THE DEVELOPMENT OF ONLINE BILLING AND INVOICE MANAGEMENT SYSTEM FOR SAUDI SMALL COMPANIES

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THE DEVELOPMENT OF ONLINE BILLING AND INVOICE MANAGEMENT SYSTEM FOR SAUDI SMALL COMPANIES

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ABSTRACT

Invoicing and billing application for different business purposes helps mainly the service providers and freelancers to manage, send professional invoices online, and track its status. Generally, all the small companies in Saudi Arabia facing a various issues for managing and tracking the invoice status of customers, which mostly back to the lacks of adapting new technology in these companies. One of these lacks is tracking the bills status for a definite projects'. Therefore, this research intends to design and develop an online billing and invoice management system to expenses effortlessly and saves both time and money on the employees in the Saudi small companies (Sepco Company). The propose system intend to provide a digital tracking of the time spend on projects and send invoices directly to clients. An evaluation was conducted among 30 employees and business administrators at Sepco Company to perceive their opinion towards the system ease of use, usefulness, and satisfaction. The result revealed that the proposed system gained a satisfactory level among the participants.

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INTRODUCTION

This chapter mainly focuses on introducing the research aims, background, and the current issues towards the billing and invoice management systems and its performance among different business companies. In addition, this chapter addresses the research solutions along with the relevant research questions in terms of designing and developing a new billing management system, which involves both technical and page optimization test. Finally, research process is introduced in order.

1.1 Introduction

E-business (also referred to as Web-based management systems) is defined as a new context for business where a large amount of information and services describe the e-commerce practices in different business organizations (Welsh, Wanberg, Brown, & Simmering, 2003). This kind of service obtains a better representation of information based on deploying different web tools and techniques for certain purposes, which could be seen as a blessing: plenty of information readily available just a click away (Tang & McCalla, 2005). Even so, it could equally be seen as an exponentially growing nightmare, in which unstructured information chokes the end users without providing any articulate details about the billing contents. An example of these integrations is data mining, which was used to simplify the existing problems with e-businesses (Dredze, et al., 2007), which can be understood not just as a collection of

data, but also as a data analysis that encompasses anything from the contents of data, and the pre-processing and modelling of these contents (Imitola, et al., 2004).

The aim of e-business systems design and development is to retrieve, process, and deliver knowledge to the end user through online. The contents can be presented into two forms, explicit content, and tacit content. Explicit content involves the joining or linking knowledge components into formal language that contain semantic statements, mathematical representations, descriptions for items, manuals, etc. This content can be easily transmitted and processed others by a computer, transmitted electronically, or stored in databases. While tacit content is defined to be as a personal content that presented in individual experience and involves indefinite factors, such as personal opinions, attitude, and the value system. As for e-payment in the business environment, tacit content found to be hard to articulate with formal language. It involves individual understandings, insights, and hunches. The e-business systems must be transformed into words, models, or numbers that can be understood, which reviews two dimensions, technical and cognitive dimensions. The technical dimension covers the relevant sort of informal and skills that frequently captured in the term know-how. Furthermore, the cognitive dimension covers the opinions, conceptions, perfections, values, emotions and mental models, and this sort of dimensions cannot be articulated very easily (Clark, 2004).

The new combination of different sorts of technology into content management systems and e-services aims to improve performance through facilitating storage and retrieval of the content using technology along with indicating the client requirements towards services (Gregg, 2007). An billing and other online payment systems were

reported to be a suitable service for managing and conducting the managing process for the people bills into a set of autonomous systems that are capable of interchangeable fundamental interactions among themselves (Cossentino, Burrafato, Lombardo, & Sabatucci, 2010). Here, an interaction is the valid form of content passing or presenting modifications in the common environment.

The online billing systems can be either software based technology or content management system. Moreover, the billing systems can contain a certain strategies for proceeding through the notifying procedures as well. An example of these strategies for billing systems is the human collaboration between organization and society. The usefulness of adopting an computational methods goes back to its ability to manifest self-organization and complex behaviors (Shah, Iqbal, James, & Iqbal, 2009). However, an e-services based system has recently been identified as a complicated set of activities, since it is conducted as a new model for envisioning, designing and executing content globally, which is structured for composing software utilized in open and distributed environments (Online booking systems). Currently, adopting technologies in the construction of e-services components has provided robust advantages in managing and controlling the content represented by a single controller in order to get the work done (Tseng, Chu, Hwang, & Tsai, 2008).

Nevertheless, integrating these technologies into the construction of billing and invoice systems has also been recognized as a way to classify the payment and managing activities in terms of entities and objects for achieving certain tasks. Several researchers have investigated the use of online billing services in managing the people invoices and bills that mostly consist of multiple ports of communicating in a peer-to-

peer network (Fernández-Caballero, López-Jaquero, Montero, & González, 2003; Garro & Palopoli, 2010) that involves all kind of business for small and medium companies. These systems performed faster and more independently along with an services provided, which helps to store and retrieve content within its entities and relations, obtaining an effective operation of such a system (Shih, Muñoz, & Sánchez, 2006). At the same time, online billing systems are placing different techniques into mechanisms that make these systems more interactive for users. Additionally, the benefit of demonstrating and combining this technique is involving different meanings, which might help in further decision-making practices in e-service systems (Sajja, 2008).

The billing and invoice management system in the Saudi small companies are still behind applying the new technology, which mostly use the traditional method for managing and processing people applications manually. Thus, this study aims to develop OBIS for helping to simplify the process of managing people billing and invoice applications easily through online application.

1.2 Problem Statement

With the widespread uptake of the Internet and other online services by the end users, there were high potentials of its applicability for business use and particularly for e-commerce purposed or other business companies. as these guesses were too confident in the short run, business companies and other marketing organizations focus turned to barriers to e-commerce development by integrating technology in managing and handling the multi queries by end users.

This is hardly can be seen in the Saudi small companies, which still use the old fashioned way for managing and submitting the billing and invoice applications to the customers, which done on paper (Simpao, et al., 2011). Several issues were addressed toward the use of the old fashion system for managing and organizing the customer bills different small companies in Saudi Arabia (Brandmeier, Hain, & Rupp, 2011), which widely lacks on the use of online billing and invoice systems that found to be as a main factor for simplifying the working process. According to these arguments, the lack of suitable online billing and invoice methods, consumer confidence in electronic payments and/or issues with the perceived security of payment methods partly explained the weak uptake of online services. In other words, payment-related difficulties were seen as one key explanation together with other factors such as products not being appropriate, sellers being unknown, delivery being uncertain, and consumers not being interested.

Thus, Saudi small companies are requiring implement a hosted online bill and invoice system that can be accessed and managed through the Internet to meet the customer and employee needs with the alternative services (Brandmeier, Hain, & Rupp, 2011), while reducing operating expenses and the concurrent costs of paper bill production and processing. This also will show the ability of these companies to handle and manage a huge number of billing and invoice applications without delaying.

1.3 Research Objectives

This research aims to obtain the following:

i) To Identify the requirements for Online Billing and Invoice System (OBIS) in Saudi Arabia.

ii) To design and develop an Online Billing and Invoice System (OBIS).

iii) To evaluate ease of use and usefulness of Online Billing and Invoice System (OBIS).

1.4 Research Questions

The main research questions that this research laid on are:

i) What is the requirement of OBIS?

ii) How to design and develop an Online Billing and Invoice System (OBIS)?

iii) Are the OBIS is satisfied the user?

1.5 Research Scope

Figure 1.1 presents the proposed OBIS flow, which includes the workplace personal computers that monitored mostly by the employees in the Saudi small companies. Also the servers A & B are linked to the employees personal computers and then with the OBIS administrator through the Internet connection. All the necessary info will be processed and saved into the OBIS database server respectively.

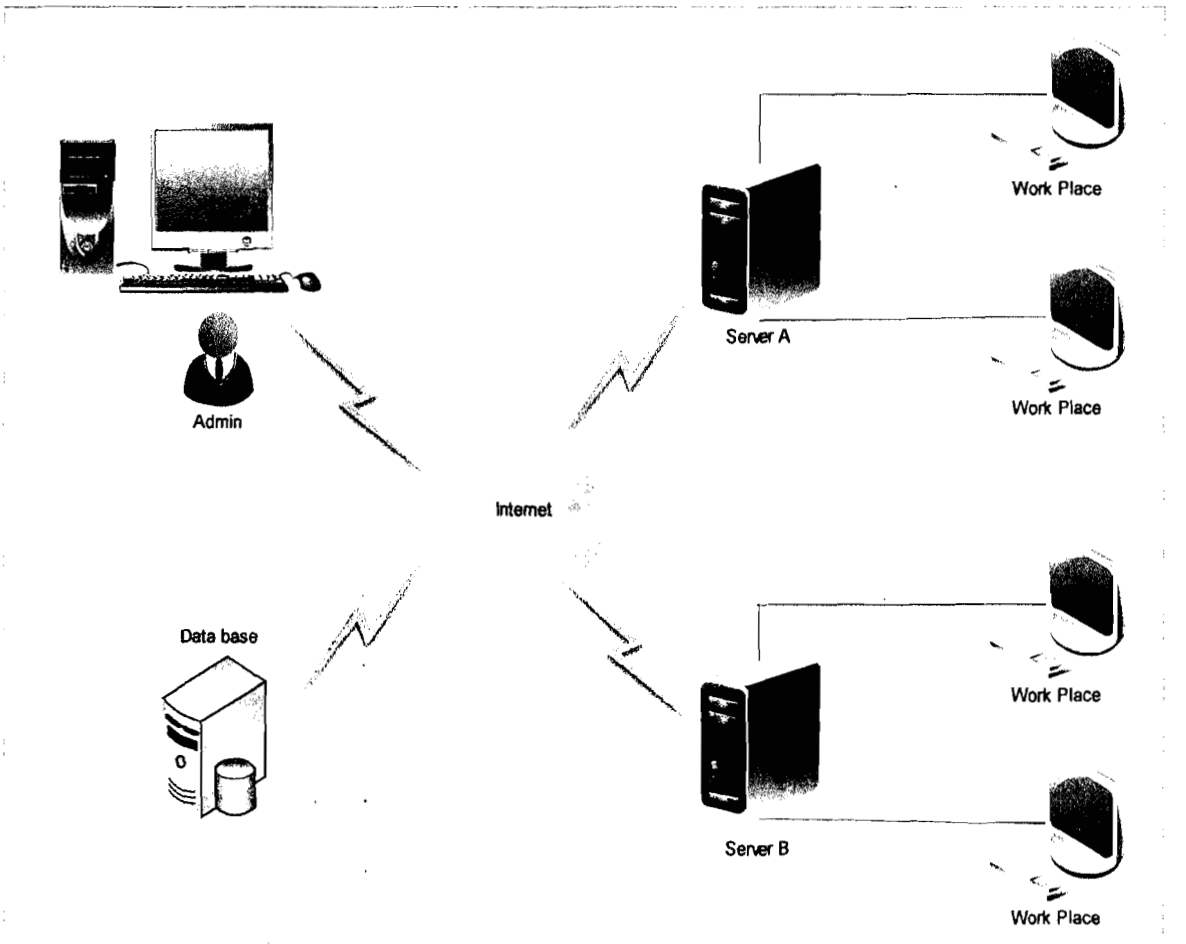

Figure 1.1: OBIS Process

1.6 Research Significance

The usefulness of applying OBIS into the Saudi small companies carry the following benefits:

i) Reduce the needs for a definite mail forms to people to initiate bill as well as preventing mail from losing.

ii) Eliminates repetitive keystrokes

iii) Simplify the monitoring procedure for the billing info.

iv) Apply a different security encryption methods for preventing other used from accessing to other pages.

v) Reduces errors by reducing the manual input to a large extent.

vi) Helps employees in the Saudi small companies to keep tracking the billing status online.

vii) Provides timely and efficient billings and collections.

1.7 Research Structure

This research will consist of six chapters which begin with the introduction section as the first chapter. This chapter explains in detail about the background of the research and the research problems that need to be solved which gives motivation to this research. The objective, scope and chapter summary have been identified and described well.

- Chapter two discusses the literature reviews, previous related work, and more information for understanding the research.
- However, chapter three discusses the methodology that used in this research.
- Chapter four consists on the analysis and design of the OBIS based on the recommendations of the Unified Modeling Langue (UML).
- Chapter five presents the research evaluation towards the use of OBIS among the Sepco Company employees.
- Chapter six discusses the conclusion of this research.

1.8 Summary

The first chapter gives an insight of the work by describing the motivation factors that lead to the selection of the area studied. It also explains the objectives of conducting the research, as well as its significance to the real world situation. These elements are important as it ignites the implementation of the research. This research focuses on determining the current lacks in the Saudi business environments by designing and developing OBIS. The evaluation of the system will be carried out in chapter 5. The next chapter deals with the literature review which elaborates on related works that have been established in the same field.

CHAPTER 2

LITERATURE REVIEW

This chapter mainly focuses on the literature related to the current studies in the area of invoice and billing management systems in different business organizations that deploy over internal and external network connection. The research components towards billing management system are presented in this chapter in details. In addition, various relevant studies are reported in this chapter.

2.1 Introduction

Developers of the business invoice and billing applications models were able to construct interfaces that assist 'the online processes with different requests' (Soloway & Pryor, 1996). Nevertheless, there are several challenges regarding the user interface: i) to provide the user with suitable content, classification-based-technology may help users specify the representation of these contents, ii) to provide a substantial context, and iii) to improve the outlook of future representation of the invoice details. For example, an electronic spreadsheet can justify the procedure for online payment. To include this, the interface could present the standard or conventional theories of conducting the online payment along with the system or organization procedure. Driscoll defines this as a persistent activity adopted purposely within frames that requires knowledge to practice (Driscoll, 1994). The user can vicariously gain the skills from the business environments through a substantial user interface.

All these challenges carry different business representations along with agent systems that enable developers to utilize simple guidelines to generate complex combined behaviours. These guidelines capture the principal structures by underlying complex behaviours within a domain. Some researchers (Example: (Jacobson & Wilensky, 2006; Weisberg & Reisman, 2008; Wilensky & Resnick, 1999) reported that such guidelines could be more accessible to the end users. The online system-based agent is also suited to the constructionist pedagogical framework (Harel & Papert, 1991). Hence, designing a pedagogical pattern for presenting the online system components structurally-based on Multi-agent Systems is seen as a new method for dealing with problem solving within certain formula or principles, such as agent systems as consequential problem solving in software development and examination (Kanteev, Minakov, Rzevski, Skobelev, & Volman, 2007).

The wide perspective of presenting the billing contents among customers has addressed and specified the main problem of these presentation techniques over the Web that end users may be operating during the browsing process (Mercer, 1995). Online billing applications designed and developed by following a certain strategy for processing and displaying user queries are accessible on the Internet. Nevertheless, users are not familiar with unlimited pedagogical representations, and this may affect their way of understanding and interacting with the content. In addition, collaborative designers of business environments need to take into account the various pedagogical patterns for providing users with the desired information. Furthermore, the query process also depends on the way content is represented.

Although modern technologies are ready for use in unlimited business and commerce fields, the important pedagogical aspects frequently remain unchanged (Ferrer & Alonso, 2010). This leads to the need to carry out an evaluation and adoption of new business models for managing the billing and invoice queries-associated methods among end users. The importance of adaptation in online business plays a significant role in the utilization of technology during navigating. In e-billing environments, there are primarily two types of adaptations: a) to client device, and b) to client activity (Bonk, Wisher, & Lee, 2004).

2.2 The Origin of Content Management Systems

The term 'content management system' (CMS) integrates content management and technological development, and is distinct from other forms of content processing (Costa & Silva, 2010; Cuerda & Minguillón, 2005; Tramullas, 2005). CMS has been presented as a significant alteration in the use of the Internet by its users, specifically institutions developing and managing content. Since 1990, different organisations have recognised the feasibility of utilising the Internet for transferring business services globally. In addition, the Internet was acknowledged as a rare opportunity for directing business communications, which had not been recognised up to the time. However, applying Internet services to CMS in terms of e-payment strategies and all the resulting developments have provided customers with proper content management methods. Thus, to tackle these developments successfully, static and unarticulated Web pages were structured clearly, and other models were developed of more dynamic Web pages capable of enabling continued modifications to fulfil the environment's requirements.

Nevertheless, the challenge was not only a technological one, but also economic. It was essential to find a tool that would enable an individual with minimum information technology (IT) skills to create the desired results rapidly and in an uncomplicated way. The development of these technologies in CMS in the field of information and corroboration management approached these technological and economic requirements.

Managing content through e-business has provided users with the capacity to browse, search, save content, etc. Most applications enable different types of communication among particular users to provide different types of services on the network. Furthermore, the use of e- business systems has provided a scientific and research-oriented network with global access. E- business also offers excellent representation for data, information and files that constructed based on definite learning methods or theories (Lowe, 2003). Therefore, the recent communication rate that offered by Internet services and users is now covering different billing and invoice models and how customers or end users may interact with the content.

2.3 Database Management System (DBMS)

DBMS is defined as intelligent computer software that widely used for the purposes of managing and processing the data between parties. DBMS can be found in different forms especially in the online systems that deals with commands transactions between the client and the server side. This software helps in providing information storage and organization, retrieval capacities. DBMS enables the system administrators whom have the full access to the database contents to modify the available information

easily anytime and from anywhere (Ramakrishnan & Gehrke, 2003). Therefore, small and medium company's world wide began utilize DBMS in order to simplify the working process virtually.

Currently, conducting billing management procedures is customised in different information and business sectors, as the initial need for structured knowledge prompts users to understand the billing contents among different number of content structures. Content management (CM) also has different aspects in the adoption of IT, where CM is concurrently applied in many knowledge-based systems involving user understanding. The main issues in structuring business contents in terms of billing and invoice info are providing the basic knowledge required by users to understand the content.

Presentation of billing information requires a good understanding of CM rules and strategies; most of these can be taught by adopting different techniques for different domains (Tsai, Chang, & Chen, 2006). Recently, managing billing information in the academic field has become more difficult, requiring the collection and retrieval of basic content in a structural display. However, managing e-payment resources usually comes after identifying the required knowledge rules for collecting and distributing large amount of data to be excessive.

2.4 Online Billing System

Online billing systems are mostly divided from the implications of information system based technology that manly aims to process the user requests and

transmitted to produce an efficient and effective process to the system itself (Chou, Lee, & Chung, 2004). Therefore, online billing and invoice systems are considered to be a Transaction Processing System that intends to collects, stores, modifies, and retrieves the transactions of a certain organization. Applying such systems into organizations has helped to reduce the human errors that mostly results from the usual use for the papers and other manual procedures for retrieving, modifying and transmitting data. Online billing systems transfer the personal info into different records to be saved into the system database.

A number of mechanisms can be used to determine the efficiency of these systems based on the number of transactions that can be generated for a given time period. A number of changes occur in the learning style during the integration of new techniques. One of these changes relates to the development of new technologies that have rapidly influenced society. Among the changes taking place in the world, the computer technology revolution is making the greatest impact on the 21st century (Maier, 2007). Figure 2.1 presents an example of the billing procedures conducted by the billing management system.

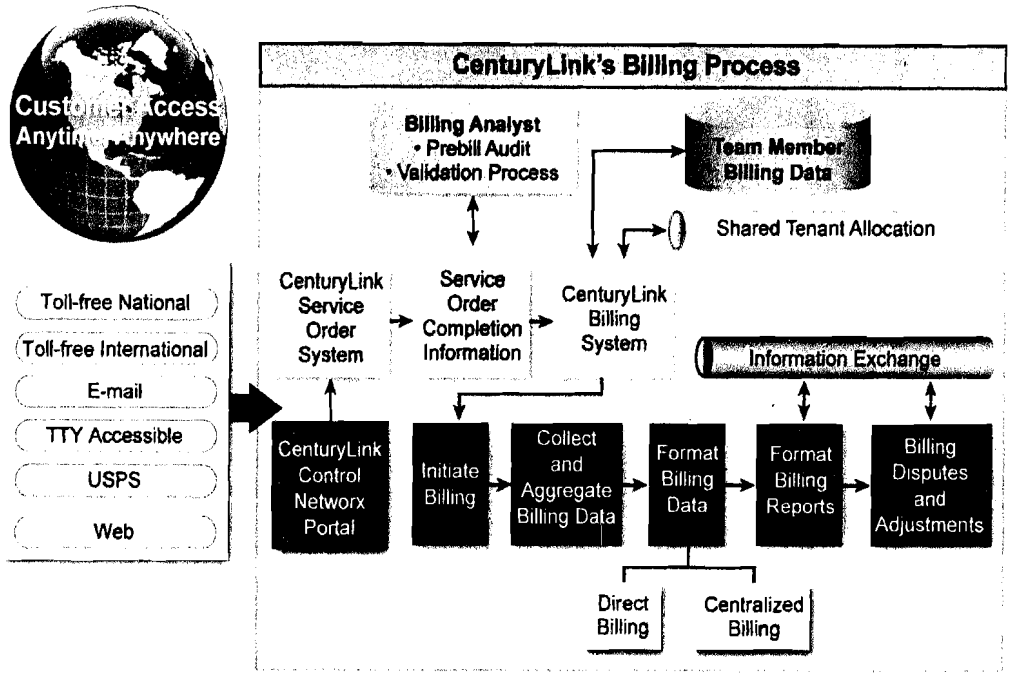

Figure 2.1: Example of Billing Management System

Maier and Schmidt (2007) identified CM as the belief that one is capable of performing in a manner that leads to attaining certain goals. It is the belief that one has the capability to execute the course of action required to manage prospective situations. Moreover, different experts have described CM in other ways as the concept has evolved in the literature and in society into the sense of belief that one's actions have an effect on the environment (Maier & Schmidt, 2007).

With the emergence of computer technology in the field of business and e-commerce, creating and sustaining change in CM can only be accomplished if the main concepts are successfully moved from one point of equilibrium to another. This movement can be facilitated by changing user attitudes towards CM technology. The Using of computers to enhance the user practices while conducting the payment procedure and this managing process is not a new phenomenon.

Computers have been used extensively in different business environments to enhance the process of billing and invoicing procedures. Hence, the term information technology has been adopted in many countries to describe the range of applications of computers in business (Maier & Schmidt, 2007).

CM also holds great promise to reform the business departments and their billing programs. This revolution in technology has also dramatically changed student learning processes such as gathering information, viewing the business administrator as a facilitator, becoming involved in experiential support, face-to-face communication, expanded creativity, and testing of new business practices.

2.5 Content Management in Billing Systems

The need to manage knowledge in organisations has become the key factor for success in the knowledge economy. Organisations throughout the world are engaging with CM projects and strategies to harvest knowledge in order to stay competitive and be innovative (Prusak, 2010). Business content management (Zikmund, Carr, Griffin, Babin, & Carr) is the process of systematically managing individuals, groups and organisations (Tsoukas, 2009). Research in the field of CM concentrates mainly on finding effective ways to manage this content through social and management perspectives; management is seen as a human-oriented process rather than a technology-based one (Nonaka & Von Krogh, 2009). However, the importance of information communication technology (ICT) means that it may now be possible to harness the capacity of such technologies to find effective solutions for managing the business contents.

CM's effects on individuals are based on the content structure adopted. These effects can address ways of organising information into an articulate whole in order to process the information's context. CM assists individuals in the organisation and stresses consistency in process and decision making as a prime avenue of success (Marwick, 2010).

As shown in Figure 2.2, it is understandable that different aspects of knowledge are represented differently, while CM has a strong focus on learners and the representation of rules and the social dimensions of business content. Awareness of knowledge contexts includes not only comprehensiveness in control of the brain and body, but is also linked to the way of presenting these contexts by the knowledge and technical dimensions of both the individual and community (Hislop, 2005). CM is not built up or shaped once, but is rather continuously analysed by various CM scales within organisations. These processes provide methods for managing symbols and give ideas to administrators or executives with high CM capability.

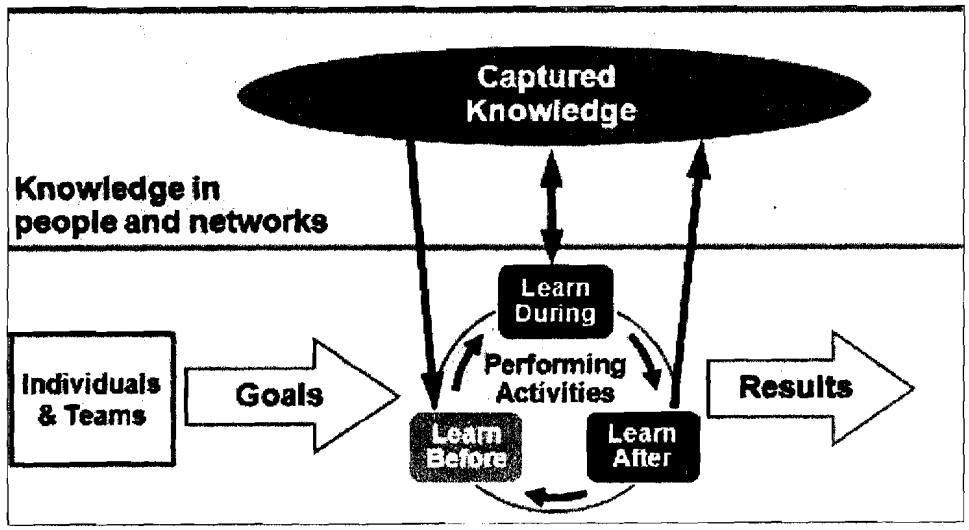

Figure 2.2: Content Management in Organisations (Hislop, 2005)

The usefulness of using e-billing system has increased recently due to changes in end users needs. New techniques have been deployed to assess individuals' problems when it comes to using e-billing systems. Most e- billing systems contain several tools for exploring user queries; these are different from other systems that use supportive technology to navigate the Web (Brusilovsky, Sosnovsky, & Shcherbinina, 2005).

Figure 2.3 displays multi-component communication via the Internet, which falls into different classifications such as the following:

- User PC: This helps to send and receive all manner of audio and video content; the category includes sound cards, webcams and microphones.
- User Communication Equipment: This helps to connect users' PC(s) to a Local Loop; this category includes modems, phone lines, Local Area Network (LAN) cards, routers and firewalls.
- Local Loop Carrier: This category of equipment helps clients to identify the location based on the Internet Service Provider (ISP), Point of Presence (POP), and includes cables, satellites, power lines and wireless.
- ISP's POP: This helps to justify connections from the user and authenticates user access.
- User Services: This category is employed by the user for access, and includes Domain Name System (DNS), email, etc.
- ISP Backbone: This interconnects the ISP's POPs, as well as interconnecting the ISP to other ISP's and online content.

- Online Content: This presents the host sites with which the user interacts.
- Origins of Online Content: This helps to provide an original source of information.

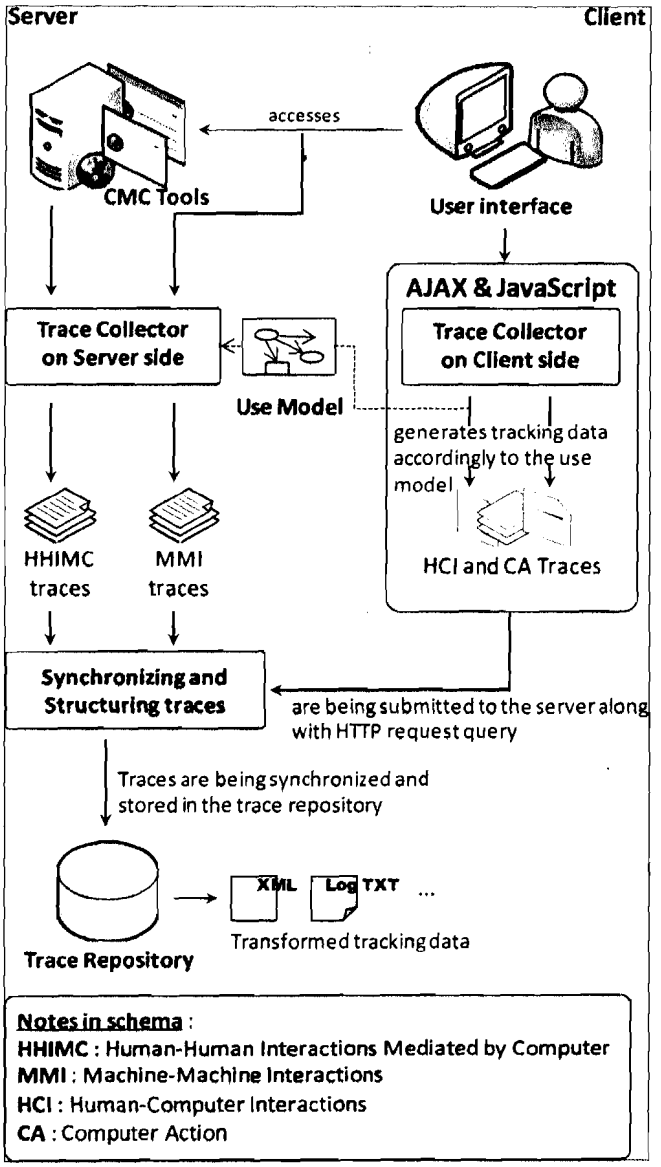

Figure 2.3: Basic Web Architecture (May, George, & Prévôt, 2008)

2.6 Related Works

A scholar by Austria (2009) introduced a new billing system, which developed to provide a different levels of highly flexible, saleable and ready for future developments of VoIP, IPVPNs, VoD and xDSL dements. The developed billing systems namely BearingPoint Infonova Billing Solution met. The working procedure of this system was consisted on managing the billing and invoice information, along with the capability to manage the entire spectrum of Wholesale Billing. Austria used Java platform to develop the system that also provides a highly competitive billing system in terms of service and maintenance costs. Figure 2.4 presents the main components of the Infonova Billing system.

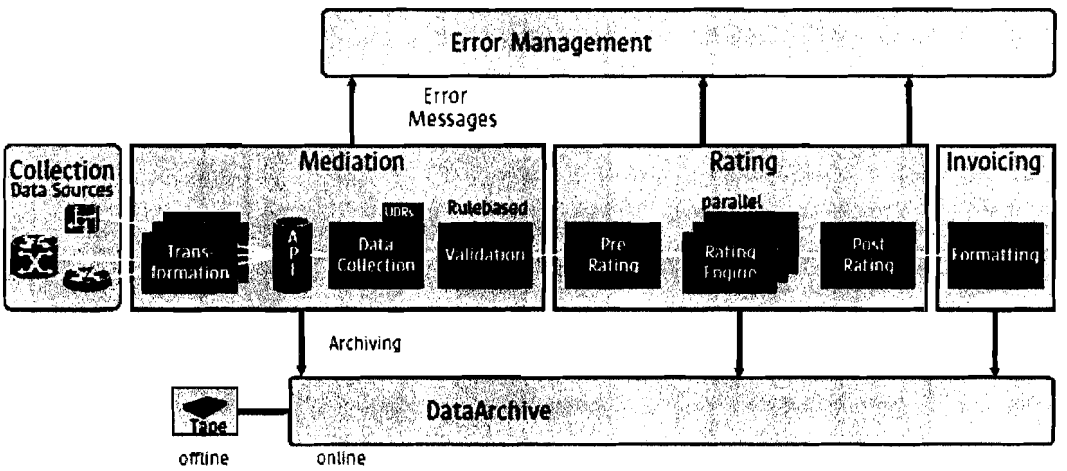

Figure 2.4: Infonova Billing system process(Austria, 2009)

Another study was conducted by (Tarwireyi, Terzoli, & Muyingi, 2008) to design and develop a new billing management system for the rural places that lacks to the Internet connectivity. They have reviewed the different issues faced by the financial management system in these areas. After declaring all the issues, they developed a

new generic architecture for the management of the costs associated with running a computer network connected to the Internet. The developed management system also namely Network Revenue Management System, enables a network to generate revenue, by charging users for the utilization of network resources. Moreover, the system provides a flexible architecture which allows the exploration of both conventional and non-conventional billing options as shown in Figure 2.5.

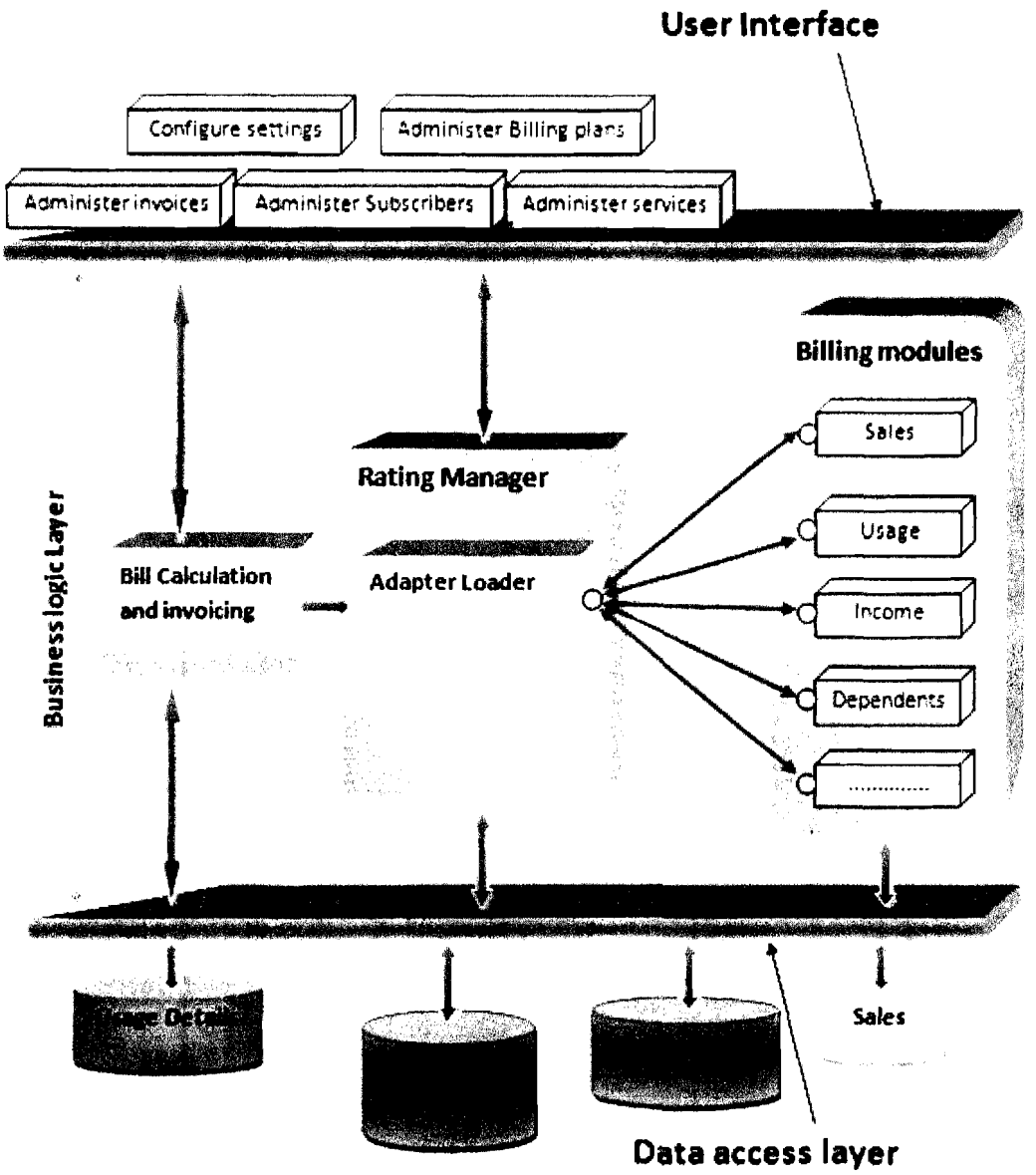

Figure 2.5: Conceptual architecture of the billing engine (Tarwireyi, et al., 2008)

Another study was established to design and develop CMS billing system called Costmedia. The system was developed based on the integration of various combinations and tools that provides clients with outsourced rating, billing and invoice generation functions. The system also provides the end users with the alternative choice to manage their billing history. The proposed billing system can be used along with the client's existing customer care, provisioning and accounting processes quickly and simply with secure data exchange via the internet. Figure 2.6 shows the Costmedia billing interface.

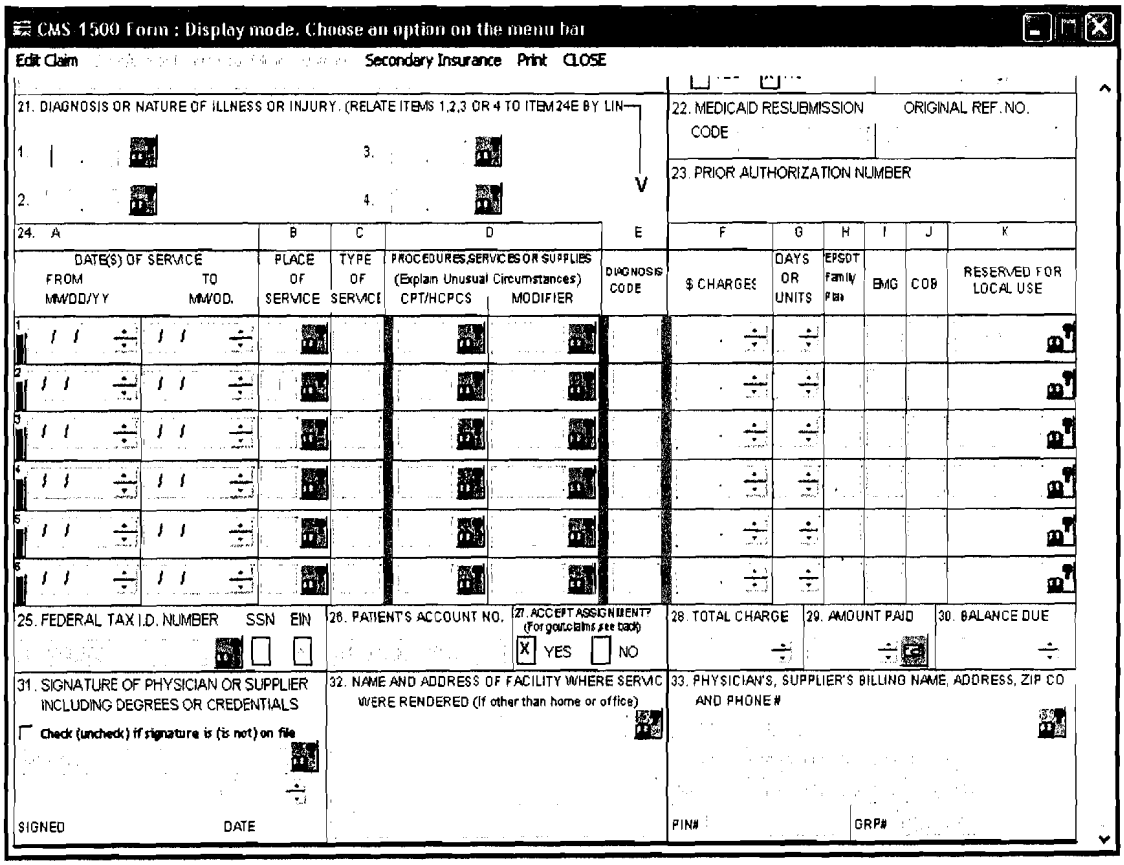

Figure 2.6: The Costmedia CMS Billing System ("Costmedia CMS Billing System," 2008)

Another billing system was developed by an European company to facilitate the customer tracking and managing procedure for their billing status. The system called Porta Billing template engine, user requires providing the billing details instructions similar to those require to be provided by the user. Figure 2.7 presents the Porta Billing template engine.

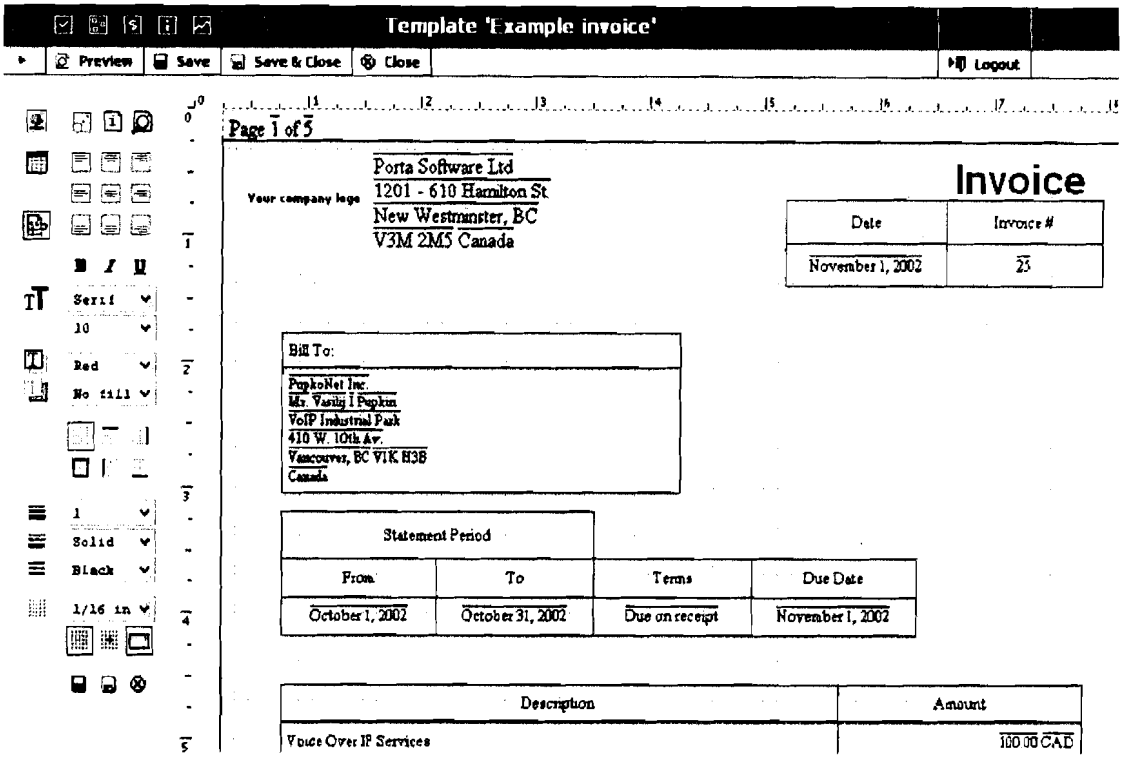

Figure 2.7: Porta Billing template engine (PortaBilling, 2006)

Furthermore, a study was carried by Zeng et al. (2008) to describe the current business needs for a new and flexiable conetent management systems that combine the different buciness components such as biulling and incoive services across multiple industries. They also introduced the problem of reducing outstanding receivables through improvements in the collections strategy. Then, they developed a new business model that can calculate the financial operations with high accuracy if an invoice will be paid on time or not and can provide estimates of the magnitude of

the delay. Finally, simulation results show that our approach can reduce collection time up to a factor of four compared to a baseline that is not model-driven as shown in Figure 2.8.

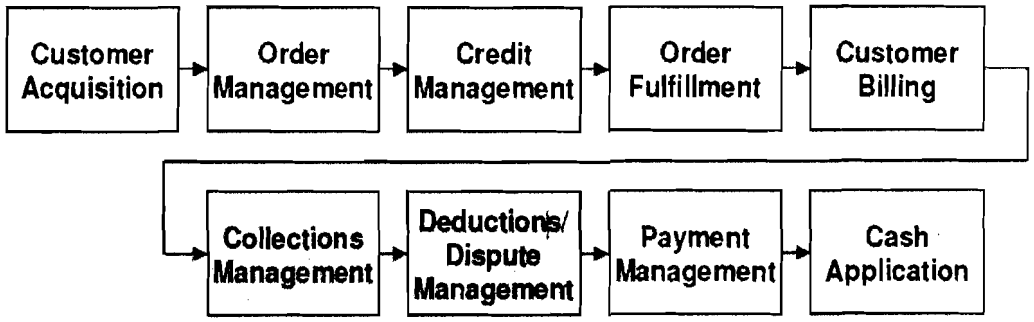

Figure 2.8 collection time (Zeng, Melville, Lang, Boier-Martin, & Murphy, 2008)

The development in the field of e-businesses was also established in order to create electronic invoice system called eInvoice for making strides to drive value and automate processes. The development of the eInvoice was mainly due to the current needs for automatic solution for managing the invoice information, which done manually by papers and other manual checks the primary payment type. Figure 2.p presents the system components between the company suppliers and buyers for the management of purchases and its invoices.

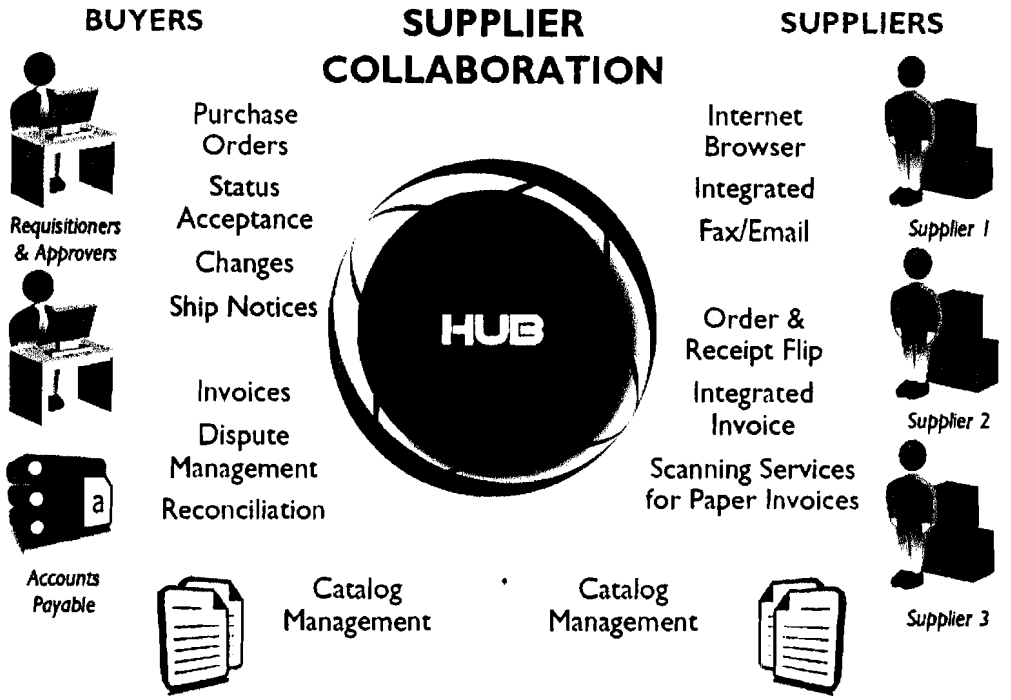

Figure 2.9: eInvoice Components (eInvoice, 2009)

In addition, Jaap and Charles (2010) developed a payment management system to provide a general and specialist readers with a description of the market landscape and recent developments in e-invoicing in Europe.

The focus of system was on the invoicing and e-invoicing in the European Single Market, Figure 2.10 shows the system components in terms of buyer, buyer's bank, seller's bank, and the main seller.

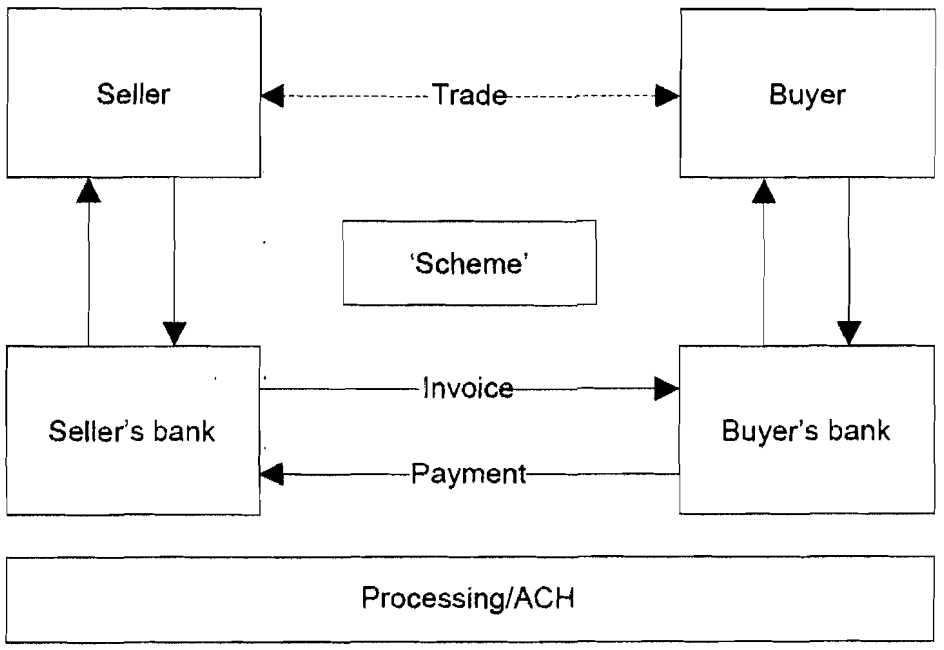

Figure 2.10: e-invoicing System components (Jaap & Charles, 2010)

A study was conducted by the National Finance Center in 2003 for designing and developing a new Internet Billing System (IBIL) Web application for serving the commerce sectors (Business Companied) with the suitable billing managing services. IBIL was developed to run on the Web environment that comes along with the Internet connection and additional security access. The generated data from the IBIL forms is transferred to the Administrative Billings and Collections System (ABCO) Figure 2.11 presents the proposed IBIL (Center, 2003).

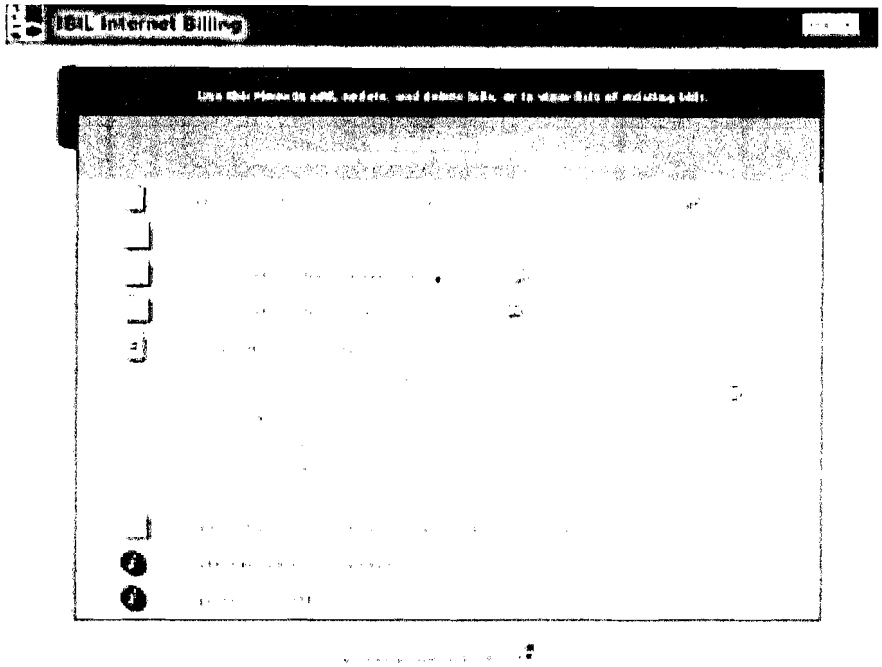

Figure 2.11: The Internet Billing System (IBIL) (Center, 2003)

Another study by Singh (2009) conducted for designing and developing a new online billing and payment system that also support the current financial needs that in many cases cannot be effectively fulfilled by the traditional payment systems. Different recommendations were considered during the development process of the system in terms of; security, acceptability, convenience, cost, anonymity, control, and traceability. The system was deployed as an e-commerce solution by evaluating the requirement of that system, characteristics and assesses the applicability. Figure 2.12 presents the proposed system.

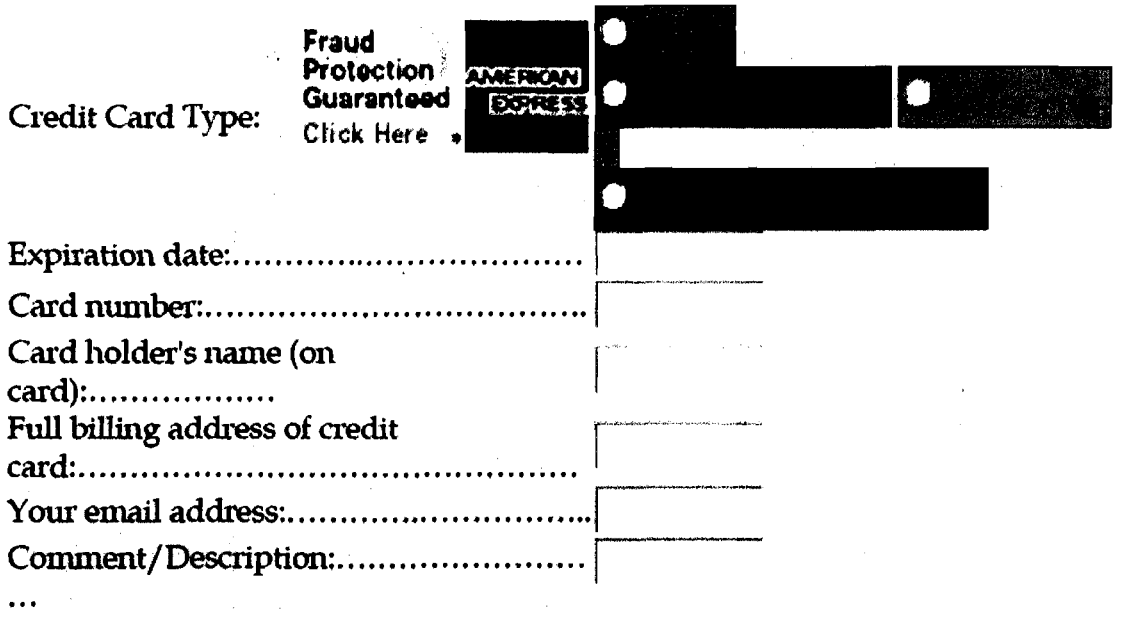

Figure 2.12: Online Billing and Payment System (Singh, 2009)

While Moertini (2011) and other colleagues applied the main concepts of IT projects to model a new online payment and invoice system based on the strategies of business risks. They also developed new schema for avoiding and reducing risks throughout the development of electronic payment system to handle tuition in the universities in Indonesia. The university regulations and other payment conditions were considered in the online system. The proposed online payment and invoice system was successfully deployed and operated in Parahyangan Catholic University, Bandung, Indonesia as shown in Figure 2.13.

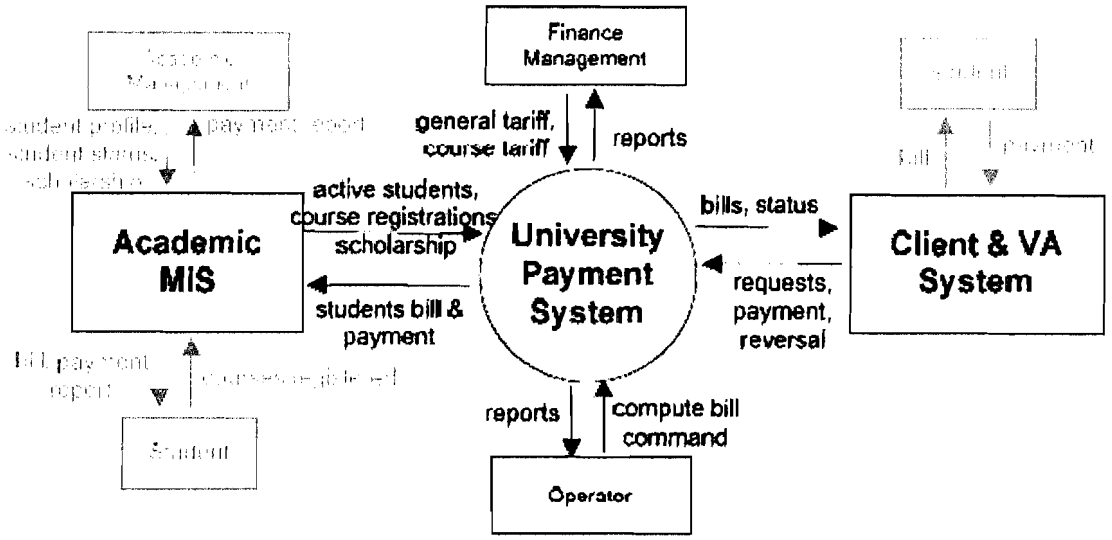

Figure 2.13: Diagram Context for the Payment and Invoice System (Moertini, Athuri, Kemit, & Saputro, 2011)

2.7 Summary

This chapter was established to present the current research components in the area of billing and invoice management systems. The related works were also addressed in this chapter by reviewing a number of studies relevant to the present research goal. The next chapter deals with the research method.

CHAPTER 3

METHODOLOGY

This chapter introduces the research methodology that used to design, develop, and evaluate the proposed OBIS functionalities based on the adaptation of Rapid Application Development Methodology (RAD).

3.1 Introduction

This research adapted the general methodology guides by Vaishnavi and Kuechler (2004/5) for designing, developing, and evaluating the proposed system. The reason of adopting this methodology is that the development procedures in the adapted methodology require passing a failing test case in each level of the approach levels. Furthermore, this methodology helps to write reliable and bug-free code of the development. Figure 3.1 shows the methodology phases in terms of awareness of problem, suggestions, development, evaluation, and conclusion.

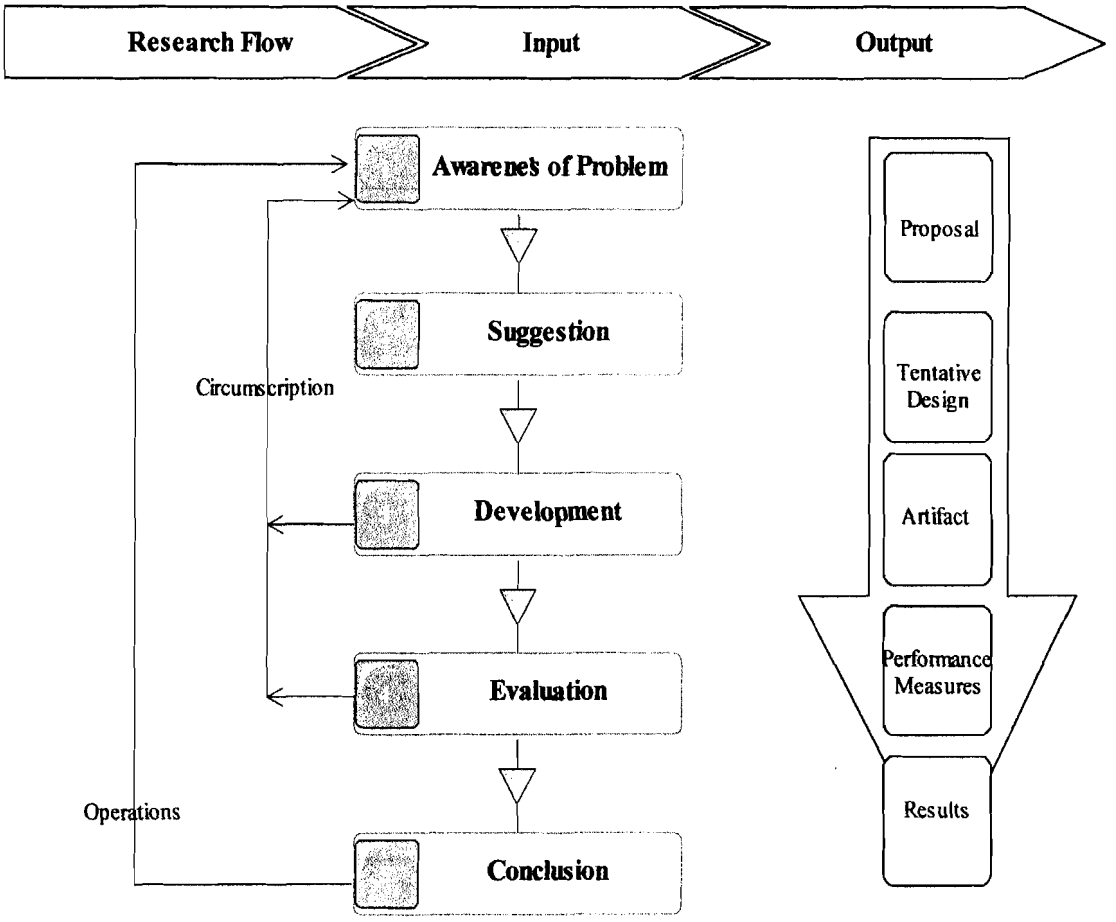

Figure 3.1: General Methodology (Vaishnavi and Kuechler, 2004)

The research development methodology (Awareness of Problem) gives the complete picture of the problem and other possible solutions. The Suggestion phase follows after the Awareness of Problem phase and is closely connected with it; the output of the Suggestion phase presents the Tentative Design. While the Development phase presents the implementation of the Tentative Design. The implementation techniques are commonly depends on the artifact stage. The software development and a high level package or tools are required to make an assumption for this research. Figure 3.2 presents the method details for each phase.

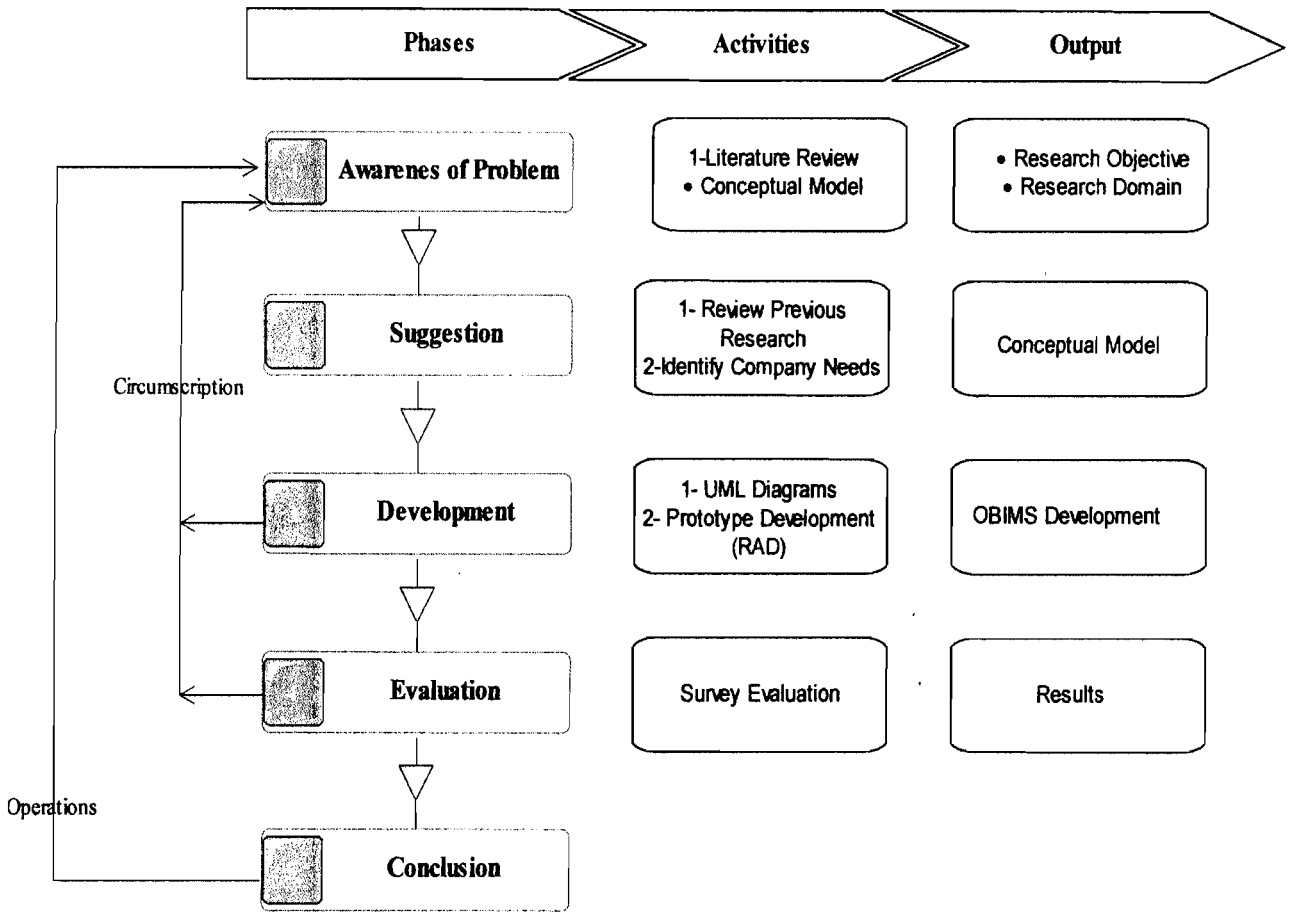

Figure 3.2: Research Method Details

3.2 Awareness of the problem

The first stage of this methodology is the Awareness of Problem for understanding the main problem that this research was conducted for. During the literature review stage, ideas, information, issues and problems related to the online invoice and billing systems. Data for this research was obtained from primary and multi sources. The study multi sources were extracted from the annual reports, journals, textbooks and other relevant publications related to the study field.

Based on these sources, we found that some researchers were able to adapt a certain techniques to enhance and develop the current billing and invoice. These techniques were relayed on performing a reliable programming language.

3.3 Suggestion

According to the problem and objective in the previous phase, this study intends to overcome the current manual issues in managing the bills and invoice details. Figure 3.3 presents the conceptual model for the proposed OBIS system.

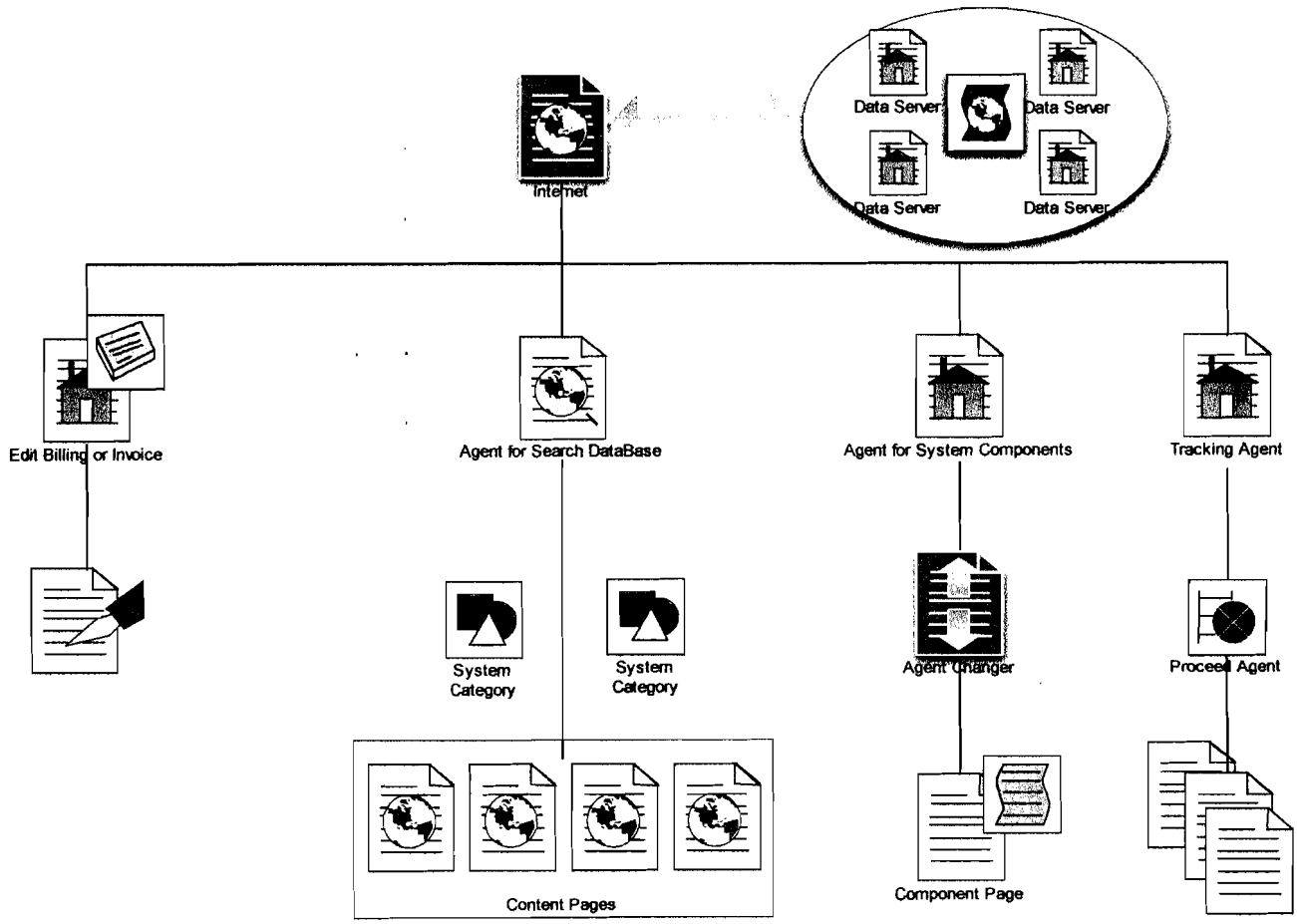

Figure 3.3 Conceptual Framework of OBIS

As well, this phase helped the research to indicate the proper project scope, timelines, technologies and solutions that already formulated in the first chapter. All the necessary about OBIS requirement and specification are defined.

3.4 Development

This phase involves the determination of the study requirements in terms of functional and non functional requirements, which was introduced based on UML concepts. A context diagram in Figure 3.2 confines study scope to obtaining the data flows that are included in the scope earlier. The context diagram focuses on relationships with external entities and identifies the information that is exchanged between these external entities and the system under review. The external entities themselves are outside the scope of the project but the data flows between the entities and the system are within the study scope.

Rapid Application Development approach was integrated in order to develop the proposed OBIS as shown in Figure 3.4 the main development phases.

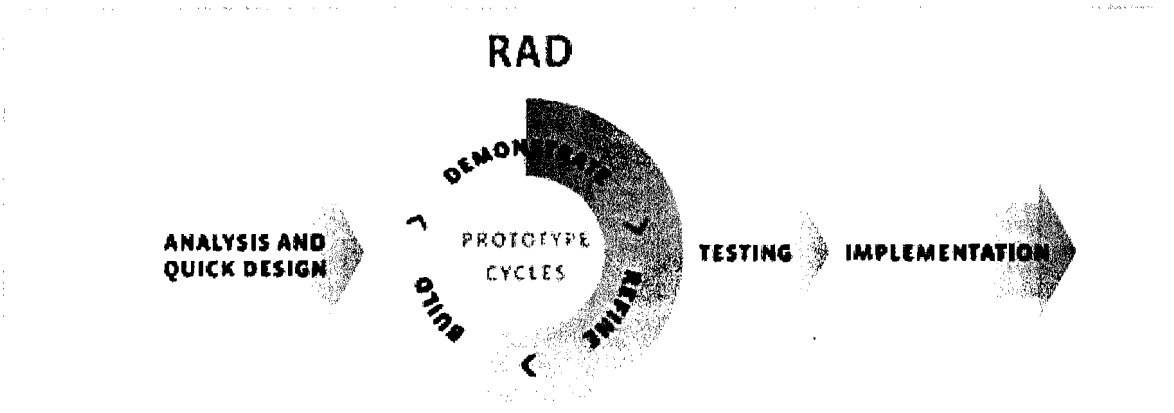

Figure 3.4: RAD Development Phases (Osborn, 1995)

3.4.1 Analysis and Quick Design

However, this stage assisted the research to know the gap between the user requirement and available products then we will define the problems statement. A short interview was conducted in order with the Sepco Company manager to indicate the company needs for the OBIS.

In this stage the researcher clarifies the previous and related literature about the appropriate solutions. The research also found out the additional references for the propose solution. This phase involves the determination of the study requirements in terms of functional and non functional requirements, which introduced based on Unified Modeling Language (UML) concepts such as functional and non functional requirements. It illustrates the business system, not the computer system. It shows the input and output data flows to a central process that represents the business system under analysis.

3.4.2 Prototype Cycle

This phase ensures that the propose web application works:

- Rhetorically: Is the web accomplishing its stated purpose and meeting its objectives for its intended audience, including satisfaction of identified revenue models?
- Technically: Is the web's presentation functionally operational and consistent with its specifications and design as well current HTML practices and syntax?
- Semantically: Is the web's domain information content correct, relevant, and complete? Is the web's user interface usable and effective?

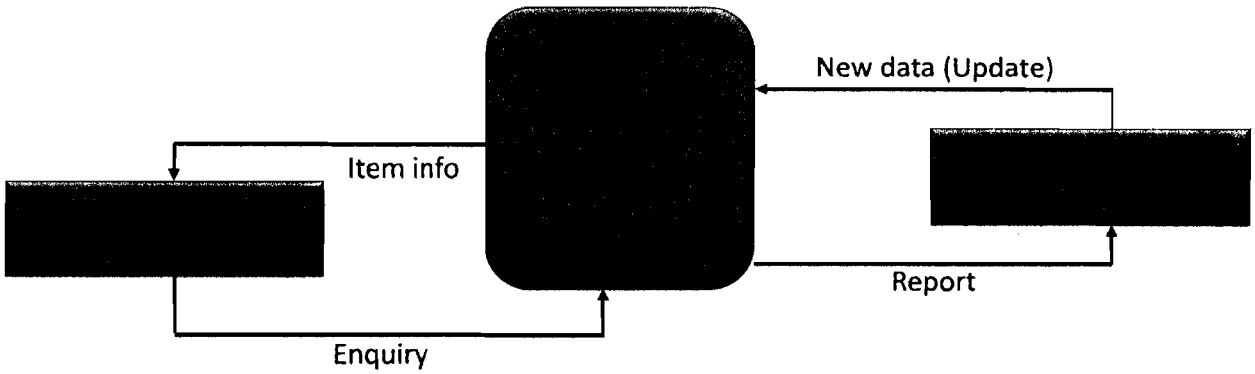

Figure 3.5: Context Diagram of the OBIS

The context diagram at the project level is the root of the functional decomposition at the conceptual level of detail. The context diagram is level zero of the decomposition.

The first level data flow diagram (level one of decomposition) further describes and decomposes the parent process on the context diagram (level zero of decomposition) as shown in Figure 3.6 below.

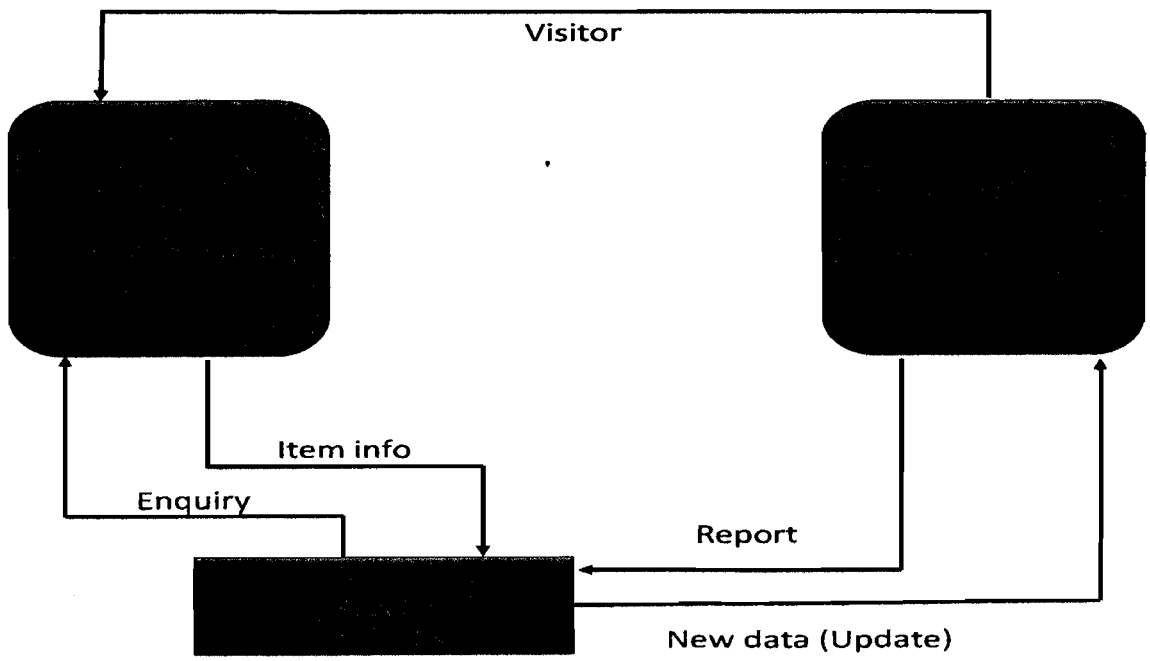

Figure 3.6: Level-0 Diagram of the OBIS

First, the OBIS allows for the administrator to add, edit, and delete a different number of data from the server. In addition, the system administrator is able to generate some reports about the website such as visitor and what are the best pages and poor pages from some systems that give the details about the website.

3.4.3 Testing

Local test was initialed for testing the system components. As well as questionnaire form distributed to a different number of employees for getting their feedback towards the OBIS ease of use and usefulness.

It also includes the process of continuously improving the usability and quality of the web to meet and exceed user expectations. Also innovation it's part of unique ways to improve the elements of the web or engage the web's audience. The online OBIS will be maintained to overcome the system lacking in performing a certain tasks.

3.4.4 Implementation

Implementation is the process of building the web according to its design. A web implementer creates hypertext markup language (HTML), Common Gateway Interface (CGI) programs. PHP and MYSQL were used for developing the propose OBIS system. Table 3.1 presents the hardware and software requirements for designing and developing the proposed OBIS.

Table 3.1: Hardware and Software Requirements

No	Tools	Description
1	Intel Laptop	For operating and running the proposed OBIS.
2	Dreamweaver	For designing the OBIS user pages.
3	PHP	For coding the proposed OBIS.
4	MYSQL	For saving and retrieving the database contents.
5	Java Script	For moving commends in the OBIS

3.5 Evaluation

Local test was initialed for testing the system components. As well as questionnaire form from Cohen (1999) and Davis (1989) was distributed to a different number of employees in the Sepco Company in Saudi.Arabia for getting their feedback towards the system ease of use, usefulness, and satisfaction. Includes the process of continuously improving the usability and quality of the web to meet and exceed user expectations. Also innovation it's part of unique ways to improve the elements of the web or engage the web's audience.

3.5.1 Research Population and Sample

Population is any group of individuals that have one or more characteristics in common that are of interest to the researcher (John & Wallen, 1993). Gay and Airasian (2000) defined population as the group of interest to the researcher (Gay & Airasian, 2000), the group to which the results of the study will ideally

generalize. In this study, the population refers to the entire group of Sepco Company employees.

In terms of the research sample, there are several methods of sampling that can be used to draw samples from a population. Zikmund (2000) categorized probability sampling techniques into five categories, simple random, systematic, stratified, cluster and multistage (Zikmund, 2000). A simple random sampling technique was used in this study with 30 Sepco Company employees.

Rea, Parker and Allen (1997) designed a table that delineates the sample sizes required for 95% and 99% percent levels of confidence for various population sizes (Rea, Parker, & Allen, 1997). For a population size of 500, for example, the required sample size is 250 in order to achieve a 30 percent confidence interval. Also, they stated that "in certain cases a sample size of 30 percent of the population size has been determined to provide the required accuracy" (Rea, et al., 1997).

3.5.2 Instrumentation

The questionnaire is a self-report questionnaire. The biggest advantage of the self-report questionnaire is that the researcher can obtain quantitative data for analysis (Cohen, 1999). Oppenheim (1998) defines questionnaire as a well written set of questions to which respondents record their answers, usually within rather closely defined alternatives (Oppenheim, 1998). For the purposes of the study, the data was gathered by means of a questionnaire.

Using questionnaire for collecting research data means construct a self report data collection instrument that is filled by the research participants. The first section of the questionnaire obtained the participant's background information. Four items were included in this section to deal with the participants' age, gender, schools, and their using for e-services. In the second section there were 12 items adapted for measuring the OBIS ease of use and usefulness.

Participants needed to, according to their attitudes, rate the statements on a five-point liker Scale ranging from 1 (strongly disagree) to 5 (strongly agree). The liker scale format (1=strongly disagree to 4=strongly agree) was used to conduct this research.

3.5.3 Reliability

Dimensions of reliability include stability (the measure gives the same results when applied to the same phenomenon more than one time), equivalence (the measure gives the same results when applied to a phenomenon by more than one investigator), and internal consistency (the items constituting a measure relate to the same phenomenon) (O'Sullivan, Rassel, & Berner, 2003). Evidence of the initial reliability of the instrument was provided with a sample of 30 Sepco Company employees. The reliability of the subscales will be determined by internal consistency (alpha coefficient) in this research. After analyzing the obtained data from users, Cronbach alpha was considered to have an acceptable

reliability Cronbach alpha above .70 suggestive of acceptable reliability (O'Neill, 2004).

3.5.4 Data Collection and Analysis

As a matter of fact, the data collection for this study was gathered through quantitative means. Data collection is simply a technique that is used to collect empirical research data. According to Kotzab (2005) collecting data can be one of the most enjoyable aspects of doing research, and the research data can be collected in a variety of ways, in different settings, and from different sources (Kotzab, 2005).

The research data was collected using convenience method to collect respondents' perspectives on OBIS. Time constrain was arranged for certain period to observe a structure questionnaire.

Data analysis is the process of systematically searching and arranging the research data. The data collected processed by using Statistical Package for Social Science (SPSS) program. It used reliability and validity of construct assessment to confirm the reliable and valid level of questionnaire item that used in this study. Furthermore, multivariate statistic technique such as descriptive frequency.

3.6 Conclusion

In this stage the researcher explain the advantages and disadvantages of the propose system and future work that can be done.

3.7 Summary

This chapter contained an overview of the methodology and procedures for this study. This chapter described the procedures used to select subjects to participate in this study, as well as described the timeline for analysis of the described sample population. It discussed the research design that was applied to the sample population. Further, it described the instrument that distributed to the sample population. Also, detailed how the data collect and how the data analyzed after collection. Next chapter will discuss the details of the analysis and the design of the proposed OBIS.

CHAPTER 4

ANALYSIS AND DESIGN OF OBIS

4.1 Introduction

In the previous chapter, the methodology has been explained considerably. The methodology consists of sever phases in terms of scope of project, prototype, design, development, test, launch, and support. This chapter discusses in details the design and development of OBIS. Among others, it explains on the requirements determination and structuring activity and the production of system design according to the functional requirements.

4.2 OBIS Requirements

4.2.1 Functional Requirements

Listed below are the functional requirements and non-functional requirement of the OBIS. In the priority column, the following short hands are used:

- M – mandatory requirements (something the system must do)
- D – desirable requirements (something the system preferably should do)
- O – optional requirements (something the system may do)

Table 4.1: OBIS Functional Requirement

No.	Requirement ID	Requirement Description	Priority
	OBIS_01	**Login**	
1	OBIS_01_01 (Login)	Provides users (Staff and Manager) a full access into the OBIS contents by entering their username and password.	
2	OBIS_01_02 (Forget Password)	Helps users to retrieve the login details in case of losing password by entering the email address.	M
3	OBIS_01_03 (Logout)	Enables users to logout from the OBIS and redirected to the login page.	
	OBIS_02	**Search**	
1	OBIS_02_01 (Search)	Enables OBIS user and manager to search the OBIS contents info.	M
	OBIS_03	**Manage Clients**	
1	OBIS_03_01 (Manage Users)	Enables OBIS manager to manage the users (customers) information by adding, updating, and deleting the user's info.	
2	OBIS_03_02 (Add Users)	Enables OBIS manager to add a different number of users by entering the user info.	M

3	OBIS_03_03 (Edit Users)	Enables OBIS manager to edit a different number of users by changing the user info.	
4	OBIS_03_04 (Delete Users)	Enables OBIS manager to delete a different number of users by marking the desire user and remove him/her from the OBIS database.	
	OBIS_04	**Manage Invoices**	
1	OBIS_04_01 (Manage Invoice)	Enables OBIS staff to manage the invoice information by adding, updating, and deleting the invoice info.	
2	OBIS_04_02 (Add Invoice)	Enables OBIS staff to add a different number of invoices by entering the invoice info.	M
3	OBIS_04_03 (Edit Invoice)	Enables OBIS staff to edit a different number of invoices by changing the invoice info.	
4	OBIS_04_04 (Delete Invoice)	Enables OBIS staff to delete a different number of invoices by marking the desire invoice and remove him/her from the OBIS database.	

	OBIS_05	**Manage Inventory**	
1	OBIS_05_01 (Manage Inventory)	Enables OBIS staff to manage the inventory information by adding, updating, and deleting the inventory item details.	
2	OBIS_05_02 (Add Inventory)	Enables OBIS staff to add a different number of inventories by entering the invoice info.	
3	OBIS_05_03 (Edit Inventory)	Enables OBIS staff to edit a different number of inventories by changing the inventory info.	M
4	OBIS_05_04 (Delete Inventory)	Enables OBIS staff to delete a different number of inventories by marking the desire inventory and remove him/her from the OBIS database.	

	OBIS_06	**Manage Payment**	
1	OBIS_06_01 (Manage Payment)	Enables OBIS staff to manage the payment information by adding, updating, and deleting the payment details.	
2	OBIS_06_02 (Add Payment)	Enables OBIS staff to add a different number of payments by entering the payment info.	O

3	OBIS_06_03 (Edit Payment)	Enables OBIS staff to edit a different number of payments by changing the payment info.	
4	OBIS_06_04 (Delete Payment)	Enables OBIS staff to delete a different number of payments by marking the desire payment and remove him/her from the OBIS database.	
	OBIS_07	**View Reports**	
	OBIS_07_01 (View Reports)	Enables OBIS staff to view the sales reports from the OBIS database.	O

4.2.2 Nonfunctional Requirements

Table 4.2: Non-Functional Requirements

No.	Requirement ID	Requirement Description	Priority
	OBIS_8	**Reliability**	
1	OBIS_8_01	For a single user, the system should crash no more than once per 2 hours.	D
2	OBIS_8_02	If the systems crash, it should behave perfectly normal when reloaded again.	M

3	OBIS_8_03	The system should be receiving a real time update for information.	M

	OBIS_9	**Usability**	
1	OBIS_9_01	Users can easily use the system.	M
2	OBIS_9_02	Users can easily manage their personal info.	M

	OBIS_10	**Operational**	
1	OBIS_10_01	The system can be viewable in any browsers.	M

	OBIS_11	**Security**	
1	OBIS_11_01	Verifying user information during the login.	M
2	OBIS_11_02	The system should be able to handle a different virus threats from outside world.	M

4.3 Use Case Diagram

Use case diagram was used for presenting the proposed OBIS functionalities among manager and staff. The OBIS use case initialed the main activities for both students and manager. Manager in this use case is allowed to manage clients' information after a successful login. However, the staffs will be capable to manage, the invoices details, inventory details, payment, perform search, and view reports as shown in Figure 4.1. These components were connected with each other based on the conceptualization of the system functional requirements towards providing better services for the clients.

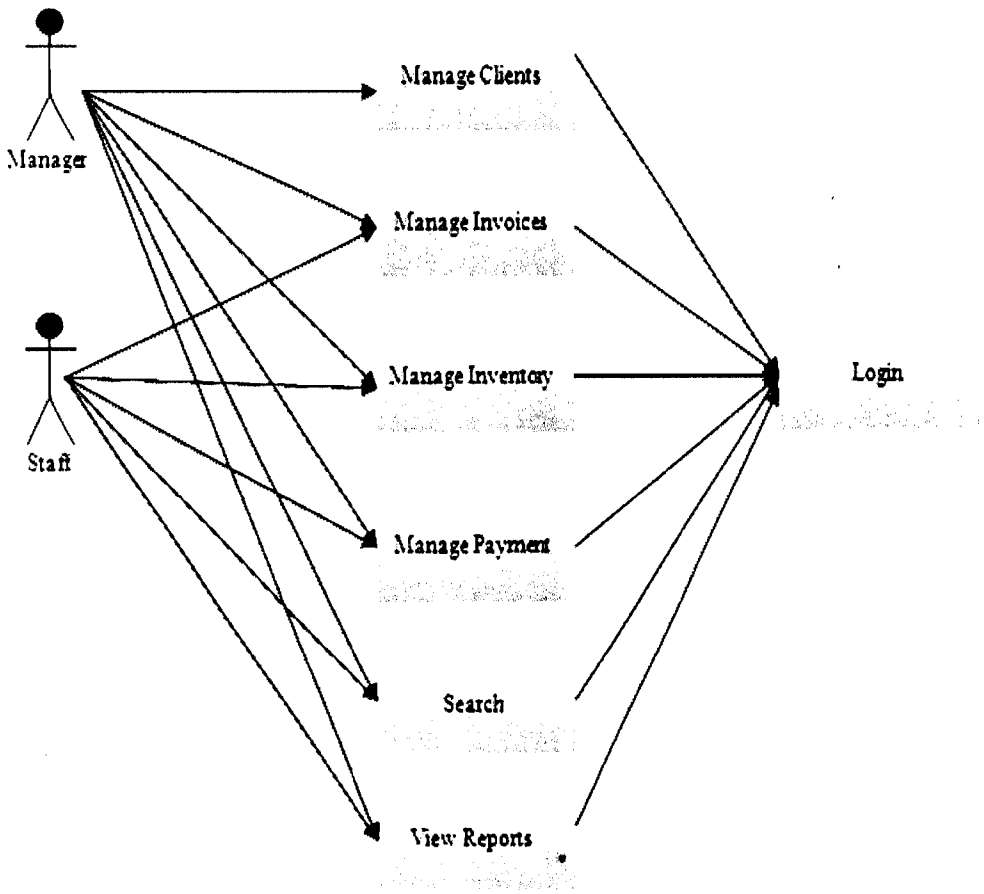

Figure 4.1: Use Case Diagram for OBIS

4.4 OBIS Sequence and Collaborative Diagram

Sequence and activity diagram presents the main elements for presenting the research design components procedure among users (Actors), boundaries, controller, and entities. This study carried out the sequence and the activity diagrams for the aiming of illustrating the working process for each use case.

4.4.1 Login Sequence and Collaborative Diagram

This sequence diagram initialed for the users (Staff and manager) to login through his/her username and password, users are requires providing the correct user name and password. Meanwhile, users will be asked for re-enter the username and password in case of wrong entries. Figure 4.2 shows the sequence diagram for the login. While Figure 4.3 show the collaboration diagram for the users' login.

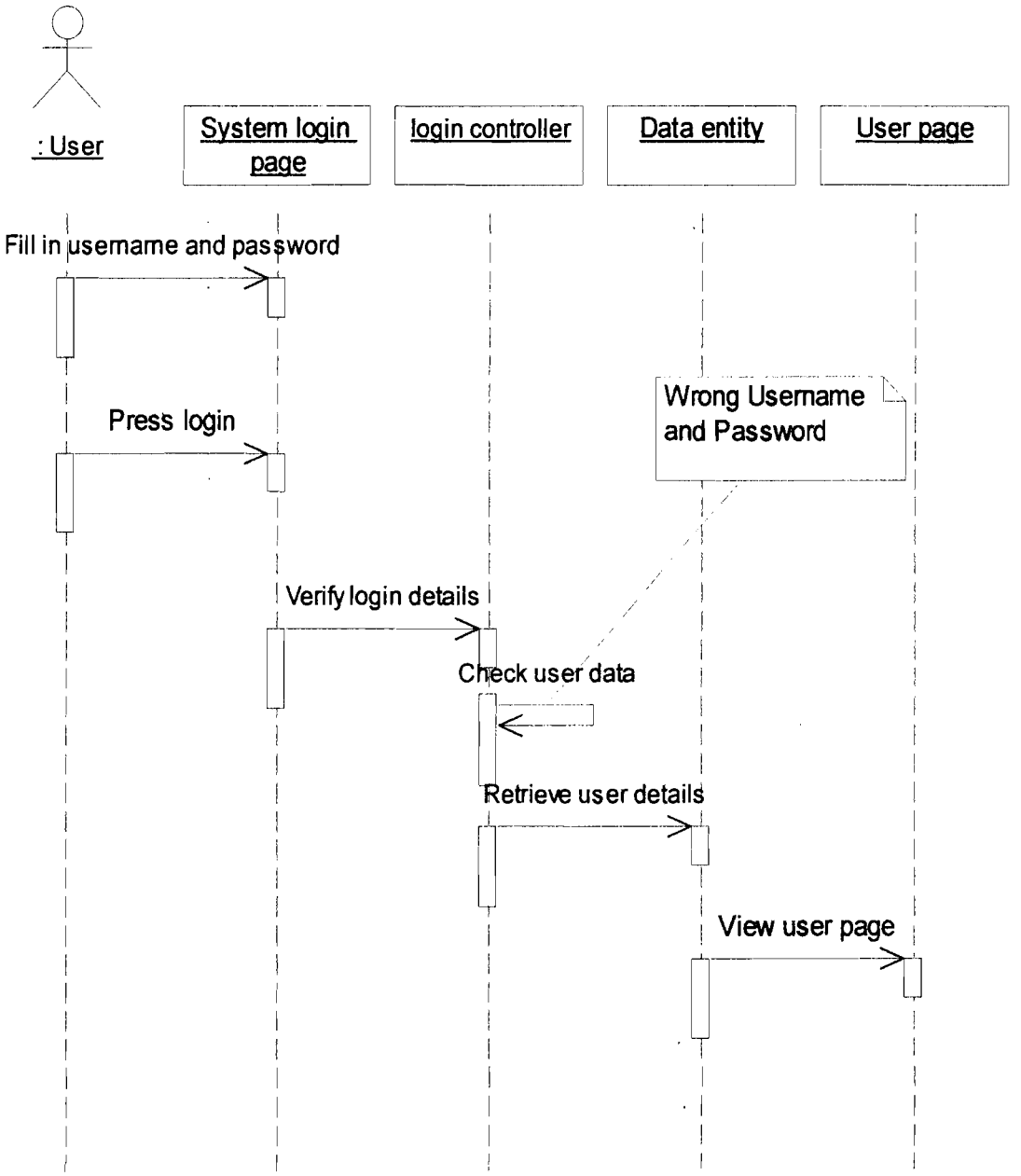

Figure 4.2: Login Sequence Diagram

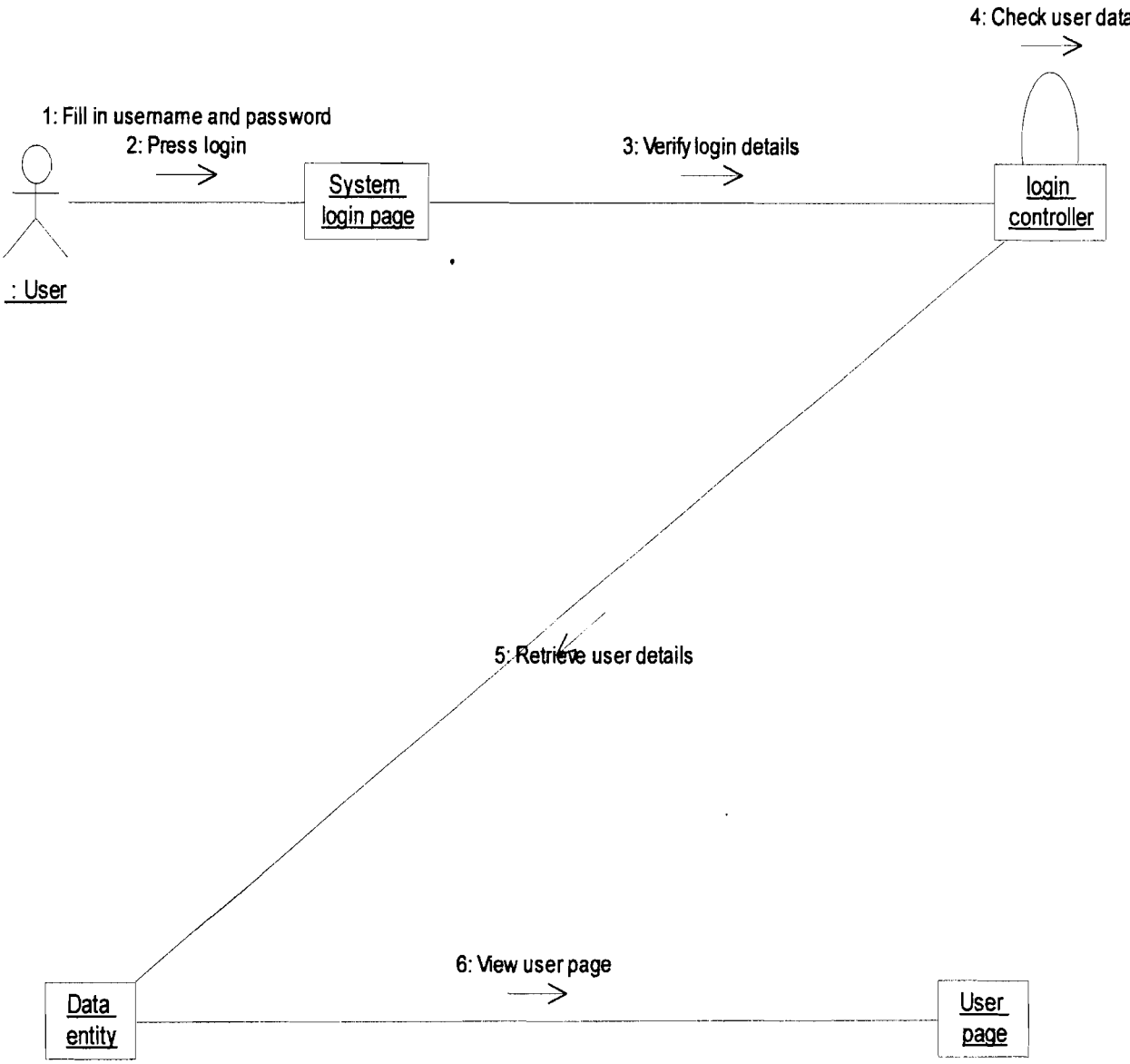

Figure 4.3: Login Collaborative Diagram

4.4.2 Search Sequence and Collaborative Diagram

This sequence diagram initialed for the OBIS staff to search through the proposed system database, staff are requiring to provide the correct keywords that matches the available info. Meanwhile, staff will be asked for reenter the search in case of invalid keyword. Figure 4.4 shows the sequence diagram for the search. While Figure 4.5 show the collaborative diagram for the staff search.

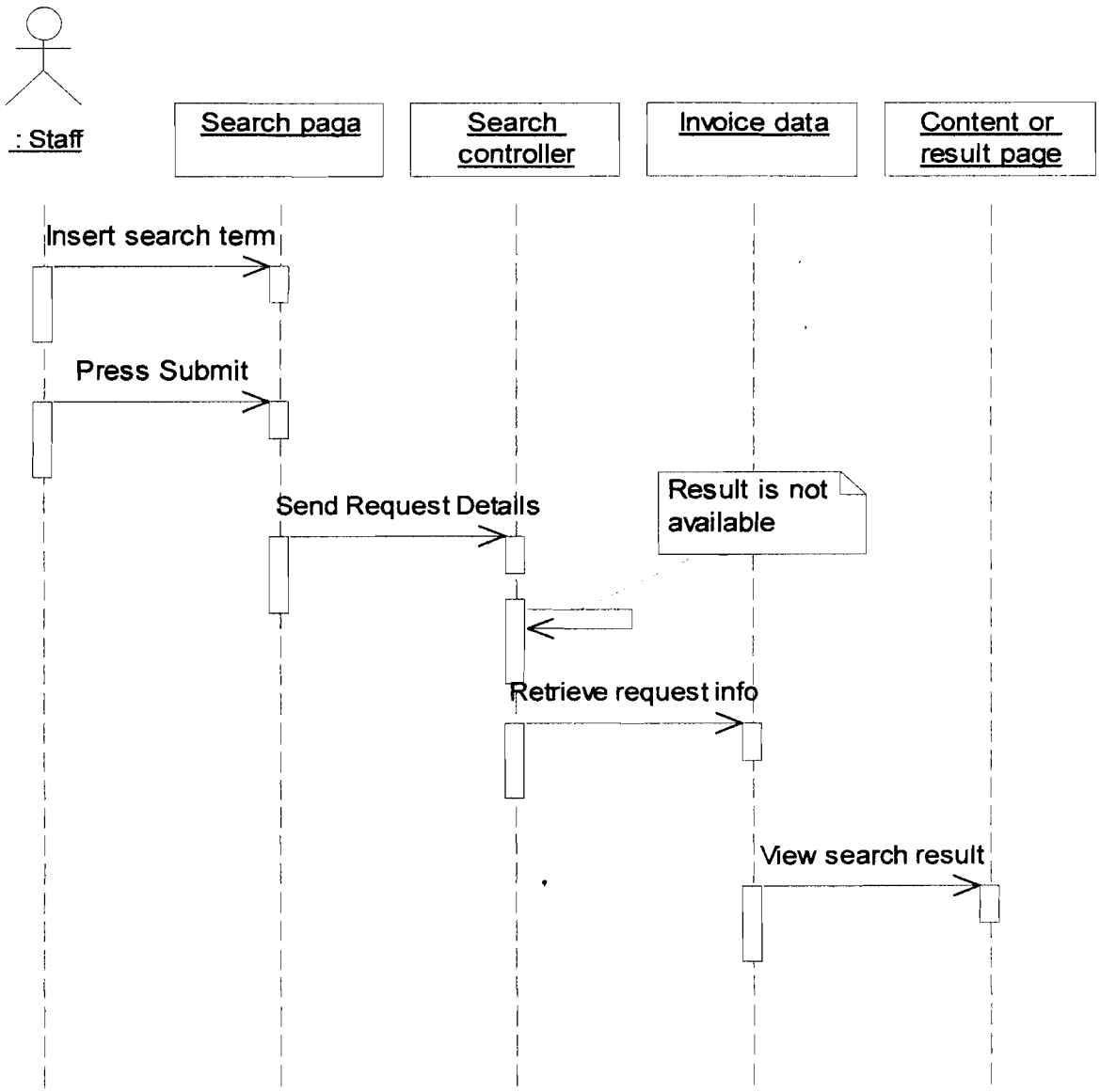

Figure 4.4: Search Sequence Diagram

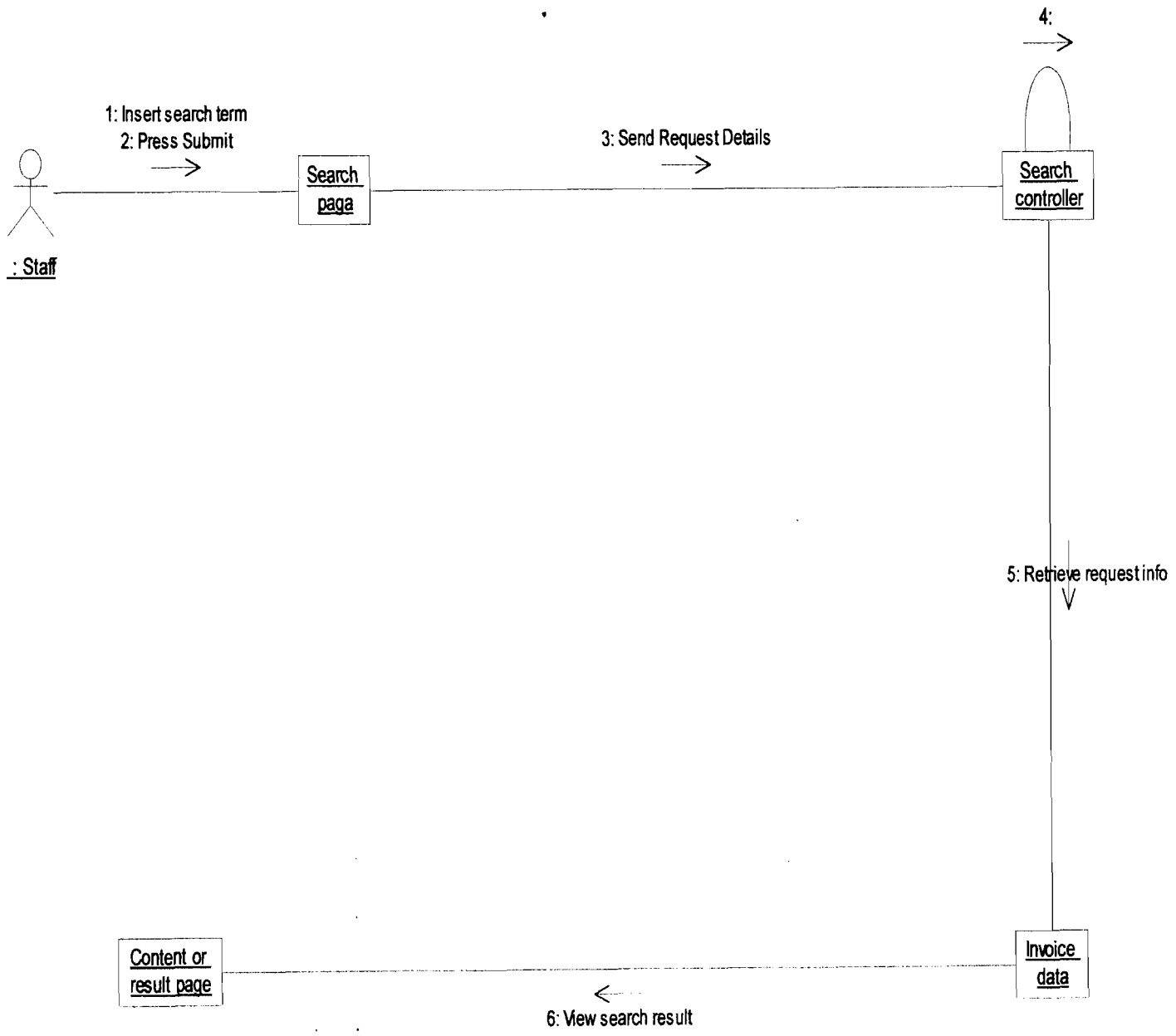

Figure 4.5: Search Collaborative Diagram

4.4.3 Manage Clients Sequence and Collaborative Diagram

This sequence diagram initialed for the OBIS manager to add, modify, and delete the clients profile from the proposed system database, manager must fill-in the require clients details. Meanwhile, manager will be asked for reenter the client details in case of invalid request. Figure 4.6 shows the sequence diagram for the manage clients. While Figure 4.7 show the collaborative diagram for the manage clients process.

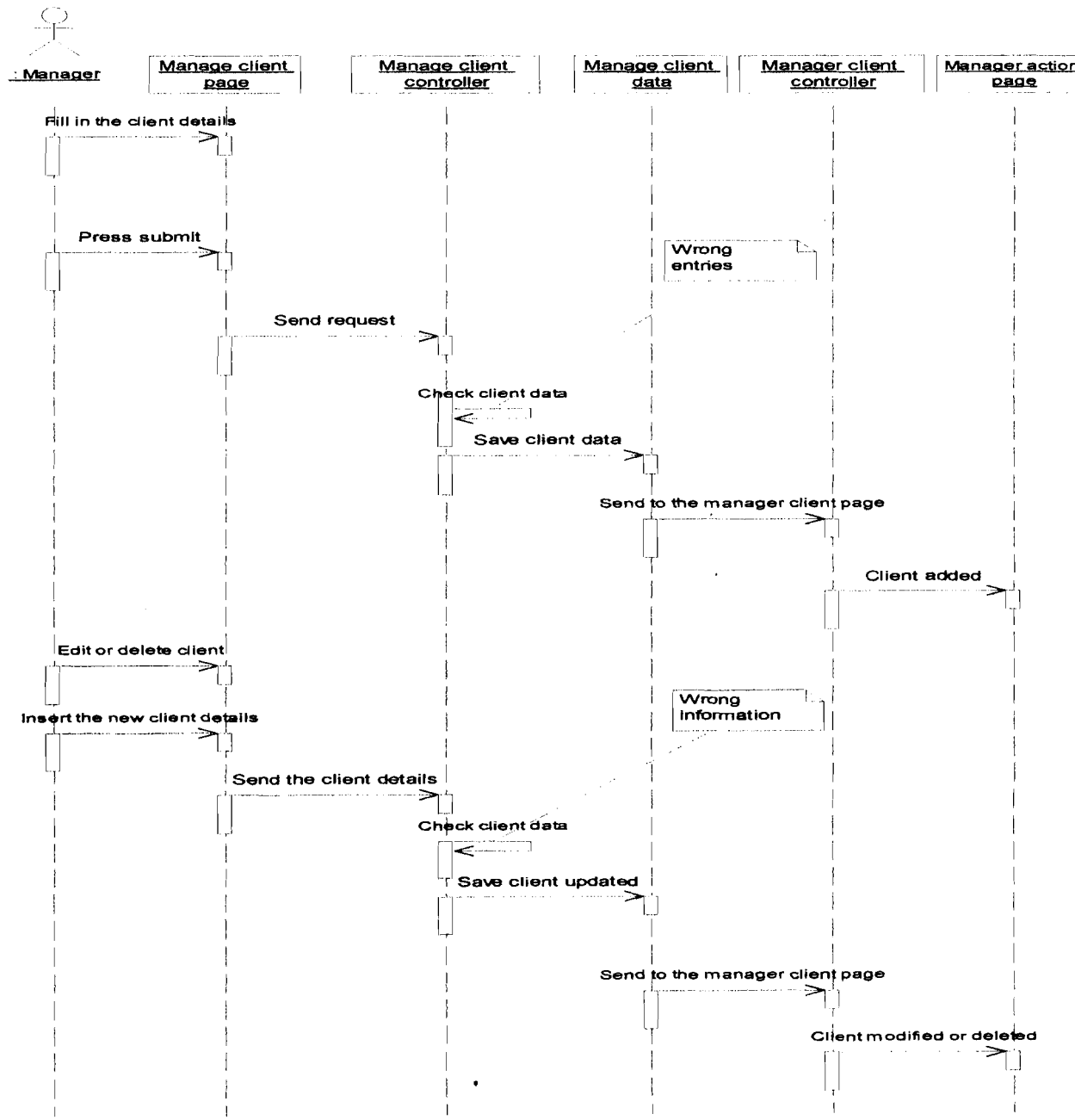

Figure 4.6: Manage Client Sequence Diagram

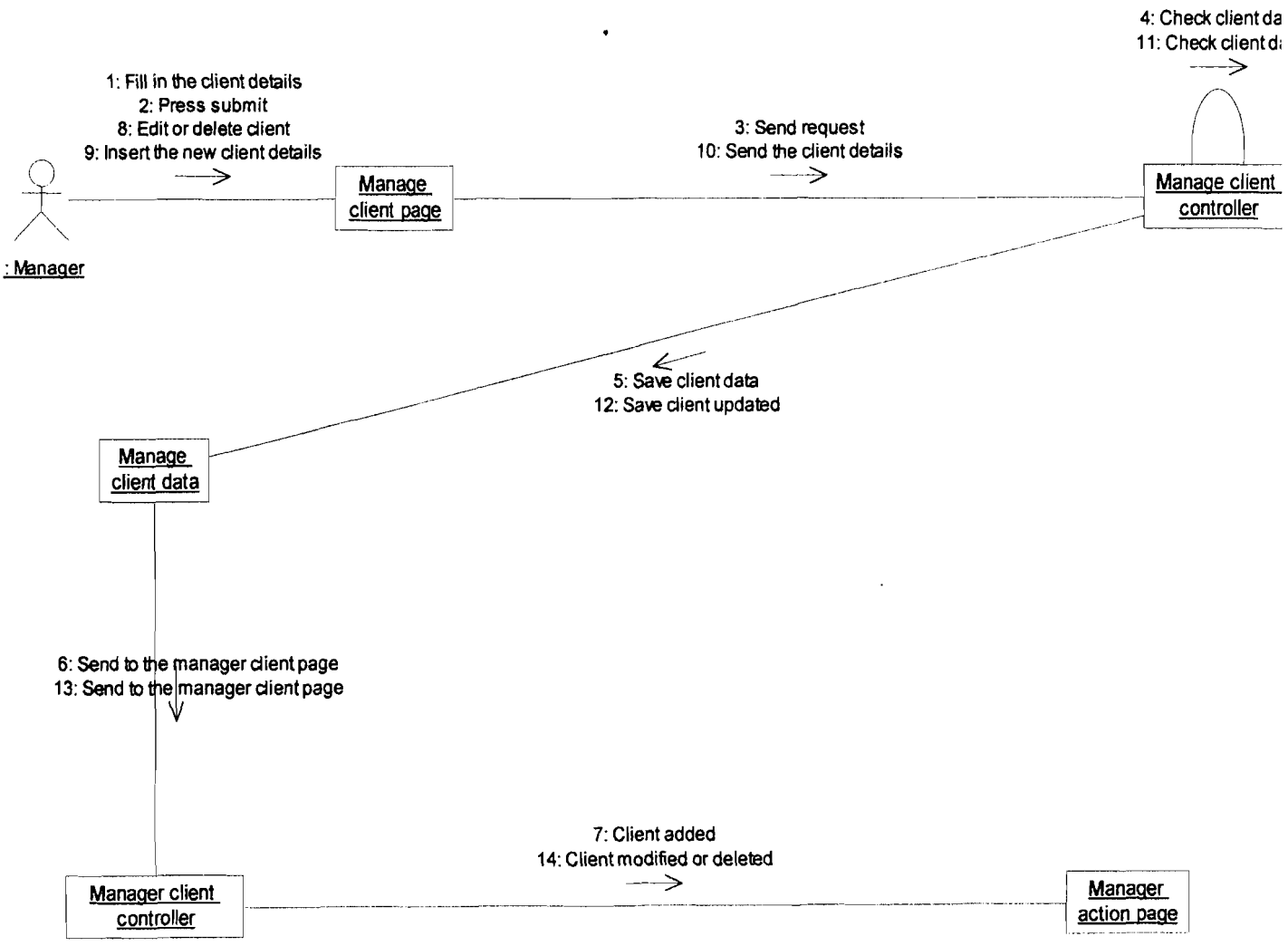

Figure 4.7: Manage Client Collaborative Diagram

4.4.4 Manage Invoice Sequence and Collaborative Diagram

This sequence diagram initialed for the OBIS staff to add, modify, and delete the invoice info from the proposed system database, staff must fill-in the require invoice info. Meanwhile, staffs will be asked for reenter the invoice information in case of invalid entries. Figure 4.8 shows the sequence diagram for the manage invoice. While Figure 4.9 show the collaborative diagram for the manage invoice process.

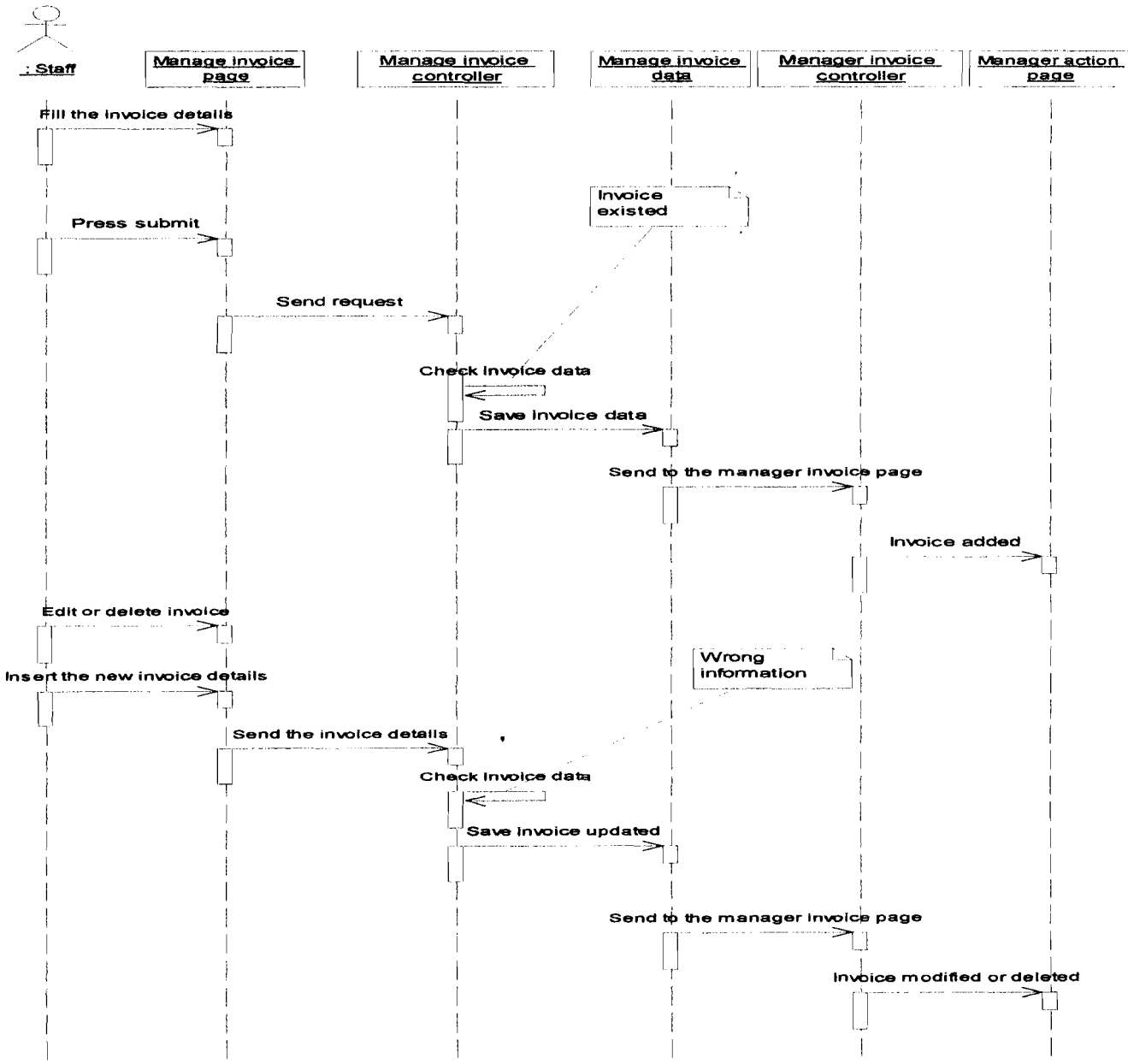

Figure 4.8: Manage Invoice Sequence Diagram

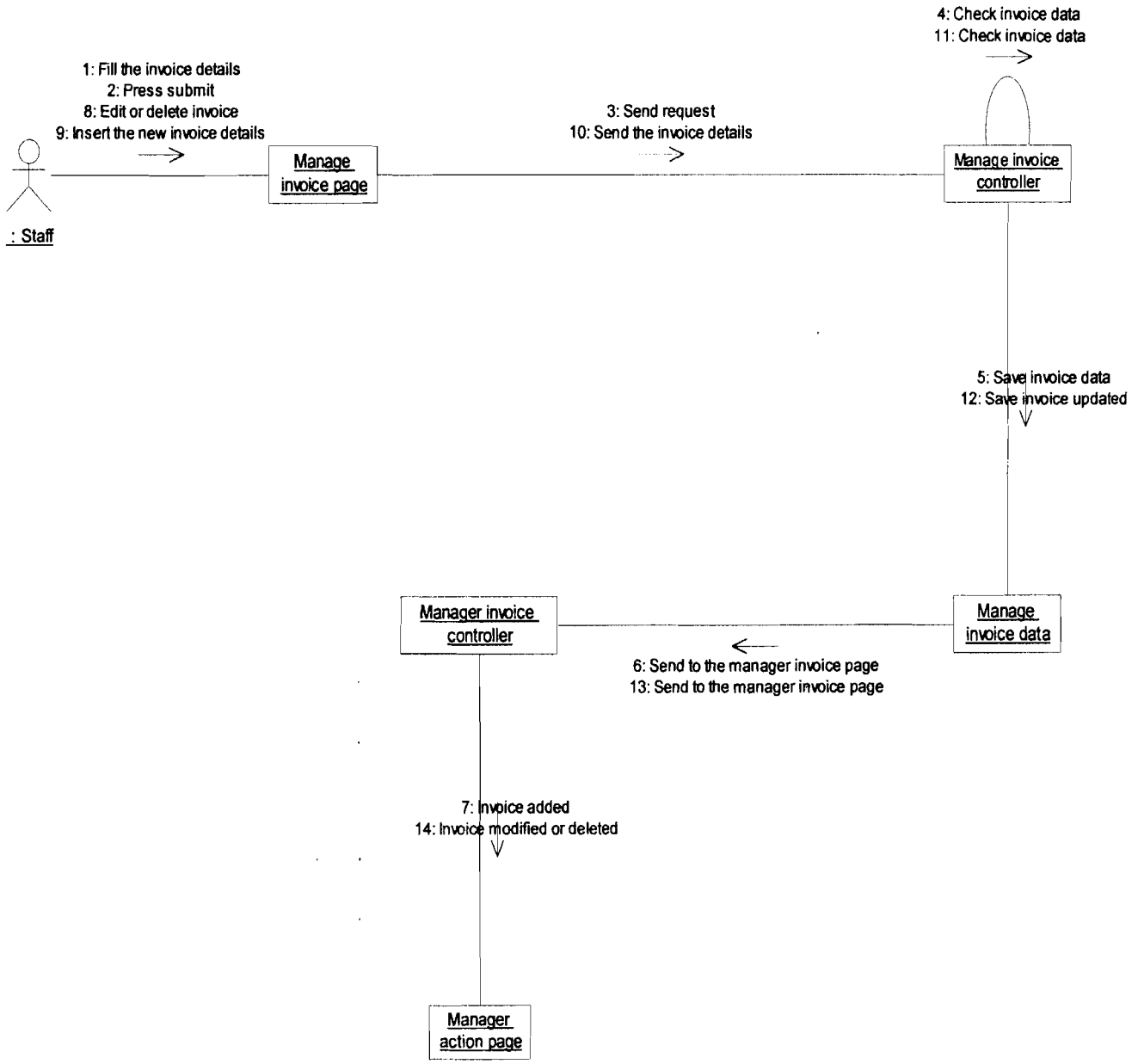

Figure 4.9: Manage Invoice Collaborative Diagram

4.4.5 Manage Inventory Sequence and Collaborative Diagram

This sequence diagram initialed for the OBIS staff to add, modify, and delete the inventory item and type info from the proposed system database, staff must fill-in the require inventory items info. Meanwhile, staffs will be asked for re-enter the item info for the inventory in case of invalid entries. Figure 4.10 shows the sequence diagram for the manage inventory items. While Figure 4.11 show the collaborative diagram for the manage inventory process.

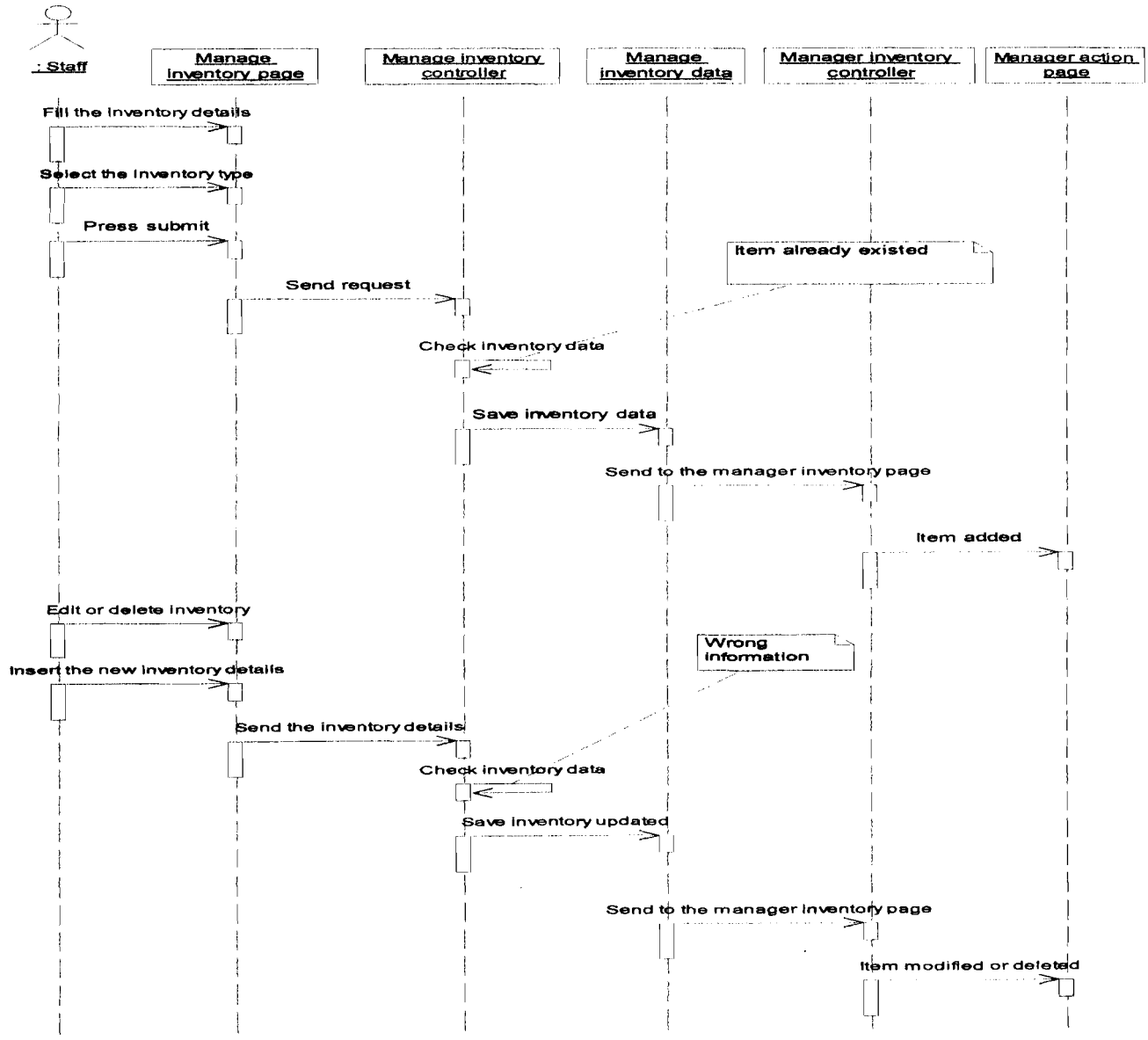

Figure 4.10: Manage Inventory Sequence Diagram

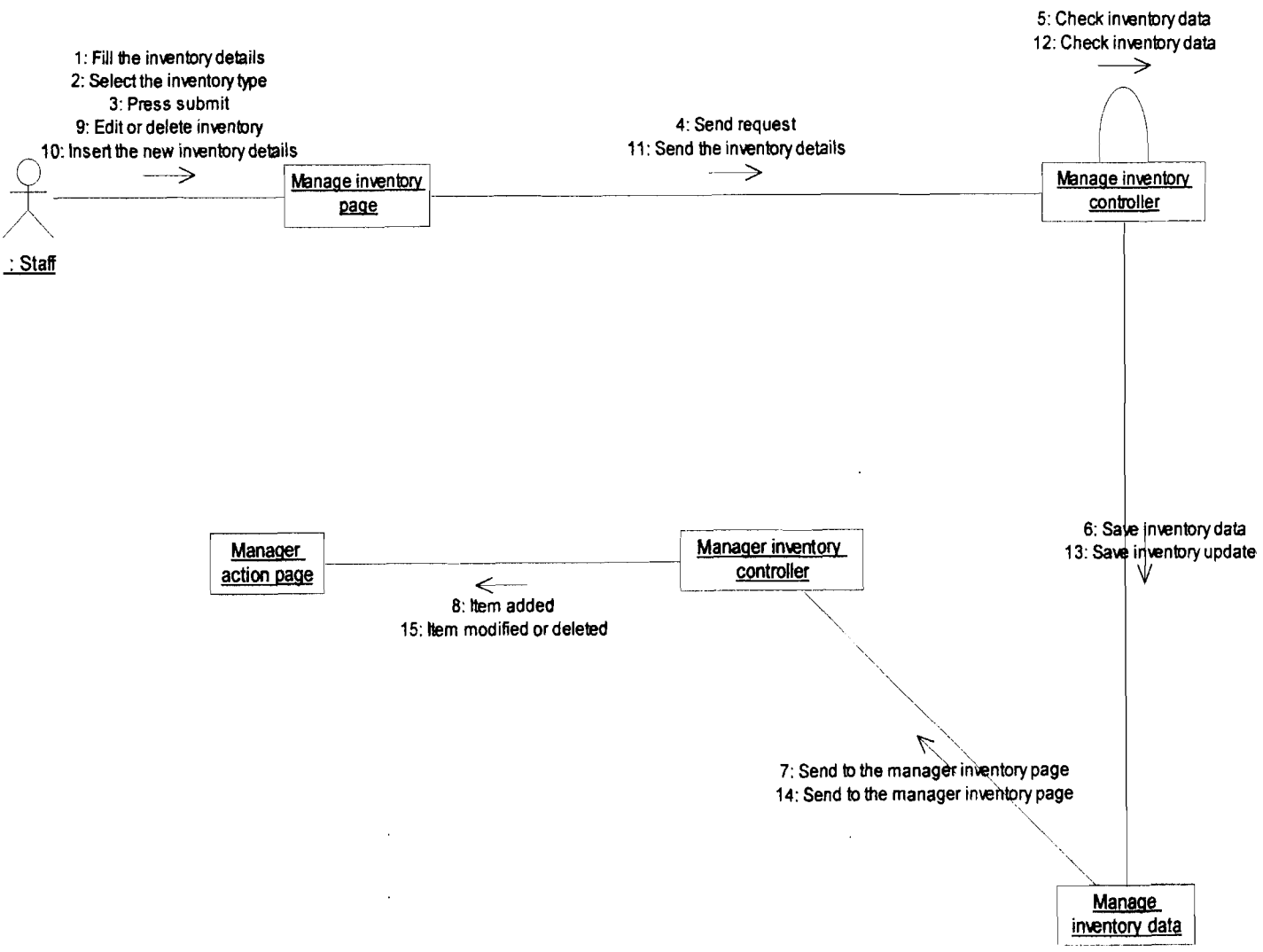

Figure 4.11: Manage Inventory Collaborative Diagram

4.4.6 Manage Payment Sequence and Collaborative Diagram

This sequence diagram initialed for the OBIS staff to add, modify, and delete the payment type details from the proposed system database, staff must fill-in the require payment details. Meanwhile, staffs will be asked for re-enter the payment type info in case of invalid entries. Figure 4.12 shows the sequence diagram for the manage payment. While Figure 4.13 show the collaborative diagram for the manage payment process.

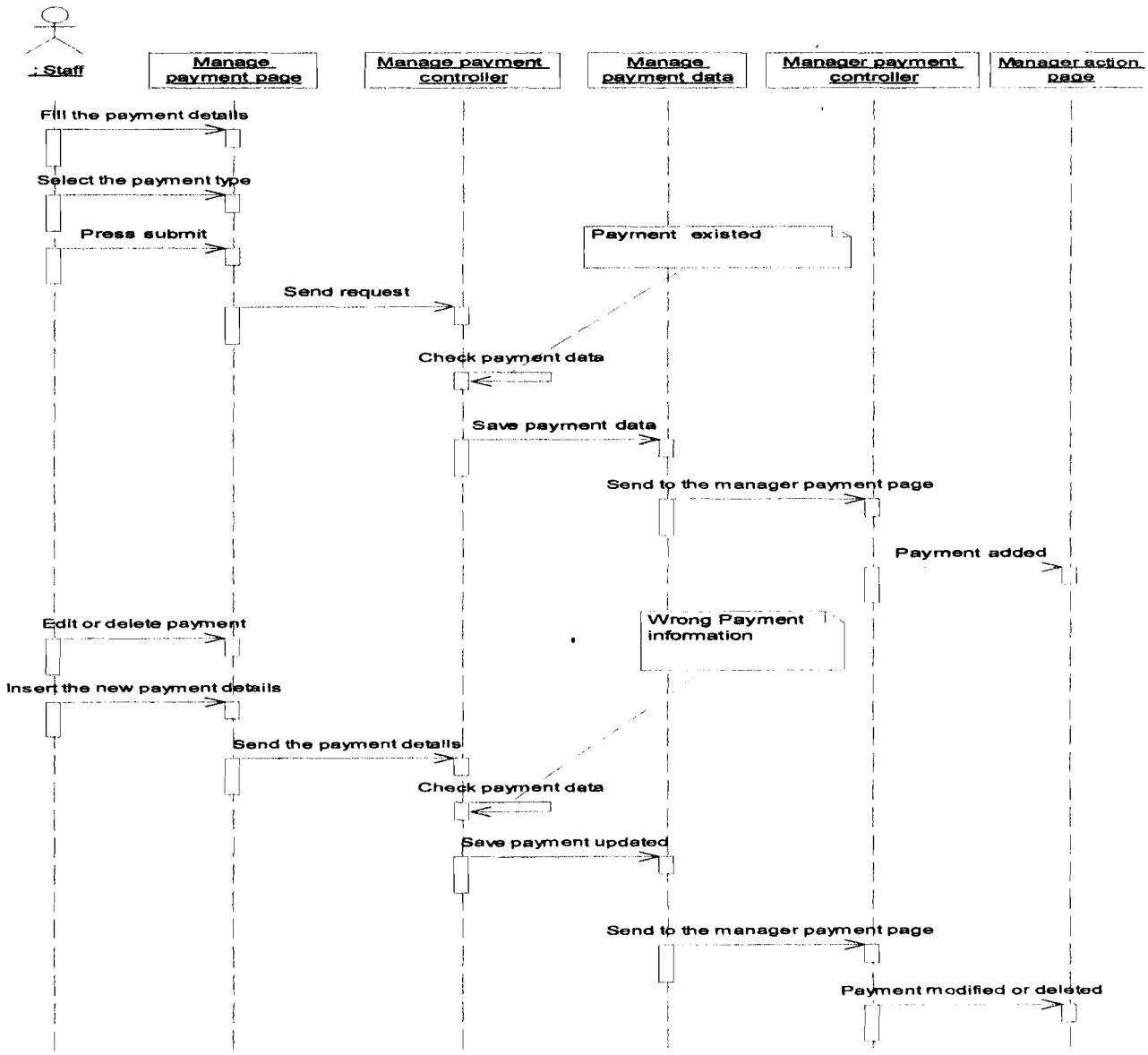

Figure 4.12: Manage Payment Sequence Diagram

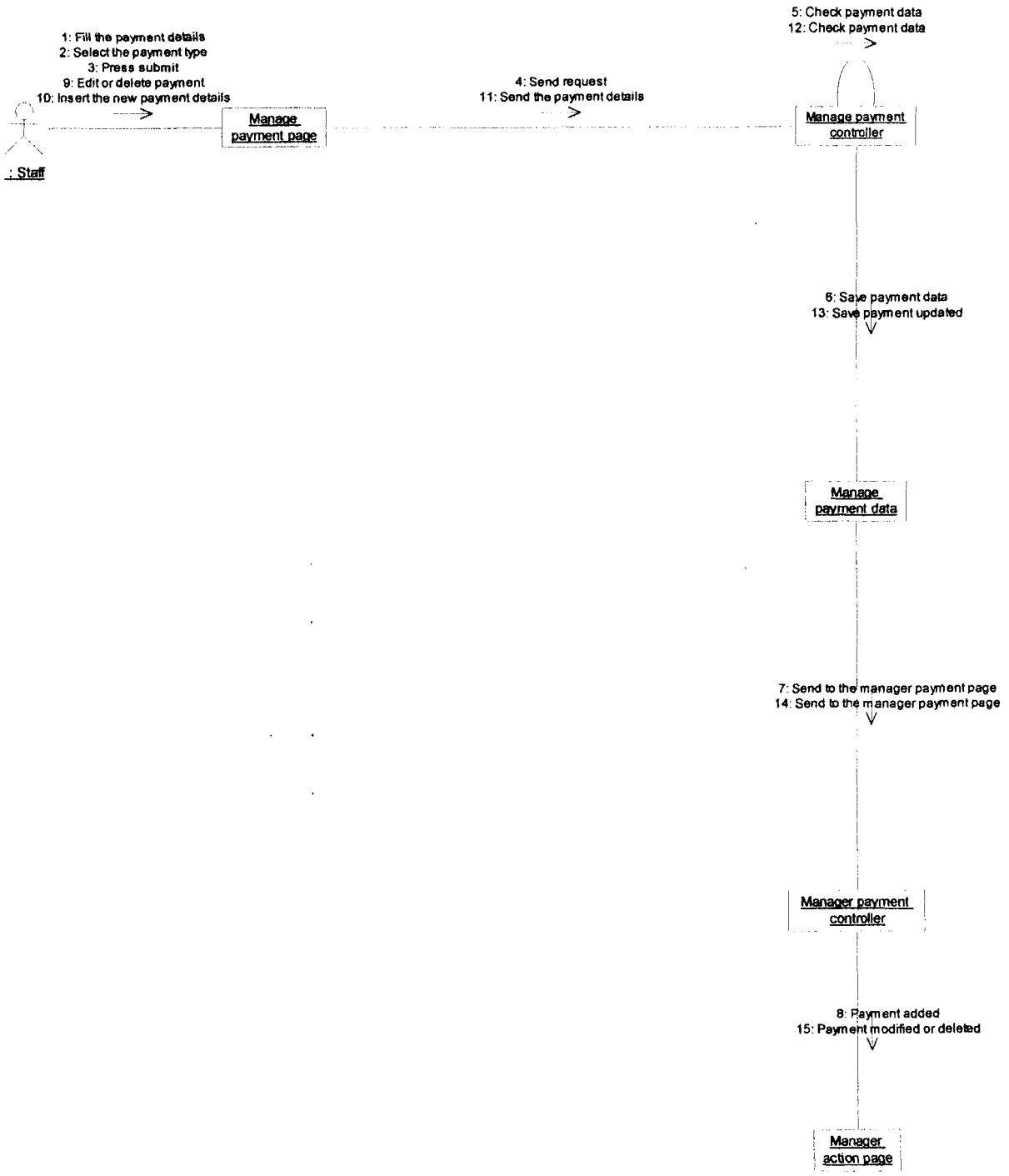

Figure 4.13: Manage Payment Collaborative Diagram

4.4.7 View Reports Sequence and Collaborative Diagram

This sequence diagram initialed for the OBIS staff to view the sale reports details from the proposed system database, staff must identify the require report date. Meanwhile, staffs will be asked for re-identify the date in case of invalid entries. Figure 4.14 shows the sequence diagram for the view reports use case. While Figure 4.15 show the collaborative diagram for the view reports process.

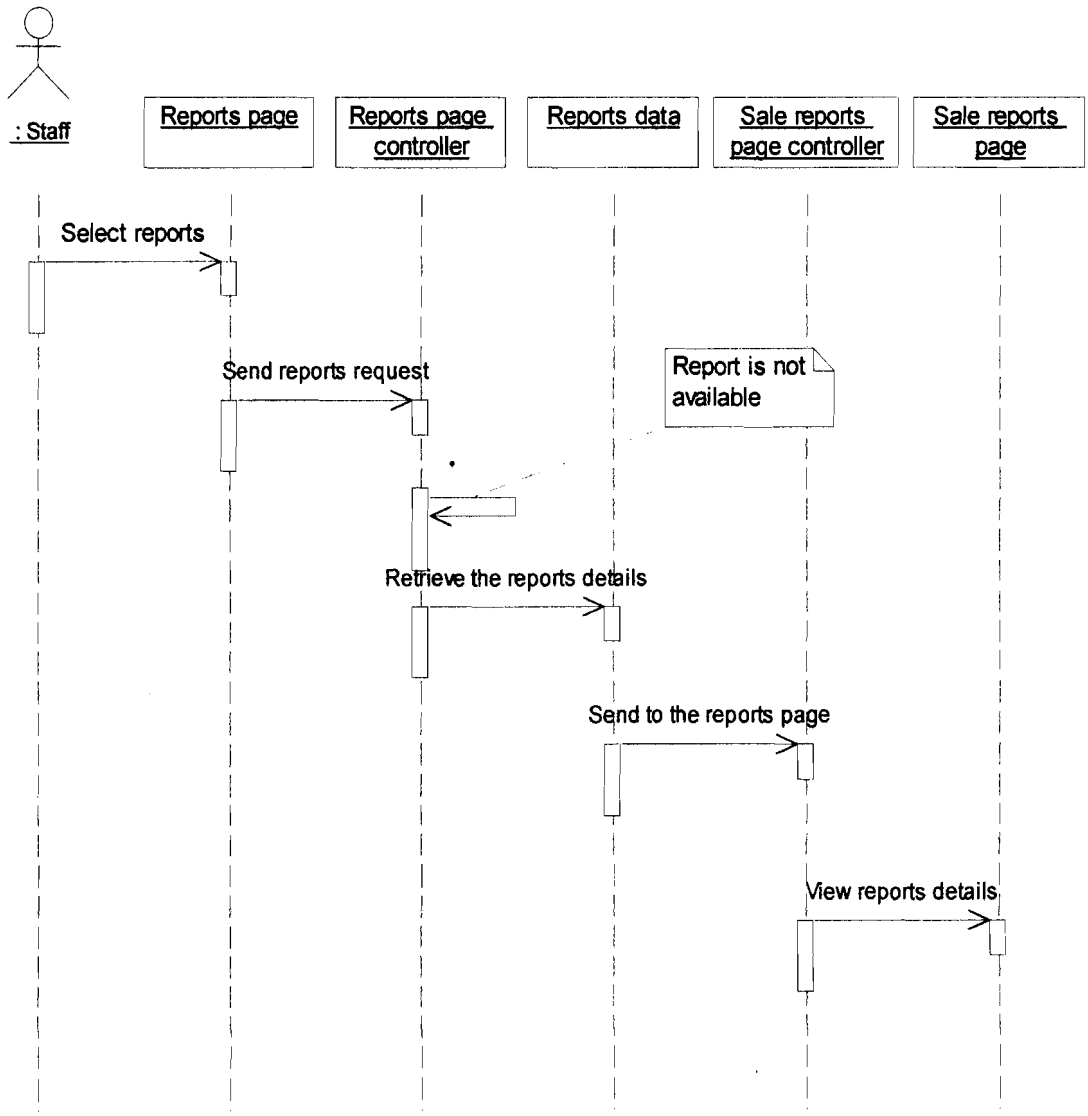

Figure 4.14: View Reports Sequence Diagram

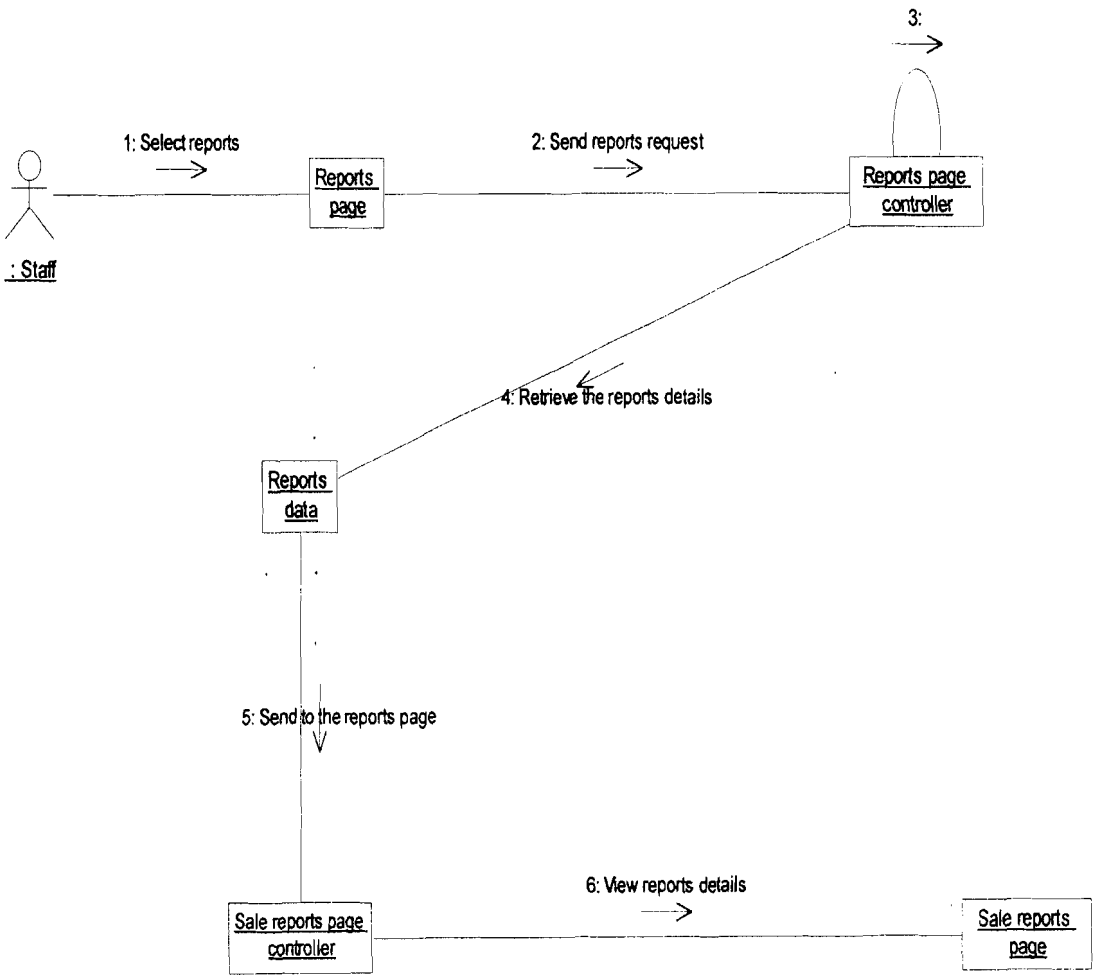

Figure 4.15: View Reports Collaborative Diagram

4.5 User Interface

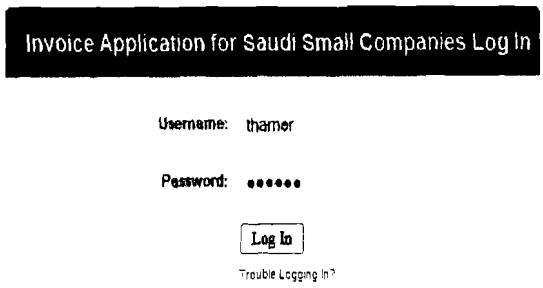

Figure 4.16: OBIS Login Page

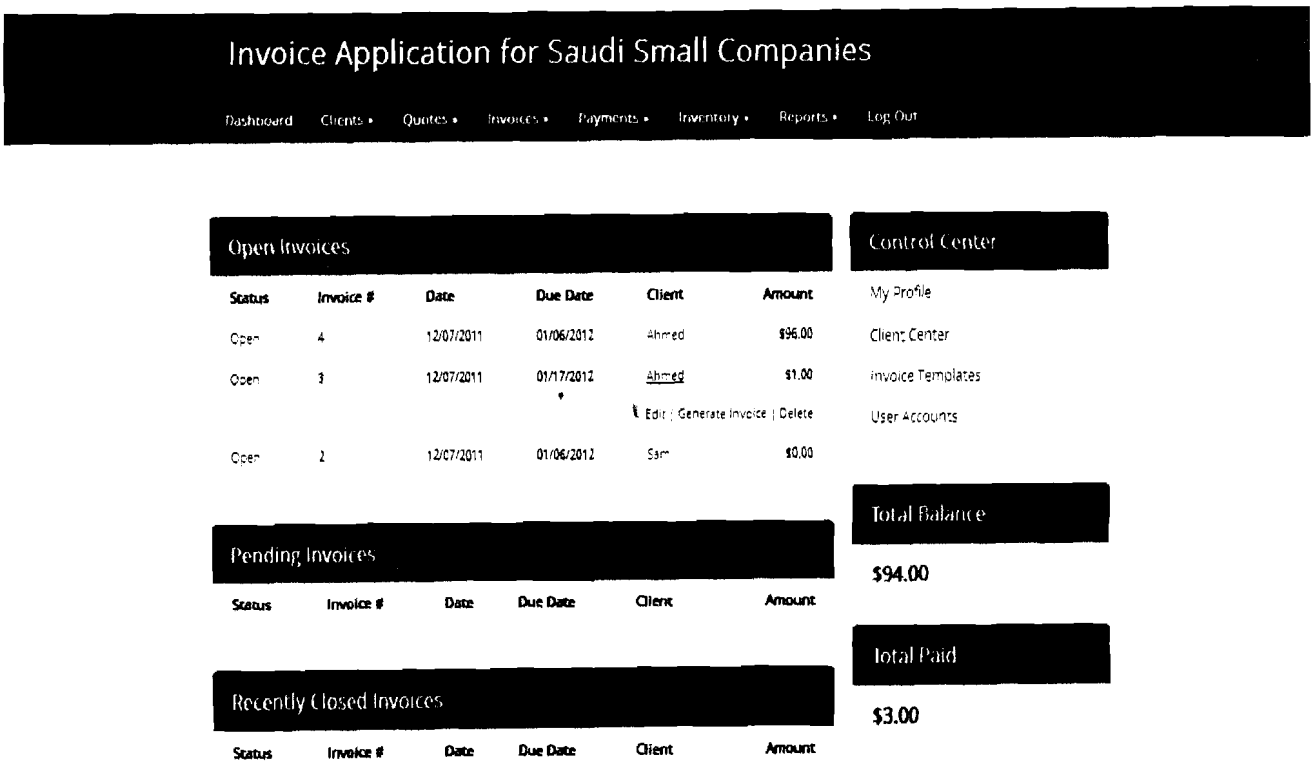

Figure 4.17: OBI Home Page

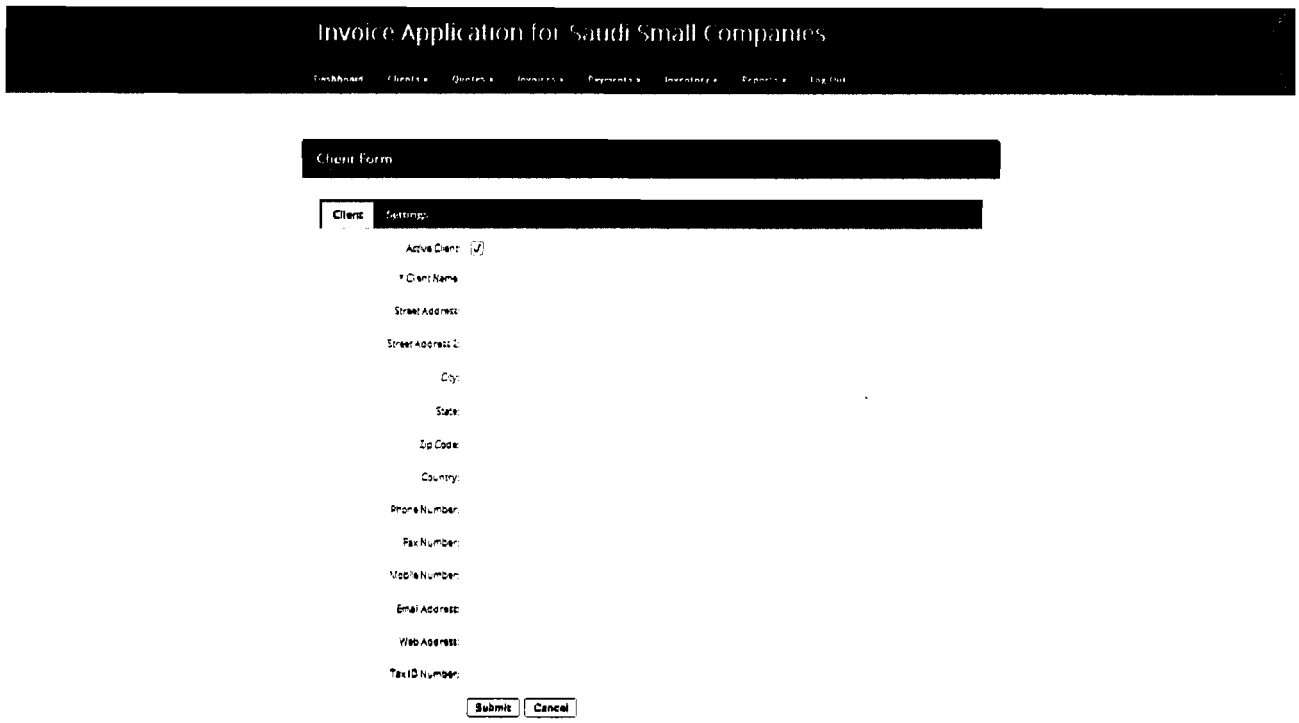

Figure 4.18: Manage Client Page

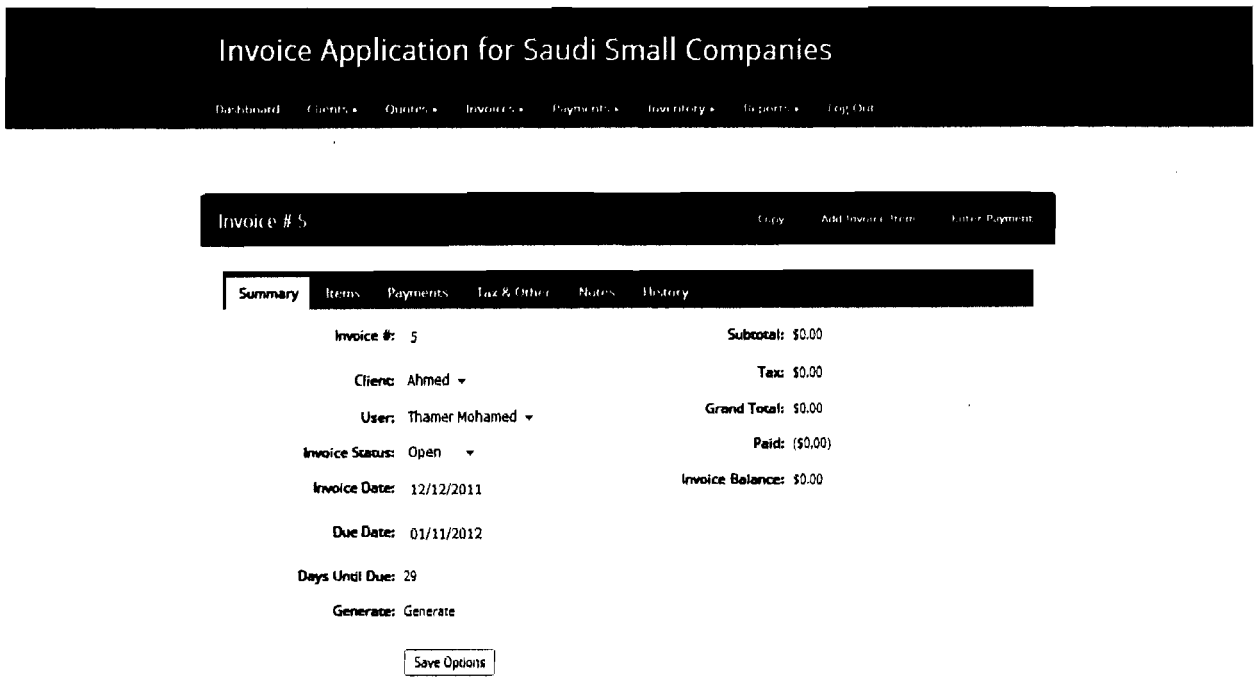

Figure 4.19: Manage Invoice Page

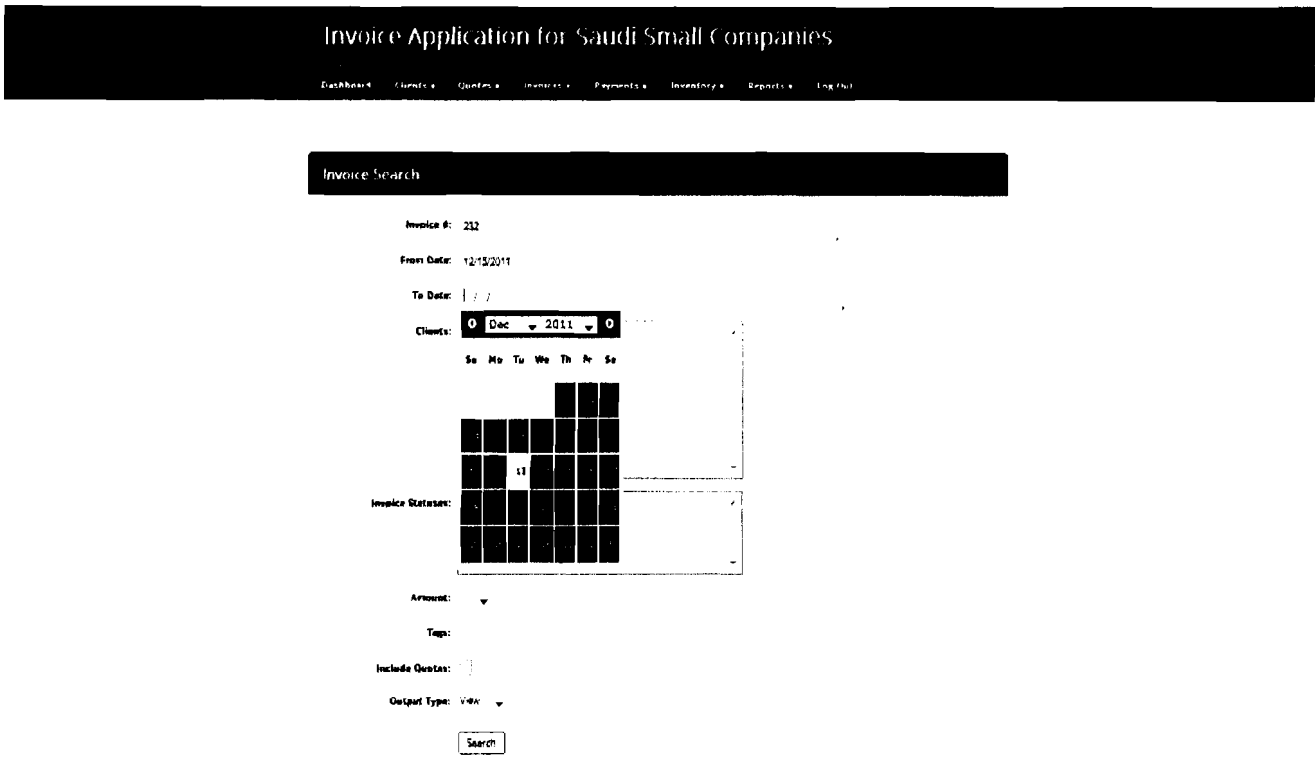

Figure 4.20: Search Page

Figure 4.21: Manage Payment Page

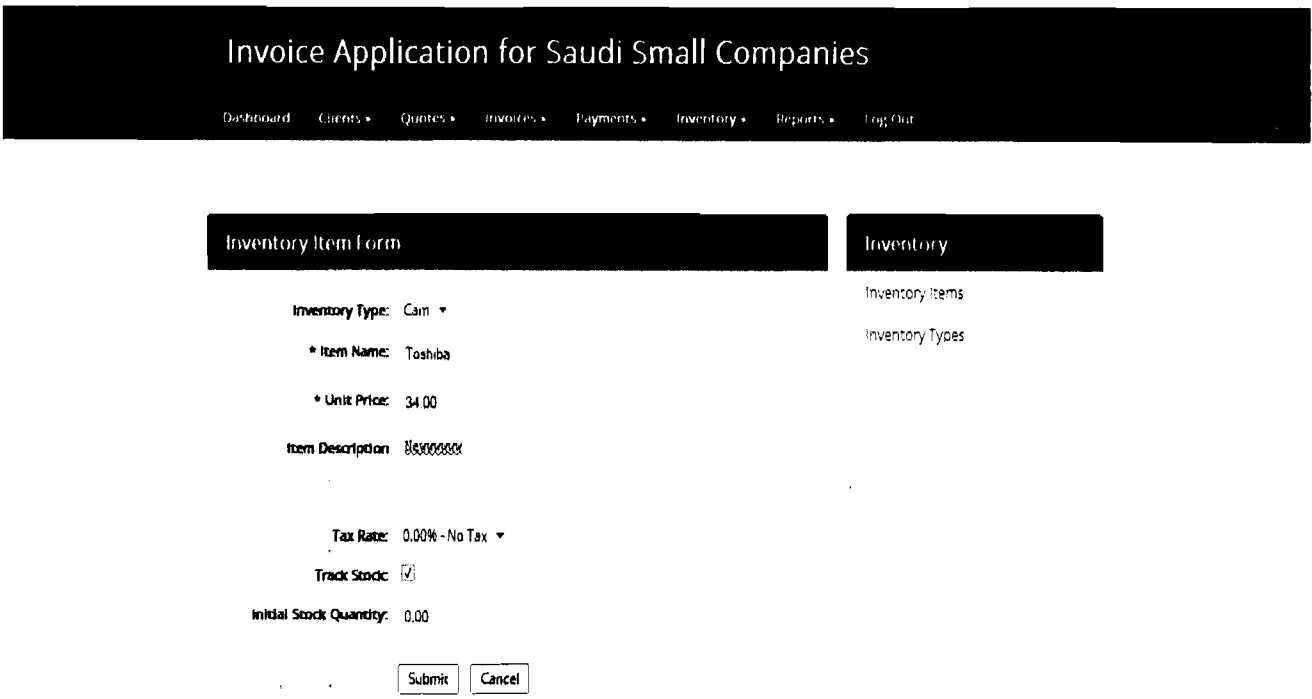

Figure 4.22: Manage Inventory Items Page

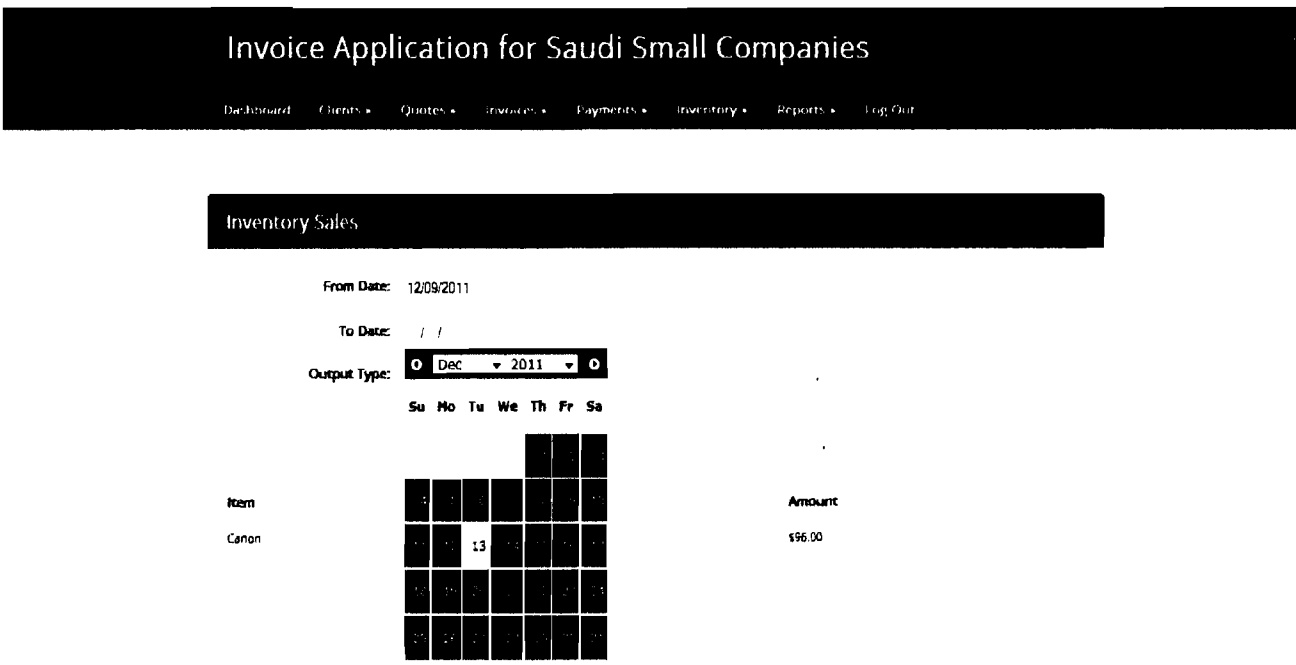

Figure 4.23: View Reports Page

4.6 PhP Code

The php code below presents the main actions towards managing the bill and invoice requests received from the users and the system manager. The process is divided into three parts, first part consists on adding the main queries, and second part consists on modifying these queries, while the last part consists on deleting the queries.

```
---------------------------------------------------
 * Set a liberal script execution time limit
 * ---------------------------------------------------
 */
        if (function_exists("set_time_limit") == TRUE AND @ini_get("safe_mode") == 0)
        {
                @set_time_limit(300);
        }

/*
 * ---------------------------------------------------
 * Start the timer... tick tock tick tock...
 * ---------------------------------------------------
 */
        $BM =& load_class('Benchmark', 'core');
        $BM->mark('total_execution_time_start');
        $BM->mark('loading_time:_base_classes_start');

/*
 * ---------------------------------------------------
 *  Instantiate the hooks class
 * ---------------------------------------------------
 */
        $EXT =& load_class('Hooks', 'core');

/*
 * ---------------------------------------------------
 * Is there a "pre_system" hook?
 * ---------------------------------------------------
 */
        $EXT->_call_hook('pre_system');

/*
 * ---------------------------------------------------
 * Instantiate the config class
 * ---------------------------------------------------
 */
```

```
$CFG =& load_class('Config', 'core');

	// Do we have any manually set config items in the index.php file?
	if (isset($assign_to_config))
	{
		$CFG->_assign_to_config($assign_to_config);
	}


	$UNI =& load_class('Utf8', 'core');

/*
 * --------------------------------------------------------
 * Instantiate the URI class
 * --------------------------------------------------------
 */
	$URI =& load_class('URI', 'core');

/*
 * --------------------------------------------------------
 * Instantiate the routing class
 * --------------------------------------------------------
 */
	$RTR =& load_class('Router', 'core');
	$RTR->_set_routing();

		if (isset($routing))
	{
		$RTR->_set_overrides($routing);
	}

/*
 * --------------------------------------------------------
 * Instantiate the output class
 * --------------------------------------------------------
 */
	$OUT =& load_class('Output', 'core');

/*
 * --------------------------------------------------------
 *	Is there a valid cache file?
 * --------------------------------------------------------
 */
	if ($EXT->_call_hook('cache_override') === FALSE)
	{
		if ($OUT->_display_cache($CFG, $URI) == TRUE)
		{
			exit;
		}
	}


	$IN	=& load_class('Input', 'core');
```

```
/*
 * --------------------------------------------------------
 * Load the Language class
 * --------------------------------------------------------
 */
	$LANG =& load_class('Lang', 'core');

/*
 * --------------------------------------------------------
 * Load the app controller and local controller
 * --------------------------------------------------------
 *
 */
	// Load the base controller class
	require BASEPATH.'core/Controller'.EXT;

	function &get_instance()
	{
		return CI_Controller::get_instance();
	}


	if (file_exists(APPPATH.'core/'.$CFG->config['subclass_prefix'].'Controller'.EXT))
	{
		require APPPATH.'core/'.$CFG->config['subclass_prefix'].'Controller'.EXT;
	}
	// Load the local application controller
	if ( ! file_exists(APPPATH.'controllers/'.$RTR->fetch_directory().$RTR->fetch_class().EXT))
	{
		show_error('Unable to load your default controller. Please make sure the controller
specified in your Routes.php file is valid.');
	}

	include(APPPATH.'controllers/'.$RTR->fetch_directory().$RTR->fetch_class().EXT);

	// Set a mark point for benchmarking
	$BM->mark('loading_time:_base_classes_end');

/*
 * --------------------------------------------------------
 * Security check
 * --------------------------------------------------------
*/
	$class  = $RTR->fetch_class();
	$method = $RTR->fetch_method();

	if ( ! class_exists($class)
		OR strncmp($method, '_', 1) == 0
		OR in_array(strtolower($method), array_map('strtolower',
get_class_methods('CI_Controller')))
		)
	{
		show_404("{$class}/{$method}");
	}

/*
 * --------------------------------------------------------
 * Is there a "pre_controller" hook?
 * --------------------------------------------------------
 */
```

```
$EXT->_call_hook('pre_controller');

/*
 * ------------------------------------------------------
 * Instantiate the requested controller
 * ------------------------------------------------------
 */
	// Mark a start point so we can benchmark the controller
	$BM->mark('controller_execution_time_( '.$class.' / '.$method.' )_start');

	$CI = new $class();

/*
 * ------------------------------------------------------
 * Is there a "post_controller_constructor" hook?
 * ------------------------------------------------------
 */
	$EXT->_call_hook('post_controller_constructor');

	// Is there a "remap" function? If so, we call it instead
	if (method_exists($CI, '_remap'))
	{
		$CI->_remap($method, array_slice($URI->rsegments, 2));
	}
	else
	{
		if ( ! in_array(strtolower($method), array_map('strtolower', get_class_methods($CI))))
		{
			// Check and see if we are using a 404 override and use it.
			if ( ! empty($RTR->routes['404_override']))
			{
				$x = explode('/', $RTR->routes['404_override']);
				$class = $x[0];
				$method = (isset($x[1]) ? $x[1] : 'index');
				if ( ! class_exists($class))
				{
					if ( ! file_exists(APPPATH.'controllers/'.$class.EXT))
					{
						show_404("{$class}/{$method}");
					}

					include_once(APPPATH.'controllers/'.$class.EXT);
					unset($CI);
					$CI = new $class();
				}
			}
			else
			{
				show_404("{$class}/{$method}");
			}
		}

		// Call the requested method.
		call_user_func_array(array(&$CI, $method), array_slice($URI->rsegments, 2));
	}


	// Mark a benchmark end point
	$BM->mark('controller_execution_time_( '.$class.' / '.$method.' )_end');
```

```
/*
 * --------------------------------------------------------
 * Is there a "post_controller" hook?
 * --------------------------------------------------------
 */
	$EXT->_call_hook('post_controller');

/*
 * --------------------------------------------------------
 * Send the final rendered output to the browser
 * --------------------------------------------------------
 */
	if ($EXT->_call_hook('display_override') === FALSE)
	{
		$OUT->_display();
	}

/*
 * --------------------------------------------------------
 * Is there a "post_system" hook?
 * --------------------------------------------------------
 */
	$EXT->_call_hook('post_system');

/*
 * --------------------------------------------------------
 * Close the DB connection
 * --------------------------------------------------------
 */
	if (class_exists('CI_DB') AND isset($CI->db))
	{
		$CI->db->close();
	}
/* End of file CodeIgniter.php */
```

4.7 Summary

This chapter introduced the system functionality of the proposed OBIS based on the manager and staffs activities. All the diagrams have been produced using the Rational Rose software. This chapter also modeled the user interface for manager and students in term of their functionalist.

CHAPTER 5

EVALUATION OF OBIS

5.1 Reliability

The alpha for 12 items was 0.523 that evolved the measurement of ease of use, usefulness, and satisfaction of participants towards the system, as well; it's indicated that the items form a scale that has reasonable internal consistency reliability as shown in Table 5.1.

Table 5.1: Reliability Statistic for all OBIS

Cronbach's Alpha	N of Items
.523	12

5.2 Descriptive Statistic

Descriptive statistics are used to describe the basic features of the data in a study. It provides simple summaries about the sample and the measures. Together with simple graphics analysis, they form the basis of virtually every quantitative analysis of data. Descriptive statistics are typically distinguished from inferential statistics. With descriptive statistics its simply describe what is the data require to be processed. With

inferential statistics, that the study aiming to indicate, which also conclude the ability of initialing immediate data alone. Table 5.2 presents the descriptive statistic of the OBIS for 12 items to perceive the participants ease of use, usefulness, and satisfaction.

Table 5.2: Descriptive Statistic for OBIS

	N	Minimum	Maximum	Mean	Std. Deviation
Q1	30	1.00	5.00	3.5000	1.23305
Q2	30	1.00	5.00	3.2000	1.36904
Q3	30	1.00	5.00	4.1200	1.00285
Q4	30	1.00	5.00	2.8400	1.23487
Q5	30	1.00	5.00	3.3400	1.15370
Q6	30	1.00	5.00	4.3200	.99877
Q7	30	1.00	5.00	2.8600	1.03036
Q8	30	1.00	5.00	3.6600	1.09935
Q9	30	1.00	5.00	2.7200	1.21286
Q10	30	1.00	5.00	4.1800	1.02400
Q11	30	1.00	5.00	3.0400	1.02936
Q12	30	1.00	5.00	2.0400	1.02824
Valid N (listwise)	30				

Further, the obtained result from Table 5.2 shows that most of the participants were agree that they were applicable to perform their task easily with the system for Mean=4.3200 (StD=.99877), as well, most of participants were also agree that OBIS service provides a very satisfactory services for Mean= 4.1800 (StD= 1.02400), and Mean=4.1200 (StD=1.00285) indicates that OBIS required short time for managing data, while other participants were agreed with quality of OBIS Mean=2.0400 (StD=1.02824), in addition, the majority of the respondents answers were averaged from not sure and agree regarding the OBIS. The result was initially showed that the majority of participants found OBIS ease to use, useful, and gained their satisfaction.

5.3 Correlation Test

Variable association refers to a wide variety of coefficients which measure the strength of a relationship. Correlation is the measurement of association (strength) of the relationship between two or three variables. It varies from 0 (random relationship) to 1 (perfect linear relationship) or -1 (perfect negative linear relationship). It is usually reported in terms of its square (r^2), interpreted as percent of variance explained.

Table 5.3 shows that ease of use and usefulness variables were significantly correlated to the study aims towards OBIS in the positive correlation. They were .557** for ease of use, .557** for usefulness, and .234 for satisfaction, those variables are significantly in low and high correlated with OBIS. According to Cohen (1999), the .557**, .682** and .234 Pearson Correlations represent the relationship among variables.

Table 5.3: Correlation Test Result

		EOU	U	SAT
EOU	Pearson Correlation	1	.557**	.234
	Sig. (2-tailed)	.	.000	.102
	N	30	30	30
U	Pearson Correlation	.557**	1	.682**
	Sig. (2-tailed)	.000	.	.000
	N	30	30	30
SAT	Pearson Correlation	.234	.682**	1
	Sig. (2-tailed)	.102	.000	.
	N	30	30	30

**. Correlation is significant at the 0.01 level (2-tailed).

5.4 Summary

The evaluation was conducted with 30 employees from Sepco Company, the multi-items measures were subjected to a series of validity and reliability checks towards the use of OBIS. For the multi-item scale, the set of items that correspond to each theoretical construct was initially subjected to an examination of Cronbach's alpha,

item-to-total correlations test, which subjected to a definite number of users that gave their answers and opinion about the OBIS.

Furthermore, this chapter has examined the relationships between variables, ease of use, usefulness, and satisfaction. The results of a Pearson Correlation analysis indicated that each of the variables has a positive and significant relationship with OBIS, thus providing initial support to the research goals towards using OBIS. The positive influence between combinations among all independent variables was supported.

CHAPTER 6

CONCLUSION

This chapter concludes the research conclusion, recommendations, and future works towards the Online Billing and Invoice System (OBIS). The conclusion was introduced in this chapter by presenting how this study achieved the research aims, according to the objectives and research problem. Moreover, a recommendation was presented for the aim of enhancing the proposed system functionalities.

6.1 Introduction

This study intended to solve the current OBIS at Sepco Company that lacking to provide the employees with the advance billing and invoicing management facilities for the customer and employees bills, which difference from one section to other at this company. This chapter introduced the overall acceptance towards the proposed system to be replaced with the current manual system. Further, this study aimed to give solutions on the current invoice management services. The objective of this study was conducted to provide the following:

i) To Identify the requirements for Online Billing and Invoice System (OBIS) in Saudi Arabia.

ii) To design and develop an Online Billing and Invoice System (OBIS).

iii) To evaluate ease of use and usefulness of Online Billing and Invoice System(OBIS).

The study tested the proposed system among Sepco Company employees based on their experience in terms of the system ease of use, usefulness, and satisfaction.

6.2 Problems and Limitations

The prime issues for this study were to reflect the staff and customer needs for an automatic solution for managing the invoice and bills anytime and anywhere. The evaluation result indicated that the participants were overly agreed that the system enabled them to perform their job in simple and easy way.

The proposed system was tested locally based on XAMPP package, which obtain a proper environment for testing the system by providing local server, mysqlo, and php. However, with limited financial resources no actual web server can be employed in testing the prototype.

6.3 Recommendations

An online billing and invoice system was tested and evaluated based on the anticipation of 30 employees of the Sepco Company to perceive the level of acceptance towards the system functionalities and other additional facilities that provided in order to help process customer billing details. This process raises different questions towards the ability of the online system to be performed in a real server, which address the following recommendations:

- Enable staff and administrator to browse and manage the system contents anytime and anywhere.
- The system has to be tested in a real server with a supporting for the different types of Internet explorers.

6.4 Conclusion

According to the problem statements and research objective, the research has heavily getting involved in developing requirements of the proposed online billing and invoice system for Sepco Company based on the adaptation of mysql, php, and apache server. Rapid Application Development approach (RAD) was applied in this study to design and develop the proposed system. In order to make requirements more understandable the requirements were modeled based on the concept of Unified Modeling Language (UML) diagrams such as use case diagram, sequence diagram, and collaboration diagram design the system requirement in order to illustrate the research objectives. Finally the system has been implemented locally and the result of the evaluation showed that participants were satisfied with the system performance and functionalities.

References

Austria, T. (2009). Infonova Billing System for an All IP Service Platform. *Infonova Billing System* Retrieved 21-10, 2011, from http://www.ministerialkongress.de/0302_CA_EN_TelekomAustria_final_web.pdf

Bonk, C., Wisher, R., & Lee, J. (2004). Moderating learner-centered e-learning: Problems and solutions, benefits and implications. *Online collaborative learning: Theory and practice*, 54-85.

Brandmeier, R. A., Hain, S., & Rupp, F. (2011). Emerging Markets Case Studies Collection. *Emerald.*

Brusilovsky, P., Sosnovsky, S., & Shcherbinina, O. (2005). User modeling in a distributed e-learning architecture. *User Modeling* 387-391.

Center, N. F. (2003). Internet Billing System (IBIL). *2011*(19-Sep). Retrieved from http://cod.nfc.usda.gov/publications/IBIL/ibil.pdf

Chou, Y., Lee, C., & Chung, J. (2004). Understanding m-commerce payment systems through the analytic hierarchy process. *Journal of Business Research, 57*(12), 1423-1430.

Cohen, A. D. (1999). Strategies in learning and using a second language. *Strategies, 3*(4).

Cossentino, M., Burrafato, P., Lombardo, S., & Sabatucci, L. (2010). Introducing pattern reuse in the design of multi-agent systems. *Agent Technologies, Infrastructures, Tools, and Applications for E-Services*, 107-120.

Costa, G., & Silva, N. (2010). Knowledge versus content in e-learning: A philosophical discussion. *Information Systems Frontiers*, 1-15.

Costmedia CMS Billing System. (2008). Retrieved 12-11, 2011, from http://www.costmedia.com/costmedia/brochure/Costmedia_CMS_Billing_Bureau.pdf

Cuerda, X., & Minguillón, J. (2005). Introducción a los sistemas de gestión de contenidos (CMS) de código abierto. *Mosaic, 36.*

Dredze, M., Blitzer, J., Talukdar, P., Ganchev, K., Graca, J., & Pereira, F. (2007). *Frustratingly hard domain adaptation for dependency parsing.* Paper presented at the CoNLL Shared Task Session of EMNLP-CoNLL.

Driscoll, M. (1994). *Psychology of Learning for Instruction*: Allyn & Bacon, A Division of Paramount Publishing, Inc., 160 Gould Street, Needham Heights, MA 02194.

eInvoice. (2009). Invoice Management via the Cloud to Reduce Efforts and Ensure Compliance. Retrieved 17-10, 2011, from http://www.hubwoo.com/pdf/librairie/en/Hubwoo_eInvoice.pdf

Fernández-Caballero, A., López-Jaquero, V., Montero, F., & González, P. (2003). Adaptive Interaction Multi-agent Systems in E-learning/E-teaching on the Web. *Web Engineering*, 359-366.

Ferrer, N., & Alonso, J. (2010). *Content Management for E-Learning*: Springer Verlag.

Garro, A., & Palopoli, L. (2010). An xml multi-agent system for e-learning and skill management. *Agent Technologies, Infrastructures, Tools, and Applications for E-Services*, 283-294.

Gay, L. R., & Airasian, P. W. (2000). *Educational research: Competencies for analysis and application*: prentice Hall Upper Saddle River, NJ.

Gregg, D. (2007). E-learning agents. *Learning Organization, The, 14*(4), 300-312.

Harel, I., & Papert, S. (1991). *Constructionism*: Ablex Publishing.

Hislop, D. (2005). *Knowledge management in organizations: A critical introduction*: Oxford University Press London.

Imitola, J., Raddassi, K., Park, K., Mueller, F., Nieto, M., Teng, Y., et al. (2004). Directed migration of neural stem cells to sites of CNS injury by the stromal cell-derived factor 1 /CXC chemokine receptor 4 pathway. *Proceedings of the National Academy of Sciences of the United States of America, 101*(52), 18117.

Jaap, N., & Charles, B. (2010). *E-invoicing*: Gilbert Lichter (EBA) and Chiel Liezenberg (Innopay).

Jacobson, M., & Wilensky, U. (2006). Complex systems in education: Scientific and educational importance and implications for the learning sciences. *Journal of the Learning Sciences, 15*(1), 11-34.

John, F., & Wallen, N. E. (1993). *How to design and evaluate research in education*: McGraw-Hill New York.

Kanteev, M., Minakov, I., Rzevski, G., Skobelev, P., & Volman, S. (2007). *Multi-agent meta-search engine based on domain ontology.* Paper presented at the

2nd international conference on Autonomous intelligent systems: agents and data mining

Kotzab, H. (2005). The role and importance of survey research in the field of supply chain management. *Research Methodologies in Supply Chain Management*, 125-137.

Lowe, D. (2003). Web system requirements: an overview. *Requirements Engineering, 8*(2), 102-113.

Maier, R. (2007). *Knowledge management systems: Information and communication technologies for knowledge management*: Springer Verlag.

Maier, R., & Schmidt, A. (2007). *A.: Characterizing knowledge maturing: A conceptual process model for integrating e-learning and knowledge management.* Paper presented at the 4th Conference Professional Knowledge Management

Marwick, A. (2010). Knowledge management technology. *IBM systems journal, 40*(4), 814-830.

May, M., George, S., & Prévôt, P. (2008). A closer look at tracking human and computer interactions in web-based communications. *Interactive Technology and Smart Education, 5*(3), 170-188.

Mercer, N. (1995). *The guided construction of knowledge: Talk amongst teachers and learners*: Multilingual Matters Ltd.

Moertini, V. S., Athuri, A. A., Kemit, H. M., & Saputro, N. (2011). The Development of Electronic Payment System for Universities in Indonesia: On Resolving Key Success Factors. *Arxiv preprint arXiv:1105.0153.*

Nonaka, I., & Von Krogh, G. (2009). Perspective---Tacit Knowledge and Knowledge Conversion: Controversy and Advancement in Organizational Knowledge Creation Theory. *Organization Science, 20*(3), 635-652.

O'Neill, E. L. (2004). *Introduction to statistical optics*: Dover Pubns.

O'Sullivan, E., Rassel, G. R., & Berner, M. (2003). *Research methods for public administrators*: Longman.

Oppenheim, A. N. (1998). *Questionnaire design, interviewing and attitude measurement*: Pinter Pub Ltd.

Osborn, C. (1995). *SDLC, JAD, and RAD: Finding the Right Hammer*: Babson Hall

PortaBilling. (2006). PortaBilling Templates Guide. Retrieved 15-11, 2011, from http://voip.iglobalink.net/porta/PortaBilling_Templates_Guide_MR12.pdf

Prusak, L. (2010). Where did knowledge management come from? *IBM systems journal, 40*(4), 1002-1007.

Ramakrishnan, R., & Gehrke, J. (2003). *Database Management Systems: International Edition*: McGraw-Hill.

Rea, L. M., Parker, R. A., & Allen, R. (1997). *Designing and conducting survey research: A comprehensive guide*: Jossey-Bass Publishers San Francisco, CA.

Sajja, P. (2008). Multi-agent system for knowledge-based access to distributed databases. *Interdisciplinary Journal of Information, Knowledge, and Management, 3*, 1-9.

Shah, N., Iqbal, R., James, A., & Iqbal, K. (2009). Exception representation and management in open multi-agent systems. *Information Sciences, 179*(15), 2555-2561.

Shih, P., Muñoz, D., & Sánchez, F. (2006). The effect of previous experience with information and communication technologies on performance in a Web-based learning program. *Computers in Human Behavior, 22*(6), 962-970.

Simpao, A., Heitz, J. W., McNulty, S. E., Chekemian, B., Brenn, B. R., & Epstein, R. H. (2011). The design and implementation of an automated system for logging clinical experiences using an anesthesia information management system. *Anesthesia & Analgesia, 112*(2), 422.

Singh, S. (2009). Emergence of payment systems in the age of electronic commerce: The state of art. *Global Journal of International Business Research, 2*(2), 1-18.

Soloway, E., & Pryor, A. (1996). The next generation in human-computer interaction. *Communications of the ACM, 39*(4), 16-18.

Tang, T., & McCalla, G. (2005). Smart recommendation for an evolving e-learning system. *International Journal on E-learning, 4*(1), 105–129.

Tarwireyi, P., Terzoli, A., & Muyingi, H. (2008). *Adapter-based revenue management system for the exploration of non-conventional billing options in new markets for telecommunications.* Paper presented at the Proceedings of the SATNAC conference Wild Coast Eastern Cape Province, South Africa.

Tramullas, J. (2005). Open source tools for content management. *Hipertext. net, 3*, 12–11.

Tsai, C., Chang, C., & Chen, L. (2006). A Case Study of Knowledge Management Implementation for Information Consulting Company. *International Journal of The Computer, the Internet and Management, 14*(3), 60-78.

Tseng, J., Chu, H., Hwang, G., & Tsai, C. (2008). Development of an adaptive learning system with two sources of personalization information. *Computers & Education, 51*(2), 776-786.

Tsoukas, H. (2009). A dialogical approach to the creation of new knowledge in organizations. *Organization Science, 20*(6), 941-957.

Vaishnavi, V., & Kuechler, W. (2004). Design Research in Information Systems, 20.11. 2004. *URL: http://www. isworld. org/Researchdesign/drisISworld. htm.*

Weisberg, M., & Reisman, K. (2008). The robust volterra principle. *Philosophy of science, 75*(1), 106.

Welsh, E. T., Wanberg, C. R., Brown, K. G., & Simmering, M. J. (2003). E learning: emerging uses, empirical results and future directions. *International Journal of Training and Development, 7*(4), 245-258.

Wilensky, U., & Resnick, M. (1999). Thinking in levels: A dynamic systems perspective to making sense of the world. *Journal of Science Education and Technology, 8*(1), 3–19.

Zeng, S., Melville, P., Lang, C. A., Boier-Martin, I., & Murphy, C. (2008). *Using predictive analysis to improve invoice-to-cash collection.* Paper presented at the International conference on Knowledge discovery and data mining Las Vegas, Nevada, USA.

Zikmund, W. (2000). Business Research Methods, 6th (ed) Dryden Press.

Zikmund, W., Carr, B., Griffin, M., Babin, B., & Carr, J. (2000). *Business research methods* (Vol. 6): Dryden Press Fort Worth, TX.

Appendix A

Questionnaire

A. Demographic Background

Please kindly tick (√) your answers to the given statements.

1) What is your AGE group?
[ ] 18-25 Years old [ ] 26-34 Years old [ ] 35-44 Years old

[ ] 44-54 Years old [ ] Above 55 Years old

2) Gender: [ ] Male [ ] Female

3) Experience of using Web?
[ ] One year [ ] More than three years [ ] Less than one year [ ] Never used

4) Job of participate? [ ] Employee [ ] Administration

B. Ease of Use and Usefulness of (OBIS)

	Ease Of Use	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	Using OBIS helped me to find the information I needed	1	2	3	4	5
2	The work by OBIS is easy to do my job	1	2	3	4	5
3	Managing data process does not need a time	1	2	3	4	5
4	Retrieving, updating data is easy and fast	1	2	3	4	5
	Usefulness					
5	Results obtained from OBIS is usually accurate	1	2	3	4	5
6	I am able to perform my work perfectly using OBIS	1	2	3	4	5
7	I am able to efficiently obtain accurate results using OBIS	1	2	3	4	5
8	I feel comfortable using OBIS	1	2	3	4	5
9	Data archiving and transmitting is sufficiently safety	1	2	3	4	5

	Satisfaction					
10	The service provided through the OBIS is very satisfactory	1	2	3	4	5
11	The required tasks of OBIS is done satisfactory	1	2	3	4	5
12	Overall, I am very satisfied with quality of OBIS	1	2	3	4	5