

**INTELLIGENT BANK MANAGEMENT SIMULATION
SYSTEM FOR MALAYSIAN FINANCIAL INSTITUTIONS
(IBMS)**

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KUALA LUMPUR
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**FACULTY OF COMPUTER SCIENCE & INFORMATION
TECHNOLOGY
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2003

DECLARATION

I declare that this thesis is my own work and has not been submitted in any form for another degree at any university or other institute of tertiary education. Information derived from the published and unpublished work and others has been acknowledged in the text and a list of references is given.

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University of Malaya

ABSTRACT

This research is about proposing an idea of simulation based training system, which could provide comprehensive information about the operations and management of banks. A prototype for the simulation based training system for local banks is developed based on the idea. The prototype was used to evaluate the participation of bank executives in using a simulation based training system with the techniques and methods of financial analysis of the banking firm. It provides them an opportunity to apply the methods in a realistic environment. The prototype, namely Intelligent Bank Management Simulation System is a web based simulation training system, which was developed in accordance to Malaysian Banking system. The prototype was modeled as a client server system. It was developed through Active Server Pages (ASP) server scripting environment and MySQL Server was used to set up the web database for the system. Intelligent Bank Management Simulation Training system involves the participation of an instructor and a group of participants to initiate a training session. The details of the training are elaborated in detail in the project report. The report also includes the results of evaluation done on the system by the local bankers to initiate the idea of using a simulation based training system in Malaysian Financial Institutions.

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LIST OF ABBREVIATIONS

ADO	ActiveX Data Objects
API	Application Programming Interface
ASP	Active Server Page
COTS	Commercial Off-The-Shelf
CPI	Consumer Price Index
CPU	Central Processing Unit
DBMS	Database Management System
GDP	Gross Domestic Product
HTTP	Hyper Text Transfer Protocol
IBMS	Intelligent Bank Management Simulation System
IIS	Internet Information Server
LAN	Local Area Network
TCP/IP	Transmission Control Protocol / Internet Protocol
UI	User Interface
UML	Unified Modeling Language

CHAPTER 1

INTRODUCTION TO INTELLIGENT BANK MANAGEMENT SYSTEM

1.1 Introduction

Currently financial institutions in Malaysia especially the local bank institutions are facing a lot of challenges in terms of world economic crisis, vast competition, instability in growth and globalization which will be the greatest challenge to be met by the banking sectors.

The rapid intensification of globalization in recent years has significantly affected the structure and operations of financial institutions. Financial institutions worldwide are also undergoing the process of consolidation and mergers, driven primarily by the desire to increase global presence and to maximize economies of scale and the scope of activities. This process has also occurred in Malaysia (whereby there has been a reduction in the number of financial institutions from fifty-four to ten banks) and has provided an avenue for expansion of electronic banking and Internet banking. These changes will undoubtedly present increased challenges to the financial institutions in Malaysia. In particular, the globalization process brought about by the trend towards greater liberalization of domestic financial systems would further reduce the barriers for the domestic financial markets. This will further intensify competition in these markets over time.

The most important requirement that need to be gained by this sector in Malaysia is by having resourceful, dynamic and strategy making personnel in financial arenas. As per our concern as information technology is making a direct turn into the Malaysian Economy, most of the sectors are finding ways to make use of this information technology evolution.

In accordance to this research topic, the use of information technology would be the best solution for the local financial institutions to gear up for the challenges ahead. Banks need a system that could emulate the overall banking management system, which will be used to practice, create strategies and resources for the growth of the economic. The Intelligent Bank Management simulation for Malaysian Financial Institutions will be able to expose the bankers to the simulated based training system.

Intelligent Bank Management will be a bank management simulation system that puts the participants in charge of a commercial bank. The participants must develop strategies and make decisions that will determine the success or failure of the specified bank. The Intelligent Bank Management system is educational as it will teach about managing a bank and will introduce the concepts and terminologies of banking. It will give an exciting and competitive game to play.

1.2 Statement of Problem

As changes in the global financial industry continue to evolve and accelerate in the new millennium, the Malaysian financial system, particularly commercial and domestic banking institutions will face monetary pressure to become more efficient and competitive, technology driven and strategically more focused.

There are varieties of options for overcoming barriers to participation and it is important to understand the extent to which such options are available, utilized and cost effective. In this research problem, we have focused on our study on the evaluation of simulation based training system for Malaysian financial institutions. The research problems are as follows:

1. Finding strategic ways for financial institutions to improve their performance as the performance gaps are widening between the local financial institutions and the international financial institutions.
2. Most of the bank executives are not exposed to simulation based training system, which is heavily used in foreign countries.
3. Some of the banks are still not leveraging on the advancements made in technology, in reengineering work processes and delivery modes, and do not offer the-state-of –the-art products and services that serve as complete financial solutions for varying types of consumers.

4. The banks are not focusing on interactive based training system which could reduce time and cost.
5. Some banks are not able to meet the increasingly more complex demands of the changing economy and the retention of their market share due to lack of strategic decision making and competitiveness

1.3 Research Objective

1. The first objective is to propose the idea of simulation based training system for the local banks, which could be used for education and training development purpose for the local banks.
2. The second objective is to develop a prototype of a web based simulation based training system, based on the idea proposed.
3. The third objective is to evaluate whether the user's participation in Intelligent Bank Management Simulation System plays an important role in managing the bank according to the strategy developed by the users. The users will be given an opportunity to work in a team and establish financial performance objectives, identify operating tactics and implement those tactics in an environment where individual performance is judged according to the collective financial performance of the group.

The system will demonstrate the manner in which individual financial decisions within banking firms interact with one another and the economic environment to determine overall financial performance, illustrating how different financial goals

may be mutually exclusive. As a result, this research will focus on the users' participation in the system.

In order to give the learners greater opportunity to learn from experience within the simulation, it is also worthwhile to establish banking communities in the non-competitive mode. The learners will be able to develop financial management skills in banking by first playing against the simulation's macro economy rather than peer banks within this community.

As the participants gain experience with the game and develop divisions that are more sophisticated across respective team members, the time required for a given team to meet, formulate strategy and execute a decision input is reduced tremendously.

At the same time, the learners develop a basic understanding of the relationships between macro economic variables, competitive events and the financial performance of their simulated bank.

1.4 Research Scope

The research focuses on providing training for the users to upgrade their skills and expertise in the banking sector. The research focuses on:

1. Providing financial information system based on the strategies created by the users participating in the research project and evaluates the results gathered from their participation.

2. A test will be conducted on user participation by utilizing the main components used in the configuration and management of the bank. The main components are:
 1. Deposit Rates
 2. Loan Rates
 3. Expenses
 4. Security purchase and sales
 5. Marketing and Advertisement
 6. Bank Report

1.5 Contributions of this Research

This research has three main contributions. Firstly, it contributes to the development of a training program prototype for financial institutions. It will provide hands-on training for the users and to evaluate the effectiveness of the system for the development of future training programs.

Secondly, the research provides a tool for the participants to practice the theories learned in books. If the theories perform well in the system, it will increase the confidence of the users in making strategic decision especially for the managers.

Thirdly this will help the organizations to evaluate the performance of employees in managing the bank. The other contributions are:

1. Collaborative Work Concept through IBMS

This research provides an opportunity for the users to think and apply the concept of teamwork, which is very important in creating strategies, establish performance objectives and to identify the operating tactics. This will not only able to increase the user participation to use IBMS but also to apply the same concept when they are at work.

2. Guideline in developing a simulation based training system

This research provides a guideline for other researchers to design a system based on Malaysian Financial Institutions as it provides all the data that need to be collected in order to implement a system. The interviews from the bank executives could be very helpful in understanding the Malaysian banking concepts.

3. Reusing Artefacts of the Software Architecture Design

Software architecture, which was designed for the Web based Intelligent Bank Management System can be reused by the organizations with similar organizational, technological and product influencing factors in order to develop other similar application quickly and less expensively. The organizations do not need to design new software architecture each time a

similar system is developed. In fact, slight changes can be made to the existing architecture to suit the new system to be developed.

4. Enables the Implementation of the Intelligent Bank Management System

The research has produced an architecture, which was designed based on the important influencing factors and development strategies. The research enables the implementation of the Web Based Intelligent Bank Management System (IBMS) that meets all the requirements in a given time and money.

5. Reference Product for the Local Banking Sector

The research has produced a product, which could be used as a reference product by the local banks in developing a system, which accommodate the learning of banking management. The concepts used to develop the Intelligent Bank Management System (IBMS) are in accordance to the Malaysian economic scale and could be used as a cross reference in forecasting the bank's performance.

1.6 Conclusion

Changing economic and business environment as well as rapid technological advances over the last decade have significant impact on the development of the financial system. Global forces at work and advances in technology have redefined the rules of the game and transformed the operational environment within which financial institutions operate. Indeed, the ability to reap the benefits arising from greater competition depends largely on the capability and capacity of financial institutions to adapt swiftly and to embrace the changes.

Similarly, the rapid pace of economic development and transformation that creates new demands as well as opportunities for businesses have called for a more effective and efficient employees in creating long term strategies for the banks. The key strategy for the bankers is to maximize the human capital in the knowledge economy. Information technology should be used in upgrading the human capital and the infrastructures involved.

The Intelligent Bank Management Simulation Training System will be the key strategy in developing the human capital and to upgrade the e-infrastructures. The objectives of developing the application relates indirectly as a tool to serve this dynamic economy efficiently and effectively, and to ensure that the local banks will have a leading role, more focused and innovative.

The problems faced by the current banking sector in Malaysia should not be the consequence of the next decade in predicting the strength of the local banks and the Malaysian economy. The local banks must adhere to the government's message in developing knowledge and skill based workers in the near future.

University of Malaya

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Banks are defined as a financial institution that accept deposits and make loans (Mishkin, 2000). For bankers, the principal raw material is money. Banks are engaged in buying and selling money. That is how banks do business or make profit. Included under the term “banks” are commercial banks, savings and loan associations, mutual savings banks and credit unions. Banks are among the most important financial institutions in the economy. Banks are the most important source of credit for individuals, corporations and governments. Financial markets are thus essential to promote economic efficiency as they perform the economic function of channeling funds from people who have saved surplus funds to those who have shortage of funds.

2.2 Banking Management

The success of banks does not only depend on the profit but also on their ability in identifying the financial services needed by the public. Modern banks are adopting new functions in order to remain competitive and responsive to public needs.

2.2.1 The Functions of Modern Banks

According to Rose (1999), there are five important services or functions played by modern banks as shown in Table 2.1.

Table 2.1
The Roles of Modern Banks

Types of Services	Explanation
The Intermediation Service	Receive deposit from customers and provide loan for business firms and individuals.
The Payments Service	Carrying out payment for goods and services on behalf of their customers.
The Guarantors Service	To stand behind their customers to pay off customer debts when those customers are unable to pay.
The Agency Service	Acting on behalf of customers to manage and protect their property or issue and redeem their securities.
The Policy Service	Serving as a conduit for government policy in attempting to regulate their growth of the economy and pursue social goals.

The vital services performed by Full Service Banking Institution today are (Rose, 1999):

1. The credit function
2. The investment and planning function
3. The payments function
4. The savings function
5. The cash management function
6. The investment banking function
7. The brokerage function
8. The trust function
9. The insurance function

Banks play a major role in channeling funds to borrower with productive investment opportunities. They are also important to ensure that the financial system and the economy run smoothly and efficiently. The basic operation and management of a bank are analyzed through a bank's balance sheet. The balance sheet is a list of the bank's assets and liabilities. Liabilities are defined as the source of fund for a bank to create businesses. Without liabilities, banks will not be able to operate. Funds are obtained through borrowing and by issuing other liabilities such as

deposits. There are four important types of liabilities acquired by a bank, as listed below:

1. Checkable Deposits
2. Non Transaction Deposits
3. Borrowings
4. Bank Capital

1. Checkable Deposits

Checkable deposits are bank accounts that allow owners of the bank accounts to write checks to third parties. Checkable deposits are the most important source of bank funds but with the appearance of new attractive financial instruments, the share of checkable deposits in total bank liabilities has shrunk over time (Mishkin, 2000).

2. Non Transaction Deposits

For the non-transaction deposits, the interest rates are higher than the checking deposits. There are two types of non transaction deposits, which are Savings Account and Certificates of Deposit.

The savings account can be added or withdrawn at any time, as there is no specific time limit or stringent rules. In Malaysia, Certificates of Deposit or CDs have a fixed maturity length ranging from several months to five years.

3. Borrowings

Banks obtain funds by borrowing from the Central Bank Federal Reserve System or FED, other banks and corporations. For Malaysian banks, the borrowing is done from the Central Bank of Malaysia.

Borrowings have become a more important source of funds for the banks compared to the earlier stage. In 1960, they made up only

around 2% of bank liabilities in the USA but currently they are exceeding 25% of the total liabilities (Mishkin, 2000).

4. Bank Capital

Bank capital is defined as the bank's net worth, which equals the difference between total assets and total liabilities. In balance sheet, the bank capital is also called "Equity". The funds are raised by selling new equity (stocks) or from retained earnings.

Banks will use the funds acquired by issuing liabilities to purchase income-earning assets. Bank assets are referred to as use of funds. The interest earned on them enables banks to make profit. Four important components need to be analyzed in terms of assets as shown below.

1. Reserves

Reserves are the deposits and other funds being hold by a bank as a cash item. According to the government regulations, some reserves will be held by the Central Bank of Malaysia, which is called Required Reserve

Ration. The balance will be held by the bank as vault cash or as Excess Reserve. For every dollar that has been deposited in the bank, a certain fraction will be kept in the Central Bank fund while others will be kept by the bank.

2. Cash Items in Process of Collection

These are the checks written from other banks that need to be deposited. The checks are classified as the cash items that need to be collected from the other banks.

3. Deposits at other Banks

Most of the small banks hold deposits in other larger banks in exchange for a variety of services, which cannot be done in the small banks such as, check collection, foreign exchange transactions and securities purchase. This collaboration is called as “Correspondent Banking”.

4. Securities

Banks use their source of funds to buy securities offered by government agencies and private business firms. In the modern banking system of the USA, the securities holdings make up 22% of the total bank assets (Mishkin, 2000).

5. Loans

All the banks make profits primarily by issuing loans. According to the current findings, some 66% of bank assets are in the form of loans

(Mishkin, 2000). According to Mishkin, in recent years they have generated more than half of the bank revenues. The three types of loans being offered in commercial banks are Real Estate loans, Industrial loans and Consumer loans.

6. Other Assets

The other assets are defined as the physical capital or fixed assets such as bank buildings, computers and other equipments owned by the bank. Banks make profit by selling liabilities and buying profitable assets. This process is called Asset Transformation. If the banks produce desirable services at low cost, it could earn good income on its asset and is able to forecast for a profitable year, but if the bank is not able to manage the Asset transformation well, the bank will go bankrupt.

2.2.2 The Principles of Banking Management

The main principle on banking management is to manage its assets and liabilities to earn high profit. There are four primary concerns in managing the balance sheet (Mishkin, 2000).

2.2.2.1 Liquidity Management

Bank need to have enough cash to pay the depositors even though the deposits are lost. Liquidity management is very important in making sure that the bank is not out of cash when there are deposits outflow.

Usually banks should make sure that they have ample reserves, so that whenever there is a deposit outflow they will be able to sustain the instability caused by the outflow through the excess reserves. Alternatively, if banks do not have enough reserve,

they need to sell of the securities to earn quick money. Sometimes, when the bank does not have excess reserve at all, they have to search for a costly solution such as borrowing from Central Banks, other banks or corporations.

Excess reserves are insurance against the costs associated with deposit outflows. The higher the costs associated with deposit outflows, the more excess reserve banks will want to hold (Mishkin, 2000).

2.2.2.2 Asset Management

Banks maximize their profit by making highest return loan and securities. This is done by reducing the risk associated in selling the liabilities and to make sure that the banks holds enough liquid assets. Banks should be able to purchase securities with high returns and low risk. Banks will also lose if they hold too much reserve as there is no interest paid for the reserve.

2.2.2.3 Liability Management

Liability depends on checkable deposits. However, since checkable deposits do not provide interest, banks are unable to attract customers according to their strategies and advertisement.

The new flexibility in liability management means that banks could take a different approach in liability management since they are not dependent on checkable deposits as the primary source of bank funds. Instead, they set target goals for their asset growth and try to acquire funds as needed.

2.2.2.4 Capital Adequacy Management

Banks need to make decision on the amount of capital that they need to hold, as this will prevent them from bankruptcy or the failure to pay the depositors and creditors. Secondly the amount of capital affects returns for the owners of the bank. Thirdly a minimum amount of bank capital (bank capital requirement) is required by regulating authorities.

The amount of bank capital affects returns to equity holders. The owners of the bank need to measure the performance of the bank through bank profitability. This is done through Return on Assets (ROA), which can be calculated as below:

$$\text{ROA} = \frac{\text{Net profit after taxes}}{\text{Assets}}$$

This formula will be able to show the profits gained from each dollar of the asset.

However, the bank owners (Equity holders) also need to know the amount that they have earned through their equity investment. This measurement is done using Return on Equity (ROE), which is calculated as below:

$$\text{ROE} = \frac{\text{Net profits after taxes}}{\text{Equity Capital}}$$

There is a direct relationship between ROA and ROE, which is determined by Equity Multiplier (EM), the amount of assets per dollar of equity capital.

$$\text{EM} = \frac{\text{Asset}}{\text{Equity Capital}}$$

Given the return on assets, the lower the bank capital, the higher the return for the owners of the bank.

Usually the government will impose certain regulations on banks.

This is because banks are an important element to ensure that the

economy runs smoothly and efficiently. This is because banks receive deposits from the public and sell the deposits to others as a loan. The government needs to make sure that the public's money are not at risk as well as to safeguard the interest rate for the savings and loan. The government also needs to control the supply of money and credit in order to achieve a nation's broad economic goals and to ensure equal opportunity and fairness in the public's access to credit and other vital financial services.

In Malaysia there are both local banks and foreign banks which compete with each other. The banks can be categorized as small, medium and large size banks. In Malaysia, the government is encouraging the banks to merge to compete with the foreign banks (Krishnan, 1997). This is important as Malaysia will be liberalizing its financial services industry in the near future (Said, 1999).

According to government regulations, none of the foreign banks fall under the large bank category but the foreign banks would be able to bring in new resources and technologies from their headquarters in other countries to gain competitive advantage in Malaysia. This will affect the local banks as they are not as large as the foreign banks and will lose their competitiveness to the international banks. That is why the foreign banks activities are limited in Malaysia and they have very few branches in Malaysia (Samad, 1994).

However, the regulation must be balanced and limited so that banks can develop new services that the public demands, competition in financial service remains strong enough to ensure reasonable prices and an adequate quantity and quality of services to the public and to avoid any discriminations (Rose, 1999).

2.3 Malaysian Banking Development

The revolution in information and communication technologies has transformed the banking and financial service industry in Malaysia. The Malaysian financial institutions have found new channels in delivering their services through major technological breakthrough.

Customers are exposed to a number of technological based delivery services. This evolution has currently reached the stage of Internet banking or online banking in most countries and virtual banking in some developed nations. In order to be competitive with international banks, Malaysian Banks also have initiated several new technology based services for the customers. This is in line with the government's initiative in promoting and implementing information technology based system, which is very helpful in banking management.

According to Forester Research cited in Deloitte Research (2000), there are 400 million online consumers in the year 2000 compared to 100 million online consumers in the year 1999. This statistic shows a major increase in the use of the internet between one year. Through the research they have found that the number of household using online banking services will increase by 500%. In Malaysia itself, Internet users are 27% of the total population in the year 2000 (Turner, 2001). According to Turner, the number of Malaysians going online is still small compared to other nations but Malaysia is certainly not lagging behind. Furthermore, Malaysian financial industry will open the door to foreign banks by 2005. Therefore, Malaysian banks must fully utilize the technology in order to compete with the giant banks from Japan, the USA and the United Kingdom.

2.3.1 Automated Teller Machine (ATM)

The Malaysian Financial Institutions has gone through a tremendous change and the first step was the deregulation of the financial sector and computerization of financial institutions in the 1970's (Phang, 1985). The computerization of the whole financial system was done because of an increase in the processing volume of customer's data and extra services introduced by the banks. Then in early 1980's, automated teller machines (ATM) were introduced. The ATMs play a major part in developing quality based customer service for Malaysia banking system. The ATMs carry out simple transactions such as depositing and withdrawing money. At the same time, it released the banks from constraints of time and

geographical location. The customers are able to use the system beyond office hours, which is a great relief for the customers from queuing up in the banks during working hours to withdraw money.

Today, the ATMs are being used for multiple purposes such as balance inquiry, cash withdrawal, transfer of funds between checking, savings and credit card accounts, bill payments, making payments to applications for initial public offerings in Kuala Lumpur Stock Exchange (KLSE), making cash and check deposit.

According to Balachandran and Krishnan Guru (2000), customers are not confident of making cash deposits via ATM machine as the cash will only be credited to the customer's account on the following working day. BSN Commercial Bank, Maybank, Philieo Allied Bank, Hong Kong & Shanghai Bank and Standard Chartered Bank introduced Cash Deposit Machines (CDM). The CDMs accept cash immediately, verified, and credited to the customer's account.

Table 2.2
The Growth of ATM Machines in Malaysia

Year	Number of ATMs	% of growth
1985	278	22.0
1986	330	18.8
1987	609	84.5
1988	868	42.5
1989	1027	18.3
1990	1202	17.1
1991	1335	11.1
1992	1439	7.8
1993	1558	8.3
1994	1975	26.8
1995	2230	12.9
1996	2326	4.3
1997	2528	8.7

(Source: The Star, Business Section, August 6, 2001)

Table 2.2, continued

Year	Number of ATMs	% of growth
1998	2647	4.7
1999	3317	25.3
2000	3004	-9.4
2001	3379	12.5

Table 2.2 shows the increase in the growth of ATM machines in Malaysia from 1985 to 2001. Furthermore, Malaysian banks grouped together and set up a consortium called Malaysian Electronic Payment System or MEPS in 1986. The advantage of this consortium is that any customers from any banks will be able to withdraw money from any other bank's ATM machine as long as the bank is registered with the consortium (Suganthi, et. al, 2001).

In the future, it is predicted that ATMs will evolve into virtual branches providing a broader range of remote transactions where customers could interact with bank personnel through video conferencing (Phang, 1995).

2.3.2 Telebanking

Telebanking can be defined as delivery of branch services via telecommunication devices whereby bank customers can perform retail banking transactions by dialing a touch-tone telephone or mobile communication unit which is connected to an automated system of the bank that utilizes Automated Voice Response (AVR) technology.

The telebanking service provides all the functions offered by ATM except withdrawal and deposit. The BSN Commercial allows stock exchange transactions through telebanking. According to Leow (1999), telebanking has numerous benefits for both customers and banks.

There is an increased convenience; expanded access and significant time saving for the customers and for the banks. Meanwhile, the cost of delivery for telephone-based services are lower than branch based services.

Table 2.3
Phone Banking Services

No	Bank
1	Alliance Bank Malaysia Berhad
2	Arab Malaysian Bank Berhad
3	Bank Islam Malaysia Berhad
4	Citibank (M) Berhad
5	EON Bank Berhad
6	Bumiputra-Commerce Bank Berhad
7	HSBC Bank Berhad
8	Malayan Bank Berhad
9	OCBC Bank (M) Berhad
10	Public Bank Berhad
11	RHB Bank Berhad
12	Southern Bank Berhad
13	Standard Chartered Bank (M) Berhad
14	Hong Leong Bank Berhad

(Source: The Star, Business Section, August 6, 2001)

Telebanking service is not considered as a major delivery channel for Malaysian commercial banks because of poor marketing strategy and it

does not offer cash withdrawal facility for the customers. Furthermore there is a lack of confidence in using telebanking services especially in the older generations. This could be because the older generations are still in a technological dilemma and are not keen to use technology for their own purpose compared to the younger generations. They may lack of confidence among older generations in using technological devices.

2.3.3 PC Banking

PC Banking was introduced in 1990 and at the end of 1995, according to Central Bank of Malaysia's report (Central Bank of Malaysia's Report, 1995), ten local Malaysian commercial banks had already been offering PC banking or home banking services. Customers will be able to access the Intranet proprietary desktop electronic package to perform cash management, account receivables and account payables. The number of customers using PC banking is still small in Malaysia because of computer facilities which are not offered in many remote places. In 1999, there were 500,000 Internet account holders in Malaysia and 1.5 million effective internet users (Suganthi et al, 2001). Based on a recent report, the number of internet subscribers until March 2000 was 1.3 million which is approximately 7% of the Malaysian population (Lal P.K, 2000).

2.3.4 Automated Self Banking Centers (ABC)

Apart from Telebanking and PC banking, Malaysian banks have established Automated Self Banking Centers, which incorporate information counter, ATM's telebanking and banking booths.

ABCs are usually situated in shopping malls and office complexes. Philleo Allied Bank has implemented Virtual Multimedia bank kiosks in Malaysia with PALVIRTUAL KIOSK, which consist of PALWORLD, PALPOINT, PALPHONE and PALTELLER touch screen terminals with video conferencing capabilities.

The customers can log in to PALWORLD to do banking transactions, online shopping, utility bill payment, share investment, flight bookings, hotel reservations and dealings with Kuala Lumpur Stock Exchange (KLSE). PALPOINT is a new generation ATM facility that is connected to over 2500 ATM's via GREAT and MEPS network nationwide. And PALPHONE is the telebanking component of virtual kiosk, which provides a variety of banking products and services via Automated Voice System (AVS). PALTELLER is a new generation terminal, allowing customers to conduct banking operations on-line via a touch screen interface with video conferencing capabilities where customers will be able to see and speak to a customer service officer located at the head office.

2.3.5 Internet Banking

Internet Banking is widely regarded as the third wave of revolution, after the agricultural revolution and the industrial revolution (Balachandran and Krishnan Guru, 2000). In June 2000, the Malaysian government provided the legal framework for domestic banks to offer Internet banking services.

According to the research of Balachander and Krishnan Guru (2000), Malaysians going online is small compared to other nations across the globe. According to him, Malaysia should not lag behind the changes of technology since the Malaysian financial industry is poised to open its doors to foreign banks by 2005.

The Malayan Banking Berhad (Maybank) became the first bank to launch its Internet banking services in June, 2000 through its own portal, www.maybank2u.com. The services offered are banking enquiry functions, bill payment, credit card payment, fund transfer, account summary and transaction history. Hong Leong Bank launched its internet banking system called “Ec-Banking” through its website, www.hlbb.hongleong.com.my. This was followed by other banks as shown in the table below.

Table 2.4
Examples of Net Services

BANK	SERVICE	TRANSACTIONS
Southern Bank	PC Banking	Real-time fund transfers, credit-card payments, access account balances and auto alerts.
Hong Leong Bank	Bank@Home	Fund transfers, balance enquiries, statement download, bill payments, cheque-book request, cheque-status enquiry, stop cheque and credit-card payments.
HSBC Bank	Hexagon	A desktop-banking system via the HSBC Group's proprietary worldwide communications network. Services include transfer of funds within own accounts and third-party accounts.
Multi-Purpose Bank	Multi-Link	Basic banking services - account balance enquiry, fund transfer, bill payments and product info. Also offers desktop share-trading via JB Securities Sdn Bhd.
PhileoAllied Bank	PALDIRECT PALWORLD	Provides banking, share investing, news and information, utility-bill payments, insurance, travel, electronic shopping and communications services.
RHB Bank	RHB OnLine	Balance enquiry, fund transfer, remittance services, fixed-deposit placements, credit-card payments, brokering and bill payments.

Banks offering Internet banking can be categorized into Level 1-Basic Presence and Level 2-Prospecting (Deloitte Research, 2000). The level 1-Basic Presence can be defined as banks having the web just for advertisement purposes while the level 2-Prospecting is for banks that offer full internet services. Most of the Malaysian banks are currently at level-2 prospecting of the Deloitte model of Internet Banking.

All banks providing Internet Banking should operate at the highest level of security. These banks depend on Secure Sockets Layer (SSL) protocol as well as 128-bit encryption to encrypt data entering the bank server and verify the bank server to the users.

2.3.6 WAP Banking

WAP banking can be defined as a mobile phone banking, which has been introduced with the emergence of the telecommunication technologies such as Global Packet Radio Services (GPRS) and 3G phones. The table below shows the banks offering mobile banking services.

Table 2.5
Examples of Mobile Phone Banking Services offered by Banks

BANK	NAME	SERVICES
OCBC Bank	i.wap	Banking transactions - balance enquiry, transaction history, statement request, fund transfer, cheque-book request, stop-payment request, bill payments. Others - news, banking rates, treasury news and credit-card services.
Philoe Allied Bank	Palworld WAP	Banking transactions, bill payments, news, share trading.
United Overseas Bank	Mobile-phone banking	Banking transactions such as balance enquiry, statement request, increase in credit-card limit and others.

This have shown a tremendous development among Malaysian banks to compete with the foreign banks with better facilities, use of technologies in delivery services, and the need for quality based services. The local banks also need to be competent in terms of human resource. The banking executives need to be more knowledgeable and skillful in the banking industry in order to make a strategy decision making for the banks and the nation as a whole. The Malaysian government has been actively involved in K-economy and knowledge based industries which need to be absorbed by the banking industry.

2.4 Simulation System

Simulation can be defined as imitating a real phenomenon. Usually computer simulation is used to predict aspects of the behavior by creating an approximate model of it.

The usage of computer simulation began in the late 1950s and has gradually applied across multiple disciplines. Researchers began to move beyond static process development to a more dynamic process development, which is able to show the dynamic behavior of a system or an interactive system.

The main objective of a system simulation is (Levary et. al. 1991):

1. To understand the relationship within a complex system
2. To experiment with the model to assess the impact of actions, options and environmental factors.
3. To test the impact of various assumptions, scenarios and environmental factors
4. To predict the consequence of action on a process
5. To examine the sensitivity of a process to internal and external factors

According to Levary et.al.(1991), many organizations are using simulations based system for training and forecasting purpose. Simulation provides a safe way of estimating the effects of extreme situation without affecting real life experiment.

2.5 Computer Simulation Development

In terms of system development, many simulation languages have been produced such as SLAM II, SIMSCRIPT, SIMAN, GPSS and DYNAMO. The simulation language offers some advantages to the modeler (Law and Kelton, 1991):

1. Simulation languages provide most of the features and constructs needed for programming a simulation model
2. Simulation model are easy to modify if written in simulation language
3. It provides error detection features for the programmers
4. The modeling approach is easily matched to the simulation languages. As an example the Pristker's approach maps directly to the simulation languages.

There are also some newly developed simulation products and services, which are more user friendly such as:

1. Adaptive Learning Platform(X.ACP)
2. Amethyst Research LLC(service offering)
3. ASCOLTA(service offering)
4. CADSIM Plus 2000(Aurel System Inc)
5. Cognitive Arts Corp(service offering)
6. Forio Server

The emergence of specialized authoring tools is a clear sign of both demand and the market creation of simulation-based products. RWD, Global

Knowledge, xStream, Ayaltus, Epiance, Knowledge Mechanics, EDT Learning and Multiverse are just few of the companies that sell specialized development tools. E-learning vendors are already adding simulation based products on their catalogues (Bosman, 2002).

The principles of dynamic modeling process can be applied to a wide range of systems: from deterministic physical systems such as car engine, to stochastic physical systems, such as a weather system, to an organizational system and business management system. The development of simulation based product is complex in nature as it involves a lot of variables that need to be tested as in the real time environment. There are also a lot of aspects that need to be taken into consideration while developing the system as the variables may inter relate with each other. The development of effective simulation product is difficult, time-consuming and expensive. For moderately complex e-learning project done by moderately experienced team, figures of 200 person-hours per instruction-hour are common (Horton, 2000).

There are six types of simulation system (Hall, 2000):

1. Software Simulation – IT/application training
2. Business Simulation – teaching business management skills, running mock companies and accounting practices.
3. Situational Simulations – interpersonal skills, soft skills, conversational skills
4. Technical Simulations – simulations of physical system such as a piece of equipment or simulating processes through diagrams

5. Procedural Simulations – teaching step by step processes
6. Virtual Worlds – teaching by re-creating environments, workplace etc

Beyond all these categories, the developed simulation needs to be fun to keep up the momentum (Bean, 2000). According to Bean, the development of fun simulations is a memorable experience because people play and learn from them without being compelled to. At the same time the user will be able to develop and internalize rules for success that they can intuitively apply in the real world. Furthermore, Bean has listed twelve important factors to develop a fun simulation:

1. Ten Minutes to Learn, a Lifetime to Master

The rules should be easy to explain but the simulation should be complex enough that it takes several rounds for a user to become expert in the field.

2. Small Successes

The user needs to feel the success even though the competition is difficult. This is to make sure that the users are comfortable with the system. Reward, don't punish.

3. Players are in control of their destiny

The players must make a decision to figure out the best way to win the game.

4. Customization

The users should have some control or ability to create their own simulation.

5. Trade-offs

There should be a clear downside to every decision.

6. Dynamic

7. Realism

Players enjoy games more that look and act like the world that's represented in the game. Managers should see reports in formats they are familiar with. If the company uses emails or memos to communicate, then memos and emails should be included in the simulation.

8. Fantasy

Business simulations combine well with [scenario planning exercises](#). Scenario planning engages managers to think about what could happen in the future and the business simulation fleshes out the scenario and makes it feel real. The simulation also provides managers with the opportunity of working through strategies to deal with specific scenarios.

9. Good Design

The graphical design is the first impression that players have of the simulation. Like all first impressions, the graphic design is going to affect the long-term perceived quality of the simulation. The graphical design is the first impression that players have of the simulation. Like all first impressions, the graphic design is going to affect the long-term perceived quality of the simulation

10. Appropriate for the medium

There have been some excellent simulations created without using computers, just like there are great games that do not use computers.

11. Human Interaction

Creating a community, through collaboration or competition, is one of the best ways to make a simulation exciting

12. Personalities or talent

To top things off, participants need to have good personalities with their simulation. It is engaging to have a senior manager from the company introduce the simulation through a short memo or a video clip.

A perfect simulation should be realistic and effective if it (Horton, 2000):

1. Implements the causal relationships and principles of the real-world system learners must master.
2. Contains details necessary for the learner to map components of the simulation to their real-world counterparts
3. Lets learners control the aspects of the simulation they would control in the real world.
4. Make learners feel they directly control the subject of the simulator without awkward intermediate steps.

2.6 Simulation System in Training and E-Learning

Computer simulation is actually an extension of e-learning concept. Basically e-learning concept has been introduced to merge with the current technology. Traditional e-learning - what is sometimes referred to as first generation e-learning- is now past the market creation phase and well into a value creation phase (Hall, 2000).

E-learning was regarded as a failure in creating quality based education (Guralnick, 2002). According to Guralnick the failure of e-learning is because:

1. Trainees are less involved in creating the e-learning modules
2. Lack of appropriate software tools for trainers – most of the application software involves technical programming which is difficult for the trainers who do not have technical background.
3. Technical implementation details take time, preventing trainers from focusing on context and pedagogy.

Furthermore, Guralnick gave three solutions for the problem:

1. Introduce Learning Architecture – Interactive learning and technology to support the application and training
2. A technical engine, invisible to users, to support personalization and customization
3. An e-learning creation “control-center” with authoring methods intuitive to trainers. The development software should be user-friendly and usable.

The solutions given by Guralnick and other researchers’ show that the advancement of technology has created a major leap in the interactive based learning or simulation based training method. Simulations are based on a simple, but effective, learning strategy – practice makes perfect (Hall, 2000).

In other words, the corporations are already convinced with the cost effective benefits and are utilizing e-learning tools to train and develop their workforce. But with current demand, the corporations are already compiling a list of feature enhancement requests such as increased interactivity and motivational components. One feature that leads the request is the development of simulation.

The corporate training and development is important with the rising global competition, information and communication technology explosion and corporation's rising interest in capturing and developing human resources. This factors forces the workers to learn while working and the best method is through interactive learning. At the same time the demand for simulation based e-learning in corporate world is being driven by a variety of factors (Adkins, 2002), including:

1. The availability of high simulation technology on PC systems
2. The customer demand for advanced e-learning products
3. The rapid convergence of enterprise software and technology
4. The emergence of the virtual platform known as Web Services

Today, with the development of software tools to create animation and interactive applications, the simulation based applications are being used extensively both in the education and industrial sector. The e-learning concept has been slowly transformed into web based e-learning simulation which is much more dynamic and customizable to the users all around the world. The development of broadband technology and the usage of internet have extremely helped for the development of web based e-learning simulation. The simulation based e-learning can be defined as a delivery of simulation based online training. According to the current research, by 2006, the market for simulation based e-learning products and services will be over \$6 billion (Adkins, 2002).

Simulation is grounded as action learning. While individuals may each perceive information through their senses, people ultimately learn by doing (Kolb, 1974). David Kolb, learning theorist and author of *Experiential Learning*, describes learning as a four-step process as shown in Figure 2.1: (1) watching, (2) thinking, (3) feeling, and (4) doing.

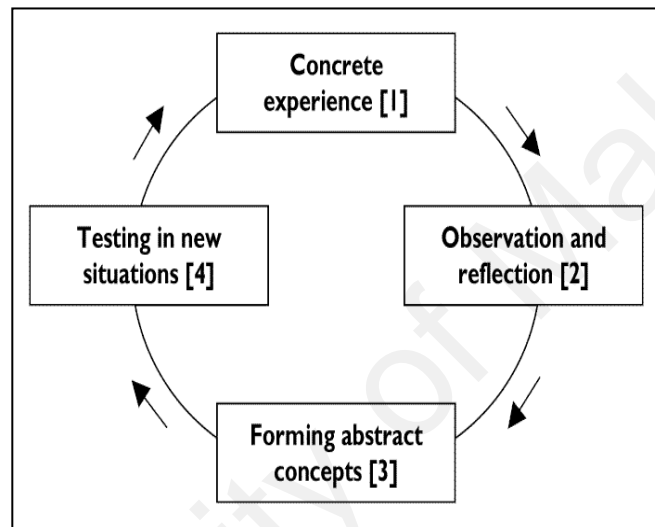


Figure 2.1
Kolb's Experiential Learning Process

Referring to Figure 2.1, learners have concrete experience that allows them to reflect on new experiences from different perspectives. From reflective observations, learners engage in abstract conceptualization, creating generalizations or principles that integrate observations into sound theories. Finally, learners use these generalizations or theories as guides to further action. Active experimentation allows learners to test what they have learned in new, more complex situations. The result is another concrete experience, but this time at a more complex level. The Kolb Strategy can be fully utilized through a simulation system. The assumption that can be derived from the Kolb Strategy is

that people seldom learn from experience unless they are given the opportunity to test and analyze the environment. This is only applicable through simulation.

There are many advantages of using simulation based system. The most important advantage is that the cost of failure is low as it provides a safe way to experiment the real life environment. As the learners need individual training, the application can be customized according to the user's perspective. The organization will be able to save time by training many people at a given time duration compared to the traditional training system. The simulation based system is able to accommodate complex tasks in a short duration. This is very important for the trainees in order to understand certain task, which is associated with analysis based task.

Furthermore, the simulations provide the opportunity to experiment with many different scenarios and see the effects on key measures (Hall, 2000). The users will be able to transform the factual knowledge by applying the knowledge and the skills in the simulation based system.

2.7 Simulation of Banking Management

Financial based simulations are used extensively in both educational and industrial sector. Simulation games have been used in business schools since 1957 (Watson, 1981). A 1962 survey of 107 AACSB member schools in the USA reported that 71.1% were using simulation

games in at least one course (Dale & Klasson, 1962) within the business faculty. Two surveys of AACSB member schools undertaken in 1967 indicated that 90.7% (Graham & Gray, 1969) and 94% (Day, 1968) of the responding schools used simulation games in their curricula. Roberts and Strauss (1975), using the same sample of schools as used by Dale and Klasson (1962), reported that 94.5% of the responding schools were then using simulation games. Finally, Faria (1987) reported that 95.1% of AACSB member schools used at least one business simulation game in their program during the 1985-1986 academic year.

According to Faria (1987), business school deans then were asked which disciplines within their faculties were currently using simulation games. The responses to this question, along with a comparison to the Faria (1987) survey that also addressed this issue, are shown in Table 2.6.

Table 2.6
Simulation Usage at AACSB Member Schools by Discipline

Programs	Faria(1987)	Survey (%)	Faria(1998)	Survey (%)
Business Policy	107	52.9	155	65.7
Marketing	103	51.0	148	62.7
Finance	50	24.8	92	39.0
Management	36	17.8	105	44.5
Accounting	18	8.9	37	15.7
Other courses	34	16.8	44	18.6

Simulation usage is up at both the undergraduate and graduate levels since the 1987 survey, and currently, 77.8% of the responding deans indicated that simulation games are being used at both the undergraduate and the graduate levels at their schools. Furthermore, as Table 2.7 suggests, most schools are using simulation games in more than one discipline.

Finally, the deans were asked about other uses of business simulation games within their faculties. Eighty-seven deans (36.9%) indicated that their students take part in intercollegiate simulation competitions, and 79 deans (33.5%) indicated that business simulation games are being used in executive development seminars/programs at their universities.

Table 2.7
Mean Rating of Teaching Method Effectiveness

Teaching Method	Faria(1987) Study	Faria(1998) Study
Lecturers	7.5	6.6
Cases	7.4	6.9
Business games	6.1	6.1
Textbooks	5.4	6.0

NOTE: Based on a scale from 1 (low) to 10 (high)

Table 2.8
Mean Rating of Teaching Effectiveness by Simulation Users and Nonusers

Teaching Method	Faria(1987) Study		Faria(1998) Study	
	Users	Nonusers	Users	Nonusers
Lectures	6.8	7.7	5.9	6.9
Cases	6.2	7.8	6.8	6.9
Business games	7.1	5.8	7.9	5.5
Textbooks	5.2	5.5	5.5	6.3

NOTE: Based on a scale from 1 (low) to 10 (high)

In both the Faria studies, business simulation games were ranked third in teaching effectiveness behind lectures and cases and ahead of only textbooks.

When the results examined by simulation users and nonusers, as would be expected, simulation user's rate business games much higher than nonusers do (7.9 to 5.5). This disparity is wider than reported in 1987 as Table 2.8 shows. Business games rank highest in teaching effectiveness among simulation users, but among nonusers business games rank lowest.

Furthermore most of the financial sectors have been involved in the simulation training system. As an example, Ameren Corporation, USA, has asked all the finance executives and managers to compete in computerized simulations that let them control more than 20 financial

variables, such as lowering expenses, acquiring new business and increasing or decreasing debt. The team that produced the best financial results over a simulated 10-year period will win the competition (Solomon, 2002). According to Solomon, “Learning is made up of mistakes, and the simulation exercise allows them to make mistakes in a controlled environment” (Solomon, 2002).

The banking simulations include both general information and employee or job specific information that makes the training relevant to each and every audience so that it can integrate the two when the site is accessed so the end user does not need to read through information and examples that are not relevant to him (Guralnick, 2002).

Malaysian higher educational institutions should be proactive in introducing simulation based e-learning system to better equip the graduates with knowledge and skills by practicing the real scenario through simulation systems. The only way to expose students to the working environment and to gain experience in banking industry is through simulation based e-learning concept.

There is a lot of development in financial based products in foreign countries such as Financial System Simulator (FSS), Bank President and InterBank Simulation System.

2.7.1 Financial System Simulator (FSS)

FSS is an internet based interactive teaching aid that introduces undergraduate students to the domestic and international consequences of monetary policy (Santos, 2002). FSS was implemented at South Dakota State University during the fall 1999. According to the university's survey, 90% of those surveyed agreed the simulation should be a permanent component of the money and banking course. Most economic faculty agrees that interaction exercises maintain (or gain) the students interest in economics, as well as dispel their preconceived notions that economic theory is an esoteric subject (Goerce and Holt, 1999).

The FSS uses the client server technology with the server doing the churning, calculation and processing of the computer code. The students will participate in the FSS for a period of six weeks and the Instructor will check the progress of the team. The teams need to download their summary statistics and prepare graphs for the presentation. The banking component of FSS focuses on commercial banking theory, including information asymmetries, structure and legislation, investment banking and international finance.

2.7.2 InterBank Simulation

There is also another simulation, which is called as InterBank Simulation Game. This system is able to bridge the gap between the Executive level (strategy) and Operational level (operations) within the organization. It also accelerates the development time of key personnel/targeted personnel through a steep learning curve. The system will be able to simulate the operations of a universal bank based on the decision of the management teams. The basic operational unit of the program is the individual bank. For each quarter the system will calculate the earnings and operating results of each team.

2.7.3 Real Money Simulation System (<http://www.profalrecht.com>)

Real Money Simulation system is an accounting simulation system created by W.David Albrect. According to Albrect the objective of Real Money is to help students learn the accounting cycle in a dynamic business environment and experience the financial statement analysis and investment decision processes that follow from financial report. The game is a contest with specific goals and rules.

According to Heyman (1975), simulation game like Real Money is an activity whose rules tend to generate in the total behavior of the participants and model of some real world process. The game helps the students to increase the ability to apply concepts and principle of

accounting. Through the system, the participants experience greater attitudinal change compared to students engaging in a more traditional learning environments.

The simulation system offers the potential for students to attribute greater value to accounting information in the decision-making process. The students also require flexibility in thinking and an adaptive response to a dynamic environment. Real Money is currently available in two version, which emphasizes in debits and credits and is most appropriate for Intermediate Accounting. The second version, most appropriate for MBA classes, uses the balance sheet equation to account for transactions.

In order to play the game, the class is divided into gaming groups with each games representing a distinct and separate local market. Students need to create a company in each local market which will be operated by one or two students. Each company will play the monopoly game to win. The companies should be able to do investment or purchase real estate properties.

The Real Money simulation system consists of two primary components, which are accounting and investing. Each company will then plays for 12 turns (1 year) and prepare financial statements. The instructor will assign the students to a gaming group to play the game. Each company will be managed by two students. The students need to meet four times during the course to play the game, which will last about one hour.

Each team will decide about their responsibilities in making decisions and managing record keeping in a manager diary. Even though they play in a team, each student member is to do the accounting and investing alone, with no consultation or help from the other team member.

In order to start the game the companies will be given a capital of \$1,500 in cash from the bank. A month starts when the first company rolls the dice. A month ends after the last company has had a chance to move and has completed transaction. During a month, a company may have transaction as it moves around the board, or when another company takes an action that affects it. Each complete turn is a month. There are 12 months in a year. The simulation system teaches about strategic decision making and also in using journal and balance sheet in updating their records.

At the same time the game is not just about using the simulation. The trainees will be provided with assignments related to financial and accounting. The students need to submit the assignment during the submission of financial reports for every month. A sample assignment is shown in the Appendix B.

The game focuses on three important components which are journals, balance sheet and income statement. The variables included in the balance

sheet are shown in Table 2.9. The Real Money simulation system is able to generate the balance sheet for all the years.

Table 2.9
Balance Sheet at year end (Turn 12) for years

	<u>Year</u> <u>1</u>	<u>Year</u> <u>2</u>	<u>Year</u> <u>3</u>	<u>Year</u> <u>4</u>
Current Assets				
Cash	\$662	\$422	\$734	\$550
Receivables	<u>100</u>	<u>100</u>	<u>50</u>	<u>50</u>
	762	522	784	600
Noncurrent Assets				
Notes Receivable	0	0	0	0
Investments in Railroads & Utilities	200	800	800	800
Land	1,140	1,500	2,960	2,960
Houses (Net)	0	0	991	1,803
Hotels (Net)	0	0	0	0
Other	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
	<u>1,340</u>	<u>2,300</u>	<u>4,751</u>	<u>5,563</u>
Total Assets	2,102	2,822	5,535	6,163
Liabilities				
Interest Payable	0	0	0	2
Taxes Payable	60	78	279	85
Mortgage Payable	0	0	0	60
Notes Payable	0	0	0	0
Other	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total Liabilities	60	78	279	147
Owner's Equity				
Contributed Capital	1,500	1,500	1,500	1,500
Retained Earnings	<u>542</u>	<u>1,244</u>	<u>3,756</u>	<u>4,516</u>
Total Owner's Equity	<u>2,042</u>	<u>2,744</u>	<u>5,256</u>	<u>6,016</u>
Total Liabilities and Owner's Equity	2,102	2,822	5,535	6,163

The income statement will be generated at the end of each year and the students will be able to view the income statement for four years and make a comparison to analyze their performance as shown in Table 2.10.

Table 2.10
Income Statements for years ended turn 12

	<u>Year</u> <u>1</u>	<u>Year</u> <u>2</u>	<u>Year</u> <u>3</u>	<u>Year</u> <u>4</u>
Rent Revenue—Undeveloped Property	\$30	\$62	\$92	\$38
Rent Revenue--Houses and Hotels	0	0	70	680
Investment Income	<u>0</u>	<u>200</u>	<u>1,000</u>	<u>200</u>
Total Rental & Investment Income	30	262	1,162	918
Rent Expense	78	82	120	228
Repair and Maintenance Expense	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Net Rental Income (Loss)	(48)	180	1,042	690
Salary Revenue	500	400	550	200
Miscellaneous Revenue	<u>150</u>	<u>200</u>	<u>125</u>	<u>95</u>
Total Revenues	602	780	1,717	985
Depreciation Expense	0	0	9	88
Amortization Expense	0	0	0	0
Miscellaneous Expenses	<u>0</u>	<u>0</u>	<u>225</u>	<u>50</u>
Income from Operations	602	780	1,483	847
Interest Revenue	0	0	0	0
Interest Expense	0	0	0	(2)
Gains on Disposal of Property	0	0	1,310	0
Losses on Disposal of Property	0	0	0	0
Other Gains/Losses	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Pre-tax Income	602	780	2,793	845
Income Tax Expense (Refund)	<u>60</u>	<u>78</u>	<u>279</u>	<u>85</u>
Net Income	542	702	2,514	2,514

2.7.4 Bank President ([html://bpaosf.bpa.arizona.edu/~ruscher/](http://bpaosf.bpa.arizona.edu/~ruscher/))

The Bank President Simulation system is both educational and entertaining. The objective of the system is to teach the concepts of bank management. The participants are trained to make better decision which will be administered by an instructor. The instructor will be given full authority to supervise the competition.

Currently the Bank President appears in two version which are student version and instructor version. The student version software will be initiated in student's workstation while the Instructor's version will be installed in the Instructor's workstation. The simulation system supports one to ten banks to compete each other in every competition. The game is also played with computer as one of the opponents.

In order to play the game, each group need to register with the system by specifying the President's name, username and password, bank name and type of banking to be chosen. Once the data have been entered, it will be saved inside a diskette and will be given to the Instructor to configure the system setting. There are fixed amounts of loans and deposits available in the economy at a given time and the data will be determined by the actual historical data from the US economy at various time. The banks need to choose any of the economic year or it will be selected randomly.

The banks registered for the competition will try to compete with each other to earn their loans and deposits. The banks will try to find strategies to attract customers to their bank. As an example, in order to attract more deposits, some of the banks may increase their interest rate and do more marketing. The game will be played for four quarters, which is equal to one year and each group need to show their management report with detailed financial performance of their own bank.

In order to begin playing the Bank President, the instructor must start a new game. This will be done through the instructor's software version.

Then the instructor needs to specify:

1. Bank's name
2. Game title
3. Number of banks competing in the game
4. Instructor name and password
5. Economic period
6. Type of Bank Management: Human Management or Computer Management
7. President's name
8. Bank Type: Full Service Bank, Consumer Bank, Business Bank and Turnaround Bank

The student will give their diskettes to their instructor, which has the important data such as bank name and all other information. The instructor will configure the regulatory environment, which consist of:

1. Loan rates
2. Deposit rates
3. Maximum capital
4. Federal Reserve Borrowing
5. Tax rate

The instructor can change the regulatory environment at the time a new game is started or at any time during the course of a game. The instructor will notify the students at least one quarter in advance of changing the regulatory environment to give students time to prepare for the change. In each quarter, the participants need to review the results of the previous quarter before making any decision for the next quarter. Once the decision has been done for each quarter, the student will save the details in a diskette and send it to the Instructor. The participants will be able to make decision on the variables shown below:

1. Deposit Rates
2. Loan Rates
3. Expenses
4. Dividend
5. Policy Limit
6. Security Purchase

7. Security Sales
8. Capital Notes
9. Common Stock
10. Loan Sales

In order to advance to the next quarter, the instructor needs to select “Advance the game to Next Quarter from the menu selection. Advancing the game to next quarter causes Bank President to read decision from the student’s diskette, calculate new results for all banks and then write the new results onto the student’s diskette.

The most important financial reports that need to be produced for each quarter are the Balance Sheet and Income Statement. The Balance Sheet shows the condition of the bank as of the first day of the quarter. The balance sheet is divided into two parts. The first part is called “Assets”. This part of the balance sheet shows what the bank has done with money it has raised. The Assets side of a Bank President bank’s balance sheet is shown in Figure 2.2 below:

<u>ASSETS</u>	<u>\$ Millions</u>	<u>Percent</u>
Cash	80	7.3
Fed Funds Sold	0	0.0
Securities	285	25.9
Loans	720	65.4
Premises	<u>15</u>	<u>1.4</u>
Total Assets	1100	100.0

Figure 2.2
The Asset Categories for Bank President

The balance sheet will be prepared as of the first day of each quarter. The other side of the balance sheet is called as “Liabilities and Equity”. This side shows where the bank got the money that is accounted for on the “Assets” side of the balance sheet, as illustrated in Figure 2.3.

<u>LIABILITIES & EQUITY</u>	<u>\$ Millions</u>	<u>Percent</u>
Deposits	984	89.5
Fed Funds Purchased	50	4.5
FRB Borrowing	0	0.0
Capital Notes	13	1.2
Equity	<u>53</u>	<u>4.8</u>
Total Assets	1100	100.0

Figure 2.3
Liability and Equity for Bank President

Since the bank must account for all of its money, the total on the assets side of the balance sheet must always exactly equal to the total on the liabilities and equity side of the balance sheet. This actually shows where the money comes from and the other shows where the money is now. The first four categories above are called “liabilities” because these funds do not permanently belong to the bank, as the bank needs to repay these funds. The “equity” is money that permanently belongs to the bank.

The participant needs to earn money through assets and pay money to acquire its liabilities. In accordance to this simulation system, the largest asset category is “loans” while the largest liability category is “Deposits”.

The banks need to earn income through interest paid by the depositors and fees charged for services provided by the bank. In Bank President, the non-interest expenses include bad debt expenses, salary and occupancy. The next financial report is Income Statement which shows the profit gained by each bank. The variables included in Bank President's Income Statement are shown in Figure 2.4 below.

<u>Income Statement</u>	<u>\$ Millions</u>
Interest Revenue	32.3
Interest Expense	-18.8
Fee Income	4.0
Non-Interest Expense	-9.5
Taxes	-3.9
Non-Operating Income	<u>0.0</u>
Net Income	4.1

Figure 2.4
Income Statement

For each quarter, the participants need to compare their actual Bank President's Income Statement with their targets. If the income statement is close to the target level, the bank can continue with their policies. However, if there is decrease in the net income then they need to identify then problem area.

Bank President's economic environment contains 100 periods of economic data. The economic data was taken from the US economy at various times in the past. The instructor need to select the beginning economic period or will be able to select a random beginning economic

period. There are nine important components, which reflect the economic data for each period as shown below:

1. T-bill rate
2. T-note rate
3. Fed Funds rate
4. Real Estate Loan Rate
5. Prime Rate
6. Percentage change in CPI
7. Percentage change in commercial loan balances
8. Percentage change in consumer loan balances
9. Percentage change in real estate loan balances

In simplest terms, a bank must first obtain funds. These funds come from deposits with the bank, funds the bank borrow from various sources, funds the bank receives by issuing its common stock and funds that the bank retains from its profits. The bank uses these funds as cash or deposited at the Federal Reserve Bank, investment in securities, loaned to individuals, businesses and other banks and some is invested in the premises from which it conducts business.

2.8 Conclusion

Most of the banks that use internet-only business model are struggling for profitability, and emerging conventional wisdom states that internet-only banking is a failed business model. But this may be premature. As internet-only banks age, they accumulate experience which may allow them to operate more efficiently in the future, and as they grow larger they may generate scale-based savings not available to traditional banks that use less capital-intensive production and distribution technologies. In order to establish technology based banking, Malaysian Financial Institutions need skill based employees and this can be accomplished by simulation based training system for both bank executives and students.

Simulations can be a useful instructional tool in any classroom contexts. McKeachie (1994) argues that "the chief advantage of games and simulations is that participants are active participants rather than passive observers. Beyond the simulation, collaborating with students in this way provides an opportunity to mentor a group of students. With the introduction of banking simulation games such as Bank President and Real Money simulation, the banks will be much more capable of using intellectual skills and values enquiry in a rational approach to problem solving and decision-making. The simulation system provides a strategic planning process for the bank executives in today's fast growing banks.

CHAPTER 3

Methodology

3.1 Introduction

In this research the focus were to evaluate on customer participation towards the use of IBMS. This research involves the development of IBMS and evaluation process that need to be done on the developed product.

Considering the scope, sensitivity and depth of this research, Waterfall Model was used as a research framework in order to develop the system. Later an evaluation procedure was used to evaluate the system performance.

3.2 Waterfall Model

The Waterfall Model describes the development method for the research in a linear and a sequential way that have specific goals for each phase of development. The development phase moves from analysis, through design, implementation, testing and integration. The Object Oriented Modeling techniques have been incorporated in the Waterfall Model. In the design phase, class diagrams were used to identify the important components related to the development of the system. Sequential diagrams were used to identify the flow of the system.

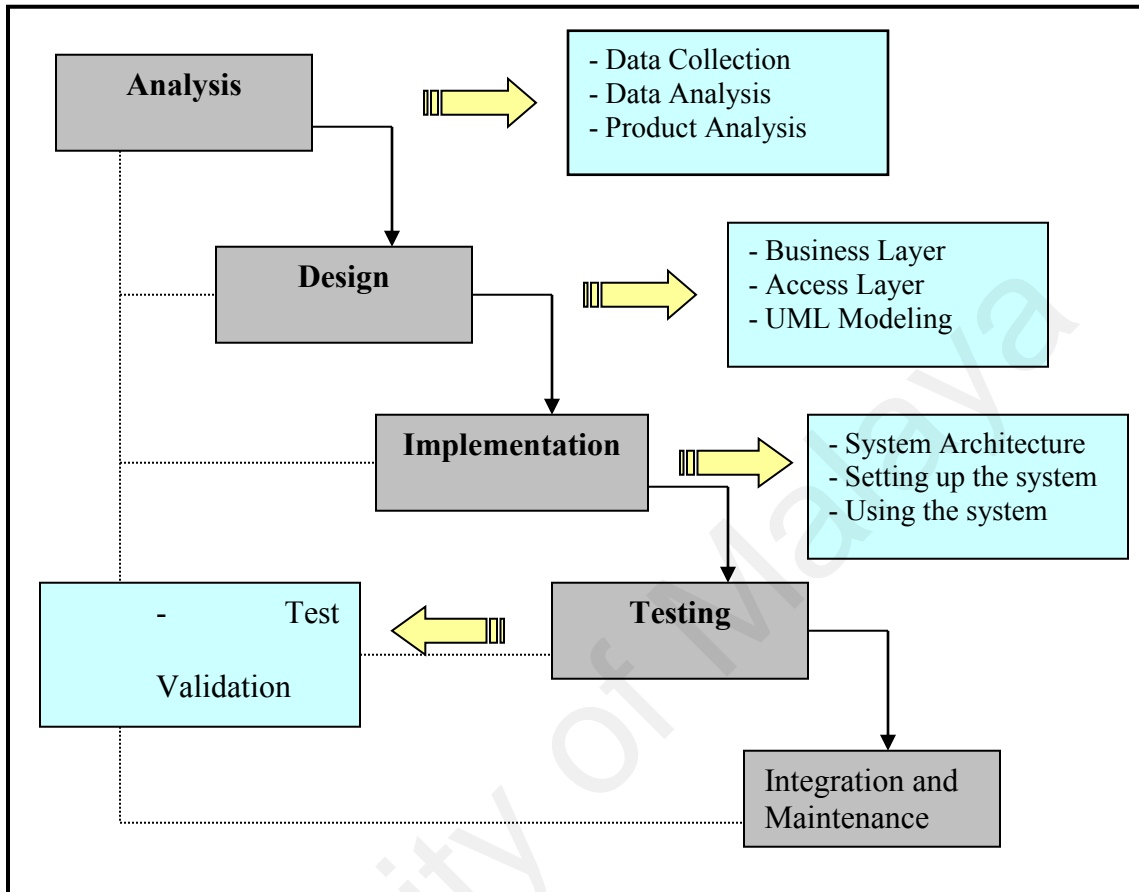


Figure 3.1: Waterfall Model Incorporated with Object Oriented Modeling Technique

3.2.1 Analysis

The first phase of Waterfall Model is Analysis. The Requirement Analysis for IBMS is shown below:

3.2.1.1 Subjects

In order to increase the validity of the study, four bank executives from each six different banks have been recruited for the survey.

Table 3.1 displays the profile of the 24 subjects.

Table 3.1
Profile of the participants

Variable	Count	Percentage (%)
Organization		
Maybank, Seremban	4	16.67
Hong Long Bank, Seremban	4	16.67
Southern Bank, Subang Jaya	4	16.67
Baffin Bank, Subang Jaya	4	16.67
Public Bank, Seremban	4	16.67
RHB Bank, Subang Jaya	4	16.67
Gender		
Female	18	75
Male	6	25
Age		
27 – 35 years old	16	66.67
36 – 45 years old	8	33.33
Job Tenure		
<5 years	6	25
6 – 10 years	14	58.33
21 – 25 years	4	16.67
Computer Experience		
<1 year	0	0
2 – 3 years	0	0
4 – 5 years	5	20.83
6 – 7 years	4	16.67
>8 years	15	62.5

3.2.1.2 Data Collection

The secondary(historical) data in the form of magazines, newspaper articles, journals and articles from the website that reflect the simulation based training system in both local and international were collected. The primary data collection methods will include the questionnaires.

In order to develop a simulation system, the banking data's need to be collected. The data's that need to be collected are:

1. Bank Annual Report
2. Malaysian Central Bank Report
3. Malaysian Economic Statistics
4. Statistics on Interest Rate: Deposit and Loan

3.2.1.3 Interviews

Interviews were conducted with the bank executives and Bank Managers. The duration of each interview was approximately one hour and conducted on a one-to-one basis. There were four interviewee from each banks.

3.2.1.4 Data Analysis

Data Analysis focused on analyzing the current Bank Management Simulation that is available for target users. A number of products such as Real Money simulation and Bank President were analyzed.

3.2.1.5 Product Analysis

Product Analysis involves two main components:

1. IBMS Functional Requirement
2. IBMS Non-Functional Requirement

The IBMS Functional Requirement involves the identification of user and system functionalities. The non-functional requirement was done to identify the constraint under which IBMS need to be met and the standards that need to be met.

3.2.2 Design

In the design phase an architectural design will be developed according to the flow of the system and after the identification of the important components in IBMS. The design phase will be divided into three main layers:

3.2.2.1 Business Layer

This will include a class diagram that represents the business (both data and behavior). The class diagram will be model the whole business and how they interact to accomplish the business processes. The class diagram captures the static and dynamic relationship that exists in between the business objects. It includes the associations and aggregations in between objects.

3.2.2.2 Access Layer

This layer is responsible for the representation of the storage class diagram. The access class layer was responsible for:

1. Translating Request

It should be able to translate any data-related request from the business layer into appropriate protocol for data access.

2. Translate Results

It should be able to translate the data retrieved back into the appropriate business objects and pass those objects back to business layer.

3.2.2.3 Interface Layer

The layer is responsible for the representation of the user interface for IBMS. The interface layer is useful in managing the IBMS system.

3.2.3 Implementation

The implementation phase was divided into two phases:

1. System Architecture
2. Using the system

3.2.3.1 System Architecture

The implementation phase focuses on the system architecture. As IBMS is a web based system, the architecture need to be identified to set up the web server and database server.

3.2.3.2 Using the System

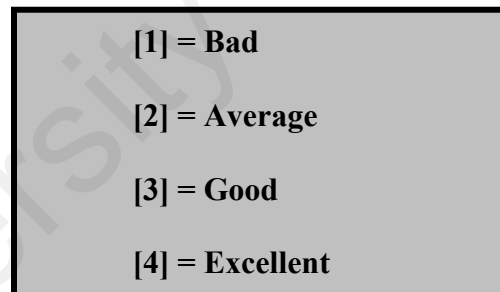
In this phase, the procedures of using the system need to be clearly identified.

3.2.4 Testing

The testing was done on the system to validate that the software functions with sufficient accuracy with respect to its requirements specification. The test data will be compared with the Central Banks' data to validate the accuracy of the test data.

3.3 Evaluation

The variables were measured by using a rating based structured questionnaire. The questionnaires contain a rating scale from 1 to 4 as shown in Figure 3.2.



[1] = Bad
[2] = Average
[3] = Good
[4] = Excellent

Figure 3.2: Rating Scale

3.3.1 Evaluation based Questionnaires

The questionnaires include six important aspects which will have a rating system from 1 to 4 as explained in the earlier stage. The important aspects to be evaluated are:

1. Program Content

The questionnaires were focused towards system objectives, information accuracy, supporting materials and quality of the instruction in reference to the objectives.

2. Effectiveness

The questionnaires were related to participant's capability to recall the information presented through IBMS, development of individual interest towards banking through the use of IBMS and the appropriateness of the system as a training module.

3. Practice / Assessment / Feedback

The evaluation was done on the type of feedback received through the responses, objective accomplishment and about collaborative learning.

4. Users Appeal and Suitability

The evaluation was related to the suitability of the tutorials, interest level towards the training system and input appropriateness.

5. Ease of Use

The questionnaires were more focused towards user navigation, system consistency, responses and interfaces.

6. Presentation

The evaluation was focused towards the quality of screen displays, text and system layout.

3.3.2 Experimental Procedures

All experimental sessions were conducted in the subjects' office. The procedures were as follows:

- a. Subjects listened / read the background statement
- b. Subjects were then trained to use the system
- c. They were randomly assigned one experimental tasks and when completed, they were then asked to complete an evaluation questionnaires.

3.4 Software

The application or Intelligent Bank Management System will be created using Active Server Page or ASP. ASPs are server generated pages which can call other programs to do things like access databases, serve different pages to different browsers and etc. ASP is almost as efficient as writing code directly to the server's application program interface.

Active Server Pages is an open, compile-free application environment in which we can combine HTML, scripts, and reusable ActiveX server components to create dynamic and powerful Web-based business solutions. Active Server Pages enables server-side scripting for IIS with native support for both VBScript and Jscript.

The ASP's operational method can be defined as follows:

1. Request - to get information from the user
2. Response – to send information to the user
3. Server – to control the Internet Information Server
4. Session – to store information about and change settings for the user's current web server session.
5. Application – to share application-level information control settings for the lifetime of the application.

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3.5 Conclusion

The waterfall model is very useful for this research as a schedule can be set with deadlines for each stage of IBMS development. The development moves from the basic concept of analysis, design, implementation and testing. Once the problem have been identified through analysis, it is easy to get down to the process of designing a solution in accordance to the given objective and criteria. The techniques, methods and measurement were used appropriately in each phase of development.

CHAPTER 4

System Analysis

4.1 Introduction

System analysis is important as it studies users need and tries to implement it to ease user's daily routine. A study was conducted on current systems which are available in the market as mentioned in Chapter 2. During the system analysis phase, system requirements were determined. Besides that, hardware and software requirements during system run-time and development phase were also determined. It is essential to know the system requirements before proceeding to design the Intelligent Bank Management System. During this research, system analysis is carried out to determine all the requirements for an Intelligent Bank Management system. This chapter explains in detail the requirements for the Intelligent Bank Management System.

4.2 Importance of Requirement Analysis in the Designing of the System

Software architecture is the bridge between the system requirements and implementation. Designing of software architecture comes after the domain analysis, requirement analysis and risk analysis but before the design, coding, integration and testing phase. It is very essential for the requirement analysis phase to be completed before proceeding to the designing of application. Anyway,

we have to keep in mind that requirements that have been determined during the requirement analysis phase may change or need to add new requirements at anytime. Hence, later tasks will certainly have impact on the architecture too.

A study was also done on other similar system such as Bank President and Real Money Simulation System as been elaborated in the Literature Review.

4.3 Requirement Analysis Procedure

4.3.1 Interviewing and Listening

Formal interviews and survey are one of the primary ways used to gather the requirement of Intelligent Bank Management System. The survey was conducted on twenty-four people from six different banks by distributing the survey forms to the participants. Interviews were conducted on six bank executives from six different banks. Many issues need to be considered such as what kind of services the users need and expect. In order to learn in detail about the types of users and their capability, an interview is essential. Hence, interviews were held with bank officers from the banks listed in Table 4.1.

Table 4.1

List of Banks and Bank Executives been Interviewed

Bank Name	Executive Name
MayBank Seremban	Mr.Tham
Hong Leong Bank, Seremban	Mr.Kensington Oh
Southern Bank, Subang Jaya	Pn. Azrumuda
Affin Bank, Subang Jaya	Pn. Jamila
Public Bank, Seremban	Mr.Pillai
RHB Bank, Subang Jaya	Mr.Chong

Most of the officers had cooperated and agreed to be interviewed regarding this issue. Interviews with the users were essential because they know what they want in the new Intelligent Bank Management System. The bank officers are one of the target users of the system; hence their expectations are very important and need to be considered when determining the requirements.

The interviews with the officers clearly show that in the bank officers' point of view, simulation based training system will be very useful for them as an e-learning tool which can be accessed from anywhere at anytime. This is because the trainees do not need to be in the same location every time to play the game.

Interviews with the users showed that most of them are computer literate. According to Mr.Kensington from Hong Leong Bank, the development of internet banking and other computerization issues will determine the development in the banking sector.

At the same time, the users showed their eagerness to know more about their bank's stability and the economics. They wanted to know what, why and how to manage a particular situation. For example, a team of participants may be facing a risk of gaining less deposit from the local economy for a certain period of time. This could be because of some improper strategy being applied. Subsequently, the team has an opportunity to create the strategy, maybe by increasing the interest rates. The users are actually training themselves to be prepared for real time situations. Currently, according to Pn. Jamila from Affin Bank, Subang Jaya, the current training focus on the banking strategies, report writing, financial analysis, bank management and other technical and marketing strategy related to interest rates.

Table 4.2 below shows the results of the interviews conducted with all the bank officers. As some of the officers do not intend to have their names written, the results of the interview with all the officers are compiled in the table shown below:

Table 4.2
List of Questions and Feedback

No.	Questions	Answers
1	Training - Type of training - Training Method - Training Location	<ul style="list-style-type: none"> - Most of the training are class room training (CRT) - For each training they will be sent to the Head Quarters in Kuala Lumpur which is tiring - One trainer for 20 -30 trainees - Training Method : Using presentation tools and workbook; workshops
2	Technological Issue and Usage	<ul style="list-style-type: none"> - Some systems are outdated especially the reporting system

	<ul style="list-style-type: none"> -Use of new technology -User feedback on the new system 	<ul style="list-style-type: none"> - Most of them are shifting towards new technology - Introduction to some of the new technology such as Linux are complicating their work as it is not user-friendly even after undergoing an intensive training - All the banks are moving towards internet banking - Some of the banks are facing difficulties in installing the new system as it is very expensive. - All banks provide training for their staffs
3	<p>Performance of Malaysian Banks</p> <ul style="list-style-type: none"> - Competitiveness - Deregulation - Weaknesses of local banks 	<ul style="list-style-type: none"> - Malaysian banks are locally very competitive but compared to foreign banks, there is a lot of development that needs to be done - Lack of international banking exposure in terms of strategies and management - The banks will achieve their objective in meeting the customer needs and as an international player while the government imposes certain regulations on the foreign banks in Malaysia.
4	<p>Computer Based Training System</p> <ul style="list-style-type: none"> - Comparison between Class Room Training (CRT) and Computer Based Training(CBT) - Recommendations 	<ul style="list-style-type: none"> - CBT is a good approach towards technology and knowledgeable worker - Some recommended to have CRT and CBT for more interaction - CBT will speed the training period - It depends on the type of training as some of the training need to have interaction with trainer
5	<p>Simulation based Training System</p> <ul style="list-style-type: none"> - Opinion on simulation training system 	<ul style="list-style-type: none"> - It is a very productive approach - The simulation system will be accepted if it could create the real environment - This approach should be taken as a long term planning - The simulation system need to have specialization and be separated for: <ol style="list-style-type: none"> 1. Loan Department 2. Business Plan Development 3. Marketing Department - Some of the users still prefer the old method

6	About Intelligent Bank Management Training System - How the system needs to be developed? - How the game should look like? - Recommendations	<ul style="list-style-type: none"> - The system need to be very practical and not boring - Should be able to accommodate all the macro factors - The system needs to be realistic such as the approach used in managing the bank and the reporting method - The game should not be too lengthy - Need to be efficient and simple to use - The system should be able to build their banking skills or expose them to the banking system - It should follow the Malaysian banking system as it differs from the United States of Americas' banking system
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According to Mr.Kensington from Hong Leong Bank, in order to be managing a bank well, the executives must have the following criterias:-

1. Technical Knowledge
2. Analytical Thinking
3. Strategic Decision Making
4. Problem Recognition
5. Financial Management
6. Marketing Strategy
7. Dynamism

Table 4.3 describes these criterias in detail in accordance to the interview results with Mr.Kensington and Mr.Pillai.

**Table 4.3
Management Criteria**

No	Criteria	Details of Interview
1	Technical Knowledge	<ol style="list-style-type: none"> 1. Asset-Liability Management: <ul style="list-style-type: none"> - Determine and measure interest rate 2. Managing Bank's Duration gap <ul style="list-style-type: none"> - Value and time weighted measure of maturity that consider the timing of all cash inflows from earning assets and all cash outflows associated with liabilities 3. Financial and Banking Structure 4. Regulatory Information 5. Managing the bank Investment Portfolio and Liquidity Position 6. Understanding of the complex rules and regulations
2	Analytical Thinking	<ol style="list-style-type: none"> 1. Interest Rate Analysis 2. Risk Analysis 3. Financial Analysis 4. Able to analyze the macroeconomics scale
3	Strategic Decision Making	<ol style="list-style-type: none"> 1. Operating Efficiency 2. Determine the bank's long range objective 3. Liability Management Strategy 4. Asset Management Strategy 5. Fund Management 6. Decision on interest rate 7. Investment in securities 8. Action plans to address and mitigate risk with clear steps
4	Problem Recognition	<ol style="list-style-type: none"> 1. Non Performing Loan 2. Competition 3. Drop in Loan Sales 4. Foreign bank penetration of Domestic Markets
5	Financial Management	<ol style="list-style-type: none"> 1. Financial flow and stocks 2. Financial Statement

		<ol style="list-style-type: none"> 3. Measure risk in banking 4. Expenses 5. Measuring the adequacy of earnings 6. Money Management skill 7. Annual Report
6	Marketing Strategy	<ol style="list-style-type: none"> 1. Monitor customer feedback 2. Facilities offered 3. Introduction of new packages for customer (eg: loan package) 4. Credit Card
7	Dynamism	<ol style="list-style-type: none"> 1. Able to change the strategy according to current economy 2. Able to comply with the Central Bank 3. Change the banking structure according to current banking trend 4. Technological innovation

4.3.2 Survey

A survey was conducted in order to gather information about the Malaysian Banking system. This information is very important in developing a simulation system that suits the banker's requirement in terms of bank management. An example of the survey form is included in the Appendix. The forms have been distributed to four bank executives from each bank as listed in Table 4.1. The questions focused on the type of training being provided, components to be included in Intelligent Bank Management Simulation training system and trends affecting the banks. The result is shown in Figure 4.1.

According to survey on the type of training being conducted in the local banks, 75% of the training use class room training only while 16.67% have said that the banks provide both class room training (CRT) and computer based training (CBT). The survey was done randomly without recognizing the bank's name as was requested by the bank executives.

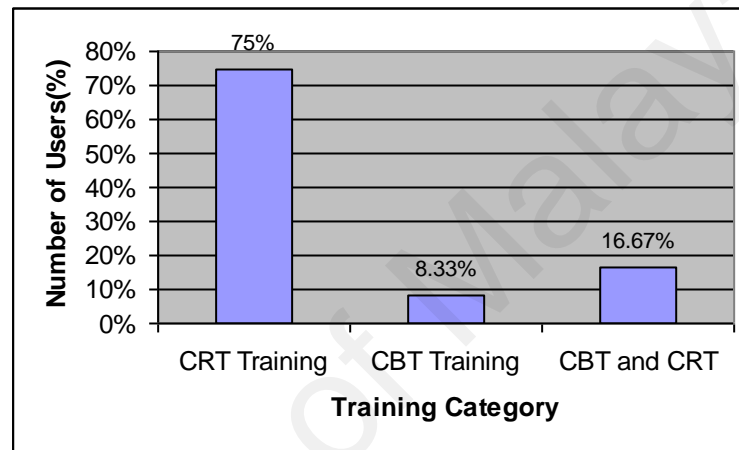


Figure 4.1: Number of users for each type of training provided for bank executives

According to a bank executive, the current training programs are held in different locations which are sometimes far from their bank branch. Some of them complained that the trainings are boring and it depends on the trainer's credibility.

According to Figure 4.2, 50% of the bank executives have rated the current training system as average and 16.67% of them have rated the training as good.

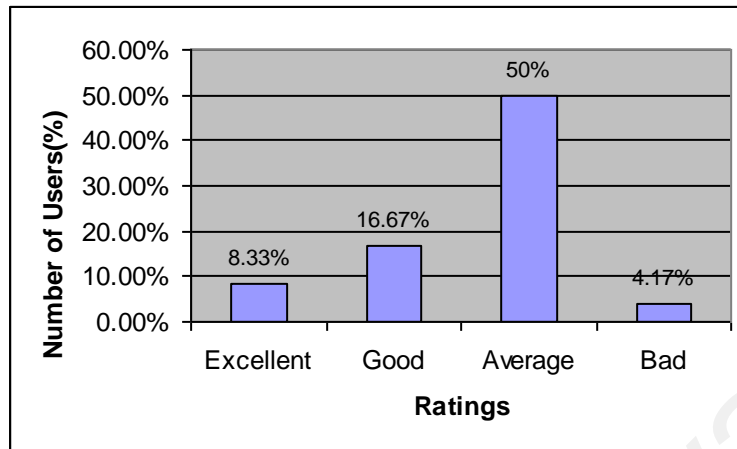


Figure 4.2: Ratings on the Trainings provided by Local Banks

The same bank executives were asked to rate simulation based training system and according to the survey as shown in Figure 4.3, 70.83% of them rate it as good while 16.67% rate it as average. This shows that most of them prefer to have a simulation based training system.

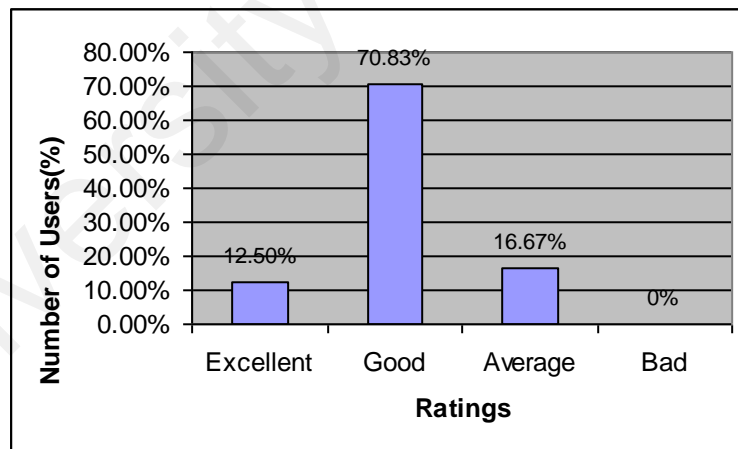


Figure 4.3: Rating by user on Simulation Based Training System

The users were asked to indicate the components which reflect the bank performance. As indicated in Figure 4.4, all of them have chosen GDP growth as an indicator to the performance of the banks while 83.33% have

chosen interest rate as one of the indicator. The others are management strategy, skillful workers and advertisement.

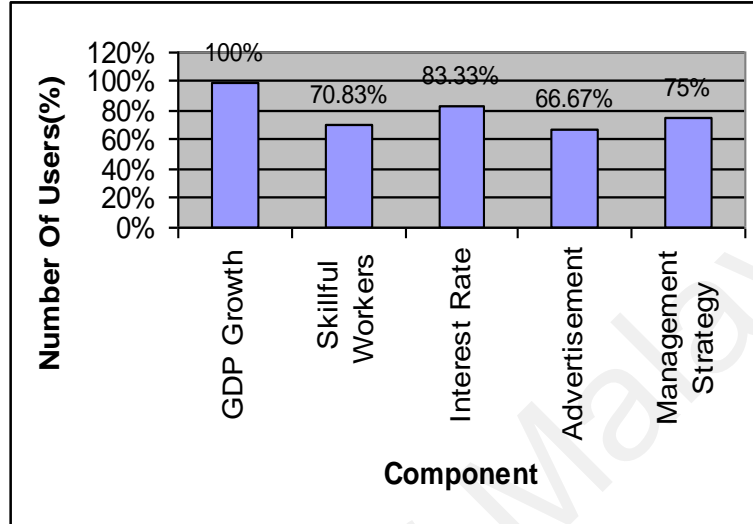


Figure 4.4: User Selection on the Components that indicate the Bank Performance

The result is shown in Figure 4.5 to identify the methods of participation preferred by bank executives. According to the survey, 83.33% prefer to play the game in groups. According to Mr. Kensington from Hong Leong Bank, the reason they choose to have it in groups is to build team work and cooperation among them, which is considered as a very important aspect in their daily business routine.

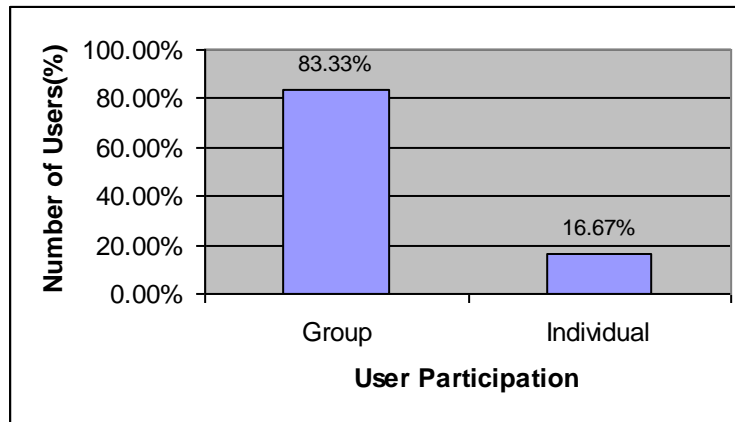


Figure 4.5: Preferred Type of Participation by the Users

Figure 4.6 shows the trends affecting banks performance. The bank executives were asked to list down the trends and 83.33% of them have indicated that the rising competition among the banks is their biggest threat and it affects their banks. The second highest trend will be knowledgeable and demanding customer. According to the graph, 68.98% have indicated that globalization could affect the bank as well.

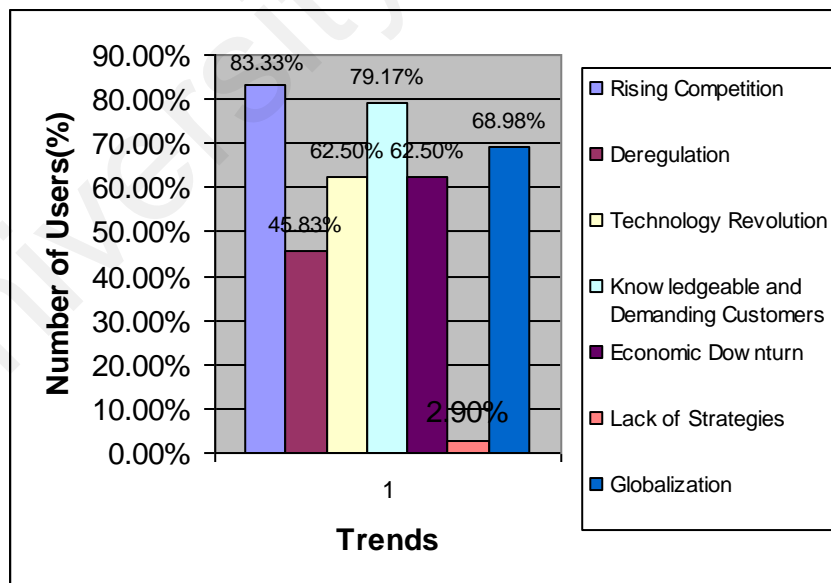


Figure 4.6: Trends that Affect the Bank Performance according to a Survey

4.3.3 Analyzing Procedures and Documents

Analysis of documents was done as another way of determining system requirements. These documents were very useful in deciding the important data needed by the participants of the IBMS. Through a detailed study on the bank records, less important data are ignored. The important data is inclusive of data which are needed by the game instructor to give fast and effective strategies to the participants, as the main aim of the system is to give benefit to both the players and the instructors. Besides that, it helped in understanding the establishment of a bank and the procedures to be followed in the banking sector.

The main documents which were useful for this project are

1. Malaysian Economic Statistic
2. Malaysian Central Bank Reports
3. Bank Annual Report

4.3.4 Malaysian Economic Statistic

The previous six years details of Malaysian economic statistics have been analyzed to understand the total amount of deposits available in a specific year in Malaysia. Table 4.4 shows the GDP growth, total GDP and Consumer Price Indices (CPI) from year 1997 to 2002.

According to the report, the data in Table 4.4 are the economic indicators of the country and the performance of banks depends on these economic indicators. These data will be shown to the Instructor and the participants to respond to the current economic situation and to manage the bank according to the economic situation.

Table 4.4
Yearly Growth Rate (Malaysian Central Bank Report)

Year	GDP Annual Growth (%)	GDP(RM billion)	CPI(Annual Change)
1997			
Quarter 1	7.6	46.0	4.0
Quarter 2	8.4	48.0	5.1
Quarter 3	7.2	50.8	5.2
Quarter 4	6.1	50.7	5.2
1998			
Quarter 1	-1.5	45.7	3.5
Quarter 2	-5.9	46.0	5.0
Quarter 3	-10.2	45.8	6.2
Quarter 4	-11.2	45.8	5.4
1999			
Quarter 1	-1.0	45.0	5.2
Quarter 2	4.8	48.0	3.0
Quarter 3	9.1	49.8	2.5
Quarter 4	11.7	51.0	2.1
2000			
Quarter 1	11.5	50.0	1.7
Quarter 2	8.3	52.5	1.5
Quarter 3	8.1	53.0	1.3
Quarter 4	2.9	54.0	2.0
2001			
Quarter 1	6.7	52.6	1.5
Quarter 2	0.4	52.5	1.5
Quarter 3	-1.0	53.0	1.4
Quarter 4	-0.8	53.5	1.0
2002			
Quarter 1	1.3	52.5	1.1
Quarter 2	4.0	54.0	2.0
Quarter 3	5.8	56.5	2.1
Quarter 4	5.4	56.5	1.8

4.3.5 Malaysian Central Bank's Statistics on Interest Rate

Referring to the Malaysian Central Bank's statistics and guidelines, the total liabilities and equity of IBMS were categorized as in Table 4.5 below:

Table 4.5
Categories of Liabilities and Equity

Liabilities Category	Allocation (%)
Deposit	90%
Central Bank Reserve	0%
Capital	6%
Equity	4%
TOTAL	100%

The deposits were categorized into checking deposit, savings deposit and time deposit as shown in Table 4.6.

Table 4.6
Allocation of Deposits in IBMS

Deposits Category	Allocation (%) from the Deposit Allocation
Checking Deposit	40%
Savings Deposit	30%
Time Deposit	30%
TOTAL	100%

The categories of assets are shown in Table 4.7.

Table 4.7
Categories of Assets and its Allocation

Assets Category	Allocation (%)
Loan	70%
Securities	20%
Cash	8%
Building	2%
TOTAL	100%

The loans were categorized into bridging loan, housing loan, syndicated loan and personal loan as shown in Table 4.8.

Table 4.8
Loan Allocation for IBMS

Loan Category	Allocation (%) from the Loan Allocation
Bridging Loan	45%
Housing Loan	10%
Syndicated Loan	13%
Personal Loan	32%
TOTAL	100%

The cash were categorized into vault cash, reserves and float as shown in Table 4.9.

Table 4.9
Cash Allocation for different type of Categories

Cash Category	Allocation (%) from the Cash Allocation
Vault Cash	20%
Reserves	40%
Float	40%
TOTAL	100%

In order for the participants to play the game, the data on interest rate need to be collected. The participants need to configure the interest rate for deposit and loans according to their managements' capability. Once the interest rate is entered and submitted, the IBMS will start to compare the interest rate with the real interest rate of Malaysian Banks as shown in Table 4.7 and Table 4.8. The data from Table 4.7 and Table 4.8 were collected from Central Bank of Malaysia and the interest rates were considered as the most effective rates for banks in accordance to the economic situation. The IBMS will automatically do a comparison between the Central Banks' rate and the participant's interest rate. The data will be evaluated according to Table 4.5 for deposits and Table 4.6 for loan. The IBMS will automatically release the amount as was stated in Table 4.10.

Table 4.10
Interest Regulator for Deposit

Rate	Interest Rate (IR)	Amount Released from Total Deposit
A	(IR – 5) to (IR + 5)	45%
B	Less than (IR – 5)	30%
C	More than (IR + 5)	15%

The table shown above was created after careful study and interview with the bank officer. According to the bank officers, Mr. Kensington from Hong Leong Bank and Mr.Tham from Maybank, as long as the interest rate is in between (IR – 5) and (IR + 5) it will be rated as ‘A’. As these interest rates are attractive and acceptable in accordance to the economic situation, 45% of the total deposit will be released to the participant’s bank automatically.

If the participant’s interest rates is less than the (IR – 5), it will be rated as ‘B’ and 30% of the total amount of deposit will be released to the participant’s bank. If the interest rate is more than (IR + 5), the system will automatically release 15% from the total amount of deposit available at a time in the country. The rules stated in Table 4.5 is applicable for all types

of deposits offered in IBMS such as checking deposit, savings deposit and time deposit.

The total amount of loan to be released will be decided through the interest rate stated by the participants and the marketing strategies established to promote their loan which will be evaluated by the Instructor. This concludes that the total loan to be provided by the banks will be decided by IBMS and the Instructor. Table 4.11 shows the total loan to be released by a bank according to the rates.

The rules stated in Table 4.11 is applicable to all types of loan offered in IBMS such as housing loan, personal loan, syndicated loan and bridging loan.

Table 4.11
Loan Allocated in accordance to the Interest Rate

Rate	Interest Rate (IR)	Amount Released from Total Loan Allocated
A	(IR – 5) to (IR + 5)	50%
B	Less than (IR – 5)	30%
C	More than (IR + 5)	15%

In accordance to the table shown above, 50% of the total loan will be allocated if the interest rate is in between (IR – 5) and (IR + 5). But if the

interest rate is less than $(IR - 5)$, 30% of the total loan will be released for the bank. If the interest rate is more than $(IR + 5)$, IBMS will automatically release 15% of the allocated loan.

Table 4.12 shows the details of deposit and interest rate in accordance to the Malaysian Central Bank report. Deposit allocation for IBMS were implemented according to the historical data shown in Table 4.12. Table 4.13 shows the details of loan available for each year and the interest rate in accordance to the Malaysian Central Bank report. The loan data were used in allocating loan for IBMS. The users data will be compared with the data in Table 4.12 and Table 4.13 to release the amount of loan and deposit in IBMS for every quarter.

Table 4.12
Details of Deposit and Interest Rate
(Malaysian Central Bank Report)

Year	Deposit (RM mil)	Interest Rate for Checking Deposit	Interest Rate for Savings Deposit	Interest Rate for Time Deposit (3 months)
1997				
Quarter 1	243, 811	8.81	3.90	4.83
Quarter 2		9.21	4.10	4.40
Quarter 3		9.27	4.19	4.45
Quarter 4		9.33	4.23	4.50
1998				
Quarter 1	307, 440	5.82	3.94	4.85
Quarter 2		5.83	3.96	4.86
Quarter 3		5.76	3.90	4.80
Quarter 4		5.74	3.87	4.78
1999				
Quarter 1	339, 708	3.24	2.50	3.80
Quarter 2		3.33	2.58	3.85
Quarter 3		3.68	2.67	3.90
Quarter 4		3.95	2.76	4.00
2000				
Quarter 1	362, 968	3.48	2.60	3.80
Quarter 2		3.50	2.64	3.85
Quarter 3		3.70	2.68	3.90
Quarter 4		4.24	2.73	3.87
2001				
Quarter 1	364, 724	3.21	2.48	3.78
Quarter 2		3.22	2.50	3.80
Quarter 3		3.34	2.58	3.85
Quarter 4		4.00	2.69	3.90
2002				
Quarter 1	366, 844	3.21	2.49	3.78
Quarter 2		3.22	2.50	3.81
Quarter 3		3.31	2.60	3.80
Quarter 4		4.00	2.70	3.85

Table 4.13
Details of Loan and Interest Rate
(Malaysian Central Bank Report)

Year	Total Loan (RM mil)	Interest Rate for Housing Loan	Interest Rate on Personal Loan	Interest Rate on Syndicated Loan	Interest Rate on Bridging Loan
1997					
Quarter 1	276, 117	9.80	5.80	7.80	10.15
Quarter 2		9.95	6.45	8.90	10.30
Quarter 3		9.90	6.30	8.85	8.40
Quarter 4		9.60	6.00	8.70	8.20
1998					
Quarter 1	283, 160	8.80	6.00	8.80	8.40
Quarter 2		8.85	5.80	8.90	8.20
Quarter 3		8.70	5.80	8.90	8.40
Quarter 4		8.65	6.00	8.85	8.40
1999					
Quarter 1	285, 160	8.65	6.00	8.80	8.45
Quarter 2		8.65	6.50	8.80	8.35
Quarter 3		8.70	6.35	8.70	8.30
Quarter 4		8.72	6.40	8.75	8.30
2000					
Quarter 1	303, 528	8.70	6.30	8.70	8.25
Quarter 2		8.65	6.35	8.75	8.20
Quarter 3		8.60	6.30	8.70	8.20
Quarter 4		8.50	6.25	8.65	8.15
2001					
Quarter 1	304, 677	8.50	6.20	8.65	8.20
Quarter 2		8.45	6.18	8.60	8.20
Quarter 3		8.40	6.20	8.65	8.25
Quarter 4		8.40	6.25	8.70	8.30
2002					
Quarter 1	305, 707	8.45	6.20	8.75	8.35
Quarter 2		8.50	6.25	8.70	8.40
Quarter 3		8.50	6.30	8.65	8.45
Quarter 4		8.55	6.32	8.62	8.40

4.3.6 Income

According to the income statement in the annual reports of Maybank, Hong Leong Bank and Public Bank Berhad, the net income can be calculated as shown below:

$$\text{Net Income} = (\text{Interest Revenue} - \text{Interest Expenses}) + \text{Fee Income} - (\text{Non Interest Expenses} + \text{Taxes})$$

Interest Revenue are the interest collected from the loan that have been released to the customers. The interest expenses are the interest being given to the customer according to the deposit being allocated to the participant's bank.

4.3.7 Bank Annual Report

The bank annual report is a very important source in recognizing the structure, format and important data that need to be declared at the end of each year. As for IBMS, a report will be generated at the end of each quarter.

The bank reports that have been analyzed are:

- i. Maybank Annual Report 2000
- ii. Hong Leong Bank Annual Report for the year 2000

- iii. Public Bank Annual Report for the year 2000
- iv. RHB Bank Annual Report for the year 2000
- v. Bank Bumiputra Annual Report for the year 2000

In accordance to the Maybank Annual Report, the bank is managed by six divisional groups called as:

1. Main Group

The Main Group is headed by the Chairman and the board of directors. The main task of the group is to administer both the international and local bank branches.

2. Operational Group

The Operational Group is headed by the CEO and the main task of this group is to manage the banking activities for both local and international banks. According to Mr.Tham from Maybank this group is regarded as the most important group as it determines the operational effectiveness and efficiency of a bank.

3. Marketing Group

The Marketing Group will be headed by the Marketing Director. The task of this group is to establish marketing strategies for the banks in all areas especially for deposit, loans and credit card.

4. Investment Group

This group is called as the investment arm of Maybank Berhad. The group will determine the type of investment to be done by Maybank.

5. Risk Management Group

The Risk Management Group will be involved more towards assisting the management in minimizing the risk factors

Table 4.14 shows the content of the bank annual report. Generally all the banks have the contents as shown in the Table 4.14 of the bank annual report.

Table 4.14
Contents of Bank Annual Report

Index	Contents
1	Notice of AGM
2	Financial Highlights
3	Financial Summary
4	Corporate Information
5	Statement of Corporate Governance
6	Audit Committee
7	Consumer Financial Services
8	Risk Management
9	Human Resource Management and Development
10	Management's Discussion and Analysis on Financial Position
11	Financial Information
12	Group Corporate Highlights

4.4 IBMS System Requirements

4.4.1 Functional Requirements

The Intelligent Bank Management Simulation System involves two type of user:

1. Instructor
2. Participants

The use case diagrams below (Figures 4.7 until 4.11) shows the task of the instructor and participants in using the system.

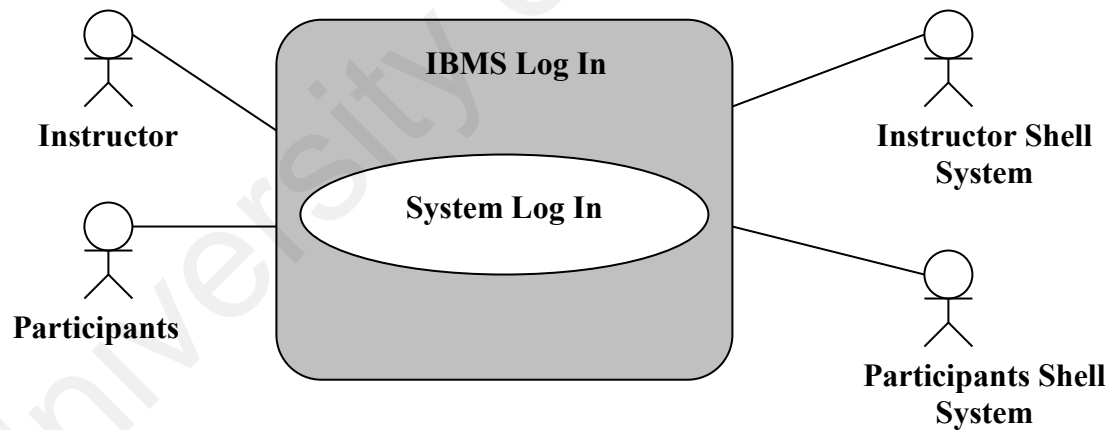


Figure 4.7: Use Case Diagram 1

Use Case: IBMS Log In

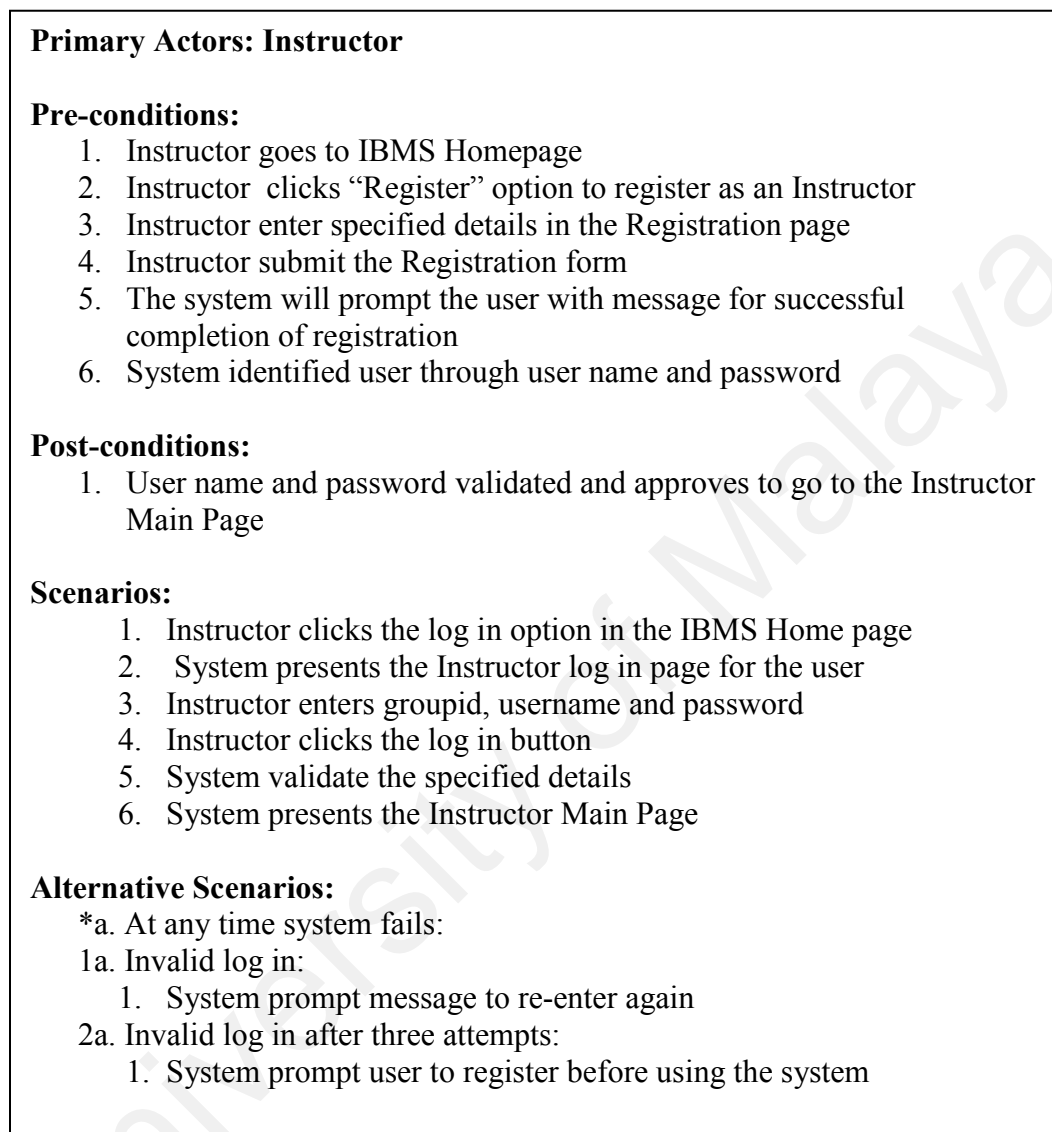


Figure 4.8: Use Case Description for IBMS Log in - Instructor

Use Case: IBMS Log In

Primary Actors: Participant

Pre-conditions:

1. Participant goes to IBMS Homepage
2. Participant clicks “Register” option to register as an Instructor
3. Participant enter specified details in the Registration page
4. Participant submit the Registration form
5. The system will prompt the user with message for successful completion of registration
6. System identified user through user name and password

Post-conditions:

1. User name and password validated and approves to go to the Participant Main Page

Scenarios:

7. Participant clicks the log in option in the IBMS Home page
8. System presents the Instructor log in page for the user
9. Participant enters groupid, username and password
10. Participant clicks the log in button
11. System validate the specified details
12. System presents the Participant Main Page

Alternative Scenarios:

At any time system fails:

- 1a. Invalid log in:
 7. System prompt message to re-enter again
- 1b. Invalid log in after three attempts:
 1. System prompt user to register before using the system

Figure 4.9: Use Case Description for IBMS Log in - Participant

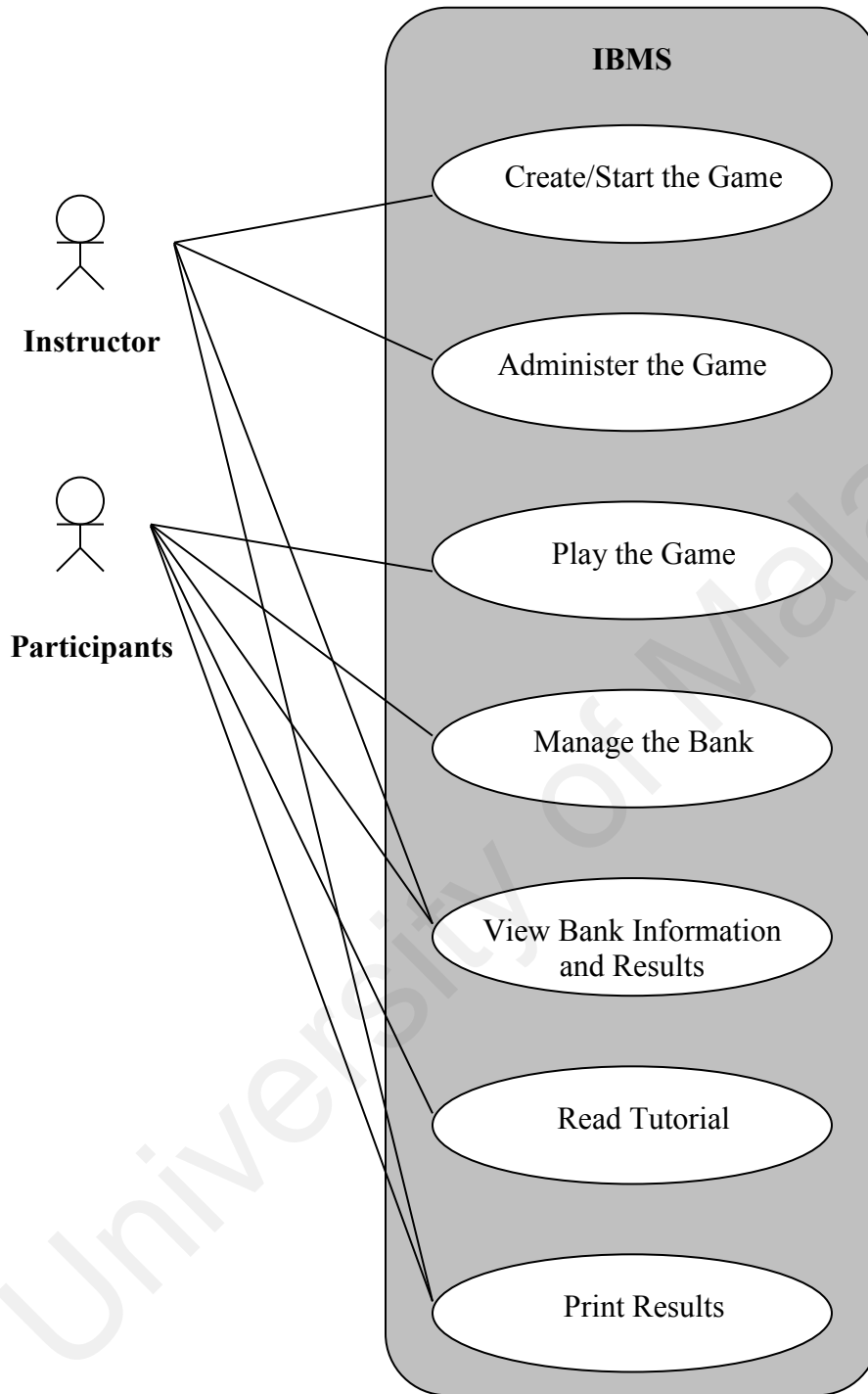


Figure 4.10: Use Case Diagram 2

Use Case : IBMS

Primary Actors: Instructor, Participants

Pre-conditions:

1. Instructor goes to IBMS Homepage
2. Instructor clicks “Register” option to register as an Instructor
3. Instructor enter specified details in the Registration page
4. Instructor submit the Registration form
5. The system will prompt the user with message for successful completion of registration
6. System identified user through user name and password

Post-conditions:

2. Instructor create a new game, configure the regulatory environment and administer the game played by the participants

Scenarios:

1. Instructor log in to the system
2. System presents Instructor Main Page
3. Instructor click “Create a New Game” option
4. System presents the New Game form
5. Instructor fill in the form with details
6. Instructor press submit button to save the details
7. System prompts user for successful submission
8. Instructor click “Regulatory Environment” from the main page
9. System presents the Regulatory page
10. Instructor enters the specified details
11. Instructor press submit button to save the details
12. System prompts user for successful submission
13. Participant log in to the system
14. System presents Participant Main Page
15. Participant read tutorial
16. Participant click “Set up Bank” option
17. System presents the Corporate Page
18. Participant enters the specified details
19. Participant click submit button to save the details
20. System displays Objective Page
21. Participant enters the specified details
22. Participant click submit button to save the details
23. System displays Operational Page

Figure 4.11: Use Case Description for IBMS

Scenarios:

29. Participant manage the bank for quarter 1
30. Participant view default information
31. Participant press submit button to end quarter N
32. Instructor view the results for the quarter N form Instructor Main Page
33. Instructor evaluate the performance
34. Instructor press submit button after evaluation
35. System will disburse loan and deposit amount after evaluation
36. System generate report for quarter N
37. Participant and Instructor view results for quarter N
38. Participant and Instructor print results: Income statement and balance sheet

*The scenario will be used for four quarters only.

Alternative Scenarios:

- *a. At any time system fails:
- 1a. Game Creation Fails:
 2. System prompt message to re-enter details and
 - 2a. Invalid Configuration:
 1. System prompt user to fill in all the details
 - 3a. Invalid Submission
 1. System prompt user to fill in corporate details again

Figure 4.11, continued

4.4.2 Non-functional Requirements

Non-functional requirements represent a wide range of performance. Non-functional requirements are the constraints under which a system must operate and the standards which must be met by the delivered system. These requirements are very important and essential to make sure that IBMS does not only fulfill the user's needs but also fulfills the operational standards, procedures, rules and regulations. The operational requirements for IBMS are:

1. Hardware and software requirements – the hardware and software used by the IBMS to perform its tasks during run time.
2. User interface (UI) which is easy to use and easy to understand – UI should be easy to use and understand as UI is the communication tool between IBMS and the users
3. Reliability – IBMS should not produce dangerous and costly failures when it is used in a reasonable manner.
4. Understandability – in terms of the coding method used, allows other programmers to understand the logic of program flows. Hence, modifications can be done easily without effecting other part of the programs
5. Security Requirement – Whenever a user registers as a participant, they will be provided with the username and password.

6. Confidentiality – when dealing with banking strategy information's, confidentiality plays a major role as only the user concern are allowed to view the records.
7. Maintainability – IBMS can be easily maintained and changes can be done with ease
8. Number of Users – The minimum number of group at a time is one and the maximum numbers of groups are four. Each group consist of six members
9. Response time – The response time should be less than 8 second as been suggested for web based system by www.websiteoptimization.
10. Availability Restrictions – 24 hours a day
11. Connectivity needed from user sites – PC users connected on a dial-up lines or on a TCP/IP LAN

4.5 IBMS Hardware Requirements

4.5.1 Server Side

4.5.1.1 Web Server

The list below shows the system requirements required to set up a web server for the Web based Intelligent Bank Management System (IBMS):

1. 133 MHz or higher Pentium compatible CPU
2. 256 MB of RAM recommended

3. 4 GB hard disk with a minimum of 1 GB of free space
4. Windows 2000 server supports up to 4 CPUs on one machine
5. Network Interface Card

4.5.1.2 Web Database

The list below shows the system requirements required to set up a database management system (DBMS) for the IBMS:

1. Personal computer with an Intel Pentium or compatible 166 MHz or higher processor
2. 128 MB of RAM is recommended
3. 95 to 270 MB of available hard disk space for server, 250 MB free hard disk space for typical installation
4. Network Interface Card

4.5.2 Client Side

4.5.2.1 Personal Computer

The list below shows the system requirements required to set up a client PC to be able to use the Intelligent Bank Management System (IBMS):

1. 166 MHz or higher processor
2. At least 32 MB of RAM

3. Hard disk requirements vary based on the system configuration and the application and the features chosen to be installed
4. Additional memory may be required depending on operating system requirements
5. Network connection through existing network configuration or modem (recommended at least 28.8 Kbps)

4.6 IBMS Software Requirements

4.6.1 Server Side

4.6.1.1 Web Server (Microsoft Windows 2000 Server with IIS 5.0)

Microsoft Windows 2000 Server operating system and its built-in web server, Internet Information Service 5.0 (IIS 5.0) is used to set up the Web Server. Windows 2000 Server operating system can help build the Internet into every part of an organization. From hosting a simple Web site to building a sophisticated e-commerce application, the Web and application services in windows 2000 provide the foundation to take full advantage of the Internet. Building on the strength of the services in the Microsoft Windows NT 4.0 operating system, Windows 2000 was designed with the internet very much in mind. The heart of the Windows 2000 Web and Application service is the built-in Web Server, Internet Information Services 5.0. The full featured server enables to host web sites that can take advantage of interactive applications.

IIS supports the latest Internet standard, so that can take full advantage of the full scope of Internet technologies. IIS 5.0 features increased reliability, scalability and performance. IIS 5.0 includes enhanced version of Active Server Pages (ASP) server scripting environment. IIS 5.0 makes it easier to restart services, and it can even automatically restart itself if a bad Web application does cause a crash. In addition, IIS 5.0 supports an improved application protection model to help make sure that bad applications could not crash the Web Server.

4.6.1.2 Web Database (Microsoft Windows 2000 Server and MySQL Server)

Microsoft Windows 2000 Server operating system and Microsoft MySQL Server are used to set up the web database for the web based IBMS. MySQL Server running on Windows 2000 Server can achieve high performance.

MySQL Server 2000 is optimized to take advantage of many new features in Windows 2000 Server. It will also run on Windows NT and Microsoft Windows 98. By using SQL Server with Windows

2000 Server, the management of the database systems is improved through the Active Directory Services available in the Windows

2000 Server. Active Directory stores properties about each database such as description, alias, version, database size and the date of last database backup.

4.6.2 Client Side

4.6.2.1 Personal computers (Microsoft Windows OS and Web Browser)

A client PC should have a Windows operating system such as Windows 95, Windows 98, Windows NT 4.0 or Windows 2000 and a web browser, Internet Explorer 5.0 or above.

4.7 Workstation Hardware Requirements

A separate workstation is needed for the development of IBMS. By avoiding the development tasks being done on the server or the run time hardware, any crash caused by coding or testing will not affect the server or other related hardware. The list below shows the system requirements required to set up a workstation to carry out development tasks for the IBMS:

1. Personal computer with an Intel Pentium or compatible 166 MHz or higher processor
2. 32 MB of RAM
3. 4 GB hard disk is recommended.

4. Network connection through existing network configuration or modem.
5. Other standard computer peripherals

4.8 Workstation Software Requirements

4.8.1 Microsoft Visual Interdev 6.0

Microsoft Visual Interdev 6.0 will be used as the software development tool in this project. It is a comprehensive web based application development tool. It also provides an integrated environment that brings together various technologies to work towards a common goal of building robust and dynamic applications for the web. Microsoft Visual Interdev 6.0 development system now provides the comprehensive resources necessary for the successful Windows 2000 development.

It is needed for building e-commerce web solutions that take advantage of the new Windows 2000 clustering technologies, such as network and component load balancing, to scalable data-driven business application. It also provides a rapid application development (RAD) environment that lets developers design, build, debug and deploy data-driven Web applications faster than ever before. Visual InterDev 6.0 simplifies the process of integrating databases into a web application. Visual InterDev 6.0 ensures that the programming model is consistent for applications that

target either down-level browser or the latest version of Dynamic HTML browsers. It also offers the best possible tool for developers working on diverse teams.

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4.9 Conclusion

The system requirements are the key input to the software architecture design. As was discussed earlier, the requirement analysis only capture the functional, operational, management or organizational, hardware and software requirements. During the designing phases, many more issues will be considered such as the layers, numbers of tiers and the infrastructure. Besides that, during the software architecture designing phase, the requirements are likely to change and this is normal as the purpose of the software architecture is to develop a formal specification that enables implementers to build applications which is operable.

CHAPTER 5

INTELLIGENT BANK MANAGEMENT SYSTEM (IBMS) DESIGN

5.1 Introduction

Software architecture design begins after the system analysis phase and before the implementation phase. In Chapter 4, the system requirements for IBMS were produced and these requirements are the key input for the software architecture design.

The design focuses on three important concepts which are business logic of IBMS, the access layer and the user interface layer. UML were used to design the architectural design for each layer. It is essential to know the business logic as it captures the static and dynamic relationship that exists in between the business objects. Then the access layers were designed in accordance to the business class diagram for data storage. The last phase was about user interface design which focuses more towards the front end of the system.

5.2 Business Class Diagram

The business class diagram was used to identify the components of IBMS and the relationship in between components. Figure 5.1 is an IBMS business class diagram. The diagram shows that in order to play the IBMS, the users need to register themselves to create an account. The business class diagram also shows the relationships in between the Instructor and participants.

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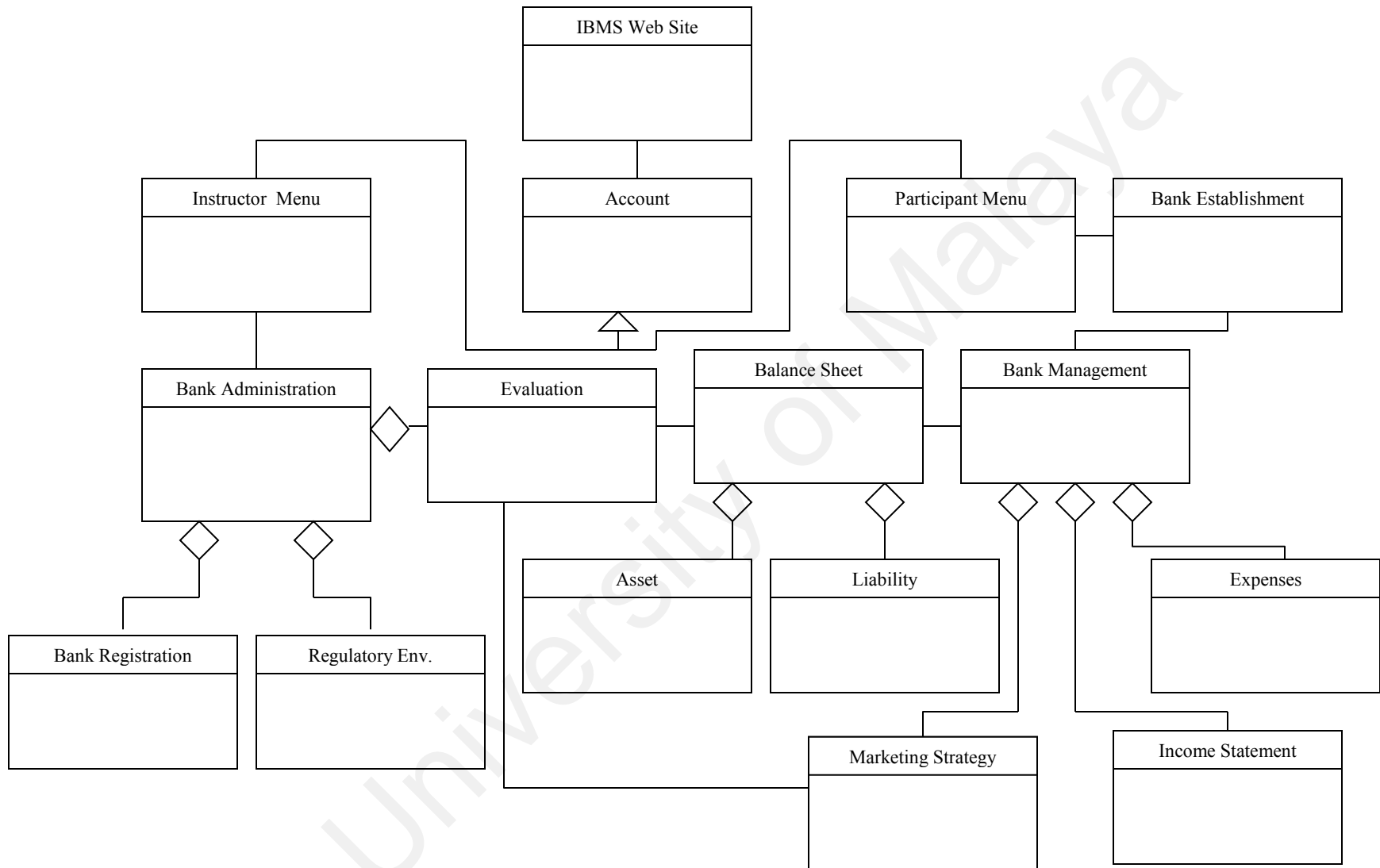


Figure 5.1: Business Class Diagram

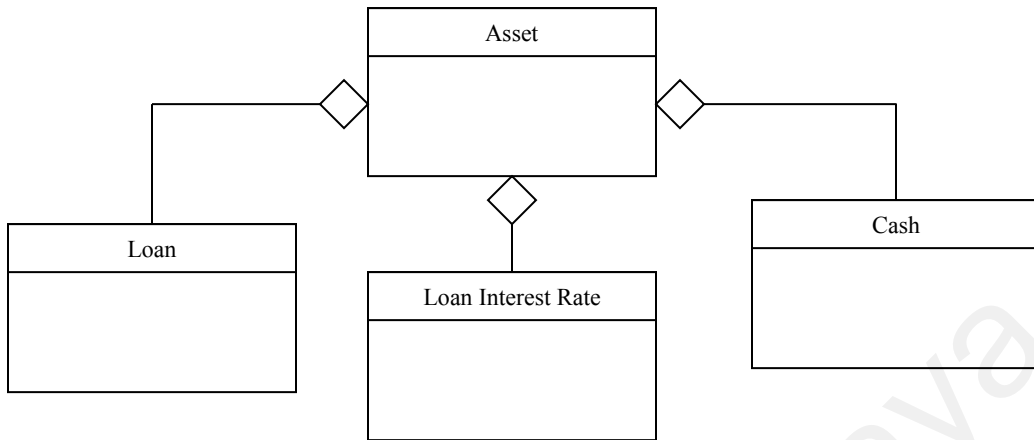


Figure 5.1, continued

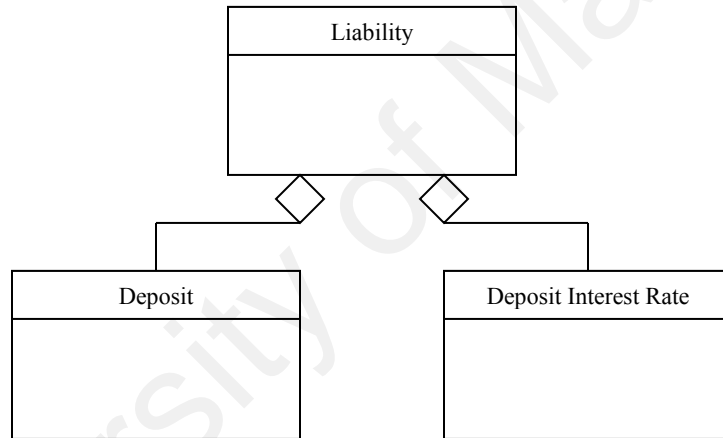


Figure 5.1. continued

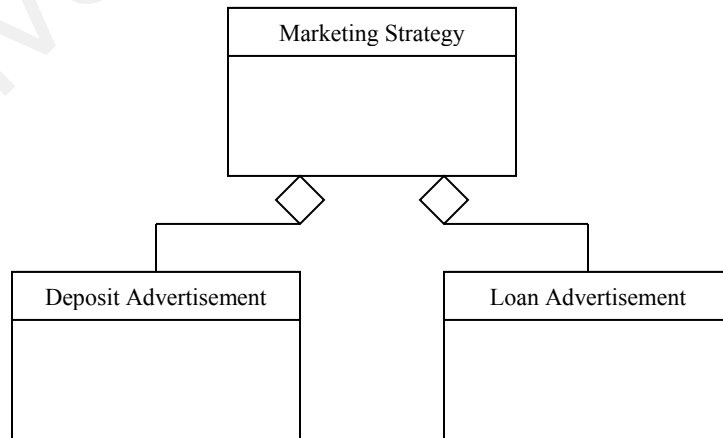


Figure 5.1, continued

5.3 Activity Diagram for the Design of IBMS

The Activity Diagram shown below is an abstraction from the use case model shown in the analysis phase. The activity diagram shows the overall workflow of the bank management using the Intelligent Bank Management System (IBMS). The activity diagram explains that the Instructor needs to start the game by registering the banks to compete in the application. Next the Instructor will go to the Regulatory Environment Page to configure the regulatory environment. Then the Instructor will press the complete button to initiate the Quarter 1 with the default configuration of Quarter 0.

Next the participants will log in to the system and if the participants are in Quarter 1, they need to establish the bank. Once the bank has been established the bank will have a default balance sheet and income statement of Quarter 0. The participants need to analyze the report and regulatory environment. Accordingly the strategy needs to be implemented to improve the bank performance. The Bank committee needs to decide on the strategy and start to play the game by configuring the interest rates and expenses.

Once the participant click the complete button, the Quarter will be completed and the Instructor will need to evaluate and rate the strategy to show the results of the bank decision.

Next, the participants will view the results and feedback from the Instructor as well as print the report. Next the Instructor will analyze the quarterly report. This cycle will go on until the last quarter. After the last quarter, the Instructor will announce the winner or the bank which have performed better than the others.

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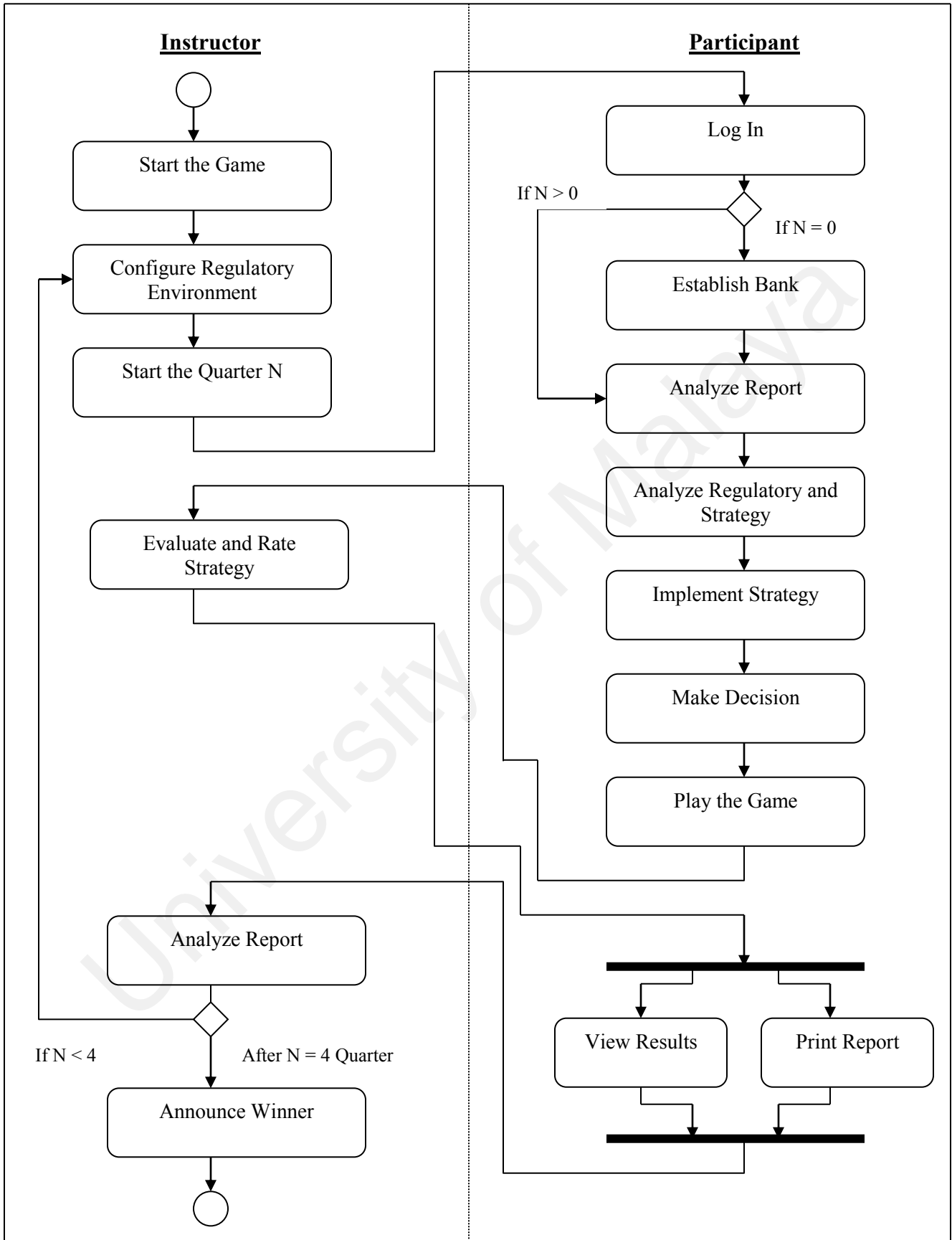


Figure 5.2: IBMS Activity Diagram

5.4 Database Classes

The database design for IBMS was carried out by identifying the access classes through the business class diagram. The storage classes for IBMS are:

1. class Registration – stores the registration information for both Instructor and participants
2. class Bank Establishment – stores the data needed for creating a new game
3. class Regulatory Environment – stores the regulatory environment data
4. class Maximum(Max) Deposit Rates – stores the range of interest rates for the types of deposits
5. class Maximum (Max) Loan Rates – stores the range of interest rates for the types of loan
6. class Maximum(Max) Reserve Requirement(Req) – stores the reserved amount for the bank from deposits
7. class Other Regulatory – stores other regulatory data
8. class Deposit Advertisement – stores data about deposit advertisement that need to be viewed by the Instructor
9. class Loan Advertisement – stores data about loan advertisement that need to be viewed by the Instructor
10. class Bank Profile – stores data needed during the setting up of the bank by the participants
11. class Balance Sheet – stores the data about assets and liability
12. class Asset – stores data about types of assets

13. class Cash – stores data about types of cash
14. class Loan – stores the amount of loan disbursed for all type of loan
15. class Loan Interest Rate – stores the data on loan interest rates
16. class Interest Income – stores the amount of interest income gained for each quarter
17. class Liability – stores data about types of liability
18. class Deposit – stores data about types of deposits
19. class Deposit Interest Rate – stores the data on deposit interest rates
20. class Interest Expenses – stores the amount of interest expenses for each quarter
21. class Expenses – stores the data on types of expenses and the amount
22. class Income Statement – stores the data related to income statement

The access classes for IBMS are shown in Figure 5.3 below:

Registration	Bank Establishment	Regulatory Environment
<ul style="list-style-type: none"> - GroupID - User Level - User Name - Password - e-mail - Department - User ID 	<ul style="list-style-type: none"> - GroupID - Bank Name - Instructor Name - Nu. Of Banks - Bank Chairman - Economic Year 	<ul style="list-style-type: none"> - Max Deposit Rates - Max Loan Rates - Max Reserve Req - Other Regulatory
Max Deposit Rates	Max Loan Rates	Max Reserve Req
<ul style="list-style-type: none"> - GroupID - Bank Name - Quarter - Checking Deposit - Savings Deposit - Time Deposit 	<ul style="list-style-type: none"> - GroupID - Bank Name - Quarter - Syndicated Loan - Housing Loan - Bridging Loan - Personal Loan 	<ul style="list-style-type: none"> - GroupID - Bank Name - Quarter - Checking Deposit - Savings Deposit - Time Deposit

Figure 5.3: Access Classes

Other Regulatory	Deposit Advertisement	Loan Advertisement
<ul style="list-style-type: none"> - GroupID - Bank Name - Quarter - Max Capital Note 	<ul style="list-style-type: none"> - GroupID - Bank Name - Quarter - Strategy 1 - Strategy 2 - Strategy 3 - Strategy 4 - Total cost 	<ul style="list-style-type: none"> - GroupID - Bank Name - Quarter - Strategy 1 - Strategy 2 - Strategy 3 - Strategy 4
Bank Profile	Balance Sheet	Asset
<ul style="list-style-type: none"> - GroupID - Bank Name - Objective - Bank Chairman - Executive 1 - Executive 2 - Executive 3 - Executive 4 	<ul style="list-style-type: none"> - GroupID - Bank Name - Quarter - Total Asset - Total Liability 	<ul style="list-style-type: none"> - Group ID - Bank Name - Quarter - Cash - Loan - Premises - Securities - Total Asset
Cash	Loan	Loan Interest Rate
<ul style="list-style-type: none"> - GroupID - Bank Name - Quarter - Vault Cash - Reserves - Float - Total Cash 	<ul style="list-style-type: none"> - GroupID - Bank Name - Quarter - Syndicated - Housing - Bridging - Personal 	<ul style="list-style-type: none"> - GroupID - Bank Name - Quarter - Syndicated - Housing - Bridging - Personal

Figure 5.3, continued

Interest Rate Income	Liability	Deposit
<ul style="list-style-type: none"> - GroupID - Bank Name - Quarter - Syndicated - Bridging - Housing - Personal - Total 	<ul style="list-style-type: none"> - GroupID - Bank Name - Quarter - Deposit - Central Borrowing - Capital Notes - Equity 	<ul style="list-style-type: none"> - GroupID - Bank Name - Quarter - Checking - Savings - Time Deposit - Total Deposit
Deposit Interest Rate	Interest Expenses	Expenses
<ul style="list-style-type: none"> - GroupID - Bank Name - Quarter - Checking - Savings - Time 	<ul style="list-style-type: none"> - GroupID - Bank Name - Quarter - Checking - Savings - Time - Total Interest Expenses 	<ul style="list-style-type: none"> - GroupID - Bank Name - Quarter - Salaries - Total Deposit Adv - Total Loan Adv
Income Statement		
<ul style="list-style-type: none"> - GroupID - Bank Name - Quarter - Total Interest Income - Total Interest Expenses - Net Interest Income - Operating Income - Total Expenses - Total Revenue - Avg Tax - Net Income 		

Figure 5.3, continued

Figure 5.4 shows the relationship in between each access class layer:

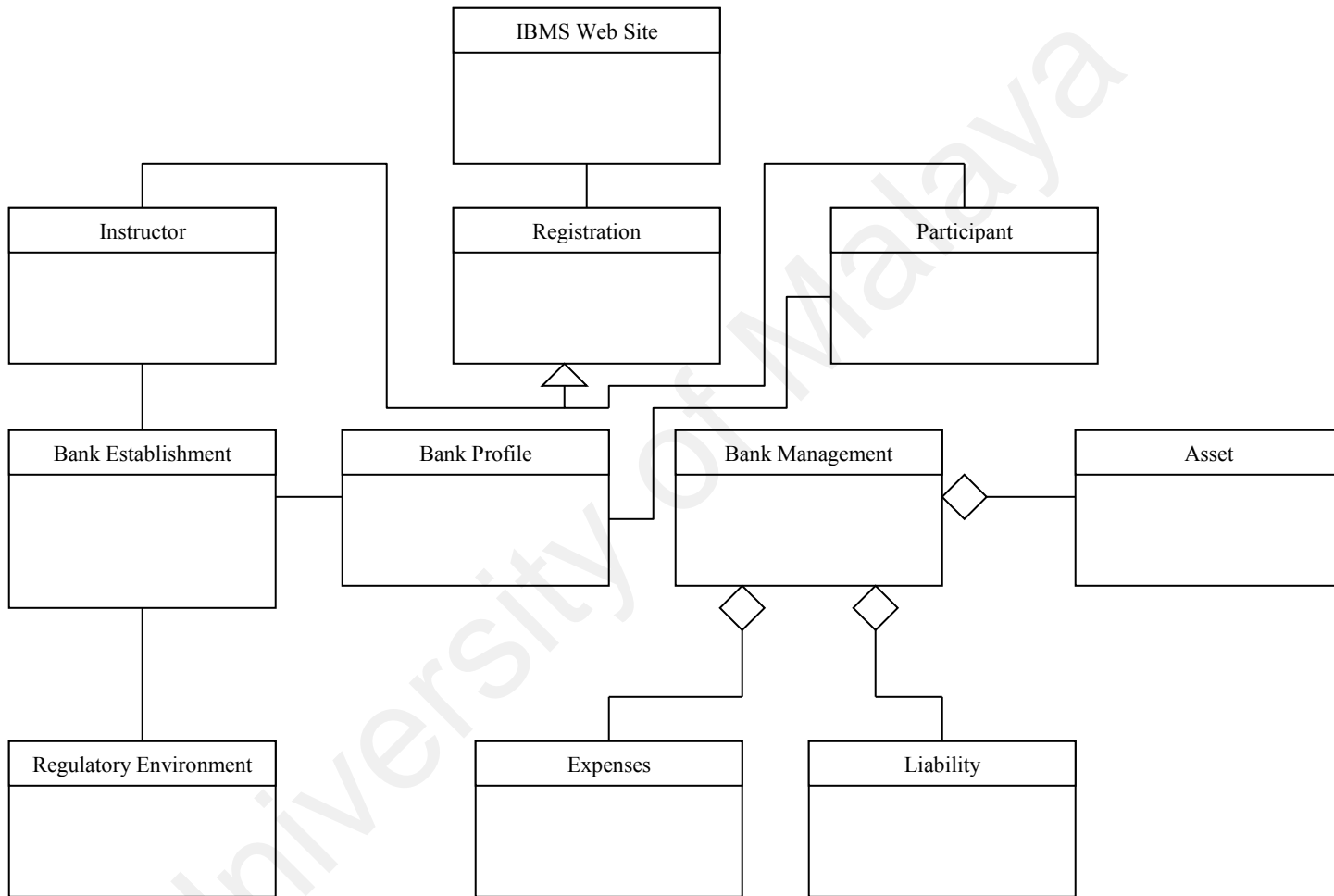


Figure 5.4: Access Classes

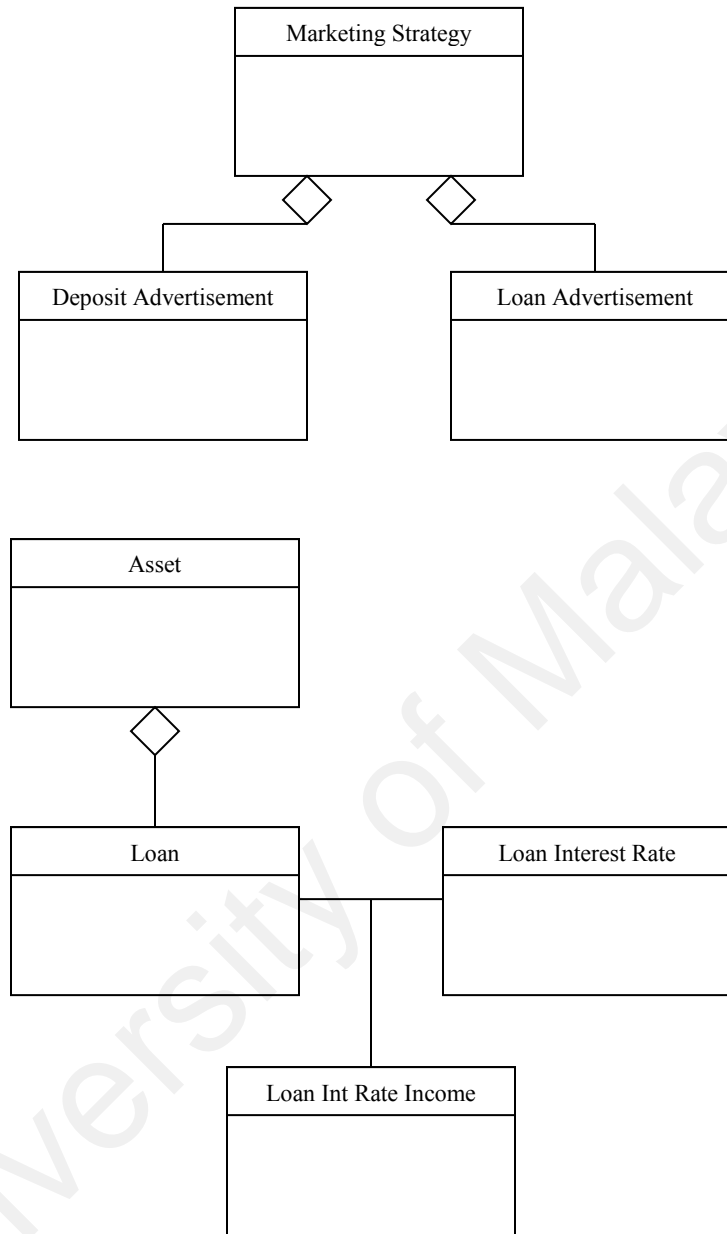


Figure 5.4, continued

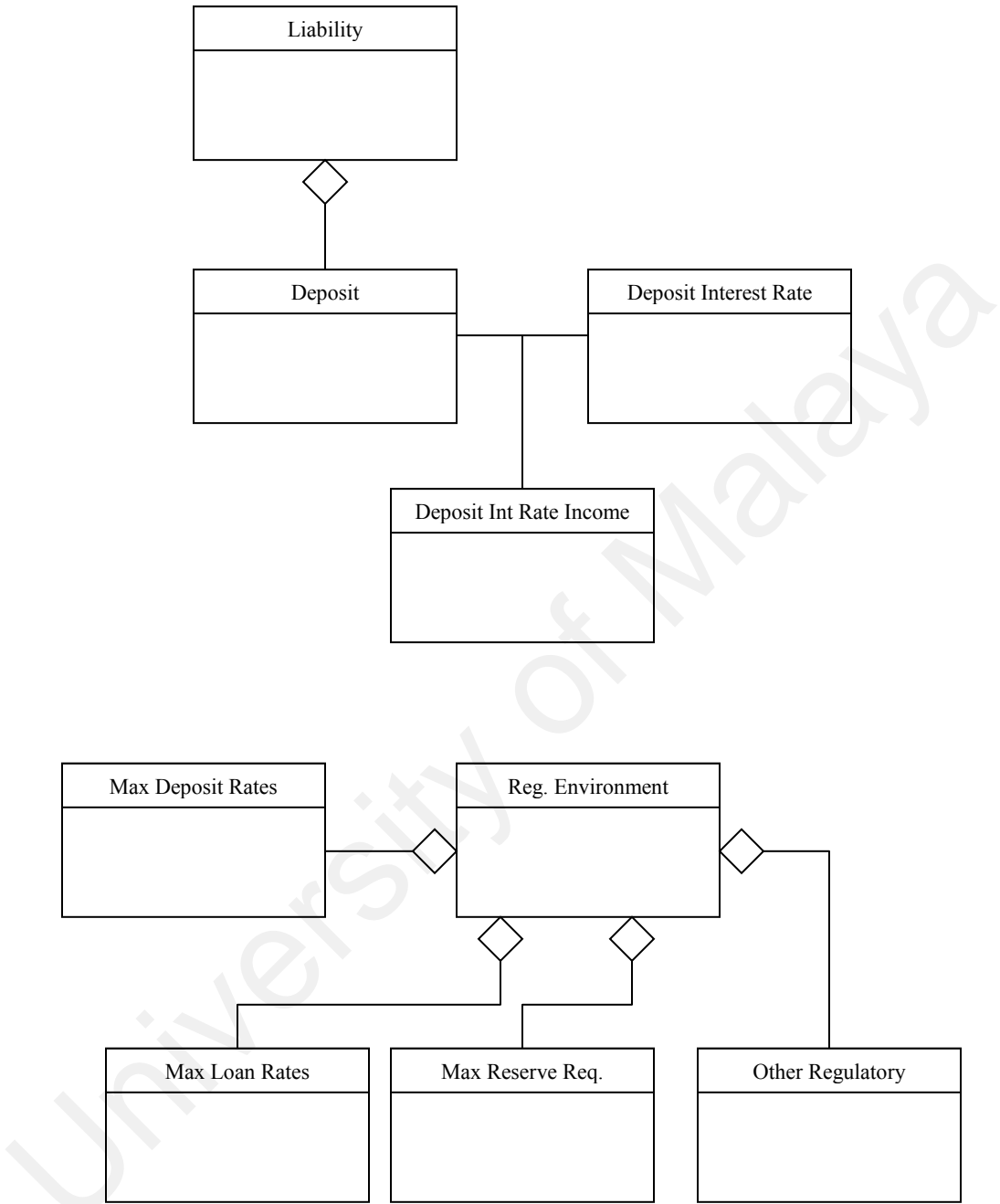


Figure 5.4, continued

5.5 Intelligent Bank Management System (IBMS) Architecture

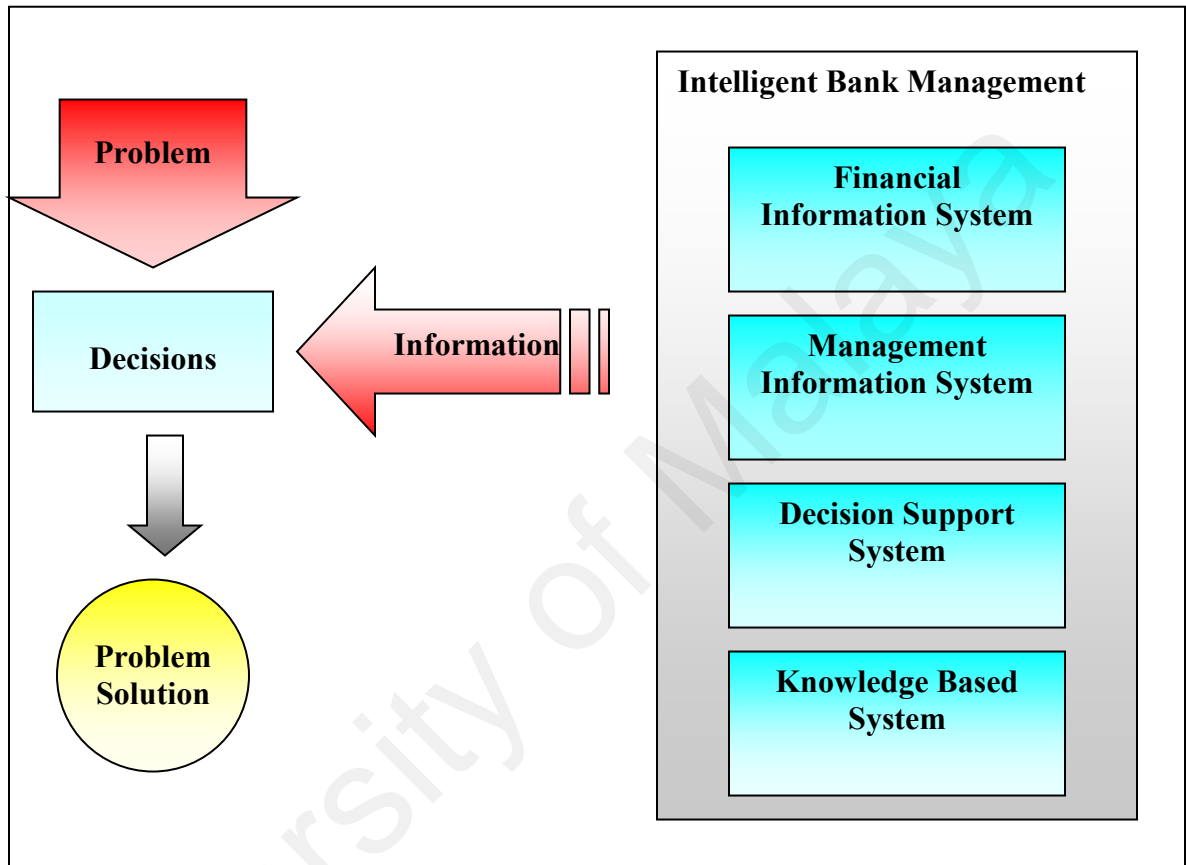


Figure 5.5: The Framework of IBMS

Figure 5.5 shows the IBMS architecture that consists of four important components to assist the participants in making decision. The components are:

1. Financial Information System

IBMS able to provide the financial information of the previous quarter as a reference to further improve in their current quarter.

2. Management Information System

The management information system is a combination of financial information system which provides the necessary information to manage the bank.

3. Decision Support System

IBMS were able to generate necessary information such as income statement and balance sheet from the participants input which were used to make a decision for the next quarter.

4. Knowledge Based System

The system was able to provide necessary information or help if the participants were not able to make a decision through the tutorial module.

The combinations of these four components were used by the participants to provide solution for their problem while managing the bank.

5.6 Sequence Diagram

Sequence diagrams are shown below to show the interaction between the user interfaces in a time sequence. The vertical dimension represents time; the horizontal dimension represents different objects. The sequence diagrams shown below were used as a guideline in designing the user interface.

The sequence diagram consists of:

1. Figure 5.6: Creating a Game
2. Figure 5.7: Game Administration
3. Figure 5.8: Playing the Game
4. Figure 5.9: Manage the Bank
5. Figure 5.10: View Results for Instructor
6. Figure 5.11: View Results for Participan

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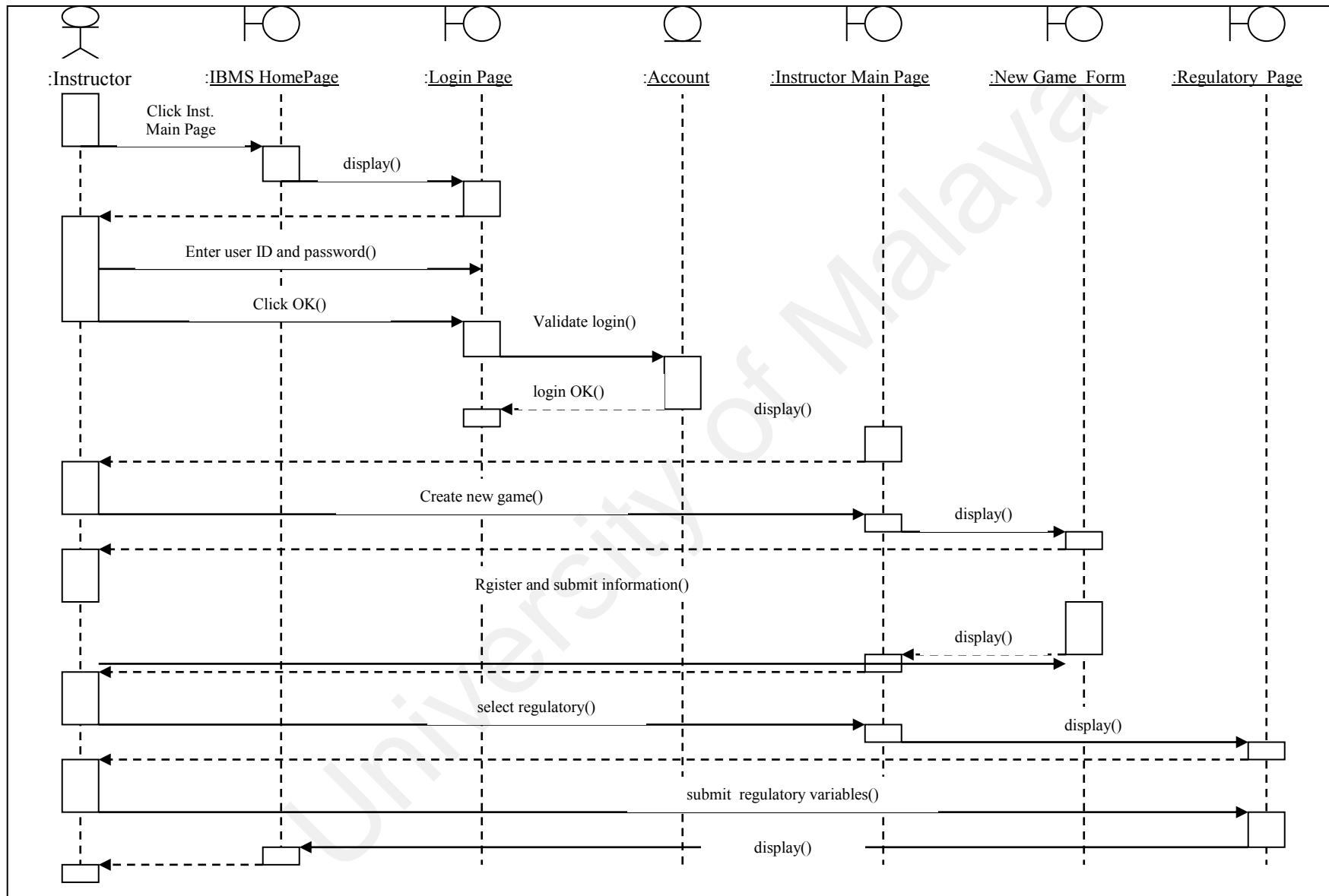


Figure 5.6: Creating a New Game

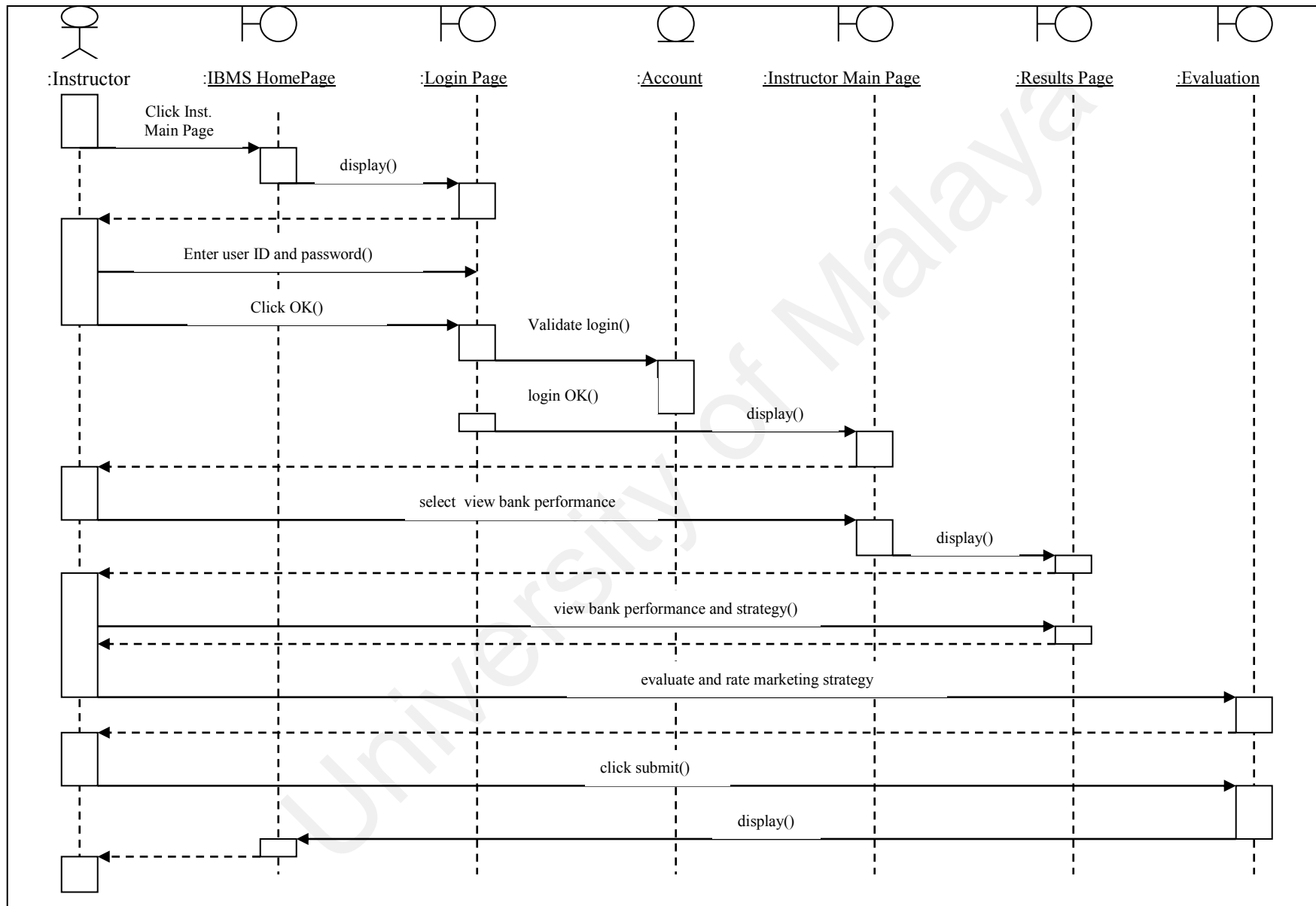


Figure 5.7: Game Administration

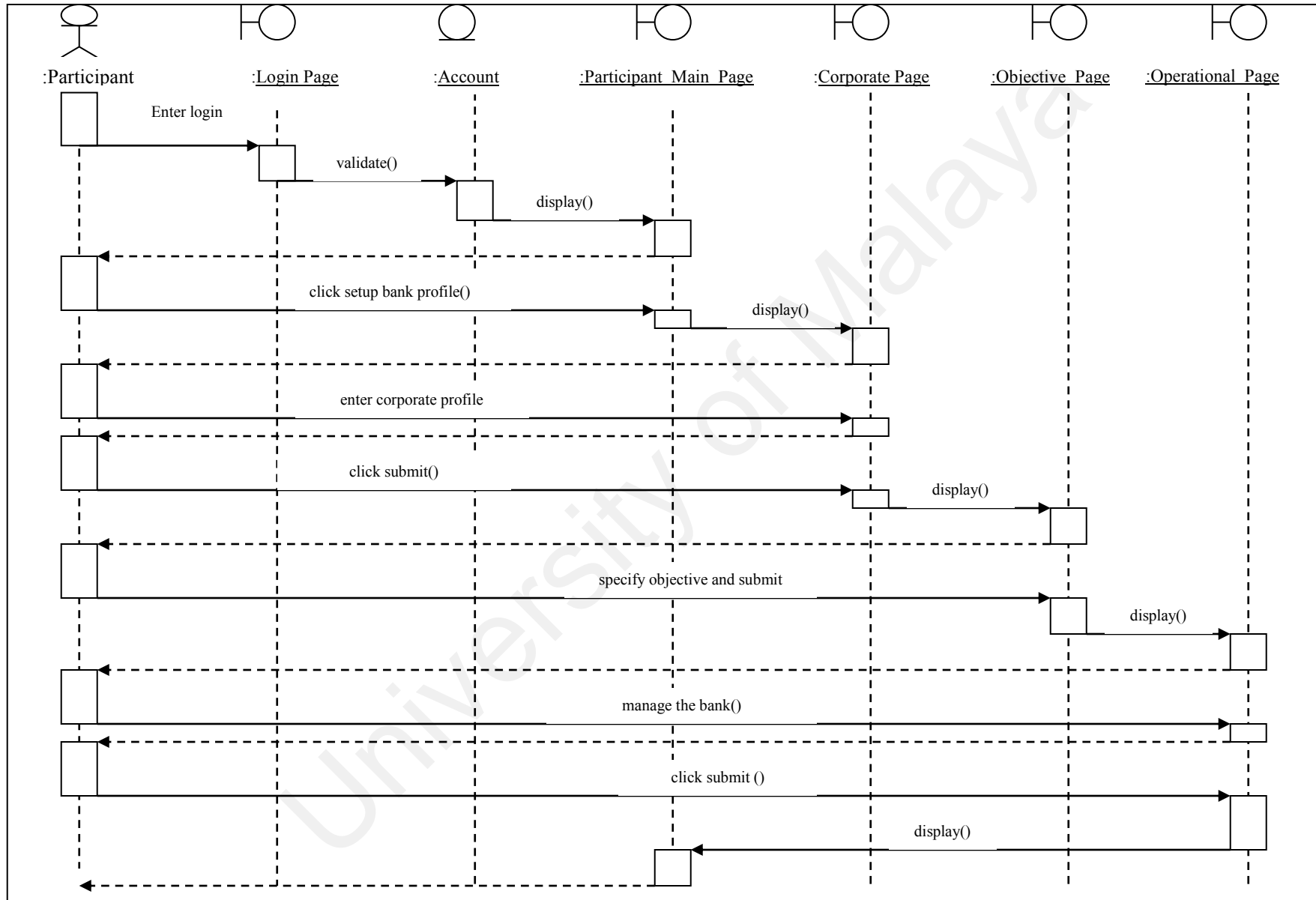


Figure 5.8: Play the Game

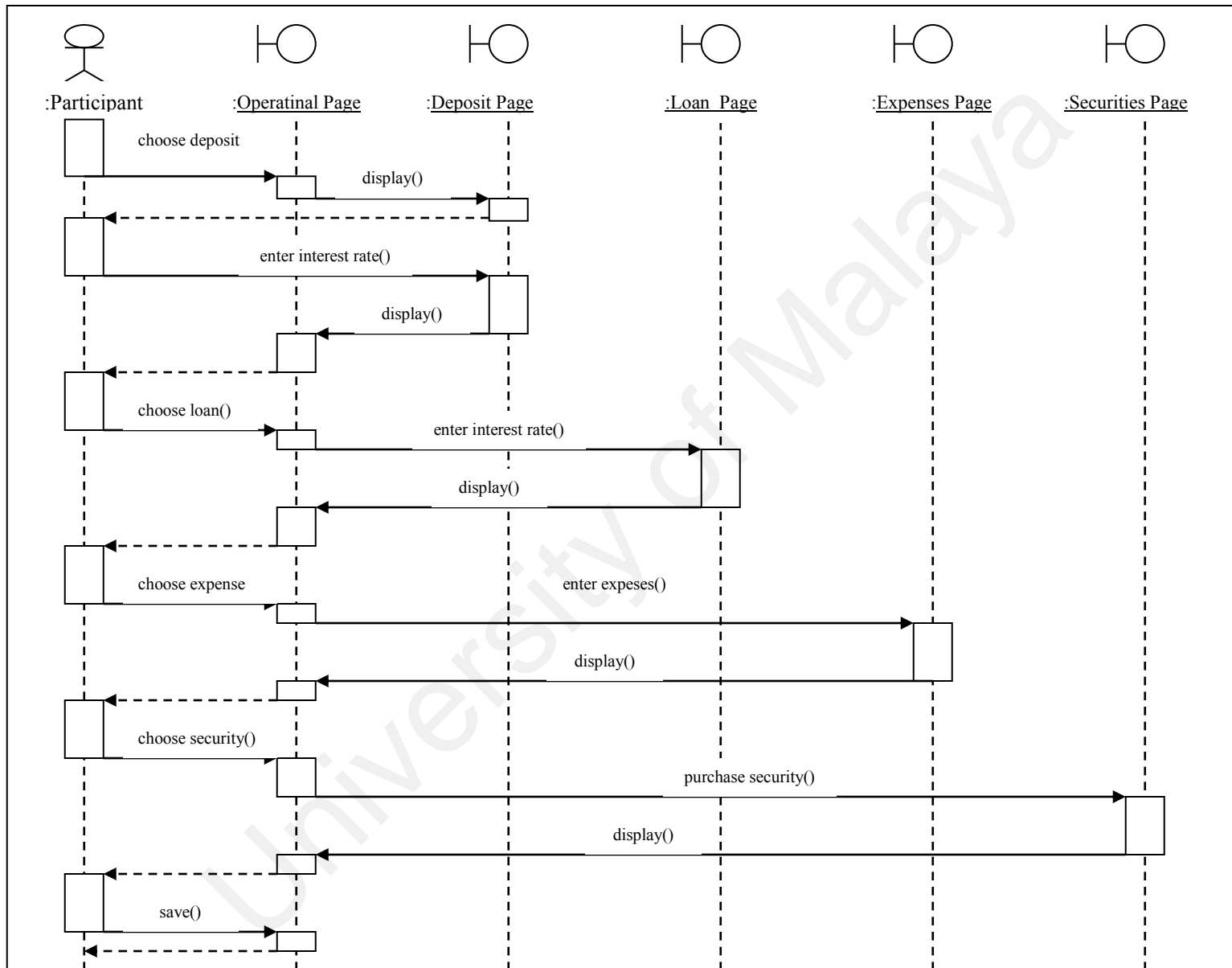


Figure 5.9: Manage the Bank

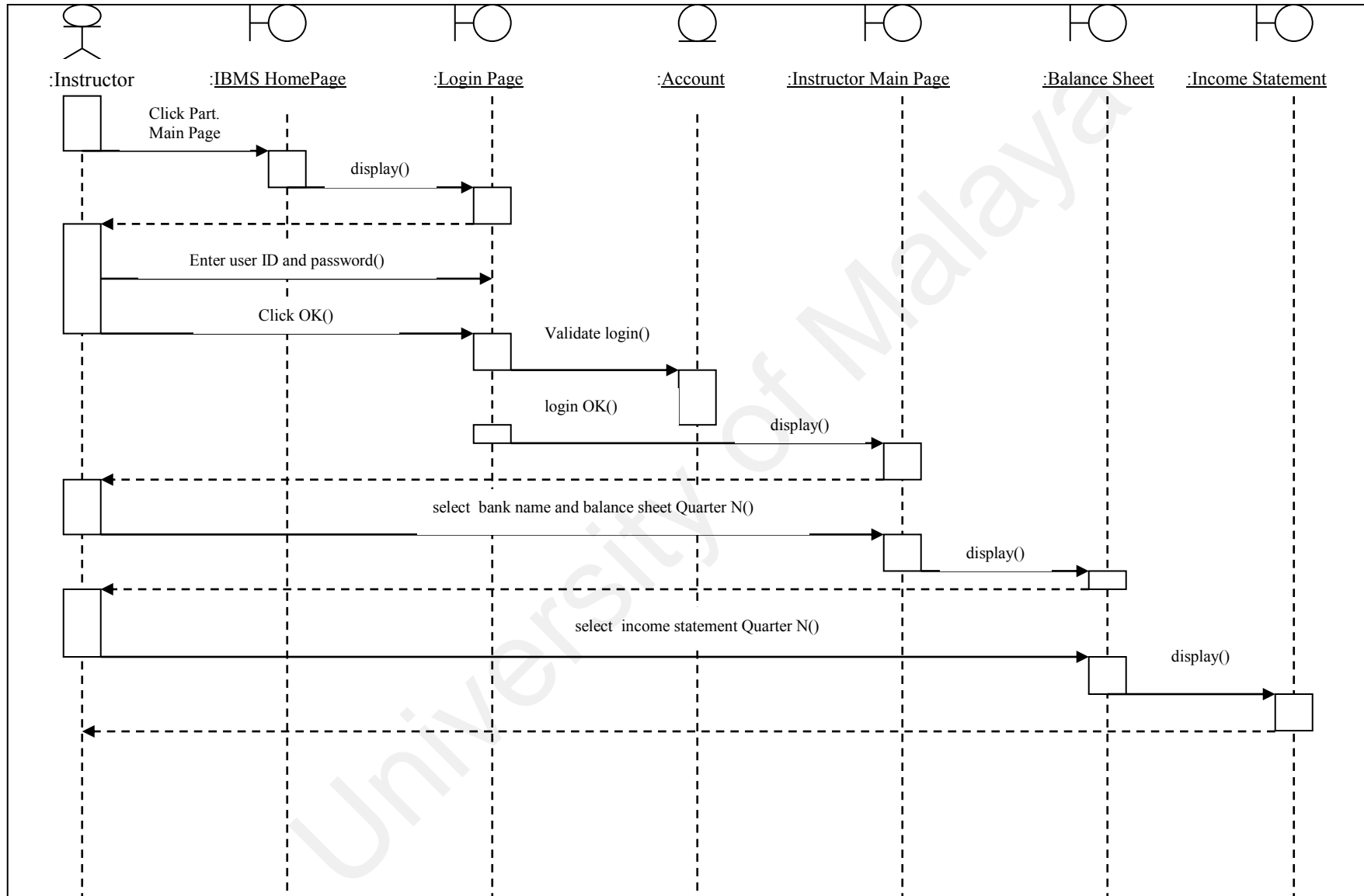


Figure 5.10: View Results for Instructor

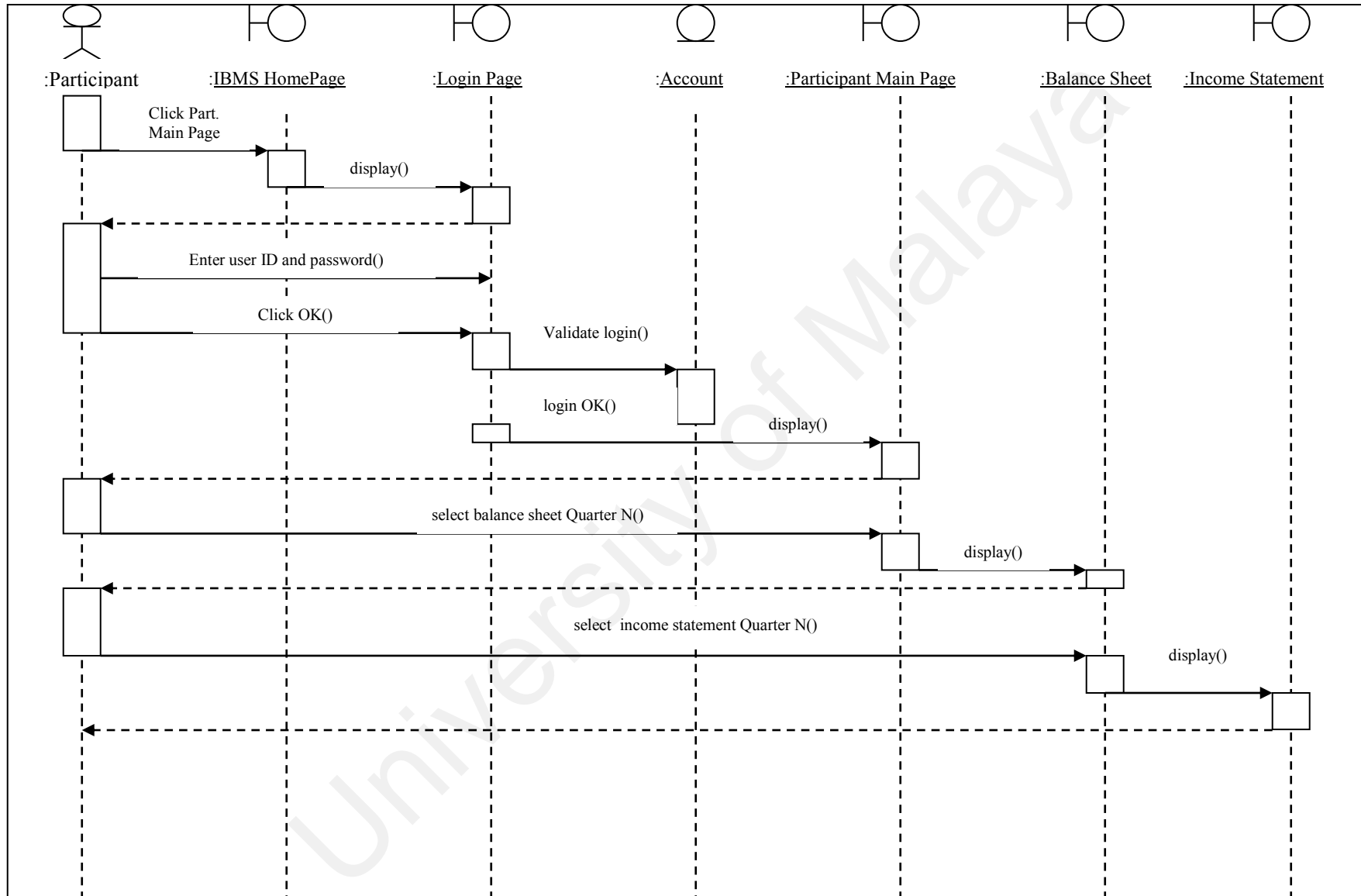


Figure 5.11: View Results for Participant

5.7 User Interface Design

Figure 5.12 shows the various front-ends that allow users to read and manipulate configuration data. Each user interface module is represented as an object in the interface layer diagram shown below.

There are two main interface layers that have been designed for IBMS in accordance to the type of users and their accessibility to the data. The diagram shows the relationship in between each interface module in detail.

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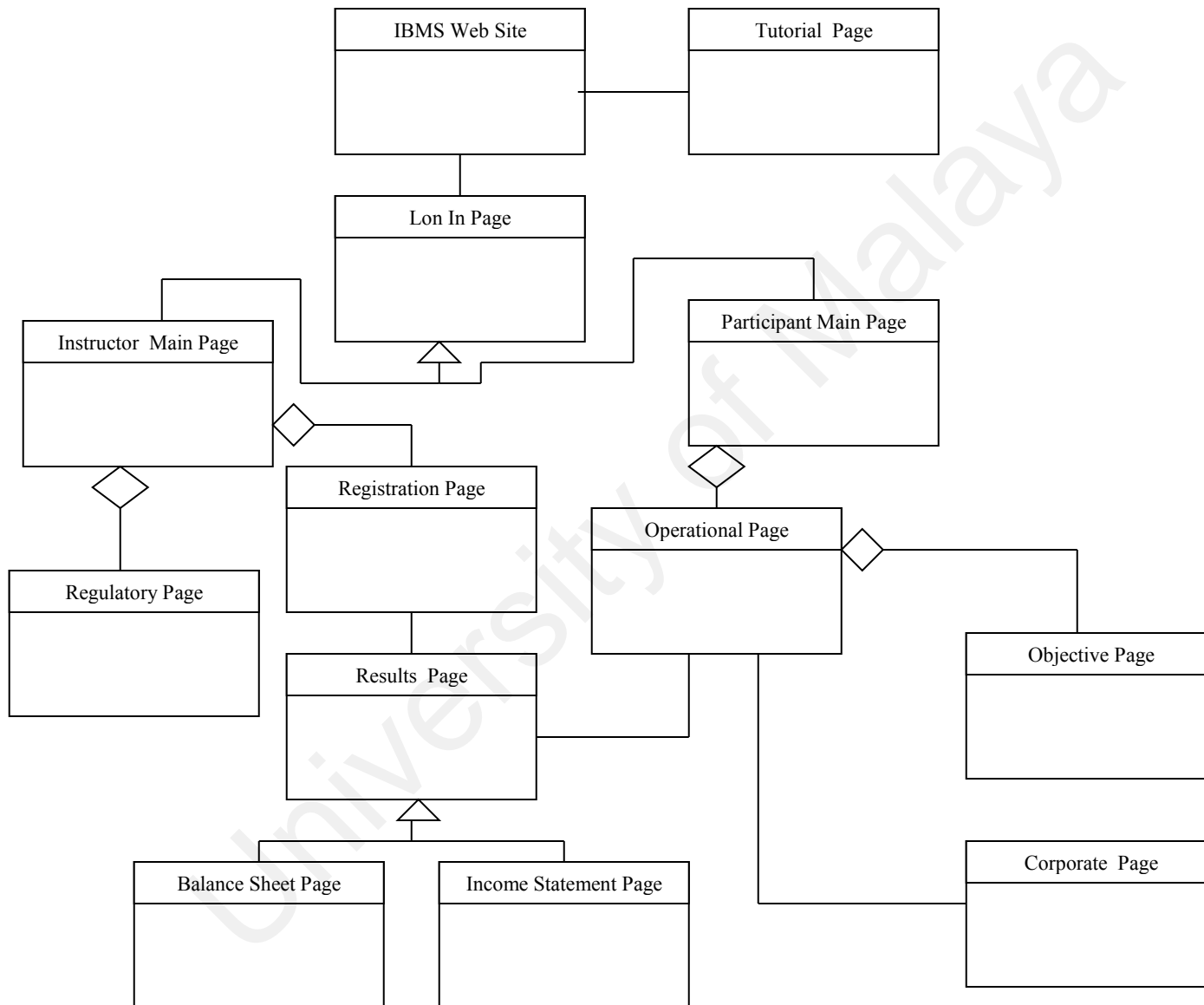


Figure 5.12: Interface Class Diagram

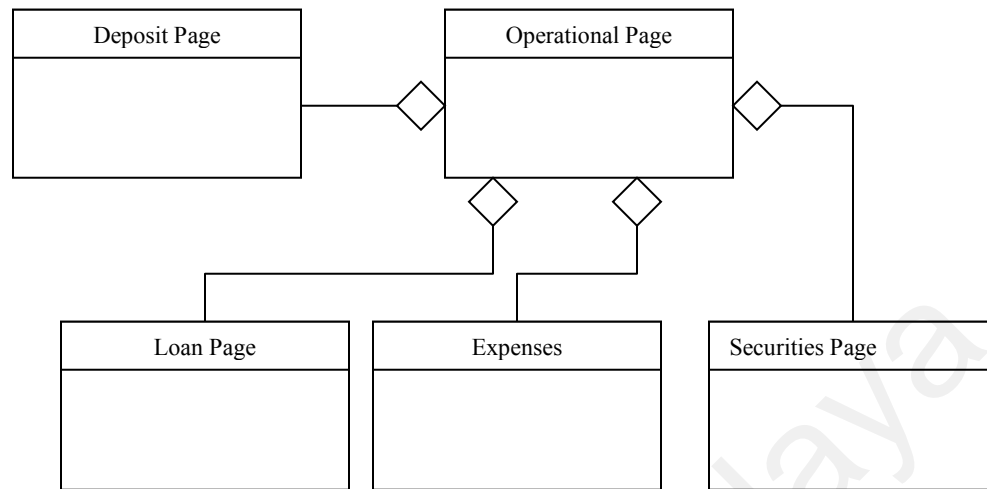


Figure 5.12, continued

5.8 Product Factor

The design of the Intelligent Bank Management System (IBMS) is closely related to the factors affecting the product such as:

1. Functional Features
2. User Interface
3. Performance
4. Dependability
5. Failure Rates and testing
6. Service
7. Product Cost

5.8.1 Functional Features:

1. On line Bank Management

Users of the system who had registered have their own bank management page

2. On Line Financial Information Records

Users of the system who had registered have access to their bank management record

3. Financial Decision Making

Users of the system who had registered will be able to change the rates (deposit, loan etc) with comparison to the previous record.

4. View Results Information

Users of the system who had registered will be able to view the results for each quarter (balance sheet and Profit report)

5. On line Tutorial on Bank Management

The registered users will be able to view the tutorial and will also able to sit for the on line test of IBMS.

5.8.2 User Interface

1. Ease of use and understandable

The system must accommodate all types of users from novice to experts

2. User Interface can be customized

The user interface will be customized for each bank registered under IBMS

5.8.3 Performance

1. Number of Users

Number of users is not set as the expectation is very high

2. Response time

User request will be processed and the result is sent back to the client PC

5.8.4 Dependability

1. Availability Restriction

System will function for 24 hours a day and it could be accessed globally

2. Costly Failures

System can be dependable in any kind of situation and avoid costly failures

3. Security Requirement

There will be a password available for each registered users

5.8.5 Failure Detection, Reporting and Recovery

1. Fault Correction

System should correct the fault once detected

2. Recovery

System should respond to the presence of faults or to loss of data

3. Error Logging

Implement proper error logging

5.8.6 Service

1. Connectivity Needed

Client's PC's connected on dial-up lines or TCP/IP LAN

2. System Upgrade

The system will be upgraded when necessary

3. Maintenance of domain specific hardware

Maintenance of the hardware important to ensure continuous operation

4. System Testing

System Testing is done after upgrading is done

5. System Maintenance

System evolution is monitored by developers

5.8.7 Product Cost

1. Hardware / Software Cost

Hardware/software cost for project must support the allocated budget for the project

2. Project Development Cost

The cost of the whole project is set

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5.9 Conclusion

In accordance to the methodology, Unified Modeling Language (UML) was used to design the software architecture for the Intelligent Bank Management Simulation System (IBMS). The result of the software architecture design is a set of documents and artifacts describing Web based Intelligent Bank Management System. The architecture model was chosen to design the software architecture for the Intelligent Bank Management System (IBMS) because it provides a good solution when factoring in all technical, marketing, personnel and cost issues.

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CHAPTER 6

Implementation

6.1 Introduction

This chapter introduces the implementation phase of IBMS which consist of system setup, procedures in using IBMS and other important information regarding system implementation. As IBMS is modeled as a client server system, the implementation of the system involves the network connection, database connection and server installation. This will be explained in detail in section 6.2. The architectural model is followed by a set of procedures and tool as been explained in the implementation phase.

The next section describes the use of IBMS in a procedural manner. The complete details on using the system have been explained in detail in section 6.3 for both Instructor and participants.

6.2 Setting Up the System

The IBMS system was modeled as a three tiered client server architecture. The components of IBMS were divided into three layers:

1. Presentation layer
2. Functionality layer
3. Data layer

All this three layers were logically separated in between them as shown in Figure 6.1 below.

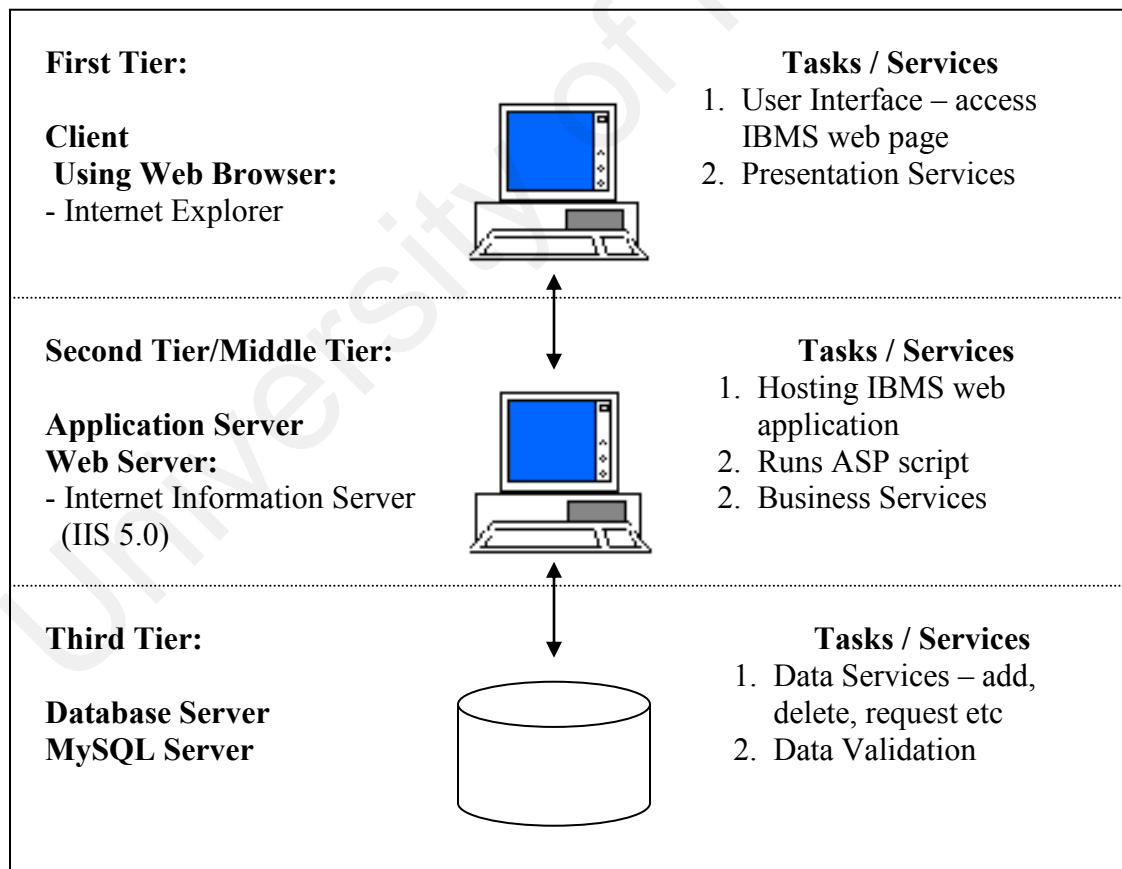


Figure 6.1: IBMS Three Tier Client Server Architecture

The clients interact with the middle tier via a standard protocol called as RPC. The middle tier interacts with the same server via standard database protocols. The middle tier contains the application logic which translates the client calls into database queries and other actions and translating data from the database into client data in return.

The system uses web browser such as Internet Explorer as a data presentation and data entry. The browser as a user interface specifies a uniform resource locator (URL) requesting a page from the IBMS Web Server.

The web server handles the requests from the web browser. The Web Server delivers the page to the browser over the network. As this system is built with client server architecture, security system were also have been implemented. The security system uses the cooperation of components at the top and middle tier to authenticate the user and authorize application services. The log in page was implemented for this purpose so that the middle tier authenticates the user and establishes a session.

Once the sessions were established, the web server stores the transaction state. The transaction states are the most recent data input by the user that has not been committed to the database.

Figure 6.3 and 6.4 are examples of source codes that have been implemented for the log in page of Instructor for IBMS. The user will enter their username and password from the web browser as shown in Figure 6.3. The html code

will request for the data through the asp scripts as shown in Figure 6.4. The ASP scripts shown in Figure 6.4 processes the requested data by validating the database and send back the response to the web browser on the client side as shown in Figure 6.2.

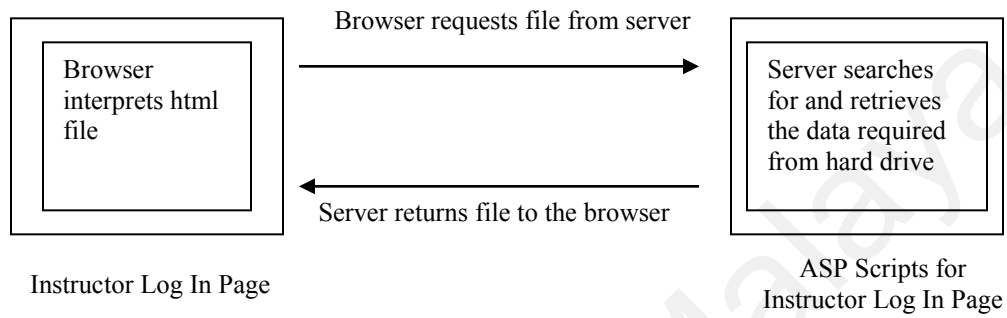


Figure 6.2: Request and Response Process for IBMS Instructor Log In Module

```

<html>
.....
.....
<form name="Login" method="post" action="inslogresponse.asp">
  <table width="273" border="0" align="left" cellspacing="0" cellpadding="0"
  bgcolor="#CCCCCC">
    <tr bordercolor="#000000" bgcolor="#FFCC99">
      <td width="94" height="47" align="right" valign="bottom"><div
  align="center">User name: </div></td>
      <td width="172" height="47" valign="bottom">
        <p align="center">&nbsp; </p>
        <p align="center">
          <input name="txtUserName" type="text" size="20" maxlength="20">
        </p></td>
    </tr>
    <tr bordercolor="#000000" bgcolor="#FFCC99">
      <td width="94" align="right" nowrap><p align="center">&nbsp;</p>
        <p align="center">Password: </p></td>
      <td width="172">
        <p align="center">&nbsp; </p>
        <p align="center">
          <input name="txtUserPass" type="password" size="20" maxlength="20">
        </p></td>
    </tr>
    <tr bordercolor="#000000" bgcolor="#FFCC99">
      <td height="44" align="right">&nbsp;</td>
      <td height="44"><div align="center">
        <input type="submit" name="Submit" value="Enter">
        <input type="reset" name="Submit2" value="Reset">
      </div></td>
    </tr>
  </table>
.....</html>

```

Figure 6.3: Source Code for Instructor Log In Page

```

<%
Dim adoCon
Dim strCon
Dim rsCheckUser
Dim strsqlDB
Dim strSQL
Dim strUserName
Dim cn

strUserName = Request.Form("txtUserName")
strsqlDB = "ibmsdb"
Set adoCon = Server.CreateObject("ADODB.Connection")
cn.Open "mahadev_mysql"
Set rsCheckUser = Server.CreateObject("ADODB.Recordset")
strSQL = "SELECT instructorregis.Password FROM instructorregis WHERE
instructorregis.UserName ='" & strUserName & "'"

rsCheckUser.Open strSQL, strCon
If NOT rsCheckUser.EOF Then
If (Request.Form("txtUserPass")) = rsCheckUser("Password") Then
Session("blnIsUserGood") = True

        Set adoCon = Nothing
        Set strCon = Nothing
        Set rsCheckUser = Nothing
        Response.Redirect"instructormainpage.asp"

    End If
End If
Set adoCon = Nothing
Set strCon = Nothing
Set rsCheckUser = Nothing
Session("blnIsUserGood") = False
Response.Redirect"denial.asp"

```

Figure 6.4: ASP Scripts for Instructor Log In

6.2.1 Database Connections

The database server was installed with MySQL Server 4.0. In order to connect the MySQL with Application server which runs ASP, MyODBC was installed.

The installation procedures are shown below:

1. MySQL were installed to C:\mysql in database server.
2. MyODBC were installed to connect to MySQL database
3. The following information were entered in the notepad:
 - a) Save it to Windows Root Directory usually (C:/WINDOWS)
 - b) Save it as my.ini
 - c) The following were entered:

```
[mysqld]
```

```
basedir = c:/ mysql
```

```
datadir = c:/ mysql / data
```

4. The windows command prompt were opened to type the following:

```
C:\ cd C:/ mysql / bin  
C:\mysql / bin > mysqld -nt --install
```
5. When the service is installed, it will be started and stopped with the Windows Service Manager, or the NET START / STOP commands
6. Then the MySQL –Front will be installed and started up to manage the interface section of the database in MySQL server.
7. The stored data can also be entered in the database through MySQL-Front. The MySQL-Front will be able to show the databases being installed.

6.3 Testing the Intelligent Bank Management Simulation System

Once the system setup as described in section 6.2 was done, IBMS were ready to be used. In order to use the system, the users need to know about:

1. Starting a New Game
2. Game Administration
3. Playing the Game
4. Reviewing last quarter's results
5. Making Next Quarter's Results
6. Advancing to next quarter
7. Printing forms and report
8. Exiting the Game

6.3.1 Starting a New Game

Before beginning to play IBMS, the Instructor will start a new game. The participant will not be able to start a new game before the registration of the Instructor. The procedures are as follows:

1. Go to the IBMS Home page
2. The Instructor need to choose the "Registration" menu to register himself form the IBMS home page

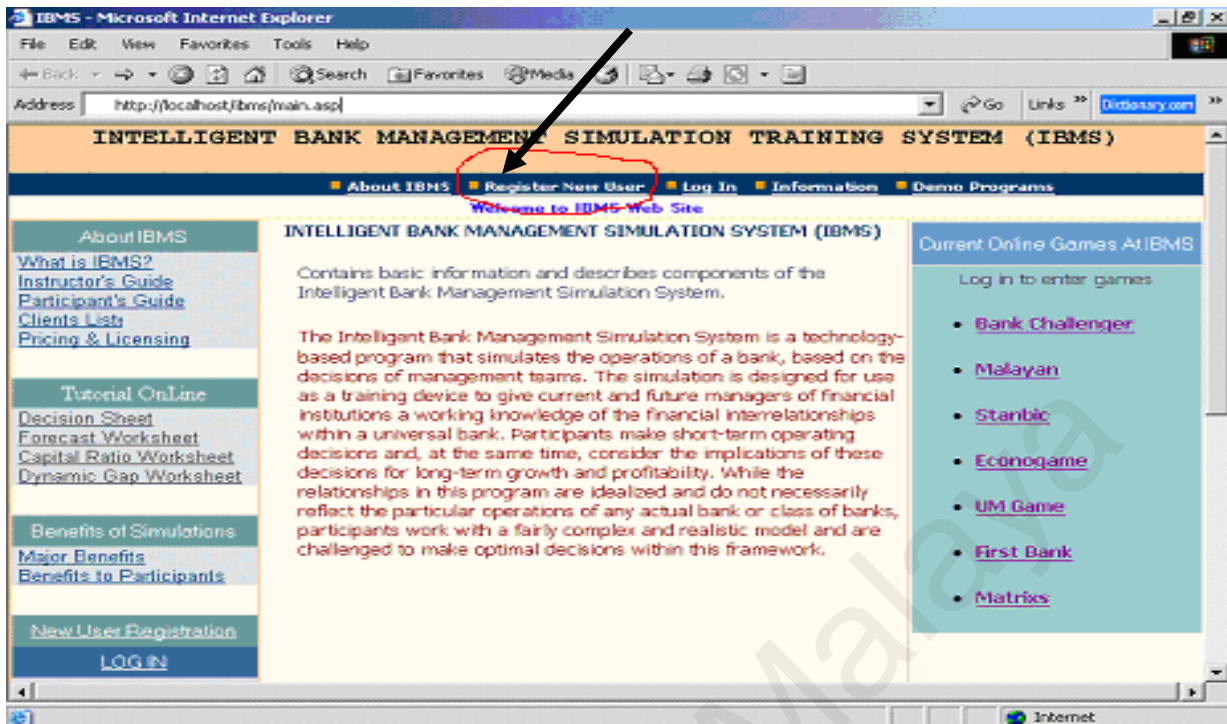


Figure 6.5: Main IBMS Page

3. Next, the Instructor need to log in to the system to enter the “Instructor Main Page”

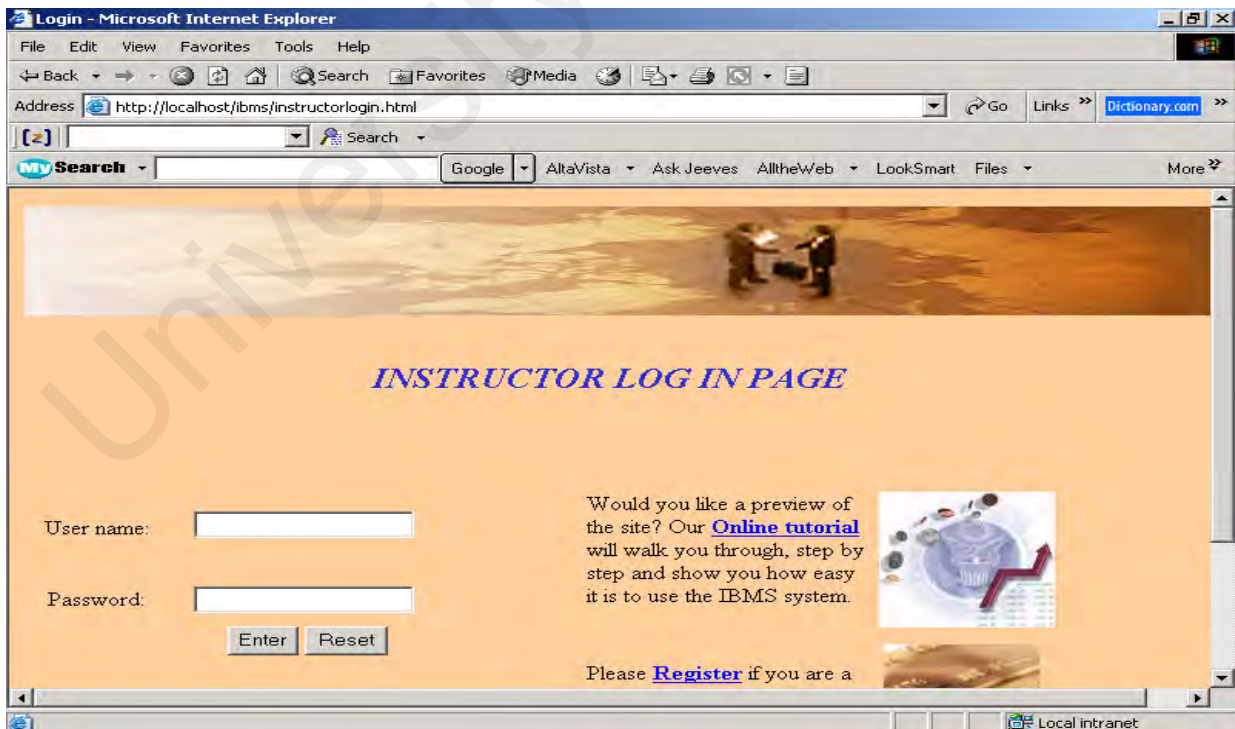


Figure 6.6: Instructor Log In Page

4. The Instructor need to choose “Create a New Game” from the Instructor’s Main Page.



Figure 6.7: Instructor Main Page

The procedures shown above are important to start a new game for the participants.

6.3.1.1 Game Administration – Instructor

The Main Page is the primary point to select the tasks needed by the IBMS to perform. In the main page, the users will be able to select to go to Instructor's Main Menu or Student's

Main Menu. If it is an instructor, then he needs to choose Instructor's Main Menu.

Next, from the instructor's main page the instructor need to create a new game. This is done by selecting "Create New Game" form the IBMS's instructor's web page. Before clicking to a new game, the instructor needs to make sure:

1. Names of banks in the new game and the additional information about the participants are created.
2. Each participant should have registered to the IBMS system through the Registration menu in the main page.

During the process of starting a new game, the instructors need to supply the following information:

- 1. Specify number of banks**

Enter the number of banks needed in the game if it is a competition.

- 2. Bank Name**

Enter a name up to 10 characters long

3. Economy Period

Choose the economic period

4. Instructor Name

Enter a name up to 10 characters long

5. Bank Chairman

Enter a name up to 10 characters long

Next, the Instructor needs to choose “Configure Regulatory Environment” button to configure the bank regulatory environment. The Instructor need to enter the specified information in the Regulatory environment page and press the submit button. Once the information has been submitted, the IBMS will write the beginning balance sheet and income statement. Each team will then have to review the current condition of its bank and make decision for the next quarter. The teams will be given a deadline for making decision and to submit the decisions made for that quarter.

6.3.1.2 Playing the Game

There should be six participants in a group. The participants need to go to main IBMS page and register themselves as IBMS participants. The participant needs to fill up the registration form and press the “submit” button.

Then the group leader need to choose the “student main menu” from the IBMS main page. The log in page will be shown for the participants to log in using their group id, user name and password. Once the participant have logged in to the system the participant will be taken to the participant’s main page. The participant’s main page. In the left side of the page, there will be a list of menu to be chosen by the participants. As a first timer, the participants need to click the “Setting Up Corporate Profile” menu option. Next, the participants need to enter the corporate profile in the corporate page. The participant needs to enter the required information in the page such as the name of the participants, post, email addresses and their required task in playing the game. Once it is completed, the participants need to press the submit button and back to the participants main page.

Next, they need to choose the “Objective” which will take to a new page. In the objective page, the participants need to specify their goals and mission for each quarter. Once completed, the participants need to press the “save” button to store the information.

Once it is completed, the participants need to go back to the participant’s main page and choose “Bank Management”. The next page is considered as an important page as this is where the participants will be able to configure and view their previous results.

6.3.1.3 Reviewing Last Quarter's Results

Before the team makes decisions on each quarter, they need to analyze the results of the previous quarter. The participants can view their results by choosing the 'Results' menu. The participants will be able to view their previous results and able to print out the results.

6.3.1.4 Making Next Quarter's Results

Each quarter the team needs to review the results of the previous quarter before making the decisions for the coming quarter. The participants can review the last quarter's results through the balance sheet and income statement. In order to make decisions for the coming quarter, the teams need to configure the list shown in the bank management page such as deposit interest rates, loan interest rates, expenses, securities and dividend. The easiest way is to begin by selecting the first option in the list which is "Deposit" and move on through the list.

6.3.1.5 Advancing to Next Quarter

To advance the current game to the next quarter, the instructor needs to select "Advance the Game to Next Quarter" from the bank management

page. Advancing the game to the next quarter causes the IBMS to read the decisions from the team input values, calculate new results for the bank and then write the new results onto the database to be updated.

The instructors are not allowed to advance the game until all the decisions are made for that quarter. This is because once the instructors have advanced the game, the process cannot be stopped. Any missing information for the team or bank will be skipped and the decisions of the team will not be processed.

The IBMS will prompt a message box during the process of advancing to the next quarter to make sure the participants are warned before advancing to the next page.

6.3.1.6 Printing Forms and Reports

The IBMS can print information about the current game for the users if the users have a printer (local or network) connected to the computer. The users are allowed to print the current page or the whole report for the quarter. There are menu options for the participants to print in the management page.

6.3.1.7 Exiting the Game

Only the Instructor will be able to close the game. This is done by entering the Instructor's Main page choosing the "Exit Game" option from the list. The game can be closed even without ending the four quarters. The participants are not allowed to exit the game.

University of Malaya

6.4 Conclusion

In order to use IBMS, a three tier system need to be implemented as shown in section 6.2. The system was built as a web based system to be accessed by the users from any place around the world. This is a great advantage for the users compared to a standalone system. The system was also implemented in a three tier model to make sure that the servers are load balanced. The instructors and the participants need to have pre-knowledge before using the system. As been explained in the implementation, the users need to follow the specified procedures before using the system.

University of Malaysia

CHAPTER 7

TESTING

7.1 Test Objective

The focus of this research is to perform a thorough evaluation on user's participation in IBMS according to the strategies developed by the users and to evaluate whether a web based simulation system could be used for education and training development purposes.

7.2 Test Scope

The test was set up in accordance to the requirements detailed in requirements stage. The testing was implemented on Windows based system. The test was done in four environments. The four environments are:

1. Configuration Test for Year 1997 – Quarter 1
2. Configuration Test for Year 1997 – Quarter 2
3. Configuration Test for Year 1997 – Quarter 3
4. Configuration Test for Year 1997 – Quarter 4

The different configurations were determined by different economic indicators and interest rate for the particular configuration. Different economic indicators and interest rates are provided in Chapter 4.

7.3 Test Data

The test data were obtained from the Central Bank of Malaysia. These data sets are available for the bank executive to test and verify in detail the effectiveness of the system. The test data includes Instructor data set and Participants data set.

7.3.1 Instructor Data Set

The Instructor data set consist of:

1. Year 1997 Growth Rate which include GDP growth and CPI
2. Interest Rate for Deposit for the year 1997 which includes:
 1. Checking Deposit
 2. Savings Deposit
 3. Time Deposit
3. Interest Rate for Loan for the year 1997 which includes:
 1. Housing Loan
 2. Personal Loan
 3. Syndicated Loan
 4. Bridging Loan
4. Instructor Game Setup Information
5. Reserve Requirements
6. Average Tax Rate

7.3.2 Participant Data Set

The participant data set consist of:

1. Participant Game Setup Information
2. Deposit Configuration
3. Loan Configuration
4. Expenses
5. Securities Sales and Purchase

7.4 Test Implementation and Results

The test implementation phase mainly involves configuring Intelligent Bank Management Simulation system and conducting a test run with the target users. A description of the standard configuration was obtained from Central Banks' Annual Report and was used as a rule set by the Instructor in order to guide the participants.

7.4.1 Instructor's Configuration

The instructor will need to login to the system and setup a game as shown in Table 7.1

**Table 7.1
Game Setup Information**

CONFIGURATION	DETAILS
Instructor Name	Arasan
Game Title	Test 1
Number of Banks	1
Bank Name	ValNet Bank
Bank Chairman	Kensington
Economic Year	1997

Since the Instructor has chosen the economic year of 1997, the standard data that have been given to the Instructor are as in Table 7.2 until 7.4 below:

**Table 7.2
Year 1997 Growth Rate (Malaysian Central Bank Report)**

Year 1997	GDP Annual Growth (%)	GDP(RM billion)	CPI(Annual Change)
Quarter 1	7.6	46.0	4.0
Quarter 2	8.4	48.0	5.1
Quarter 3	7.2	50.8	5.2
Quarter 4	6.1	50.7	5.2

Table 7.3
Details of Deposit and Interest Rate for Year 1997
(Malaysian Central Bank Report)

Quarter(1997)	Total Deposit (RM mil)	Interest Rate for Checking Deposit	Interest Rate for Saving Deposit	Interest Rate for Time Deposit
Quarter 1	243, 811	8.81	3.90	4.83
Quarter 2		9.21	4.10	4.40
Quarter 3		9.27	4.19	4.45
Quarter 4		9.33	4.23	4.50

Table 7.4
Details of Loan and Interest Rate for Year 1997
(Malaysian Central Bank Report)

Quarter(1997)	Total Loan (RM mil)	Interest Rate for Syndicated Loan	Interest Rate for Housing Loan	Interest Rate for Personal Loan	Interest Rate for Bridging Loan
Quarter 1	200, 004	9.80	5.8	7.80	10.15
Quarter 2		9.95	6.45	8.90	10.30
Quarter 3		9.90	6.30	8.85	8.40
Quarter 4		9.60	6.00	8.70	8.20

Next, the Instructor will specify the rates according to the tables shown above in the regulatory environment as shown in Table 7.5

**Table 7.5
Regulatory Environment for Game Test 1**

Maximum Loan Rates	Percentage (%)
Syndicated Loan	20.0
Housing Loan	12.0
Bridging Loan	20.0
Personal Loan	25.0
Maximum Deposit Rates	Percentage (%)
Checking Deposit	20.0
Savings Deposit	15.0
Time Deposit	15.0
Maximum Reserve Requirements	Percentage (%)
Checking Deposit	8.0
Savings Deposit	3.0
Time Deposit	5.0
Maximum Capital Notes (% Equity)	50%
Average Tax Rate	2.47

7.4.2 Participant's Configuration

Next, the participant will log in to the system and will establish the details of the bank. The game will consist of six players per groups as shown in Table 7.6.

Table 7.6
Bank Establishment Details for Game Test 1

Designation	Details
Bank Chairman	Kensington
Bank Objective and Mission	Number one bank in Malaysia
Bank Executives	1. Khairul
	2. Bala
	3. David Lee
	4. Kumara
	5. Kamarul

The participants entered the relevant data for interest rate for Loan as shown in Table 7.7. The interest rates are adjusted according to the previous quarter results.

Table 7.7
Interest Rate Configuration for Loan (Game: Test 1)

Loan Type	Quarter 0	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Syndicated	9.80	9.75	9.85	9.80	9.50
Housing	5.80	5.70	6.40	6.20	6.00
Bridging	7.80	7.60	8.70	8.85	8.00
Personal	10.15	10.10	10.15	8.70	8.10

Table 7.8 shows the loan amount that has been disbursed for each quarter in accordance to the interest rate.

Table 7.8
Loan Amount for Quarter 0 to Quarter 4 (Game: Test 1)

Loan Type	Quarter 0 (RM mil)	Quarter 1 (RM mil)	Quarter 2 (RM mil)	Quarter 3 (RM mil)	Quarter 4 (RM mil)
Syndicated	6350.40	30845.25	23587.20	31752.00	38102.00
Housing	1411.20	6854.50	5241.60	7056.00	8467.00
Bridging	1835.00	8910.85	6814.00	9172.80	11007.00
Personal	4515.80	21934.40	16773.00	22579.20	27095.00

Table 7.9 indicates the interest rate that has been configured by the participants for the deposit. The interest rates were configured by referring to the previous quarter results.

Table 7.9
Interest Rate Configuration for Deposit (Game: Test 1)

Deposit Type	Quarter 0	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Checking Deposit	8.81	8.80	9.15	9.20	9.30
Savings Deposit	3.90	3.85	4.00	4.10	4.20
Time Deposit	4.83	4.80	4.35	4.40	4.45

Table 7.10 shows the total amount of deposit being disbursed in accordance to the interest rate.

Table 7.10
Total Deposit for Quarter 0 to Quarter 4 (Game: Test 1)

Deposit Type	Quarter 0 (RM mil)	Quarter 1 (RM mil)	Quarter 2 (RM mil)	Quarter 3 (RM mil)	Quarter 4 (RM mil)
Checking Deposit	5485.75	10971.50	10971.50	10971.50	5485.75
Savings Deposit	8228.60	8228.60	5485.50	8228.60	8228.60
Time Deposit	5485.50	8228.60	8228.60	5485.50	5485.50

Table 7.11 shows the total amount of expenses for each quarter.

Table 7.11
Total Expenses for Budget Categories (Game: Test 1)

Budget Category	Quarter 0 (RM mil)	Quarter 1 (RM mil)	Quarter 2 (RM mil)	Quarter 3 (RM mil)	Quarter 4 (RM mil)
Salaries	45.00	35.00	33.00	34.00	35.00
Advertisement for Deposit	20.00	25.00	27.00	35.00	37.00
Advertisement for Loan	20.00	25.00	27.00	36.00	40.00
Technology	40.00	15.00	18.00	25.00	31.00
Premises (Asset)	25.00	9.00	10.00	10.00	10.00

Table 7.12 indicates the total assets for each quarter.

Table 7.12
Total Assets from Quarter 0 to Quarter 4 (Game: Test 1)

Asset Type	Quarter 0 (RM mil)	Quarter 1 (RM mil)	Quarter 2 (RM mil)	Quarter 3 (RM mil)	Quarter 4 (RM mil)
Cash	1613	7834.00	5990.40	8064.00	9676.80
Loan	14111.90	68545.00	52416.00	70560.00	84671.70
Premises	403.20	1958.00	1497.60	2016.00	2419.20
Securities	4032.00	19584.00	14976.00	20160.00	24191.80

Table 7.13 indicates the total liability and equity from quarter 0 to quarter

4.

Table 7.13
Total Liability and Equity from Quarter 0 to Quarter 4

Type	Quarter 0 (RM mil)	Quarter 1 (RM mil)	Quarter 2 (RM mil)	Quarter 3 (RM mil)	Quarter 4 (RM mil)
Deposit	19199.85	46628.55	71314.15	95999.75	115199.60
Central Borrowing	0	0	0	0	0
Capital Notes	576.00	1399.00	2140.00	2880.00	3456.00
Equity	384.00	933.00	1426.00	1920.00	2304.00
Total	20159.85	48960.55	74880.15	100800	120959.60

Table 7.14 shows the income obtained by the bank for each quarter.

Table 7.14
Income Statement Information (Game: Test 1)

Details	Quarter 0 (RM mil)	Quarter 1 (RM mil)	Quarter 2 (RM mil)	Quarter 3 (RM mil)	Quarter 4 (RM mil)
Interest Income	1305.00	6290.00	4953.00	6325.00	7204.00
Interest Expense	1069.00	1676.00	1580.00	1587.00	1099.00
Net Interest Income	236.00	4614.00	3373.00	4738.00	6105.00
Operating Income	201.00	3571.00	3003.00	3700.00	5009.00
Expenses	150.00	109.00	115.00	140.00	153.00
Total Revenue	287.00	8076.00	6261.00	8298.00	10961
Average Tax	5.00	6.45	6.45	6.45	6.45
Net Income	272.65	7555.10	5857.17	7763.00	10254.00

7.5 Conclusion

This chapter presented the test results for all four quarters. Table 7.1 to Table 7.14 presents the overall result of the testing, which was summarized from the test game. As can be seen from the tables, the results were systematically obtained for each quarter as shown in Table 7.14. The results obtained were according to the configuration that has been done for each quarter. In accordance to the results, the net income increased for every quarter. This shows that the participants played well in accordance to the test environment.

The results were accurate in accordance to the algorithm used to calculate the results in Table 7.14. The test performed well in accordance to year 1997 economic environment.

CHAPTER 8

EVALUATION

8.1 Introduction

This chapter presents the results of evaluation done on Intelligent Bank Management Simulation system (IBMS). The evaluation was done by the target users to evaluate the effectiveness of the system and the usage of IBMS as a training tool. The evaluation was done by bank executives from a total of six banks which include Maybank Seremban, Hong Leong Bank Seremban, Southern Bank Subang Jaya, Affin Bank Subang Jaya, Public Bank Seremban and RHB Bank Subang Jaya. A total of 24 users have evaluated the system.

The evaluation process involves six important aspects in evaluating the usefulness of IBMS as a training module and to evaluate the user participation in using the Intelligent Bank Management Simulation system (IBMS).

8.2 Evaluation Process

The most important aspects which was evaluated by the participants were:

1. Program Content
2. Effectiveness of IBMS
3. Practice / Assessment / Feedback
4. Users Appeal and Suitability
5. Ease of Use
6. Presentation

The evaluation process was conducted using an Evaluation form as shown in Appendix C. The details of each and every aspect are explained in detail as below.

8.2.1 Program Content

The Intelligent Bank Management Simulation system needs to have a clear objective which is well understood by the target users. The instruction given in the system should match the objective or the goal of the users. The instruction should be able to address various learning styles and intelligence which is very important for a simulation based system. The information provided by the system need to be accurate and in accordance to current environment. The IBMS should be able to provide materials for enrichment and other remedial activities such as assignments and manuals.

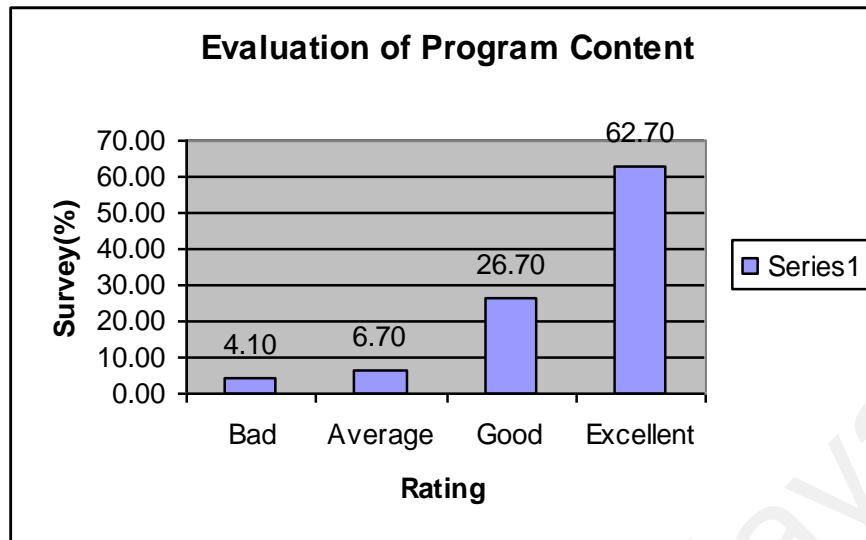


Figure 8.1
Results on Evaluation of Program Content

Figure 8.1 above shows that 62.7% of the participants of IBMS have evaluated the program content as excellent while 26.70 have evaluated the system to be good.

8.2.2 Effectiveness of IBMS

This section is very important in analyzing the users' participation in using the simulation based training system. The participants should be able to recall and use the information from the IBMS. The application should be able to prepare participants for the future through the experiences gained from using the system. The IBMS was also evaluated on the effectiveness to act as an appropriate training tool.

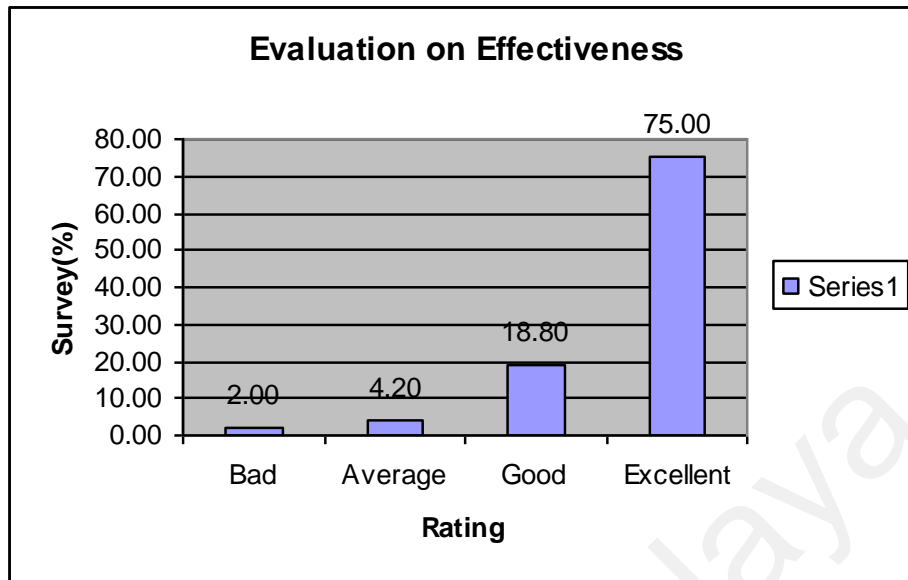


Figure 8.2
Results on Evaluation of Effectiveness

The graph shown above shows that 75% of the participants have evaluated IBMS to be excellent while another 18.8% have evaluated the system to be good.

8.2.3 Practice / Assessment / Feedback

The IBMS was also evaluated for providing relevant feedback in accordance to the participants' responses. Evaluation was done on the effectiveness of practices given to accomplish objectives, immediate feedback and effectiveness of collaborative learning experiences through Intelligent Bank Management Simulation system.

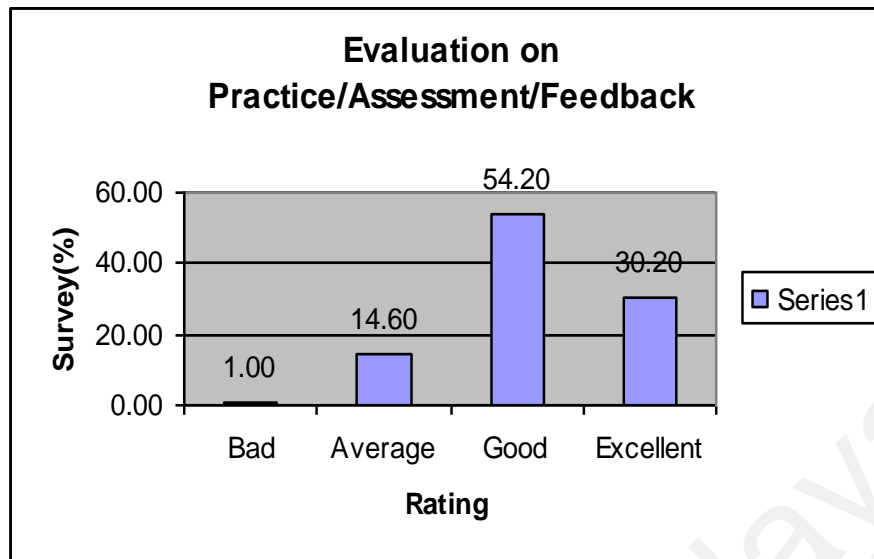


Figure 8.3
Results on Evaluation of Practice/Assessment/Feedback

As shown in Figure 8.3, 54.20% have evaluated the practice, assessment and feedback system to be good while 30.2% have evaluated it to be excellent.

8.2.4 Users Appeal and Suitability

The participant will evaluate whether the training system matches interest level of indicated users or able to gain attention from the user to use the system again. The expected input and the tutorials should be appropriate to the target users. The evaluation also involves the compatibility of the system in terms of user's attention and the required time period to complete the game. Figure 8.4 shows the results of evaluation on users appeal and suitability.

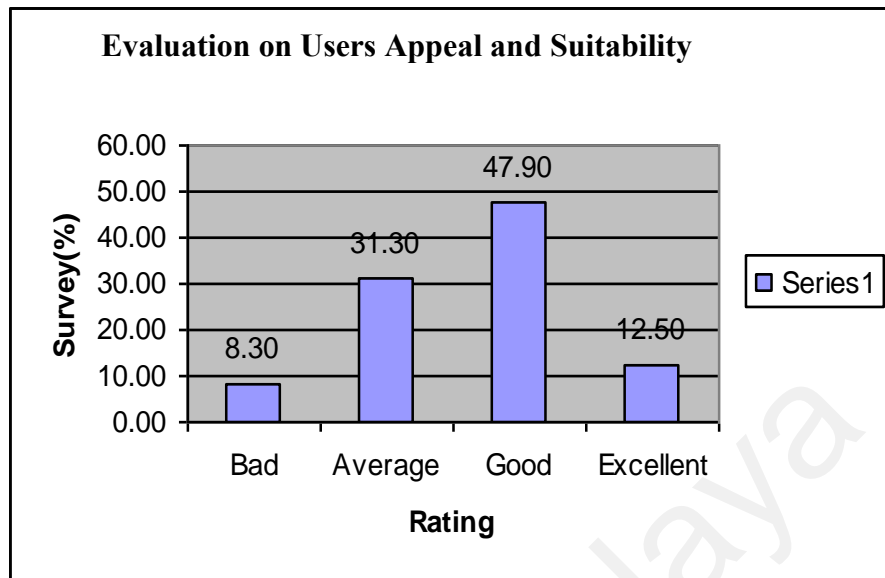


Figure 8.4
Results on Evaluation of Users Appeal and Suitability

8.2.5 Ease of Use

The evaluation was done in terms of user navigation and screen directions. The screen direction needs to be consistent and easy to follow. The help options should be available for the users. The evaluation will also involve the response of IBMS to the user input. The interfaces designed need to be consistent with the environment. Figure 8.5 shows that 57.4% of the participants have evaluated the system as excellent

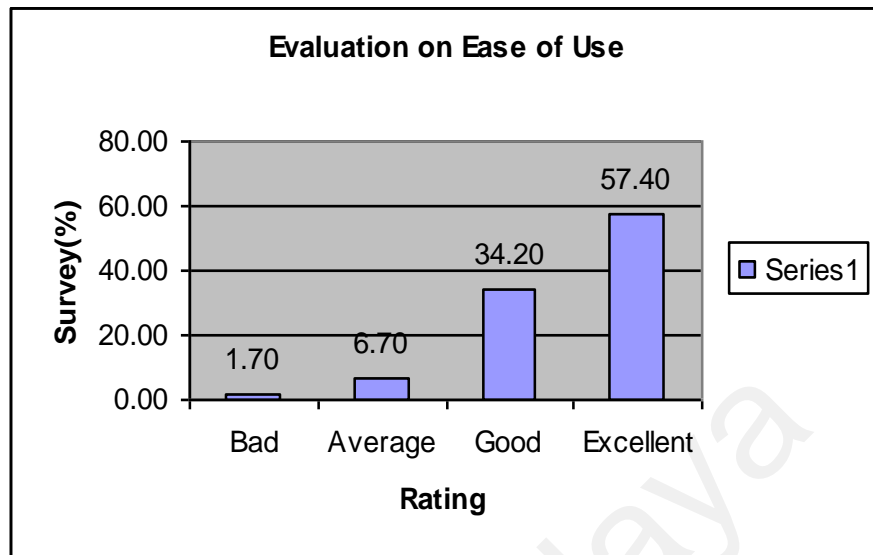


Figure 8.5
Results on Evaluation of Ease of Use

8.2.6 Presentation

The evaluation will involve the presentation of the information which is appropriate and logical. The participants also need to evaluate on the screen display and the presentation of the text which is suitable for the target users. The spelling, grammar and punctuation were also evaluated. Figure 8.6 shows the results of the evaluation on the presentational aspect of IBMS.

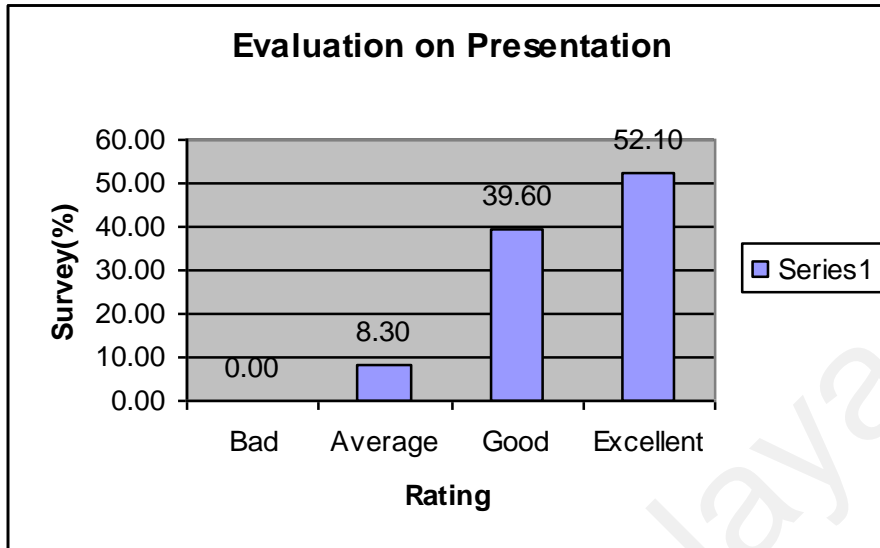


Figure 8.6
Results on Evaluation of Presentation

8.3 Results

Table 8.1 and 8.2 show the results of the evaluation in accordance to the six important aspects:

**Table 8.1
IBMS Evaluation Results I**

		Total Selection for each Rate			
		1	2	3	4
Program Content					
1	Objectives are clearly stated	0	0	4	20
2	Instruction matches objectives	0	2	4	18
3	Instruction addresses various learning styles and intelligences	0	1	6	17
4	Information is current and accurate	5	1	8	10
5	Materials for enrichment and remedial activities are provided	0	4	10	10
Effectiveness					
6	Participants are able to recall and use information presented following program use	0	2	8	14
7	The application prepares participants for future real-world experiences	0	0	0	24
8	Participants develop further interest in topic from using program	2	2	4	16
9	This is an appropriate use for training program	0	0	6	18
Practice / Assessment / Feedback					
10	Feedback is relevant to student responses	1	0	12	11
11	Practice is provided to accomplish objectives	0	4	4	16
12	Feedback is immediate	0	6	18	0
13	Collaborative learning experiences are provided for	0	4	18	2

Table 8.1, continued

IBMS Evaluation's Results I

		Total Selection for each Rate			
		1	2	3	4
Users Appeal and Suitability					
14	The training system matches interest level of indicated users	0	2	14	8
15	Expected input is appropriate for indicated users	2	10	8	4
16	The tutorials are suitable for indicated users	0	8	16	0
17	Required time is compatible with student attention	6	10	8	0
Ease of Use					
18	User can navigate through application without difficulty	0	0	7	17
19	Screen directions are consistent and easy to follow	0	0	6	18
20	Help options are comprehensive and readily available	2	2	10	10
21	Application responds to input as indicated by directions	0	4	10	10
22	Interface provides user with an appropriate environment	0	2	8	14

Table 8.1, continued
IBMS Evaluation's Results I

		Total Selection for each Rate			
		1	2	3	4
Presentation					
23	Information is presented in a developmentally appropriate and logical way	0	2	12	10
24	There is appropriate variety in screen displays	0	2	9	13
25	Text is clear and printed in type suitable for target user	0	0	5	19
26	Spelling, punctuation and grammar are correct	0	4	12	8

Note:

Rate 1: Bad

Rate 2: Average

Rate 3: Good

Rate 4: Excellent

Table 8.2
IBMS Evaluation Results in Percentage

		Ratings in %			
		1	2	3	4
Program Content					
1	Objectives are clearly stated	0	0	16.7	83.3
2	Instruction matches objectives	0	8.3	16.7	75
3	Instruction addresses various learning styles and intelligences	0	4.2	25	70.8
4	Information is current and accurate	20.8	4.2	33.3	41.7
5	Materials for enrichment and remedial activities are provided	0	16.6	41.7	41.7
Effectiveness					
6	Participants are able to recall and use information presented following program use	0	8.3	33.3	58.4
7	The application prepares participants for future real-world experiences	0	0	25	75
8	Participants develop further interest in topic from using program	8.3	8.3	16.7	66.7
9	This is an appropriate use for training program	0	0	25	75
Practice / Assessment / Feedback					
10	Feedback is relevant to student responses	4.2	0	50.0	45.8
11	Practice is provided to accomplish objectives	0	16.7	16.7	66.6
12	Feedback is immediate	0	25	75	0
13	Collaborative learning experiences are provided for	0	16.7	75	8.3

Table 8.2, continued
IBMS Evaluation's Results in Percentage

		Ratings in %			
		1	2	3	4
Users Appeal and Suitability					
14	The training system matches interest level of indicated users	0	8.3	58.4	33.3
15	Expected input is appropriate for indicated users	8.3	41.7	33.3	16.7
16	The tutorials are suitable for indicated users	0	33.3	66.7	0
17	Required time is compatible with student attention	25	41.7	33.3	0
Ease of Use					
18	User can navigate through application without difficulty	0	0	29.2	70.8
19	Screen directions are consistent and easy to follow	0	0	25	75
20	Help options are comprehensive and readily available	8.3	8.3	41.7	41.7
21	Application responds to input as indicated by directions	0	16.6	41.7	41.7
22	Interface provides user with an appropriate environment	0	8.3	33.3	58.4

Table 8.2, continued
IBMS Evaluation's Results in Percentage

		Ratings in %			
		1	2	3	4
Presentation					
23	Information is presented in a developmentally appropriate and logical way	0	8.3	50.0	41.7
24	There is appropriate variety in screen displays	0	8.3	37.5	54.2
25	Text is clear and printed in type suitable for target user	0	0	20.8	79.2
26	Spelling, punctuation and grammar are correct	0	16.7	50.0	33.3

Note:

Rate 1: Bad

Rate 2: Average

Rate 3: Good

Rate 4: Excellent

8.4 Conclusion

The evaluation process composed of six important categories that have been evaluated by the participants of Intelligent Bank Management Simulation Training system (IBMS). The results show that IBMS was able to gain and maintain attention throughout the lesson. It is also able to provide and maintain appropriate levels of challenge.

The evaluation results conclude that IBMS is an effective tool if not a reasonably well developed tool which can be used for training purposes. The evaluation shows positive results in terms of using a simulation based training system. The participants have also evaluated that the system plays an important role in providing training for the participants to manage a bank and create strategy and decision making for the banking industry.

CHAPTER 9

DISCUSSION AND CONCLUSION

9.1 Reliability of the Research Study

In any research study, it is very important to check the reliability of how the study was conducted. In order to develop the Intelligent Bank Management System for Malaysian Financial Institution, a careful plan was carried out in designing the activities that is needed for developing the IBMS. The first step was by gaining knowledge on the scope of the application, which will provide a guideline or to be able to think as the user of the application. The next step was to identify a design approach, which provides guidelines to design the software architecture. The approaches were identified from reference books, articles and journals as well as journals via Internet as been elaborated in the Literature Review. All the approaches were identified and analyzed from different aspects before it was chosen.

In order to gather possible requirements for this application, interviews were conducted with bank executives as mentioned in Chapter 4. This is to ensure that the suggested training system is applicable for Malaysian Financial Institutions. An analysis was also done on the currently available Bank Management system. Using their concepts as reference is important to improve and understand the banking system.

9.2 Evaluation on Intelligent Bank Management System (IBMS)

Evaluating the software architecture design is essential to ensure whether the architecture supports the system to meet its requirements and to make sure that there is high user participation in using the system. The main issues discussed in this research study are scalability, security, availability and performance of the Intelligent Bank Management system (IBMS). These are the important factors to be adhered by a system. The IBMS was evaluated by the participants through six important aspects and each aspect has gained good rating.

1. Scalability and Performance

The architecture designed separates the business logic from the user interface and data source. Breaking up application to separate tiers can reduce the complexity of the overall IBMS and allow enhancements to be done easily to handle growing number of users in future.

Hence, resources consumed by the object can be returned to the server and this increases the scalability of the application at any one time.

2. Availability

The software architecture design has defined that using the non-shared server will help in assuring the high availability of the system. All server resources will be exclusively dedicated to one web project which will increase

performance. In situation where system faces severe technical problem, server may be rebooted without the concern of affecting other users.

3. Security

Security of the data is essential as the Web based IBMS deals with bank records which are very confidential. Providing exact regulatory environment when requested by the users is very critical. In the architecture, the data access layer shields the inner structure of the database from the developer. Developer cannot circumvent security or procedure by changing rows in the database in an incorrect order.

4. Reliability

The Intelligent Bank Management System is said to be reliable if it provides correct information at any time and any place. This was proven in the testing and evaluation phase in Chapter 5 and was evaluated by the participants in the evaluation phase.

9.3 Problems Encountered

Throughout the research study, there were three major problems encountered. The problems are:

1. Lack of Actual Simulation System for Reference

The research lack of actual simulation system to be referred to in order to implement IBMS. The research faced numerous challenges and unknowns while

trying to produce IBMS as there are no simulations system to be referred to even though there are documentations on the sample systems.

2. Lack of Local Data for Reference

There were tremendous problem in gathering information for the Intelligent Bank Management system as there are no sample projects that have been developed in Malaysia in accordance to Malaysian banking policies.

Even though there are some components from IBMS that have been developed overseas, it does not provide a guideline in developing the Intelligent Bank Management System (IBMS). Research was made on the local banking sector as well as local economy to customize the system local users.

3. Cooperation from Organization

During the project research, it was difficult to get cooperation from the related industries as they were less interested in the research. This has sometimes affected the findings on the local banking system. But anyhow the details were gathered through the staffs.

9.4 Limitations and Weaknesses

The research project will be limited due to the collection of secondary data. In the internet savvy developed world such as in the USA, Japan and Europe, businesses are already reaping profits and other returns due to the advantages of the electronic banking system and specialized training system for banking staff.

However the existence of Information Technology in transforming the financial institutions in Malaysia is just in its infancy, where bankers are still struggling to implement the preliminary stages. So, most of the articles and journals available on Malaysian businesses only covers issues on ICT on helping the banks to move forward, the technologies needed and plans but not on the progress on what had already been implemented.

The study was limited due to the fact that respondents do not answer the questionnaires in details. Discrepancies such as incomplete or inaccurately filled questionnaires returned might be caused by the banks' reluctance to disclose information that could possibly lead to legal problems caused by legal matters or legal conflicts caused by their respective corporate policies. Apart from that, many banks refuse to cooperate at all, with reasons that they have a strict schedule and do not have time to comply with such matters outside their business. Additional limitations were imposed due to the size of the sample and limited instrument return. Therefore, caution should be taken to accomplish this research.

9.5 Recommendations for Further Studies and Further Enhancements

The objective of this research is to evaluate user participation in using a simulation based training system. However, this research could not produce a complete system as there are many more areas that need to be investigated in order to enhance the system through this research. Hence, further studies and enhancements have been identified.

The recommendations are:

1. The automated analysis need to be introduced to all the components in IBMS. This is very useful as user will have guidelines in analyzing the banking performance through artificial intelligence and expert system. The system needs to be logically sound and it can be done if the system is able to analyze the results without the user's interference and provide a solution.
2. As this project involves the expertise of two major fields which are economic and information technology, there should be exposure and cultivation of learning the economic subject for all the students in Malaysia. This is important as economic plays an important role for a country and it will be very useful for all of us to understand the process flow of banking sector and local economy. With greater exposure on economy, a software developer will be much more creative in developing a user friendly system.
3. The project is much more focused towards managing a bank. But further research need to be done about the central bank. As the instructor act as the central bank, there should be more authority given to the instructor on-line in changing the regulatory environment.
4. Guidelines to design software architecture for web application must be established. These guidelines should consider the application tiers in a web application. The guidelines should allow different tier to be designed uniquely prior to the technology used by each tier for the application.
5. This product will be a full based virtual bank if it has both the consumers and the staffs operating the system. Currently IBMS is only used to manage the bank. The system should be further enhanced as a simulation based training system.

9.6 Conclusion

The progress in software development needs to be analyzed carefully in accordance to the current environment. Currently most of the product needs to be automated and intelligent to make decisions. And even though Intelligent Bank Management System (IBMS) does not have all the intelligence and automated criteria, it is a breakthrough in the local market as well as the banking sector. This has a great impact on the participation of the user in using the system. The users have participated well and they prefer to have a simulation based training system as it creates a problem environment for the users to solve rather than giving instruction on solving problems as in class room based training system. This was proven through the user feedback on using IBMS as in Chapter 6.

At the same time web applications are becoming more and more popular due to the rapid deployment of the tools and technologies for their development. This system will be beneficial and useful for all the people involved in banking and economic sector. Hence, implementing the system quickly and less expensive is a critical factor for a system's success. It is hoped that with the implementation of the enhancements and improvements, the outcomes produced at the end of the study would make effective contribution in implementing the Intelligent Bank Management System quickly and less expensively.

APPENDIX

Appendix A: Survey Form for Analysis

SURVEY FORM

BANK MANAGEMENT SIMULATION TRAINING SYSTEM1

We would appreciate it if you would take a few minutes to answer the following questions so we may better improve our bank management training system conducted by University Malaya's Post Graduate students.

This is a survey to find out the preferences of Bank Executives in using Simulation Based Training System (Intelligent Bank Management System) in improving their skills, banking strategies and making a good decision. Intelligent Bank Management System (IBMS) is a training game of competition played through computers in web based environment

All data gathered will be used solely for the purpose of my research. All participants' specific information will be held strictly confidential and will not be used for any commercial purposes.

QUESTION PART A

1. What type of training is being provided for the bank executives, financial executives and etc?
 - A. Manual training
 - B. Simulation Based Training
 - C. Others: _____
2. How would you rate the current training program?
 - A. Excellent
 - B. Good
 - C. Average
 - D. Bad
3. Would you like to have computer based: Simulation Based Training System such as Simulated Bank Management System?
 - A. Yes
 - B. No

4. Do you think computer based training system could improve your skills compared to a manual training system?
 - A. Yes
 - B. No

5. How would you rate your self in using computers?
 - A. Very Good
 - B. Good
 - C. Average
 - D. Bad

PART B

6. Select the components that indicate the bank performance?

GDP Growth	[]
Skillful Workers	[]
Interest Rate	[]
Advertisement	[]
Management Strategy	[]

7. Select the components that need to be included in the simulation based training system?

Economic Analyzer	[]
Tutorial	[]
Forecast System	[]
Reporting	[]
Others:	_____

8. How would you like to play the game (simulation based bank management system)?
 - A. Group
 - B. Individual

9. The simulation game will be played for 4 Quarter [1 Quarter = 3 months]
 - A. Agree
 - B. Disagree
 - C. Others: _____

10. What are the trends affecting your bank performance?

Rising Competition	[]
Deregulation	[]
Technology Revolution	[]
Knowledgeable and Demanding Customers	[]
Economic Downturn	[]
Lack of Strategies	[]
Globalization	[]

Appendix B: Sample Assignment of Real Money Simulation System

Count the cash on hand at the end of the last team's turn 13. Prepare a cash memo listing the amount of cash on hand and have a player of another company verify and sign it. Note the square where you end your turn. If you are part of a team playing the game, both team members are to turn in a copy of the cash memo. One team in the game should record the amount carried over in Free Parking.

The game is played mostly in teams of two, but each member of the team must separately complete and submit the following assignment. There is to be no collaboration.

1. Journalize transactions. Maintain a general journal for your company to record all events and transactions that occur during the game. Journal entries should be dated (yy/mm), and must correspond with events in the manager's diary. BE CAREFUL to record all of your transactions.
2. Prepare a general ledger (using the attached chart of accounts) and post all transactions. Because some accounts are nominal, you should have a separate copy of the general ledger for every year (remember that real account balances for 1/13 carry over to 2/1). All entries in a particular ledger account should be dated.

3. Prepare an unadjusted trial balance at the end of the year.
4. Reconcile the cash on hand with the balance of the cash account at the end of every year. Any discrepancy is probably due to the failure to record a transaction during the game. If the amounts do not agree, attempt to discover the cause of the discrepancy by comparing notes with other players and make a correcting entry. If the discrepancy cannot be explained, adjust the cash account balance to agree with the cash on hand, with an adjustment going to either miscellaneous revenue or miscellaneous expense.
5. Prepare and post the following year-end adjusting entries for depreciation, salary, interest and income taxes [Please disclose all computations when handing in the material:
6. Prepare an adjusted trial balance.
7. Prepare and post closing entries.
8. Prepare a post-closing trial balance.
9. Prepare (in good form and typed/word-processed) an income statement and balance sheet. See the attached samples. Notes should also accompany the financial statements when appropriate.
10. Prepare a President's letter (typed/word-processed) for investors that summarize the year's highlights. Forecasting earnings for the next year is optional. Your President's letter should also be e-mailed to your lecturer.
11. Include your name plus names of competing students on a cover page.
12. In order, hand in the following:
 - a. Cover page.

- b. Annual report, containing President's letter (typed or word-processed), financial statements (typed), and notes (typed).
- c. Manager's diary (typed).
- d. Accounting journal with regular, adjusting, and closing entries (does not need to be typed).
- e. Ledger accounts (does not need to be typed).
- f. Trial balances (does not need to be typed).
- g. A photocopy of cash memo. (*very important*)
- h. A schedule of computations for all adjusting entries.
- i. List of assets owned at end of year (does not need to be typed).

Failure to complete an assignment will result in receiving a very stiff penalty. Late assignments will also be penalized.

Appendix C: Evaluation Form

Please evaluate IBMS according to the rates stated below

[1] = Bad [2] = Average [3] = Good [4] = Excellent

Program Content		
1	Objectives are clearly stated	[1][2][3][4]
2	Instruction matches objectives	[1][2][3][4]
3	Instruction addresses various learning styles and intelligences	[1][2][3][4]
4	Information is current and accurate	[1][2][3][4]
5	Materials for enrichment and remedial activities are provided	[1][2][3][4]

Effectiveness		
1	Participants are able to recall and use information presented following program use	[1][2][3][4]
2	The application prepares participants for future real-world experiences	[1][2][3][4]
3	Participants develop further interest in topic from using program	[1][2][3][4]
4	This is an appropriate use for training program	[1][2][3][4]

Practice / Assessment / Feedback		
1	Feedback is relevant to participant responses	[1][2][3][4]
2	Practice is provided to accomplish objectives	[1][2][3][4]
3	Feedback is immediate	[1][2][3][4]
4	Collaborative learning experiences are provided for	[1][2][3][4]

[1] = Bad [2] = Average [3] = Good [4] = Excellent

Users Appeal and Suitability		
1	The training system matches interest level of indicated users	[1][2][3][4]
2	Expected input is appropriate for indicated users	[1][2][3][4]
3	The tutorials are suitable for indicated users	[1][2][3][4]
4	Required time is compatible with user attention	[1][2][3][4]

Ease of Use		
1	User can navigate through application without difficulty	[1][2][3][4]
2	Screen directions are consistent and easy to follow	[1][2][3][4]
3	Help options are comprehensive and readily available	[1][2][3][4]
4	Application responds to input as indicated by directions	[1][2][3][4]
5	Interface provides user with an appropriate environment	[1][2][3][4]

Presentation		
1	Information is presented in a developmentally appropriate and logical way	[1][2][3][4]
2	There is appropriate variety in screen displays	[1][2][3][4]
3	Text is clear and printed in type suitable for target user	[1][2][3][4]
4	Spelling, punctuation and grammar are correct	[1][2][3][4]

Appendix D: Main Page of Intelligent Bank Management System

The screenshot shows the main page of the Intelligent Bank Management System (IBMS) accessed via Microsoft Internet Explorer. The browser's address bar shows the URL <http://localhost/ibms/main.asp>. The page title is "INTELLIGENT BANK MANAGEMENT SIMULATION TRAINING SYSTEM (IBMS)".

The page features a navigation menu with the following items: [About IBMS](#), [Register New User](#), [Log In](#), [Information](#), and [Demo Programs](#). Below the navigation menu, a welcome message reads "Welcome to IBMS Web Site".

The main content area is divided into three columns:

- Left Column:** Contains a sidebar with sections: "About IBMS" (with links for "What is IBMS?", "Instructor's Guide", "Participant's Guide", "Clients List", and "Pricing & Licensing"), "Tutorial OnLine" (with links for "Decision Sheet", "Forecast Worksheet", "Capital Ratio Worksheet", and "Dynamic Gap Worksheet"), "Benefits of Simulations" (with links for "Major Benefits" and "Benefits to Participants"), and "New User Registration" (with a "LOG IN" button).
- Middle Column:** Titled "INTELLIGENT BANK MANAGEMENT SIMULATION SYSTEM (IBMS)", it contains a paragraph: "Contains basic information and describes components of the Intelligent Bank Management Simulation System." followed by a detailed description: "The Intelligent Bank Management Simulation System is a technology-based program that simulates the operations of a bank, based on the decisions of management teams. The simulation is designed for use as a training device to give current and future managers of financial institutions a working knowledge of the financial interrelationships within a universal bank. Participants make short-term operating decisions and, at the same time, consider the implications of these decisions for long-term growth and profitability. While the relationships in this program are idealized and do not necessarily reflect the particular operations of any actual bank or class of banks, participants work with a fairly complex and realistic model and are challenged to make optimal decisions within this framework."
- Right Column:** Titled "Current Online Games At IBMS", it includes a "Log in to enter games" prompt and a list of game links: [Bank Challenger](#), [Malayan](#), [Stanbic](#), [Econogame](#), [UM Game](#), [First Bank](#), and [Matrixs](#).

The browser's status bar at the bottom indicates the connection is to "Internet".

Appendix E: Participants Log In Page

The screenshot shows a Microsoft Internet Explorer browser window displaying the login page for the Intelligent Bank Management Simulation System (IBMS). The browser's title bar reads "Welcome to Intelligent Bank Management Simulation System - Microsoft Internet Explorer". The address bar shows the URL "http://localhost/ibms/login.asp". The page content includes a header image of two people shaking hands, followed by the title "PARTICIPANTS LOG IN PAGE". Below this is a "LOGIN TO IBMS" section with three input fields for "Group ID", "User ID", and "Password", and a "Log in" button. To the right, there is a promotional text about an "Online demo" and a "Register" link, accompanied by two small images: one of a globe and one of a pen. At the bottom right, there is a link for "About IBMS" and a copyright notice "Copyright©2003 IBMS". The browser's status bar at the bottom shows "Done" and "Internet".

Address Go Links Dictionary.com

PARTICIPANTS LOG IN PAGE

LOGIN TO IBMS

Group ID :

User ID :

Password :

Would you like a preview of the site? Our [Online demo](#) will walk you through, step by step and show you how easy it is to use the IBMS system.

Please [Register](#) if you are a new User.

[About IBMS](#) | Copyright©2003 IBMS

Appendix F: Balance Sheet on Assets Page

Balance Sheet - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <http://localhost/lbms/balance.asp> Go Links Dictionary.com

**QUATERLY REPORT
FOR THE FINANCIAL QUARTER 2
BALANCE SHEET**

ASSETS	Quarter 0 (RM Million)	Quarter 1 (RM Million)	Quarter 2 (RM Million)
Cash	1,613	7,834	5,990
Loan:			
Housing Loan	1,411	6,854	5,241
Personal Loan	4,515	21,934	16,773
Syndicated Loan	6,350	30,845	23,587
Bridging Loan	1,835	8,910	6,814
Securities	4,032	19,584	14,976

Done My Computer

Appendix G: Balance Sheet on Liabilities Page

Balance Sheet - Microsoft Internet Explorer

File Edit View Favorites Tools Help

← Back → Search Favorites Media

Address <http://localhost/lbms/liability.asp> Go Links Dictionary.com

UM BANKING GROUP

QUATERLY REPORT

FOR THE FINANCIAL QUARTER 2

BALANCE SHEET

LIABILITIES	Quarter 0 (RM Million)	Quarter 1 (RM Million)	Quarter 2 (RM Million)
Deposit			
Checking Deposit	5485	10971	10971
Savings Deposit	8228	8228	5485
Time Deposit	5485	8228	8228
Capital	576	1399	2140
Equity	384	933	1426

Done My Computer

Appendix H: IBMS Tutorial Page



Appendix I: Income Statement for IBMS

Income Statement - Microsoft Internet Explorer

Address: http://localhost/ibms/income.asp

**QUARTERLY REPORT
FOR THE FINANCIAL QUARTER 2**

	<i>QUARTER 0</i> <i>(RM Million)</i>	<i>QUARTER 1</i> <i>(RM Million)</i>	<i>QUARTER 2</i> <i>(RM Million)</i>
Interest Income	102,289	109,806	217,867
Interest Expense	(49,628)	(56,682)	(102,197)
Net Interest Income	52,661	53,124	115,670
Non Interest Income	33,313	8,843	43,145
Non Loan Provision	-	-	-
Operating Income	93,705	67,174	171,952
Expenses (Staff, premises, marketing)	(28,834)	(28,802)	(55,894)

Done My Computer

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