete and view the available participants for each fruit available in the system.
Requirement 3	The system should allow the administrator to add, delete and view the available announcements for each fruit available in the system.
Requirement 4	The system should allow the administrator to add, delete and view the available commercial advertisements for each course available in the system.
Requirement 5	The system should allow the administrator to generate reports about participants' numbers and their details for specific dates or courses.
Requirement 6	The system should enable the administrator to ensure data integrity and consistency of the system.

Requirement 7	The system should allow the participants to view courses list at first and allow them to select desired course to view its details.
Requirement 8	The system should allow the participants to register in any course they are interested in by selecting the course and date available then enter their bio data.
Requirement 9	The system should not require any login/registration info from participants in order to use the system. Login is required for the administrator part only.

4.3 System Design

The design of the system includes UML diagrams, and a sketch of the system's architecture. The UML diagrams involved are use case diagram, class diagram and sequence diagrams. The following section illustrates the design of the system. Microsoft Visio is used to draw necessary diagrams that help in the development

stage. Use case diagram, as displayed in figure 4-1 describes the overall interaction between the system and its users:

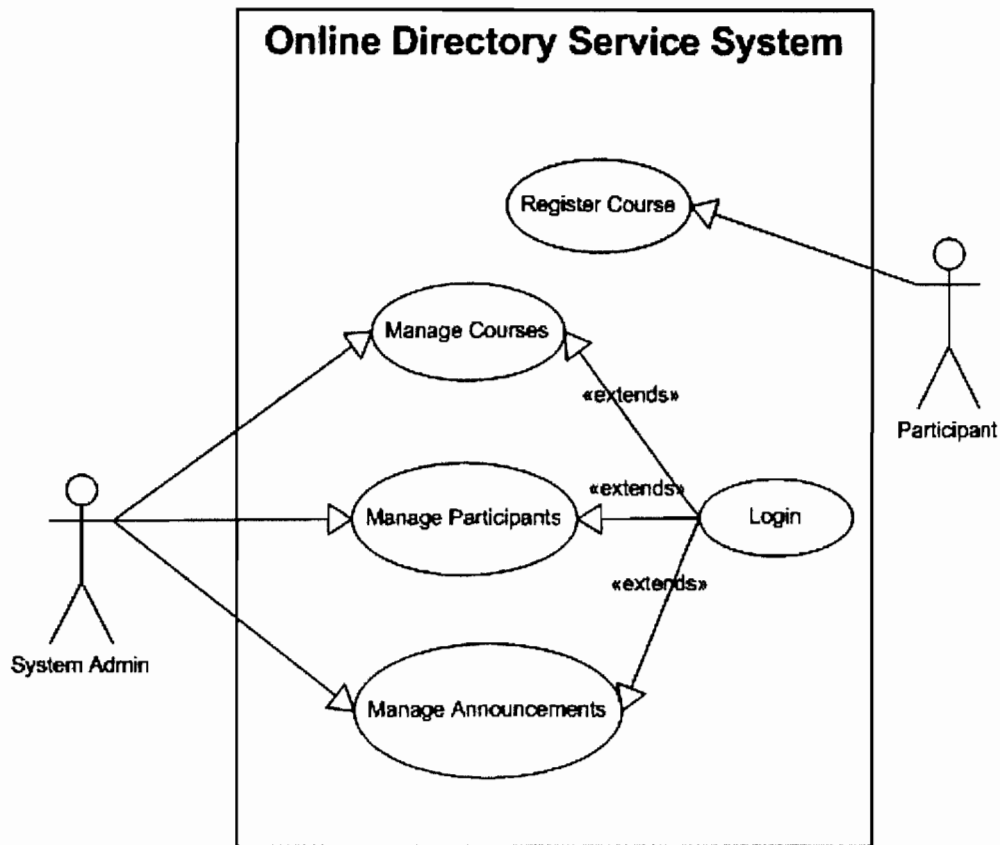


Figure 4-1: Main Use Case

The main use case diagrams model the functionality of the participants and the system administrator as actors of the system. The functionality of the participants is the ability to interact with the system by viewing certain course info and details related to that course and its time and date of availability. The functionality of the system administrator is the ability to interact with the system by updating the system data and adding new courses or participants or any new announcement for

any course to make it available to the participants. For more information of the various use cases, refer to the sequence diagram of each.

4.3.1 Use Case Specification

4.3.1.1 Login Use Case Diagram

4.3.1.1.1 Brief Description

This use case is initiated by the Administrator. This use case will enable the admin to be logged in the system to perform other tasks

4.3.1.1.2 Pre-Conditions

No Pre-conditions.

4.3.1.1.3 Characteristic of Activation

Event Driven (on Admin's demand)

4.3.1.1.4 Flow of Events

4.3.1.1.4.1 Basic Flow

- This use case begins when the Admin enters to the home page and enters username and password.
- The system verifies this username and password (E-1) and display the Admin record.

4.3.1.1.4.2 Alternative Flow

Not Applicable.

4.3.1.1.4.3 Exceptional Flow

E-1: invalid username and password. The Admin can re-enter a username and password or terminate the use case.

4.3.1.5 Post-Conditions

The Admin will be logged in the system.

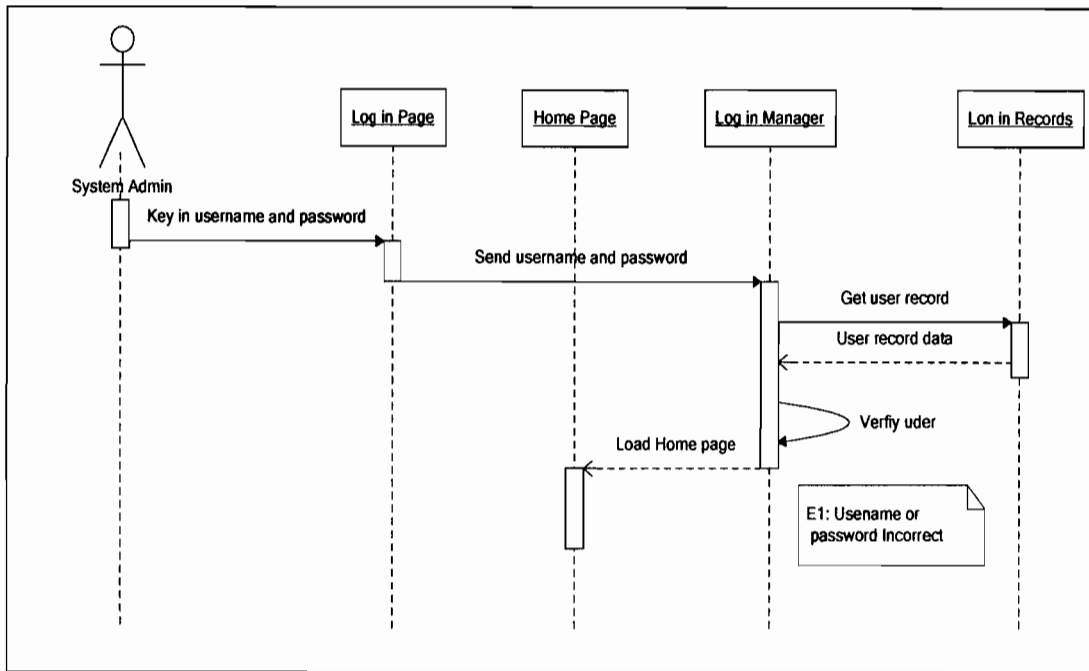


Figure 4-2: Admin Login Sequence Diagram

4.3.1.2 Manage Courses Use Case Diagram

4.3.1.2.1 Brief Description

This use case is initiated by the system administrator. This use case will enable the administrator to Edit Courses details and description.

4.3.1.2.2 Pre-Conditions

The system administrator must be logged in the system

4.3.1.2.3 Characteristic of Activation

Event Driven (on administrator demand)

4.3.1.2.4 Flow of Events

4.3.1.2.4.1 Basic Flow

- This use case begins when the administrator select to add new course to the system on the page.
- The system displays a list of available courses
- The administrator select add new course.
- The system then displays a form for new course.
- The administrator then fills the new course information.
- Finally the system records the new course in the database.

4.3.1.2.4.2 Alternative Flow

Not Applicable.

4.3.1.2.4.3 Exceptional Flow

Not Applicable.

4.3.1.2.5 Post-Conditions

- courses records will be updated

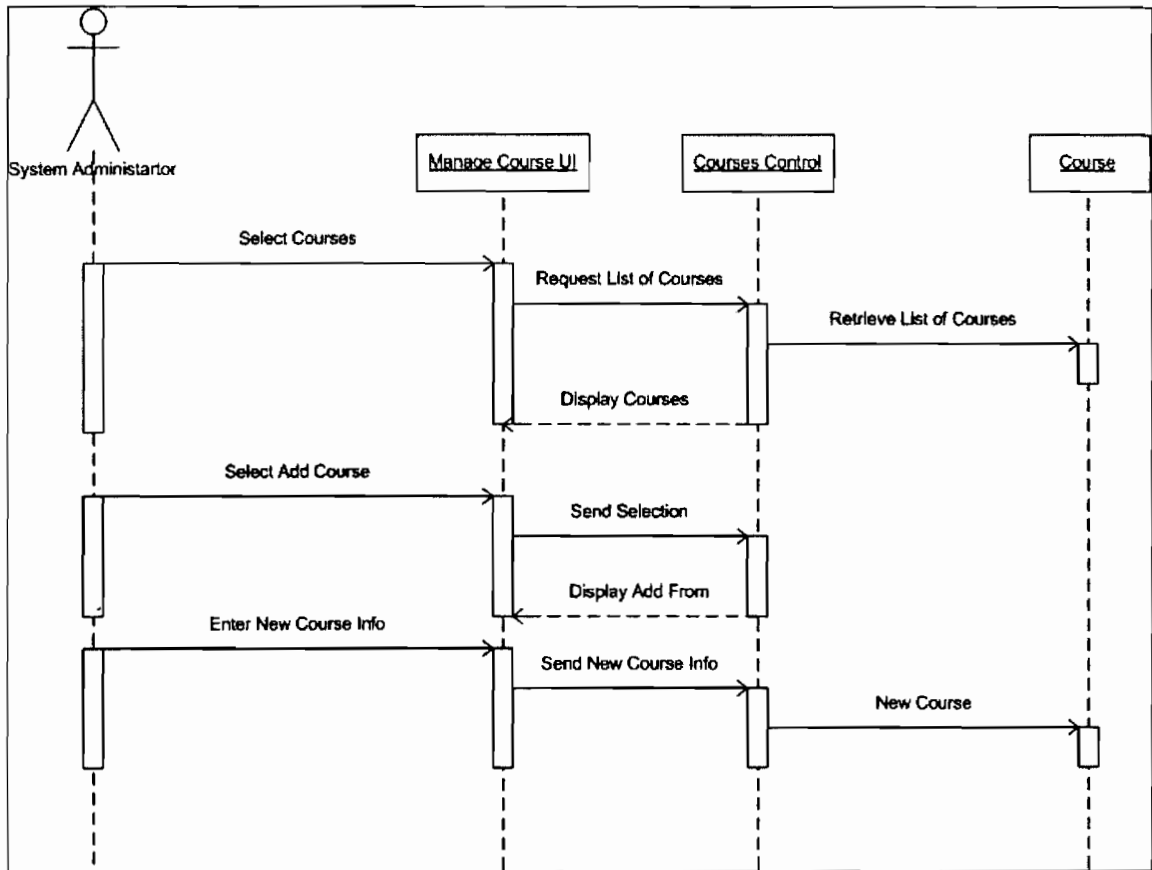


Figure 4-3: Manage Courses Sequence Diagram.

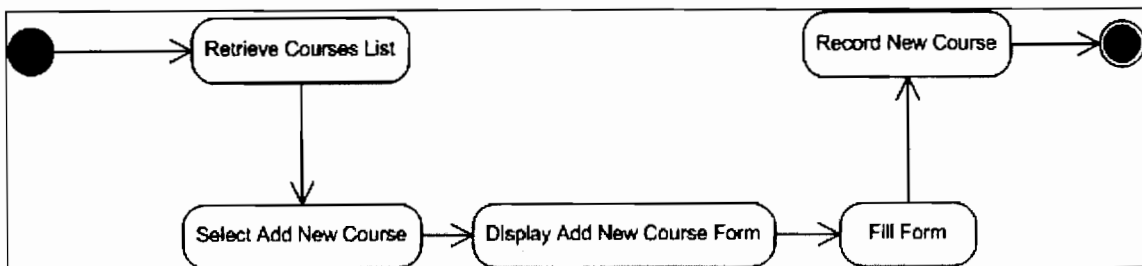


Figure 4-4: Manage Courses Activity Diagram.

4.3.1.3 Manage Participants Use Case Diagram

4.3.1.3.1 Brief Description

This use case is initiated by the system administrator. This use case will enable the administrator to Edit Participants details and description.

4.3.1.3.2 Pre-Conditions

The system administrator must be logged in the system

4.3.1.3.3 Characteristic of Activation

Event Driven (on administrator demand)

4.3.1.3.4 Flow of Events

4.3.1.3.4.1 Basic Flow

- This use case begins when the administrator select to add new participant to the system on the page.
- The system displays a list of available participants for certain course
- The administrator select add new participant.
- The system then displays a form for new participant.
- The administrator then fills the new participant information.
- Finally the system records the new participant in the database.

4.3.1.3.4.2 Alternative Flow

Not Applicable.

4.3.1.3.4.3 Exceptional Flow

Not Applicable.

4.3.1.3.5 Post-Conditions

- participants records will be updated

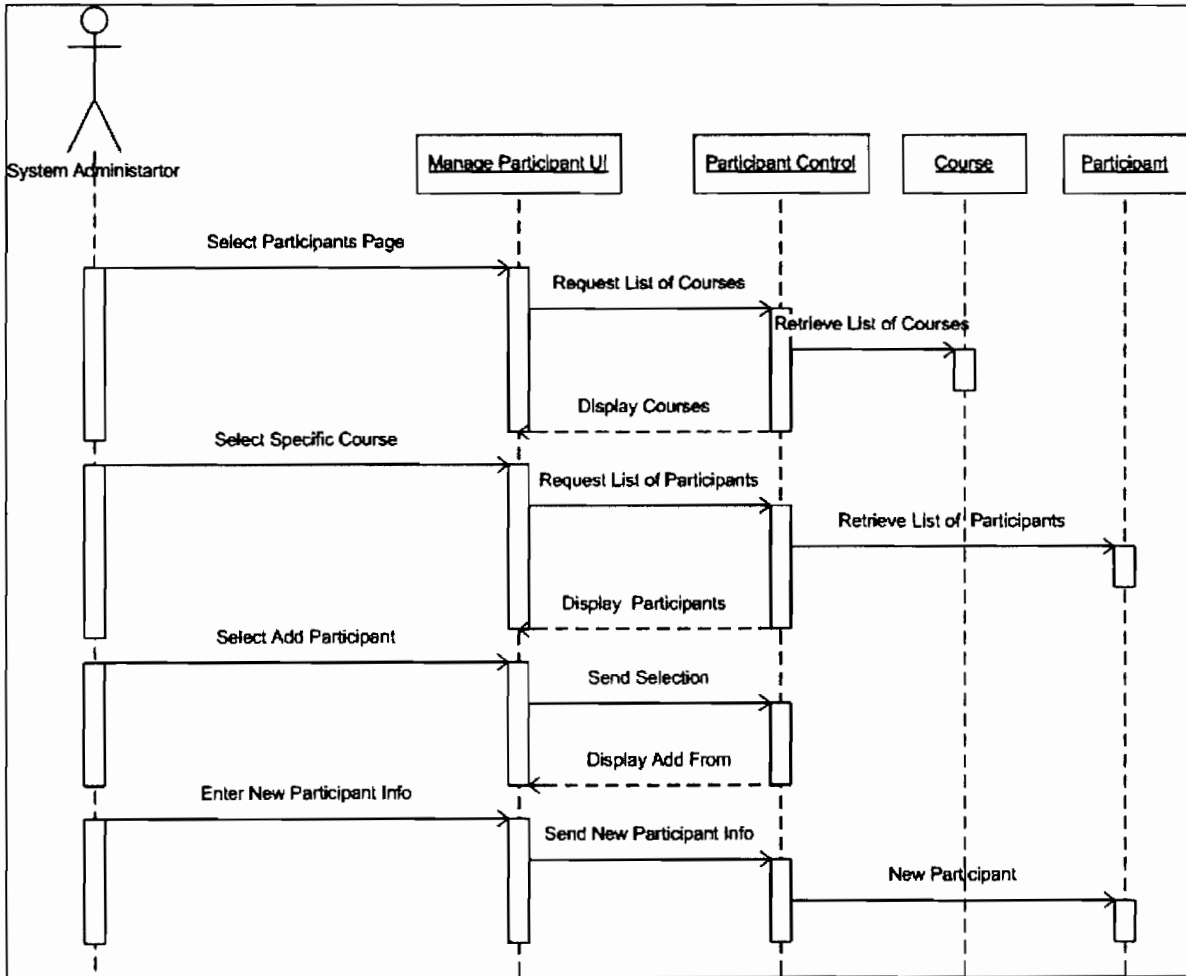


Figure 4-5: Manage Participants Sequence Diagram.

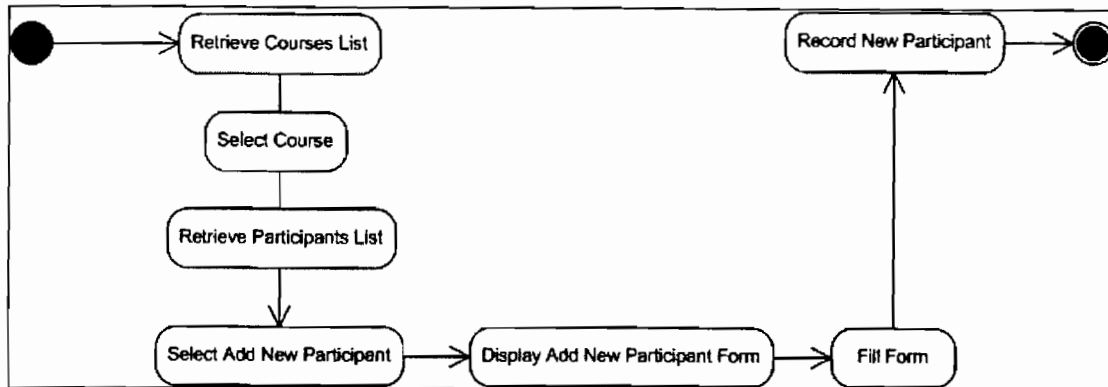


Figure 4-6: Manage Participants Activity Diagram.

4.3.1.4 Manage Announcements Use Case Diagram

4.3.1.4.1 Brief Description

This use case is initiated by the system administrator. This use case will enable the administrator to Edit announcements details and description.

4.3.1.4.2 Pre-Conditions

The system administrator must be logged in the system

4.3.1.4.3 Characteristic of Activation

Event Driven (on administrator demand)

4.3.1.4.4 Flow of Events

4.3.1.4.4.1 Basic Flow

- This use case begins when the administrator select to add new announcement to the system on the page.

- The system displays a list of available courses
- The administrator select add new announcement.
- The system then displays a form for new announcement.
- The administrator then fills the new announcement information.
- Finally the system records the new announcement in the database.

4.3.1.4.4.2 Alternative Flow

Not Applicable.

4.3.1.4.4.3 Exceptional Flow

Not Applicable.

4.3.1.4.5 Post-Conditions

- announcements records will be updated

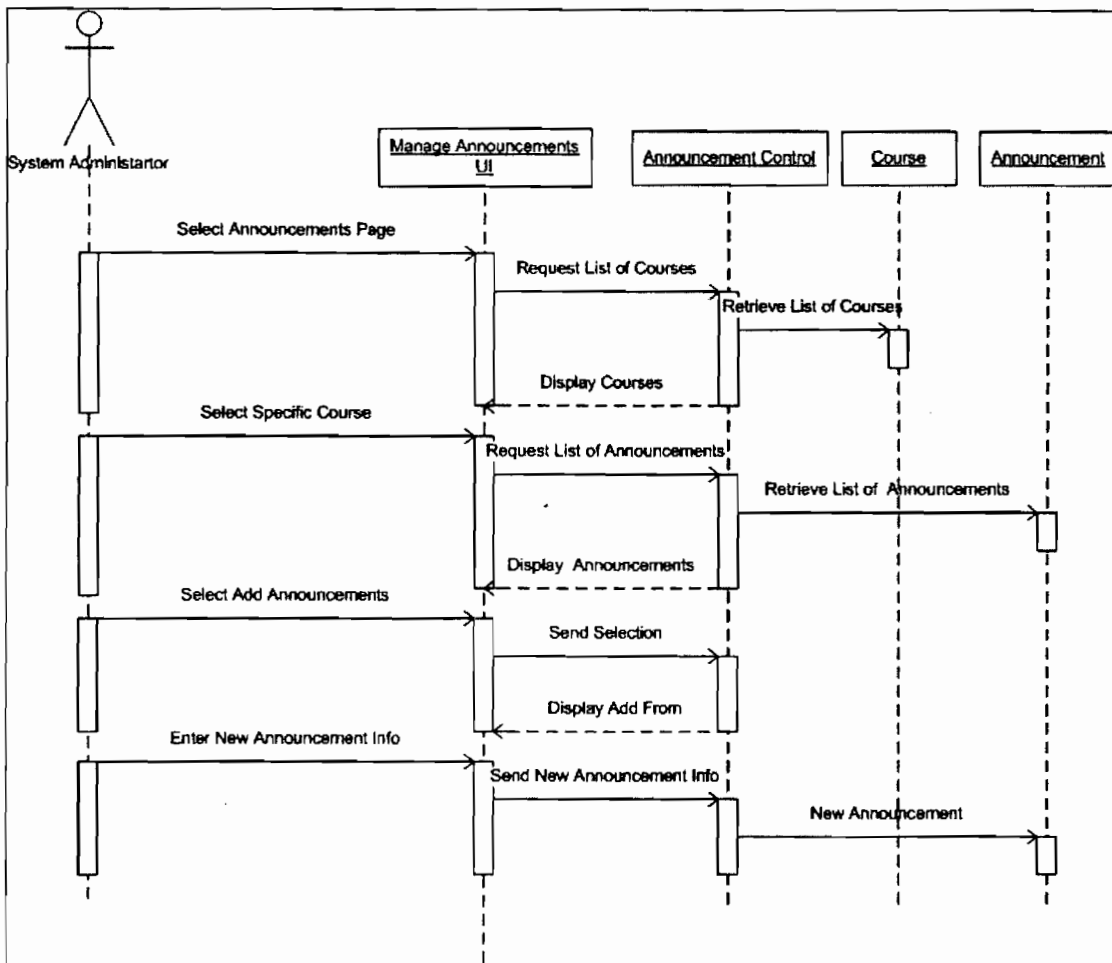


Figure 4-7: Manage Announcements Sequence Diagram.

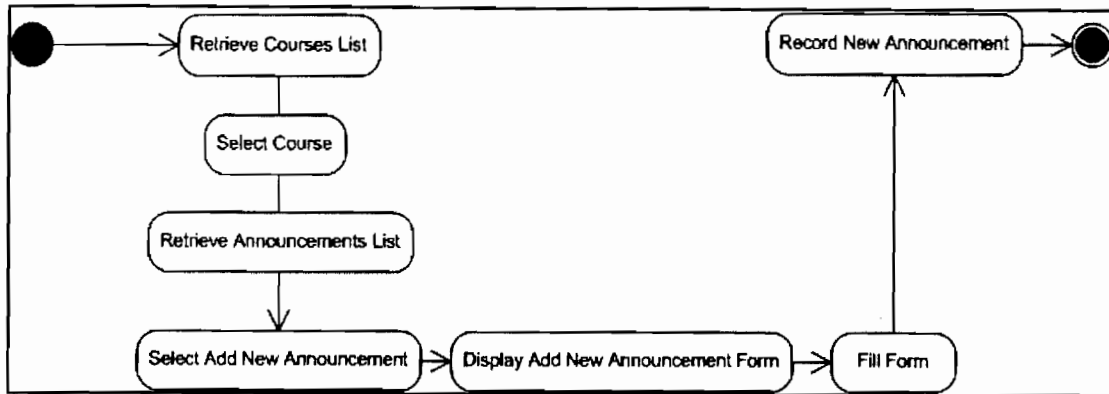


Figure 4-8: Manage Announcements Activity Diagram.

4.3.1.5 Register Course Use Case Diagram

4.3.1.5.1 Brief Description

This use case is initiated by the participant. This use case will enable the participant to view courses details and description and its timetables and enable participant to register in desired course.

4.3.1.5.2 Pre-Conditions

Not Applicable.

4.3.1.5.3 Characteristic of Activation

Event Driven (on participant demand)

4.3.1.5.4 Flow of Events

4.3.1.5.4.1 Basic Flow

- This use case begins when the farmer visits the home page.
- The system displays a list of available courses
- The farmer selects one course to view details.

- The system then displays description of the course.
- The farmer to register in this course.
- The system displays the registration form.
- The farmer his personal details and submit the form.

4.3.1.5.4.2 Alternative Flow

Not Applicable.

4.3.1.5.4.3 Exceptional Flow

Not Applicable.

4.3.1.5.5 Post-Conditions

Not Applicable.

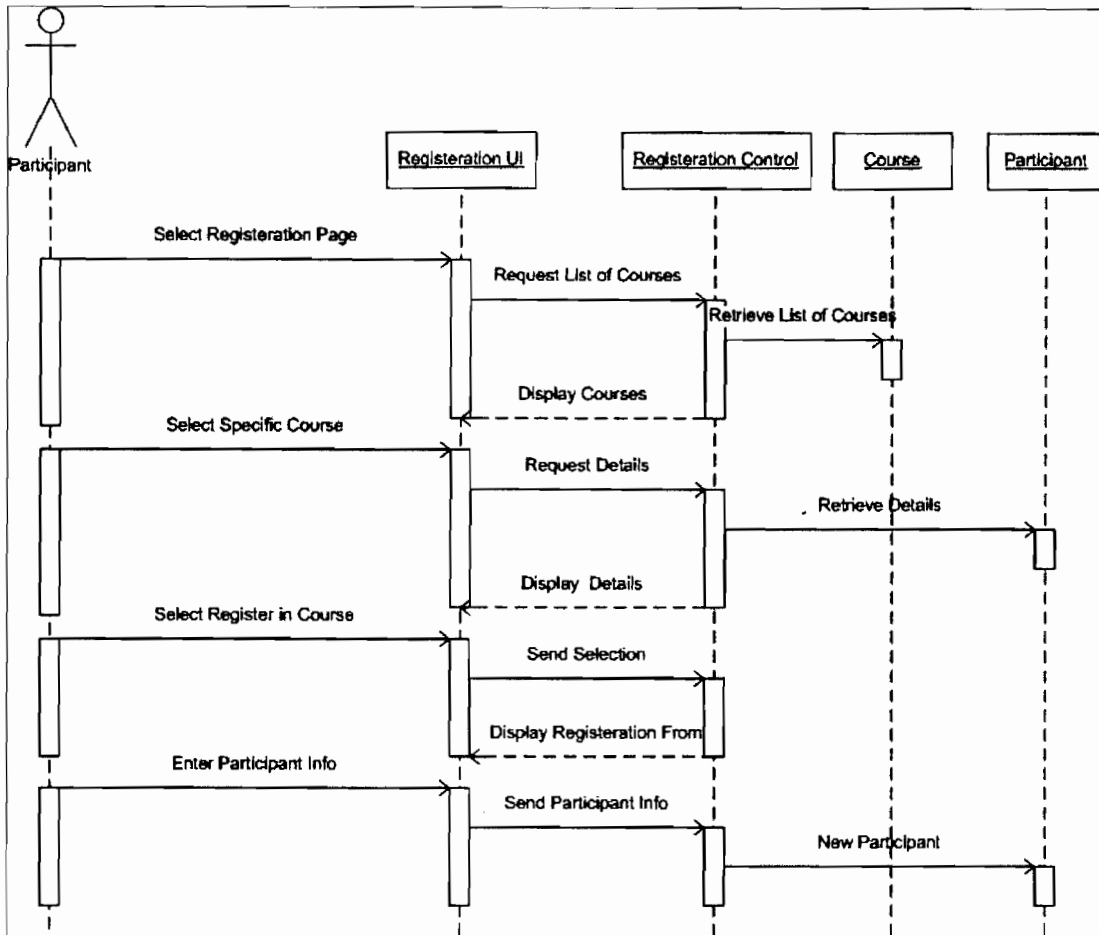


Figure 4-9: Register Course Sequence Diagram

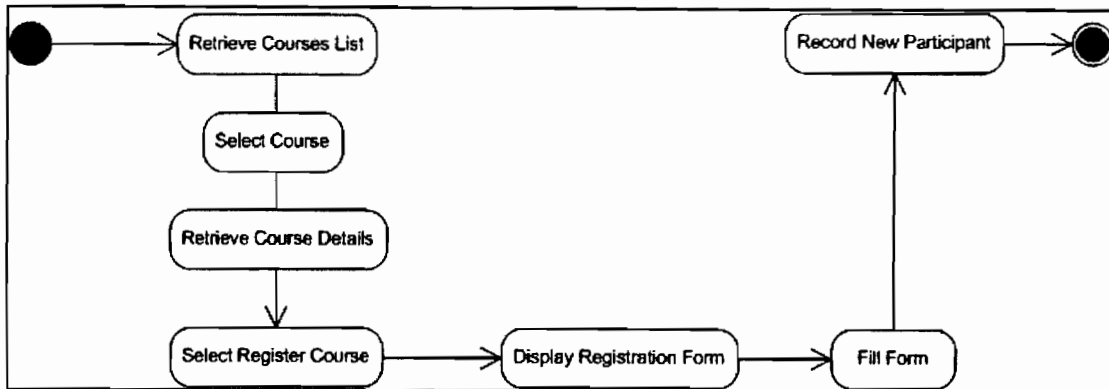


Figure 4-10: Register Course Activity Diagram

As illustrated in the previous sequence diagrams not participant but system administrators only need to verify themselves first in order to be able to manage the system data and perform their roles. Participant can easily navigate through system to view and get the information they want in an easy flow of events and then register in any course they want.

4.4 System Architecture

For the system architecture, the three-tier architecture model is the best structure to use. Here is how the three-tier model is incorporated into the system.

- **Tier 1:** This is the client side of the architecture. The user will be shown formatted HTML pages resulting from ASP.net code, which will be submitted to the application middleware for processing. It will

actually be the front-end of the system and it is where the user will interact with the system.

- **Tier 2:** This is the middleware side of the architecture or the application tier. The main applications used in this layer are .NET Framework, which will be processed by a web server, i.e. Tomcat. Also in this tier will be the SSL protocol if it is exist, to make sure the system and data is secure from unauthorized users.
- **Tier 3:** This is the backend side of the architecture and where all the data and records are kept. Also known as the business data, the technology used store the business data is Microsoft SQL Sever 2005.

The following figure shows the system architecture.

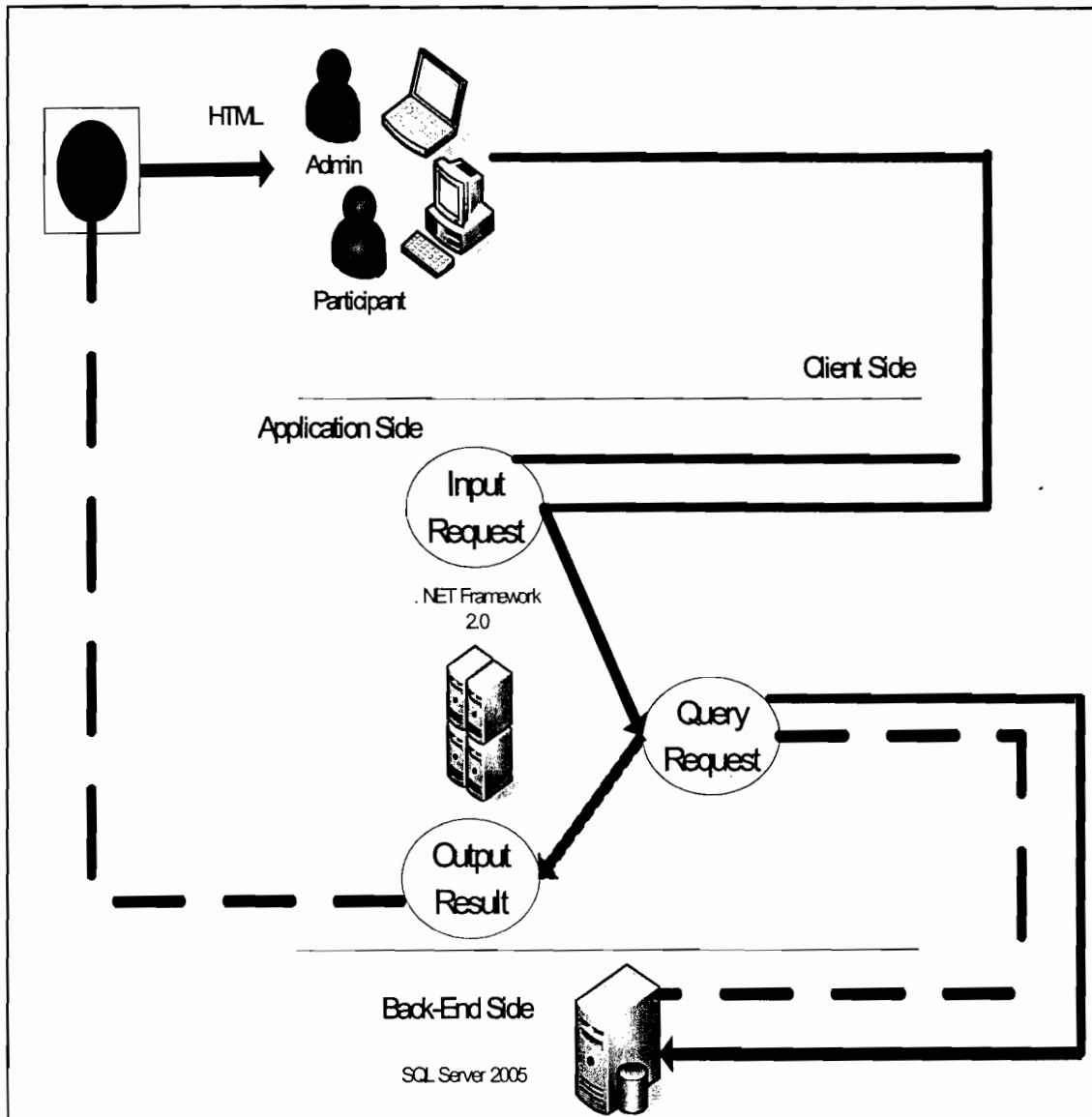


Figure 4-11: System Architecture

4.5 System Interface Design

4.5.1 Login Page

This page welcomes the user to the application. It displays and allows the user to Input User Id and Password, then click login button; the screen will automatically display the Home page, the home page menu will be created depends on the user role (See Figure 4-12)

Kampung Tradisi Training Center

Home Courses Partners Contact Us

User Login

Log In

User Name:

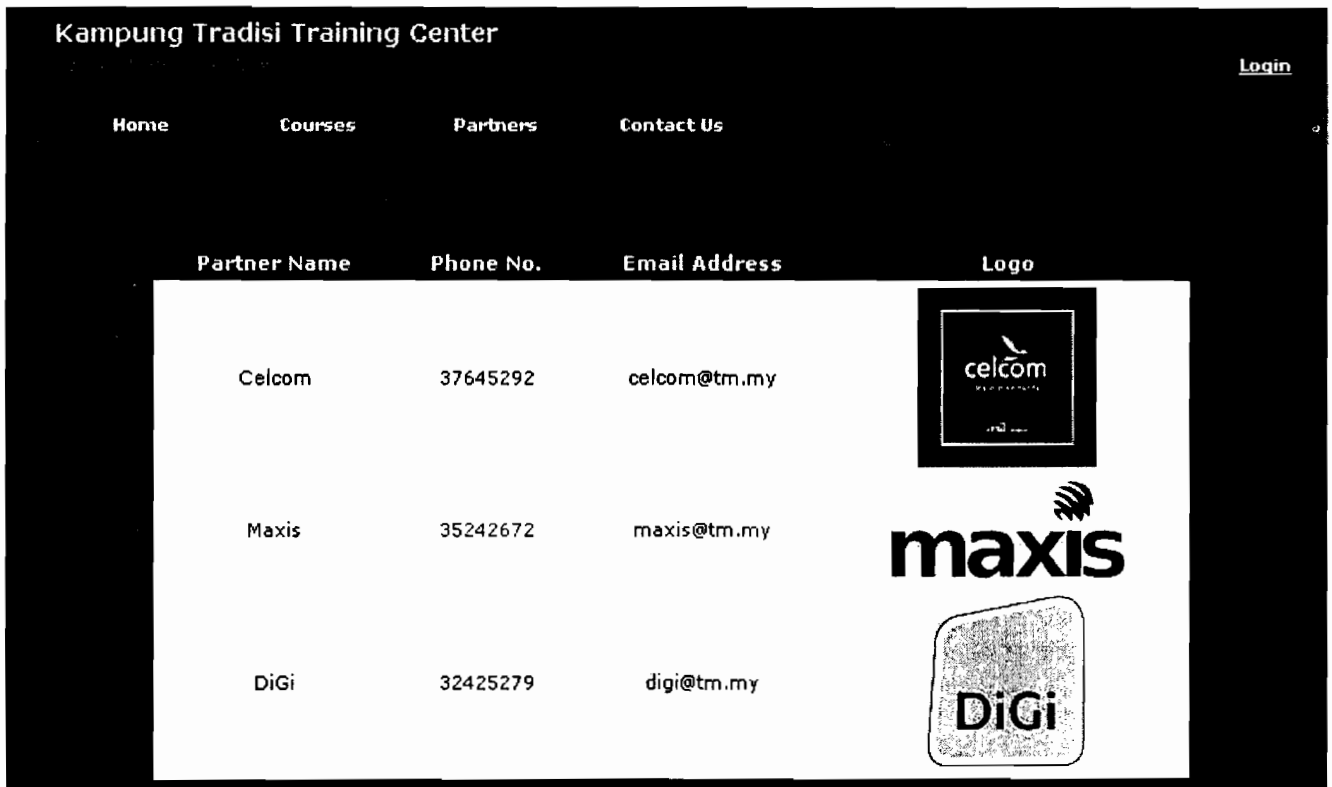
Password:

Remember me next time.

Figure 4-12: Login Page.

Based on the user login info the system will specify the user Role and permissions and based on those permissions the system main menu which is a dynamic menu will be generated to enable the user to access only his authorized pages of the system.

4.5.2 Partners page






Partner Name	Phone No.	Email Address	Logo
Celcom	37645292	celcom@tm.my	
Maxis	35242672	maxis@tm.my	
DiGi	32425279	digi@tm.my	

Figure 4-13: Partners page.

The visitors of the training center website can view the list of the partners using this page. As displayed in the above figure the page will show a list of the available companies that have partnership with the training center. This list can be viewed only by the participants or public visitors and can be edited or modified by the administrator only if there is any new partner to be added to existing one to be

deleted. Based on the user permission the page will allow the user to view only this list as seen in the above figure or to view and edit in case of administrator is log in.

4.5.3 Courses page

	Course Name	Description	Total Hours	Start Date	End Date
Select Course To Register	MS PowerPoint 2007	PowerPoint is software that lets you create materials that can be presented using a projector.	20	11/1/2009	11/3/2009
Select Course To Register	MS Word 2007	Microsoft Word is a popular computer program that allows you to create and edit text documents. Documents such as letters, resumes.	20	11/15/2009	10/18/2009
Select Course To Register	Internet	How to use Internet, Browsing, Searching.	20	12/13/2009	12/15/2009

Figure 4-14: Courses page.

As shown in the above Figure, in order for the participant to register in any courser desired, participant view the available list of courses and its description and details and we decide which course to register can just click on the desired course to move to the registration page in order to key in his personal information and complete the registration process. This way is adopted by the system in order to facilitate the registration process and make it easier for the participant to choose the desired course. The registration page is shown in the figure below.

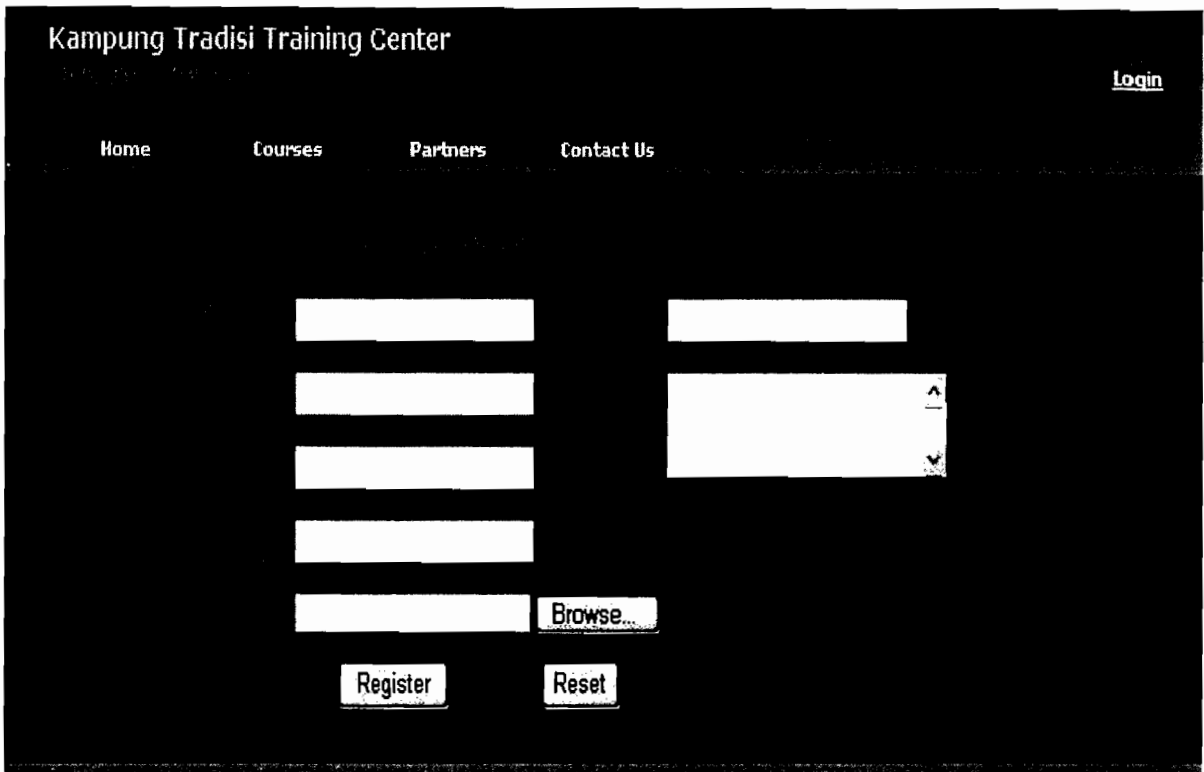


Figure 4-15: Registration Page

Participants will be directed to the registration page shown above after choosing the desired course in order to complete the registration process.

4.5.4 Manage Courses

Kampung Tradisi Training Center [Login](#)

[Home](#) [Courses](#) [Partners](#) [Contact Us](#)

	Course Name	Description	Total Hours	Start Date	End Date
View Participants	MS PowerPoint 2007	PowerPoint is software that lets you create materials that can be presented using a projector.	20	11/1/2009	11/3/2009
View Participants	MS Word 2007	Microsoft Word is a popular computer program that allows you to create and edit text documents. Documents such as letters, resumes.	20	11/15/2009	10/18/2009
View Participants	Internet	How to use Internet Browsing, Searching.	20	12/13/2009	12/15/2009



Fandi	Murad	murad@hotmail.com	178373699	Kg. Tradisi	30	
Eissa	Mohammed	moh33@hotmail.com	178344444	Kg. Tradisi	25	

Figure 4-16: Manage Courses page.

As shown in the figure above, the users of this page are the system administrators, view and manage any participant in any course. The system adopted this hierarchy in order to make easier and more convenient for the system administrator to manage the courses and its participants.

4.6 System Database Design

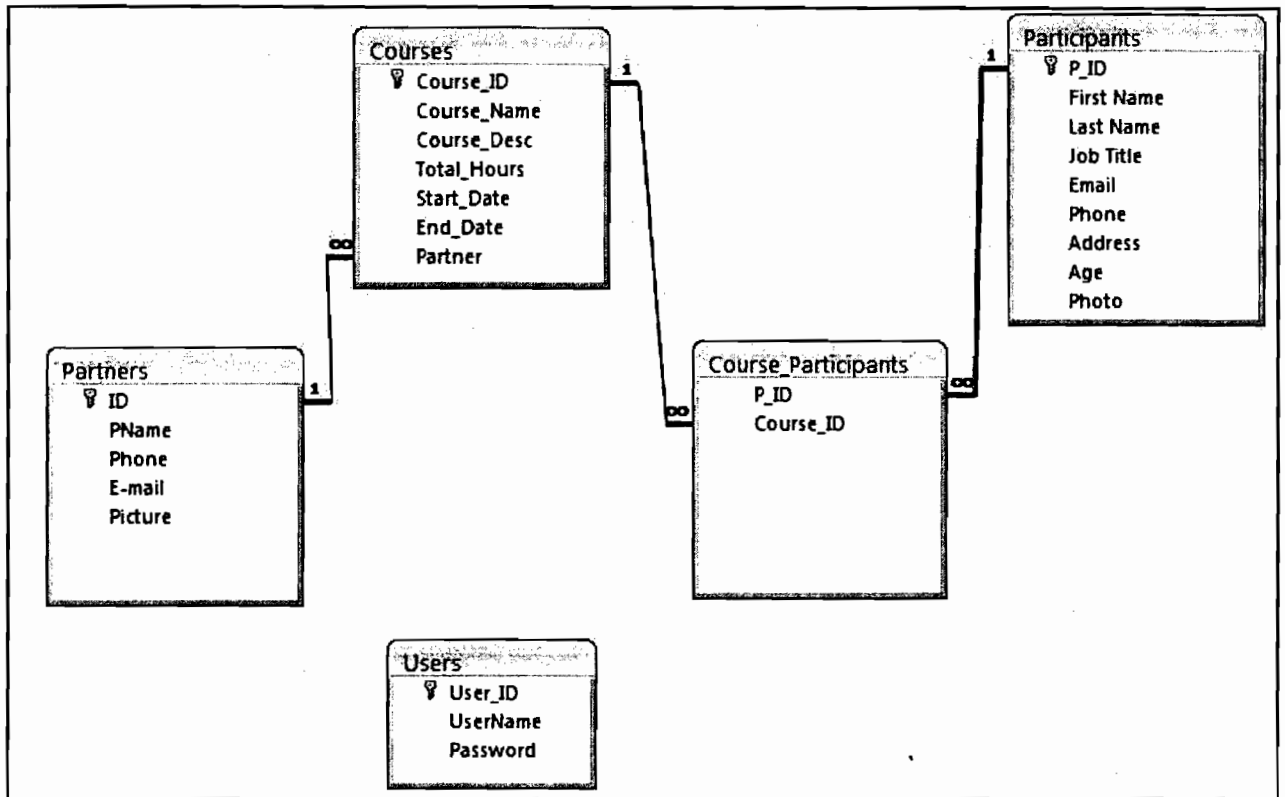


Figure 4-17: System Database Schema.

The database schema shown in Figure above is the system's database for storing the courses and participants information. The database schema shown reflects the actual hierarchy of the courses and its participants. The main entity in the schema is the courses entity since it's the top hierarchy and each course has many participants with a partner associated with each of course.

4.7 System Evaluation

The main aim of this section is to discuss the evaluation of the Online Service System. A usability test is one of the most fundamental methods in usability evaluation, because real test users are asked to use the product. The moderator of the test gives predetermined test tasks one at a time to the test user, who in turn performs the tasks with the user interface (Nielsen, 1993).

The users involved in this test had a combination of experience and skills characteristics. Altogether, there were five users involved, whom the researcher feels comfortable although the latest research indicates that testing only four to five participants will expose the vast majority of usability problems (Nielsen, 2000). Despite previous claims that about five participants are enough to find the majority of usability problems (Virzi 1992; Nielsen and Landauer, 1993), a recent study by Spool and Schroeder suggests that this number may be nowhere near enough (Spool and Schroeder, 2001; Woolrych, & Cockton, 2001).

4.8 Evaluation Techniques

The testing was performed by monitoring user's performance on carefully constructed benchmark tasks in the field in order to gather information about the user's attitude towards the system.

The test used thinking-aloud protocol technique where the respondents were encouraged to vocalize their thoughts, feelings and opinions while interacting with the system. This technique was intended to capture what the participants were thinking including their confusion, frustration and delight.

4.8.1 Constraints and Purpose

Time was the primary constraint for the usability tests and data analysis since most people were very busy. The purpose of this evaluation is to find usability problems and to improve the design of the Service System. Usability is expressed in the form of the percentage of participants performing each task correctly without asking for assistance.

4.9 Testing and Results

The system is tested by a sample of UUM postgraduate student because of their familiarity with similar systems. The results of the usability test are detailed below. The testing was conducted using a questionnaire built on IBM's Computer System Usability Questionnaire. This questionnaire is divided into four sections; system usefulness, the information quality, the interface quality and the overall satisfaction.

This study used the Postgraduate Students Portal of UUM as a testing benchmark for testing the usability of the system because the questionnaire respondents are familiar with that portal. There was total of 20 questionnaires distributed on UUM postgraduate students.

Table 4-2 summarized the statistics of each question in CSUQ. For the evaluation of "System Use," the mean scores ranged from 2.35-2.83. The scores showed strong agreement on the design of the system use functions. The best scores in this domain were obtained for Questions 6 and 7, which asked whether the System was "comfortable to use" and "easy to use." For the evaluation of "Information Quality," the mean scores ranged from 2.55-3.30. The best score in this domain was obtained for Question 14, which asked about the effectiveness of completing work with the System. The range of scores in this domain was less dispersed, with half of the questions scoring 2-4 and the other half 2-5. The response rates for Questions 9, 10 and 11 were low, with many participants marking "N/A". As these questions concerned error messages, recovery from mistakes and on-line help, this indicates that most of the participants did not come across any errors during the dietary recording process. The average scores of each domain were calculated. The corresponding means of the average scores of "System Use," "Information Quality" and "Interface Quality" were 2.56, 2.84 and 3.00 respectively. Are shown in Table 4-2

Table 4-2: Descriptive statistics for the CSUQ question items

Table 2. Descriptive statistics for the CSUQ question items	n	Mean	S.D.
System Use			
1. Overall, I am satisfied with how easy it is to use this system.	20	2.65	0.81
2. It is simple to use this system.	20	2.50	0.76
3. I can effectively complete my work using this system.	19	2.53	0.91
4. I am able to complete my work quickly using this system.	20	2.50	0.83
5. I am able to efficiently complete my work using this system.	20	2.80	0.95
6. I feel comfortable using this system.	20	2.35	0.99
7. It was easy to learn to use this system.	20	2.35	0.81
8. I believe I became productive quickly using this system.	18	2.83	0.86
Information Quality			
9. The system gives error messages that clearly tell me how to fix problems.	10	3.30	1.16
10. Whenever I make a mistake using the system, I recover easily and quickly.	9	2.89	0.78
11. The information (such as on-line help, on-screen messages and other documentation) provided with this system is clear.	15	2.93	0.70
12. It is easy to find the information I need.	18	2.94	0.73
13. The information provided with the system is easy to understand.	20	2.80	0.95
14. The information is effective in helping me complete my work.	20	2.55	0.76
15. The organization of information on the system screens is clear.	20	2.70	0.98
Interface Quality			
16. The interface of this system is pleasant.	20	2.85	1.23
17. I like using the interface of this system.	20	3.05	1.05
18. This system has all the functions and capabilities I expect it to have.	19	3.16	1.07
Overall			
19. Overall, I am satisfied with this system.	20	2.50	0.76

4.9.1 System Usefulness

Respondents (PG) has 96% agreed that the system is useful.

4.9.2 Information or Content Quality

Respondents (PG) has 90% agreed that the system is of high quality content.

4.9.3 Interface Quality

Respondents (PG) has 94 % agreed that the system is of high quality interface.

4.9.4 Overall Satisfaction

The following figure shows the overall system satisfaction. The average of users who agreed with element of overall satisfaction (OS) is 92.5%.

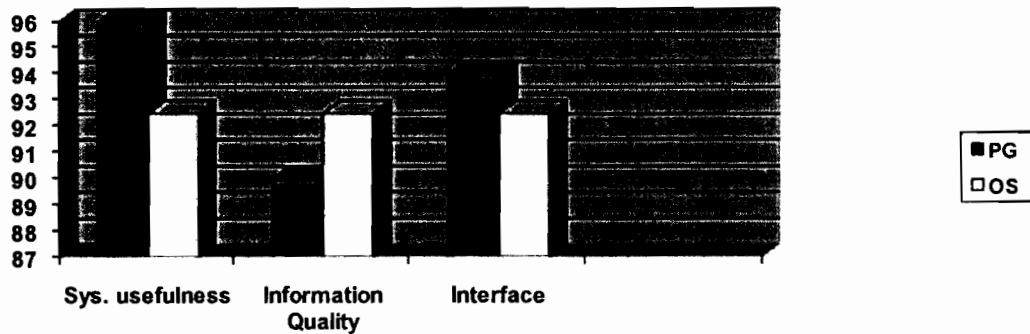


Figure 4-18: Usability Evaluation

4.10 Recommendations and Remarks

The users' identified problems, comments and remarks are listed below for each task or topic.

4.10.1 Interface

Some users preferred a simple interface without too many fancy things. But some of them thought that the interface should be more attractive and colorful. Besides that, important information like courses' start and end date should also be highlighted.

4.10.2 Functionality

The testers felt that the available functions were sufficient and covered most important both the management side of the training center and the community participants needs.

4.10.3 General Remarks

Although not all testers used a web application before, they could still use the application easily because of their familiarity with similar web-based applications. Based on the observation, the main problem encountered them during the test was the small size of screen font.

CHAPTER 5: CONCLUSION

5.1 Introduction

The conclusion chapter will review the project's overall progression. This includes problems and limitations encountered during the development of this project. Finally, this chapter will be ended with possible directions for future work related to the project.

5.2 Problems and Limitations

This project focuses on delivering the required guidance and support for the community of Kampung Tradisi rural area to their homes in the easiest possible way in order to ensure about their alert and concern about any important training courses or information they may be interested in.

However, some problems and limitations discovered during and prior to the development of the project are:

- Although this is a web based system, it has yet to be published for the final testing and real usage by the Kampung community due to time constraints and publishing complications.

- This system interface was built for and tested on Microsoft Internet Explorer 6 browser. It might encounter some problems on Netscape Navigator or any other browsers like Google Chrome.
- The system's database was built using Microsoft Access 2007 for easier development and mobility issues. also It has some limitations that was discovered during the deployment and real testing such as the security issues and the performance which dose not appear during the development.
- The system's database was a stand alone and doesn't integrate with any database already exist in similar systems and this requires ensuring about the data consistency when storing any data.
- Since there is no integration or extraction tools between the system's database and other similar systems databases such as the rural development ministry or agriculture ministry databases or even the training service providers. It still needs to key some data manually which may result in some data inconsistency besides the cost of managing and integrating the data from different sources.

5.3 Future Development Considerations

Throughout the development of this system, several issues regarding design and development were discovered. Future design and development of related projects could be done based on these considerations:

- Integrating this system database with other similar related databases and building a data warehouse for them to be used by any system concerned in this rural area community information like ministry of rural development or any other government agency concerned and this would solve many problems mentioned before.

5.4 Conclusion

A web based directory service system for Malaysian village Kampung Tradisi has been developed to support rural development activities there in achieving their goals and objectives of having a high participation from the rural community there. The project provides a great support to community and rural development concerned authorities in terms of spreading and publicly sharing knowledge and guidance.

Some work still need to be done in order to make the system more functional and reliable such as meeting the unfulfilled limitations of this project mentioned earlier in this chapter of this document to enhance this system productivity and efficiency.

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APPENDIX A: Questionnaire

An Online Services for Rural Community Development Training Center of Kampong Tradisi

This questionnaire, which starts on the following page, gives you an opportunity to tell us your reactions to the system you used. Your responses will help us understand what aspects of the system you are particularly concerned about and the aspects that satisfy you.

To as great a degree as possible, think about all the tasks that you have done with the system while you answer these questions.

Please read each statement and indicate how strongly you agree or disagree with the statement by circling a number on the scale. If a statement does not apply to you, circle N/A. Please write comments to elaborate on your answers.

Note: The interface includes those items that you use to interact with the system. For example, some components of the interface are the screens (including their use of graphics and language).

1. Overall, I am satisfied with how easy it is to use this system.

STRONGLY									STRONGLY
AGREE	1	2	3	4	5	6	7		DISAGREE

2. It was simple to use this system.

STRONGLY									STRONGLY
AGREE	1	2	3	4	5	6	7		DISAGREE

3. I could effectively complete the tasks and scenarios using this system.

STRONGLY									STRONGLY
AGREE	1	2	3	4	5	6	7		DISAGREE

4. I was able to complete the tasks and scenarios quickly using this system.

STRONGLY									STRONGLY
AGREE	1	2	3	4	5	6	7		DISAGREE

5. I was able to efficiently complete the tasks and scenarios using this system.

STRONGLY AGREE	1	2	3	4	5	6	7	STRONGLY DISAGREE
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6. I felt comfortable using this system.

STRONGLY AGREE	1	2	3	4	5	6	7	STRONGLY DISAGREE
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7. It was easy to learn to use this system.

STRONGLY AGREE	1	2	3	4	5	6	7	STRONGLY DISAGREE
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8. I believe I could become productive quickly using this system.

STRONGLY AGREE	1	2	3	4	5	6	7	STRONGLY DISAGREE
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9. The system gave error messages that clearly told me how to fix problems.

STRONGLY AGREE	1	2	3	4	5	6	7	STRONGLY DISAGREE
---------------------------	----------	----------	----------	----------	----------	----------	----------	------------------------------

10. Whenever I made a mistake using the system, I could recover easily and quickly.

STRONGLY AGREE	1	2	3	4	5	6	7	STRONGLY DISAGREE
---------------------------	----------	----------	----------	----------	----------	----------	----------	------------------------------

11. The information provided with this system was clear.

STRONGLY AGREE	1	2	3	4	5	6	7	STRONGLY DISAGREE
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12. It was easy to find the information I needed.

STRONGLY AGREE	1	2	3	4	5	6	7	STRONGLY DISAGREE
---------------------------	----------	----------	----------	----------	----------	----------	----------	------------------------------

13. The information provided for the system was easy to understand.

STRONGLY AGREE	1	2	3	4	5	6	7	STRONGLY DISAGREE
---------------------------	----------	----------	----------	----------	----------	----------	----------	------------------------------

14. The information was effective in helping me complete the tasks and scenarios.

STRONGLY									STRONGLY
AGREE	1	2	3	4	5	6	7		DISAGREE

15. The organization of information on the system screens was clear.

STRONGLY									STRONGLY
AGREE	1	2	3	4	5	6	7		DISAGREE

16. The interface of this system was pleasant.

STRONGLY									STRONGLY
AGREE	1	2	3	4	5	6	7		DISAGREE

17. I liked using the interface of this system.

STRONGLY									STRONGLY
AGREE	1	2	3	4	5	6	7		DISAGREE

18. This system has all the functions and capabilities I expect it to have.

STRONGLY									STRONGLY
AGREE	1	2	3	4	5	6	7		DISAGREE

19. Overall, I am satisfied with this system.

STRONGLY									STRONGLY
AGREE	1	2	3	4	5	6	7		DISAGREE

COMMENTS: