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All praise to Allah S.W.T., the lord of the worlds, and blessings and peace upon our leader and chief, MUHAMMAD S.A.W., upon his companions, and upon those who followed them with sincerity until the Day of Judgment.

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**Abstract**

Computer based aided learning that has been introduced since 1950's are believed to be highly potential to become a teaching tool. Now, the CAL learning tools can be achieved as CD ROMs, web based system and a lot more. This increasing is due to the rapidly grown of home computer among people. However, here in Malaysia, this new ways of learning are new to the citizens and a lot of teaching methods still using books as a teaching tool.

Cepat Baca BM project has been conducted from 15th June 2003 until 12th February 2004. This project tries to develop a teaching method aiding the children learning to read Malay Language by using CAL concepts. This thesis consist of 8 chapters from ***Introduction;*** that briefly explain on the "*Cepat Baca B M*" system, ***Literature Review;*** that shows the finding from other teaching systems and techniques, ***Methodology;*** to describe the methodology to be use in developing the system, ***System Analysis***; explain the system needs, the users needs, and the tools and software that are needed to develop this system, ***System Architecture;*** that presented the complete system design explanations, ***System Implementation;*** explaining the phases involve between design phases to the implementation, ***Testing;*** shows the tests that have been conducted to the developed system and lastly the, ***Conclusion;*** the overall conclusion about the system that has been developed can be found in this chapter.

***Abstrak***

*Pembelajaran berbantukan komputer telah diperkenalkan sejak tahun 1950-an dan dipercayai sangat berpotensi untuk digunakan sebagai peralatan bantu mengajar. Kini, peralatan Bantu mengajar ini boleh diperolehi dalam bentuk CD ROM, system berasaskan laman web dan sebagainya. Peningkatan penggunaan peralatan ini adalah disebabkan penggunaan komputer dirumah yang semakin bertambah. Walaubagaimanapun, peralatan Bantu mengajar ini dianggap baru di Malaysia dan kebanyakan kaedah pembelajaran di negara ini masih menggunakn buku sebagai peralatan mengajar.*

*Projek Cepat Baca BM telah dimulakan pada 15 Jun 2003 sehingga 12 Februari 2004. projek ini bertujuan membina satu kaedah pembelajaran yang mampu mendidik kanak-kanak membaca Bahasa Melayu dengan menggunakan bantuan computer. Thesis ini mengandungi 8 bab yang bermula dengan* ***Pengenalan;*** *yang menerangkan secara ringkas berkenaan projek Cepat Baca BM,* ***Kajian Literasi;*** *menunjukkan kajian tentang kaedah sedia ada,* ***Methodologi;*** *menjelaskan methodologi yang akan digunakan untuk membangunkan system,* ***Analisa system;*** *menerangkan keperluan sistem, pengguna dan peralatan-peralatan yang diperlukan untuk membangunkan sistem,* ***Binaan Sistem;*** *yang membentangkan binaan sistem yang yang telah dibina,* ***Implementasi Sistem;*** *membincangkan perubahan fasa daripada rekabentuk system kepada sistem yang telah siap,* ***Ujian;*** *menunjukkan ujian-ujian yang telah dijalankan keatas system, dan akhir sekali,* ***Kesimpulan;*** *menyimpulkan semua proses yang telah berlaku semasa proses membangunkan sistem sehingga sistem siap sepenuhnya.*

Contents Pages

Contents Pages

| Table | Pages |
|---|---|

**Diagram** **Pages**

# CHAPTER 1 : INTRODUCTION

## 1.1 Introduction to "Cepat Baca B M" project.

This project is meant to introduce a learning tool focusing on pre-school kids to aid and teach them on reading the Malay Language using a method that already being introduced. The main goal on building this tool are to enable the children learn on reading Malay Language as fast as possible as well providing the pre-school and primary school with a new comprehensive teaching tool.

As we know, there are many teaching methods to help the children on reading Malay Language being introduced from time to time. These teaching methods are developed after researching various children psychological and mental ability before they come out with a comprehensive ways of teaching. Even though different methods use different concepts of teaching, but the aim are the same.

The system tool that will be developed using all the resources available to fulfill the entire boundary limit; thus will become a "flexible, reliable, user friendly and easy to use" system. It is hope the tool that will be developed will meet its target on reducing the learning time for children to read Malay Language.

## 1.2 Problem Definition

The system tool that will be developed is a tool that speed-up the learning process for the pre-school children to read Malay Language. It will replace the manual tool form into software type. If we look into our market, all the teaching methods to read Malay Language are in manual. Books are often found being used to aid the parents and teachers to teach the children on reading. However, almost every method is delivered through a set of books that must be bought together.

The scenarios is this set of books are heavy, and the problem will occur when a book or some book are missing from the set. The customer of this book cannot buy a single book to replace the missing book. Therefore, if software of this book is to be developed, it will reduce the chance of losing the book and many additional data can be added in the software like sounds or interactive spelling quizzes. This software will become a very reliable and interactive tool for the children in their way in learning to read Malay Language.

To develop this aiding tool, these questions must first be answered:

- what are the purpose developing the tool
- which teaching method will be used to developed this tools
- how to get the resources of the method which can help developing this tool
- what are the information to be input into the tool and is it enough
- how to make this aiding tool a reliable and user-friendly tool

This question will help the tool developer developing the system so the goal on developing it will be meet.

## 1.3 Project Objective

The main goal on developing this tool is to introduce a new flexible, reliable, user friendly and easy to use teaching tool, focusing on pre-school kids to aid and teach them on reading the Malay Language. This tool should be the new teaching tool for school, as it meets the government campaign on reducing the "IT blindness".

The "Cepat Baca B M" tool is developed to fulfill these objectives:

- To ease the pre-school children learn to read Malay Language.
- To aid parents and teachers on teaching pre-school children reading Malay Language.
- To provide an aiding tool that is flexible, reliable, user friendly and easy to use for children.
- To reduce the physical material of teaching tools (from a set of books to a software).
- To avoid loses of some teaching material that may occur especially when using set of books.
- To introduce an electronic environment and reducing the used of paper.

## 1.4 Project Scope

System Architecture

- This aiding tool is developed to fulfill the purpose to speed-up the learning process for the pre-school children to read Malay Language. It will greatly help the parents and teachers to guide the pre-school children to read Malay Language.
- The tools also provide an interactive way to deliver the teaching methods like sounds and pictures.
- Questions and quizzes also provided inside the tools to speed up the learning process.

User

- The target user for this system is the pre-school students.
- Other user should be the students' supervisor like the parent and teachers to aid the children using the aiding tool.

Activity

- Activities for the pre-school students are depending on their level of skill. The beginner will be introducing to the basic way on spellings and the upper skill level of the user will have the more difficult task. This level will be determined through an interactive quiz at end of each chapter.

## 1.5 Expected Result From "Cepat Baca B M" Project

The aiding tool that is to be developed is to meet the following expectation:

- Decrease the learning time for pre-school children to read Malay language.
- Provide a flexible, reliable, user friendly and easy to use tool.
- Satisfy the method developer that gives the copyright to introduce their product into software.
- Stimulate the pre-school children to learn Malay Language.

## 1.6 Project Planning

Plans are need to develop an aiding system tool. The "Cepat Baca B M" projects are done in two phase. The time-line for first phase is from June 2003 to September 2003; consist of documentations of Project Introduction, Literature Study, Methodology, System Analysis and System Architecture. The second phase will be done starting November 2003 to February 2004 and the activities to be done are The Implementation and Testing of the developed tools.

**Table 1.1 : System Development Time-Line**

| Developing Activity | Time-Line | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | June 2003 | July 2003 | Aug 2003 | Sept 2003 | Nov 2003 | Dis 2003 | Jan 2003 | Feb 2003 |
| System Study and Reference | | | | | | | | |
| System Analysis | | | | | | | | |
| System Architecture | | | | | | | | |
| System Testing and Implementation | | | | | | | | |
| Documentation | | | | | | | | |
| All the activities are scheduled depends on current situation and can be altered accordingly. | | | | | | | | |

## 1.7 Chapter Overview

The system development processes, which have two phases, are divided into eight chapters to ease on writing the final reports later. The overviews of all eight chapters are stated here.

***Chapter 1: Introduction***

This chapter explains briefly, on what are the "Cepat Baca B M" system tools that will be developed. The project objective, project scope, the important of this project to be develop, the estimated result and the system development time-line can be found in this chapter.

***Chapter 2: Literature Review***

This chapter shows the finding from other teaching systems and techniques that are already exist. Literature Review are important especially as a guide on developing this system tool so the system are to be develop will achieve it objectives.

***Chapter 3: Methodology***

A methodology will be choosing to ease on developing the system. This chapter will explain about the model of "Cepat Baca B M" system tool with more detail and show how it is appropriate with the system to be build.

***Chapter 4: System Analysis***

The system needs, the users needs, and the tools and software that are needed to develop this system will be explain in this chapter.

***Chapter 5: System Architecture***

The complete system design explanations about the "Cepat Baca B M" system tool can be found in this chapter. These system designs are include the database design, program design and interface design, which are suite to the system to be developed.

***Chapter 6: System Implementation***

Explain the phase, which involve the change between design phases to the implementation in real application.

***Chapter 7: Testing***

This chapter shows the tests that have been conducted to the developed system. These also include, unit testing, module and integration between all system function.

***Chapter 8: Conclusion***

The overall conclusion about the system that has been developed can be found in this chapter. This chapter also includes the problems that occur while developing this system.

## 2.1 Background Review.

The main purpose of this section is obviously to achieve more understanding on the project concepts and definition. Hence, this section is a background study to improve and understanding this project very well. It consists about supplementary knowledge and information, past researches and theory development that are not only to be review but also in assisting to develop this teaching system tools.

## 2.2 Review of the Existing Methods and Techniques

Computer Based Learning (CAL) has been introduced around 1950s and known as a potential tools as a teaching aids. In 1985, over 100 learning based system being used in United State. Unfortunately, the Malaysian are still not familiar with the CAL concepts. However, the method on teaching the pre school students to read already being introduced. Some examples of the learning methods already been introduced like noun method, phonetic method, interactive learning method, and much more. The methods I choose to review are as below:

i) A set of books - ***Bacalah Sayang***

ii) A set of books - ***Bacalah Anakku***

iii) Cassette - **Early Reading Series Beginners Level,2003**

iv) CD ROM - **Key Stage 1 English**

### 2.2.1 *Bacalah Sayang*

*Bacalah Sayang* has been published by Penerbitan Fargoes Sdn Bhd. The authors of this book are Miss Maslina bt Hj Ramli and Pn Suzie bt Mat Harun while the advisor is Tn Hj Husin b Othman. Miss Maslina has a Literature Degree in Psychology from University Kebangsaan Malaysia. She once conducted a study on children cognitive improvement towards the pre school children to evaluate the children memory capability. Pn Suzie have the experienced of more than 15 years in giving her effort writing educational books. The advisor, Tn Hj husin once worked as a teacher before being assigned as Curriculum Officer in The Ministry of Education.

The learning started with recognizing the letter, before encouraging the children to form noun. Through this method, children are though to spells noun before combining the nouns they learn into words. The tool for this learning process is a set of noun card. As a whole, this method can be considered as a traditional ways to teach children to read because this method emphasize in letter recognizing. These books come in set and have been divided into certain level.

### 2.2.2 *Bacalah Anakku*

*Bacalah Anakku* has been written by Miss Nik Eliani Nik Nawi and Mr Othman Ahamad and been published by ONE-Stop Language & Computer Consultancy. Miss Nik Eliani are a Bachelor holder in Arts from Brock University, Ontario and has a Diploma in Education from International Islamic University from Kuala Lumpur while Mr Othman Ahamad are a Bachelor holder in Arts from Feirleigh Dickinson University, New Jersey and also has a Diploma in Education from International Islamic University from Kuala Lumpur. Both of them are well experienced in the world of education and through their past experience and knowledge, they have written these set of books.

*Bacalah Anakku* comes in 9 books including the teachers' guideline, a cassette and a set of noun card. The interesting and unique parts from these books are they are introducing the phonetic based teaching method with simple repeatable noun, less picture and colorful. The phonetic based teaching method state that all the letter must be introduce as it sound like an B pronounce as "*beh*". The activity in this phonetic method emphasize in attention and discrimination to the letter. These books suggested that all the learning activity must be alternately exchange with some reading game.

### 2.2.3 Early Reading Series Beginners Level,2003

Early Reading Series Beginners Level, 2003 is a cassette that has been published by One-Stop Language and Computer Consultancy. This method of teaching emphasizes hearing as a learning tool and also introduced the easy way to learn reading using the phonetic way. It is more like the method in *Bacalah Anakku* but it is presented in a musical concept.

### 2.2.4 Key Stage 1 English

Key Stage 1 English is produced and being published by The Times Education Series. This CD ROM teaches the children on reading using it fun and attractive activities. The software provides an interactive interface that may attract children to use it. The activities are divided into recognizing letter as general, recognizing small cap and all cap, completing a word base on picture given, combining a sentence, matching picture with the spelling, and spelling activity based on hearing skills. Each except the first activity is locked until the users achieve the minimum requirement from the previous activity. The requirement is counted as a star symbols.

## 2.3 Comparison Between Existing Techniques

This is where a developer can see the advantage and disadvantages from the existing methods. It is important so the developer can decide how the system will be developed going to be. From this comparison, the developer can also pick some of the positive elements or technique to be included in the software to be developed.

### 2.3.1 *Bacalah Sayang*

The method in these books can be defined as a traditional method. Its carry the traditional way on how the past parents or teachers teach their youngsters. It is proven that this method is working fine and a lot of school using this method to teach the children. Through the sequence in this method, children will recognize the letter and through time the children will learn to spell nouns, words and lastly can read books.

However, the noun emphasize method are found less effective because it burden the children to remembered the letter. This will make student wont learn to read fast because a lot of remembering need to be done before they can match a nouns become words. I also found those students who learn through this method will quickly find themselves bored.

### 2.3.2 *Bacalah Anakku*

This method is known as a modern way to teach pre-school to read. It emphasizes the phonetic (sounds of each letter) as a learning method. Each books are divided into three stages of learning and has been proven much effective than the traditional way. The first stage required the students to make the sound of each letter separately. For example the letter "A" pronounces as "aaaaa". The second stage will guide the children to combine the sound of vocal letter with a consonant to produce a noun. For example "B" (pronounce as "beh") combine with an "A" (pronounce as "aaa") will produce a "ba" sound. The third step is combining nouns to build a complete word. *Bacalah Anakku* provides a colorful interactive letters and picture as to attract children. This books also come with the teacher manual to aid the teacher teach their children much effective. It also helps the teacher to evaluate the children by giving the instruction and example of evaluation form.

However, because this book comes in set, it is considered bulky and will use a lot of space to keep. Each book also has the risk on loosing because it has seven different books.

### 2.3.3 Early Reading Series Beginners Level,2003

The Early Reading Series Beginners Level, 2003 methods is same as been emphasized by Bacalah Anakku. The differences are it being presented as a sound using a cassette. From this cassette, listener will hear a conversation between two people as a guider or teacher and another child as an example of students. The concepts try to centralized here is the easy way to spell and read through hearing skill. After explaining each sound of letter, the listener will hear that each phonetic sound being presented as an attractive song. This will help the listener remember the sound of each letter.

Unfortunately, this tool only presented as sounds. So the children will feel bored easily because there is no colorful or attractive picture that can attract or help the children. As we know, Children will attract easily through scenery and without any picture guide, children will not know the look of each letter unless being showed by other person.

### 2.3.4 Key Stage 1 English

This software comes with an interactive interface that can generate children interest to use the system and is considered as a fun game learning. Each learning game has been arrange from basic learning as identifying letters until expert users to spell each words that been pronounced by the system. To proceed to the next game, users must complete the previous game.

The weakness of this software is it cannot detect different user and save or print the users' achievement. This software also required each user to go through each game before arrive at the game the user wanted to use.

## 2.4 The use of Computer as an Aiding and Teaching Tools

The main objective to develop the system is to make it as a reliable aiding and teaching tools so the pre-school children will learn reading Malay language faster. To achieve this objective, a few strategies will be use:

i) Provide basic learning and understanding to teach the users

ii) Using interactive multimedia simulation presentation to attract and aid the users

iii) Evaluate the students through test, tutorial or problem solving game materials.

The system developer must know the important environment than can affect the system to be developed. This will ensure the system to be developed will achieve it objectives. The important aspects in Computer Aided Learning (CAL) environment are the word processing and desktop publishing environment, database that can keep the record of each user and their performance, the communication environment between users and the system, and lastly the electronic and multimedia environment as sounds, graphic, system manipulation and others.

The benefits using this computer system as a learning tool is it can be self-pacing, attractive, provide a record keeping, reliable, timeliness, flexible and can improve users motivation to learn more. However, by using this software, it can lead to decrease the human relationship in the learning process. The cost to make the software also can increase the price for the user to buy the software.

# CHAPTER 3 : METHODOLOGY

## 3.1 Introduction on methodology

All project development system, software, or application will go through a life cycle called *Software Life-Cycle*. General, the phases in this life-cycle includes Analysis Requirement, System Architecture, Unit and Integration Testing, System Testing, Receive testing and Operation and Maintenance. All methodology used by system developer must use all or part of these phases depending on the application to be developed. The System Development Process can be referred through methodology and will be the guideline for a system developer developed a quality system. Choosing a methodology is very important for the system developer to assure the application development processes are systematically done other than giving a clear and same understanding on the activities, resources and the boundary limit. Other purposes of methodology are to search for any inconsistencies, redundancies, repeating and omissions in the processes. It is also important to visualize the goal of developing this system through evaluation on the activities that are generated.

## 3.2 Methodologies Comparison

The phases in traditional methodologies usually in sequence and usually used in traditional system development because the traditional system development usually come with activities table that can be expected earlier. All works can be documented and planned first. The data required for the system can be achieve as whole, and analyzed before putting the intention on how to process the data. The spiral methodology is a methodology much more flexible compared to the traditional methodology. It combined the traditional methodology and the prototype methodology. This methodology allowed any phase to be repeated if an error detected from the previous phase.

## 3.3 System Development Methodology

The methodology that has been chosen to use for this system is Prototype Model with evolution. This prototype includes the process to build up a test system or experiment system faster and cheaper to be evaluated by the end user [Loudon & Loudon, 1997]. Prototype will produce an early model to be used and evaluated by the end user and the processes in the prototype will give a detail model interactively. By using this model, the system to be developed can be fixing and repaired until the all aspects requirement are fulfill. This will also reduce the cost and the development time.

Prototypes are divided into requirement prototype and evolution prototype. Requirement prototype is the prototype that detects the system requirement. It will go through the "model-critic-fix" process and will influencing the result of the user respond. These processes are to be repeated until this prototype has been approved by the user. The evolution prototype, in the other hand, is a system development methodology that can create a real system. The evolution prototype will be used to develop this system; due to the system to be developed are quite small.

The evolution prototype is use to identify and gathered the system requirement wish by the user. Depend on the requirement, the prototype will be adjust or redeveloped until it meets the entire requirement needed by the user; and will be used in the final system development.

The sequences inside evolution prototype are-

i. Recognize the user interface, input, output, store and control.

ii. Developed a prototype

iii. Testing and evaluate by the user

iv. Recognize the user requirement to improve the system.

This step will be repeated a few times until the user really satisfied the prototype of the real system that will be developed. The environment or situations to develop the prototype are-

i. *leading-edge* based system

ii. A system with dynamic equality or the requirement that can be change

iii. A real time automated system, highly interactive application with a complex user interface.

## 3.4 Prototype Development

Many important processes involve building the prototype that fulfills the entire requirement in the prototype development phase. A highly skilled designer who knows exactly all the requirements are needed to developed the prototype. The phases involve in the prototype model includes analysis phase, design phase, development phase and implementation phase. (Refer to diagram 3.1)

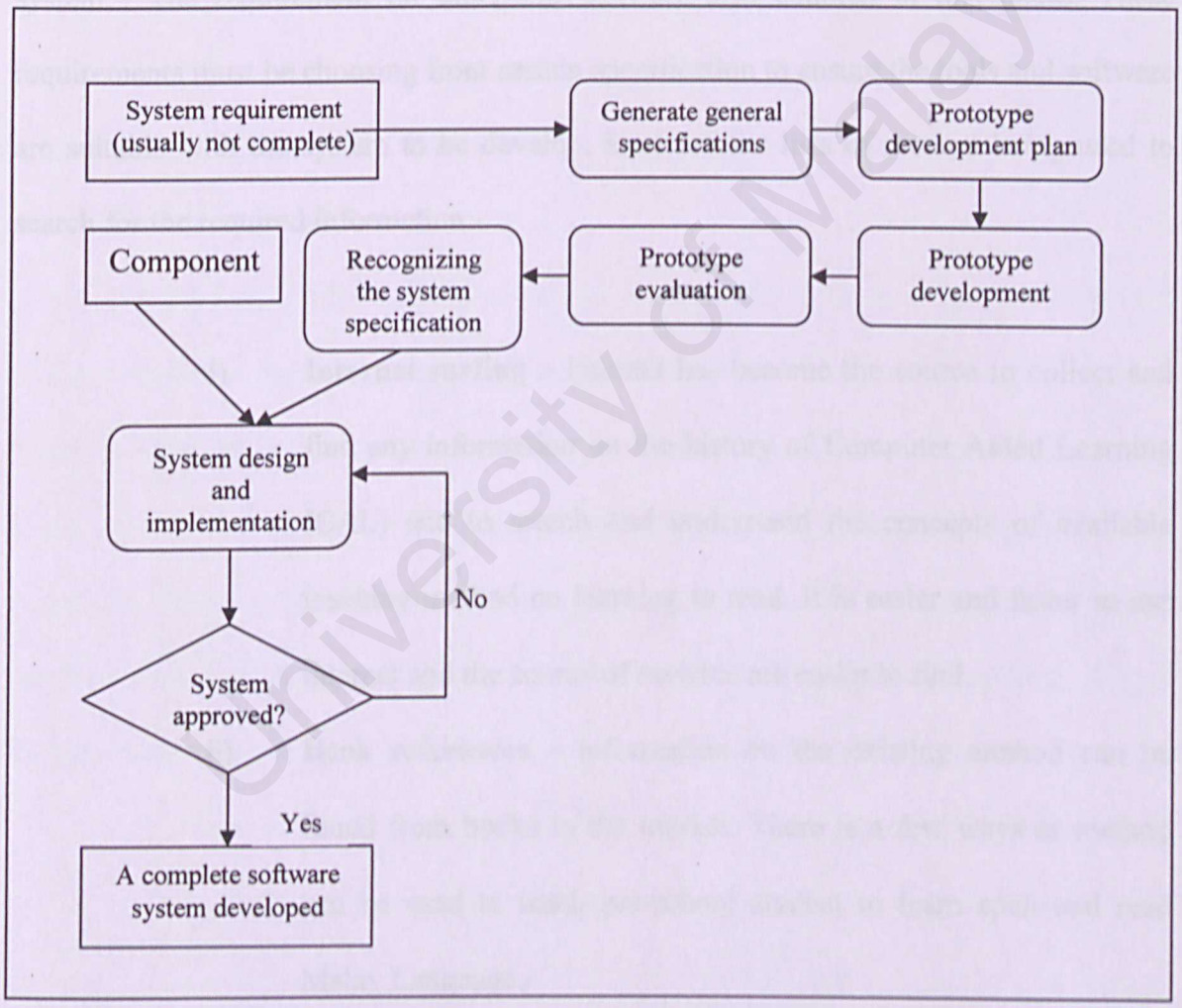



**Diagram 3.1 : Evolution prototype model**

### 3.4.1 Analysis Phase

In this phase, all the information are gathered together to understand the environment on the preexisting system and the system to be developed. All the problems occur will be reviewed to decide any additional requirement needed for the develop system. The literature review are use to understand the concepts and methods needed; as well as to understand the requirement and technology need to be use in the developing system. The requirement on tools and software also counted in this phase. These requirements must be choosing from certain specification to ensure the tools and software are suitable with the system to be develop. Here are the lists of method being used to search for the required information:-

i) **Internet surfing** – internet has become the source to collect and find any information on the history of Computer Aided Learning (CAL) and to search and understand the concepts of available teaching method on learning to read. It is easier and faster to use internet and the source of revision are easier to find.

ii) **Book references** – information on the existing method can be found from books in the market. There is a few ways or method can be used to teach pre-school student to learn spell and read Malay Language.

iii) **Interview** – All pre-schools have a method to teach children to read. To get the information on what method they are using and how effective the method they are using, interview is one of the best option. By interviewing some of the pre-school teacher from different pre-school, one can decide which method are much more effective and commonly being used.

### 3.4.2 Design Phase

Result from analyzed review will be pictured in early prototype form. In this phase, conceptual, logical and physical design will be conducted. The conceptual design meant to understand the concept so a work flow can be produced. In logical design, the UML models including use case, sequence diagram, and collaboration diagram are needed to identify the attributes and the entities. The physical design is important to determine the specification for the tools and software to be use. In this physical design, all the unstructured dataset will be keyed into the database that will be design.

### 3.4.3 Development Phase

The development phase started after the design phase completed. This phase includes system coding plus installing the tools and software required. The physical design activity also conducted in this phase. The development process is implement base on the previous physical and logical design plan. The prototype developed earlier will be tested in this phase to detect any errors and to ensure the system software already meet its requirement. Documentation for the system program will be produce to ease any incoming references.

### 3.4.4 Implementation Phase/Testing and Evaluation of the Prototype

In this phase, end testing activity will be commencing by the users. Any errors are unexpected to occur for this prototype model has gone through a long continuous testing. The system will be test from system logical flow, data entry, and required information outflow and information reliability.

## 3.5 Methodology Justification

This methodology has been chosen for it advantages in developing the system. The advantages are:-

i) All phases in system development process can be repeated depend on the requirement by using the Prototype Model. If an error detected in any previous phase, that particular phase can be rebuild to make any necessary correction.

ii) The Prototype Model has an advantage when the user requirements are not complete. So, active interactions with the users are very important. This interaction can trigger the user participation and commitment to help building the software.

iii) Any misunderstanding that may occur of any problem between users and developers can be reduced and solved hastily because of the active participation from the user.

iv) Active users can pronounce the requirement needed for the developing system and this will greatly reduced any system designing error. So, the developing system will fulfill the users' desire.

v) The system that to be develop also will have less failure risk and does not need a lot of updating. This lead to lower development cost.

### 3.6 *Unified Modeling Language* (UML)

UML is a series of step called phase; supported by technique, rules and guideline to produce a software system. It is a standard for object oriented software development model to identify, develop and for software system documentation purpose. It also offer more understanding for developing the system and provide a complete semantic to build the database. UML has been chosen as the method to be use in this system because of these factors:-

i) Problems can be define precise and faster due to review of users need always been updated. This is needed because analyzing phase for requirement is carrying out until the complete system is fully developed.

ii) Analyzing is conducted from in all phases.

iii) UML may support complex problems.

iv) The system that can define the

v) A system than can evaluate users performance.

There are a few important phases in the software development that will be explained. The phases are:-

i) Requirement Analysis

ii) Design Analysis

iii) System Testing

iv) Implementation

v) Documentation

### 3.6.1 Requirement Analysis

Requirement Analysis are to choose the definition and specification system requirement either it is the functional requirement or non-functional requirement. This analysis will include interaction review between the system and the environment, data flow and the information including the relationship between activities or functions to ensure the system are well executable. Use-case model has been use in the UML.

### 3.6.2 Design Phase

Design Phase are commence after the requirement analyzing review has been define. This phase explain how process and data being execute in procedural form. The characteristic to be reviewed includes programming, data structure, abstract, information hiding and modularity. In this phase, a Class Diagram will be build to project and decide the Object Class and data field involve.

### 3.6.3 Testing

Testing is a process to run the program and performing a few series of scanning to detect any error that may occur. The purpose of this phase is to test the system that has been developed to see whether the system can manage to fulfill its requirement depend on the specification or not. The output result from the test will be compare to the real expected output. If the specification does not fulfill the system requirement, then a new use-case will be identified and the Testing Phase shall be repeated to ensure the objectives of the system are achieved.

### 3.6.4 Implementation

The Implementation Phase will be executed after use case has been design and the system being tested. The use case will be implemented as the guideline for programming and coding while building the real system in the Implementation Phase.

### 3.6.5 Documentation

After the testing and evaluation process, the developing system will be documented using the prototype so the system can be improve in the future. This documentations process are commence after the real prototype has been completed. It is useful for the programmer to decide if there any changing to be done.

# CHAPTER 4 : SYSTEM ANALYZING

## 4.1 Introduction

System analyzing is an important subject while developing the system because software and tools required can be defined through this step. Suitable tools and software is factor to produce a good system. So, any tools and software must be choosing wisely to prevent any problem that may occur and caused the system development process being interrupted. The choosing of these requirements must base on the current technology.

Through the system analysis, the definition and specification of the system requirements can be defined. This includes the literati on review between the system with the environment, data flow and information; as well as the relationship between activities and functions that may allow the system to operate efficiently.

## 4.2 Software and Tools Requirement

In developing a system, the main thing must take into consideration is to decide the system requirements. These are the requirement for a system:

1. Tools requirement
2. Software requirement

### 4.2.1 Tools Requirement

To develop a system, it is important to justify the tools required to run the system.

#### 4.2.1.1 Computer Requirement Specifications

i. 600 MHz Intel Pentium(r) III processor or equivalent

ii. 128 MB RAM (256 MB recommended)

iii. 16 MB Graphic card

iv. 2 GB hard disk drive

v. Windows 98 SE, Windows 2000, Windows XP, or Windows Server TM 2003

vi. 256 color monitor800 x 600 pixels (1024 x 768 pixels recommended)

vii. Mouse, Printer and Keyboard

#### 4.2.1.2 Justification of Tools Selection

i. As a base to install the system

ii. To run the system

iii. To store the developed system

iv. To connect the system with the users

### 4.2.2 Software Requirement

Information technology achievement makes the operational system more popular and is able to withdraw users' attention. The users' requirement and needs can be fulfilling by choosing the suitable and appropriate software to be used. The software characteristics needed are:

i. Allowing to maintain lot of data

ii. The ability to interact with the database

iii. Easy to understand and have a noncomplex syntax.

iv. Support the language characteristic and have an attractive interface.

#### 4.2.2.1 Oracle 8.1.7.0.0

This is the main program that I will use to develop this system. Oracle is one of the development tools that can be found. This tools uses SQL (Structured Query Language) and used to manage information in an Oracle database.

#### 4.2.2.3 Operational System: Microsoft Windows XP

This is the platform where the "Cepat Baca B M" software will be running from. Windows XP. Windows XP brims with new features, improved programs, and tools.

#### 4.2.2.4 Microsoft Project 2000

*Microsoft Project* 2000 is a software use for project planning. Some output like Pert Cart and graph can be produce using this software so the developers have a glance when building the system. It also can help to understand how the project developed.

#### 4.2.2.5 SONY Sound Forge 7.0

SONY Sound Forge 7.0 is use to record voices that are essentials to the program that are developed. With this, I can change the tone of recorded voices, change the sound format to wave type and enhance the voice.

#### 4.2.2.6 Adobe Photoshop

Adobe Photoshop is very useful for this software. This software can cut picture, enhance and change the picture type. A very good picture can be made if using this software.

#### 4.2.2.6 Justification of Software Selection

Choosing software is necessary in developing a system. Without software, the system cannot be develops. The characteristic for the software to be use are:

i. Software can be defined as a base or place where the system are designed and implemented

ii. All system input or output data are stored in the database produced by the software.

iii. Software is a place that is reachable by the users.

## 4.2 Functional Requirement and Non-Functional Requirement

It is important to know the functional and non-functional requirement so the developer will not be distracted from the development plan and the objectives are achieve.

### 4.3.1 Functional Requirement

Functional requirement are define as something that needed to make the system developed achieves its main objective. These are the functional requirements for Cepat Baca BM:

i. Dividing the pre school children learning progress into categories

ii. Provide an audio and visual environment to aid the children

iii. Evaluate and display users' performance through a test that provided.

iv. Have a carry mark conditions to proceed to higher level of categories.

### 4.3.2 Non- Functional Requirement

Non-Functional Requirement needed as an accessory to make the system to be developed better. The system can be run without the non-functional requirement but it will not be a complete system. These are the examples for the non-functional requirement for Cepat Baca BM:

i. Attractive interface

ii. Ensure the software develop are user-friendly

iii. Each test result will be calculated 5 second or less

## 4.4 Conclusion

Through the work plan that has been carried out, the use of suitable tools and software has been defined to develop this system. Furthermore, the functional and non-functional requirement also has been decided. These will definitely be the guideline to ensure the system objective would be achieved.

# CHAPTER 5 : SYSTEM DESIGN

## 5.1. Introduction

Designing is an important aspect in developing a software application project. It is define as process of changing idea to make it better so the application development process will be easier. A good system design will ensure the results match the project objectives and goals. It is also to ensure the development process executed smoothly. This chapter will discuss on the project design suggestion and the expected result including system architecture, data flow diagram (DFD), entity relationship diagram (ERD), program flow chart and interface design.

## 5.2. System Architecture

The overview of this system has been told in the system goals, objectives and scope in the earlier chapter. Like any other system, *Cepat Baca BM* also stress out about the concept modeling where the modules are divided into smaller components for different module. Three modules for this software system are Operational Module, Software Application Module and Users Service Module.

## 5.3. The Components in the System

Every system is build from smaller part called components. *In Cepat Baca BM* software, a few components has been define include database, interface module for users log-in interface module for activities provided and interface module for activities provided

### 5.3.1. Database

In the Operational Module, the person involve are users. This module will stored the user profile and the user ID as a key because there will be a lot of people will use the system. This will ensure all achievement points will not mix up. The User ID will directly connected to the database so the system can identify the user (if the user already exist) or create a new user profile. This database store all information of users achievement points so the user can evaluate his or her performance. The Entity Relationship Diagram **(Diagram 5.1)** below shows the database structure for this module.

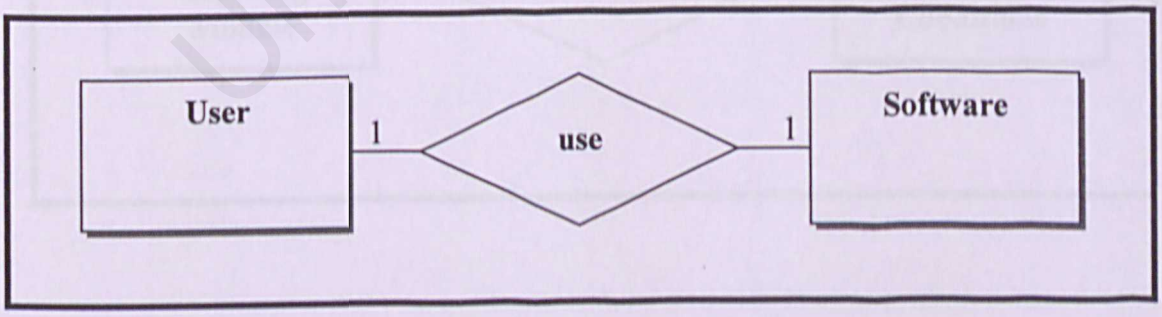



**Diagram 5.1 : Entity Relationship Diagram (ERD) for Service Operational Module**

The Entity Relationship Diagram **(Diagram 5.2)** below shows the database structure for the Software Management module.

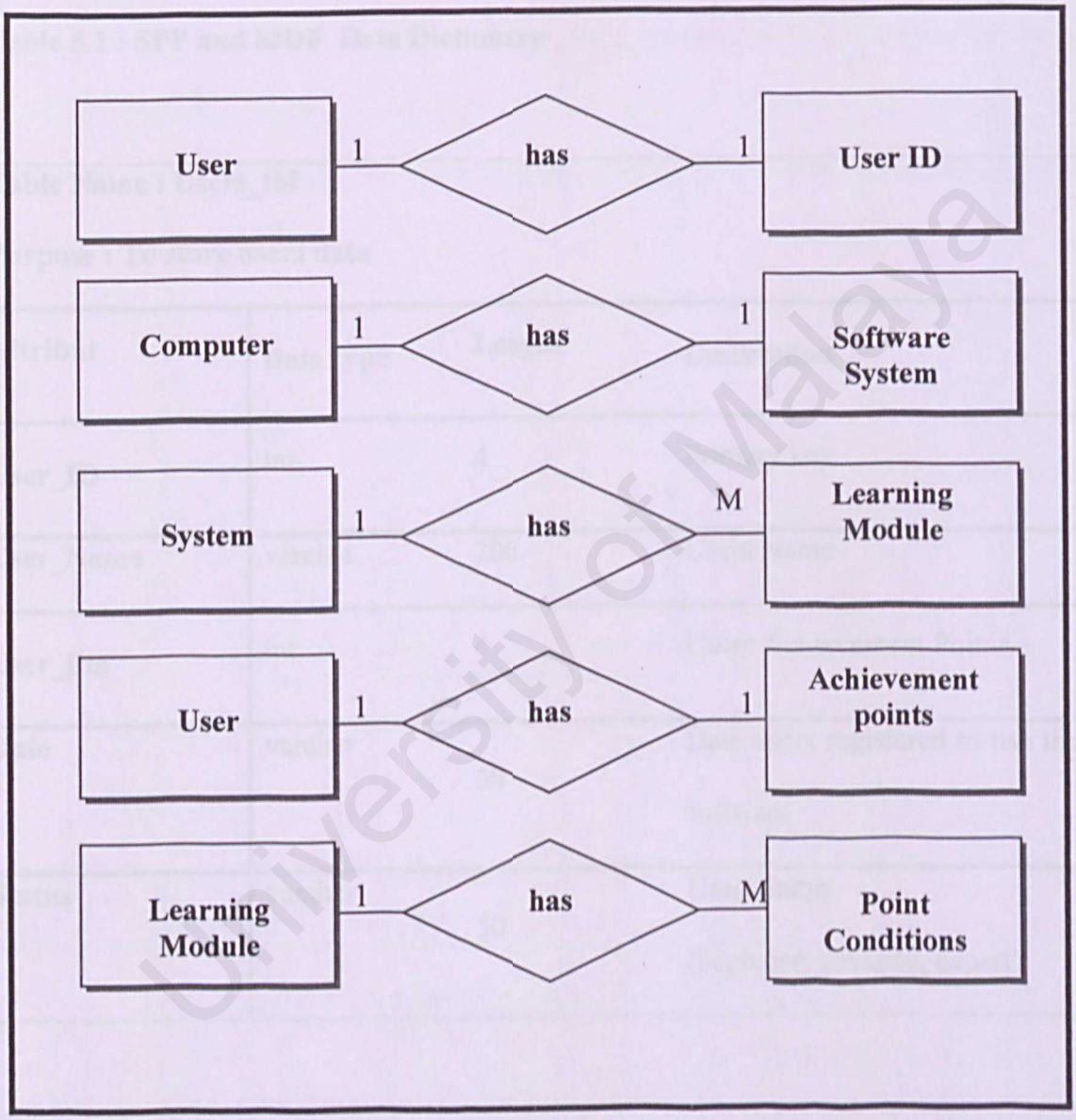



**Diagram 5.2 : Entity Relationship Diagram (ERD) for Software Module**

Through the entity diagram in the previous page, the database components for *Cepat Baca BM* software system will have a table that will design as **Table 5.1 : SPP and MDF Data Dictionary**

**Table 5.1 : SPP and MDF Data Dictionary**

| **Table Name : Users_tbl**<br>**Purpose : To store users data** | | | |
|---|---|---|---|
| **Attribut** | **Data type** | **Length** | **Description** |
| **User_ID** | int | 4 | Primary key |
| **User_Name** | varchar | 200 | Users Name |
| **User_Pts** | int | 4 | Users Achievement Points |
| **Date** | varchar | 50 | Date users registered to use the software |
| **Status** | varchar | 50 | Users status (beginner, advance, expert) |

### 5.3.2. Interface Module for Users Log-in

Users who want to use this program must have the user ID. This is to help the system tracking the user' point of achievement and to evaluate either the user is a beginner or an expert user. **Diagram 5.3 : Interface Module for Users Log-in** shows the first interface for the system.

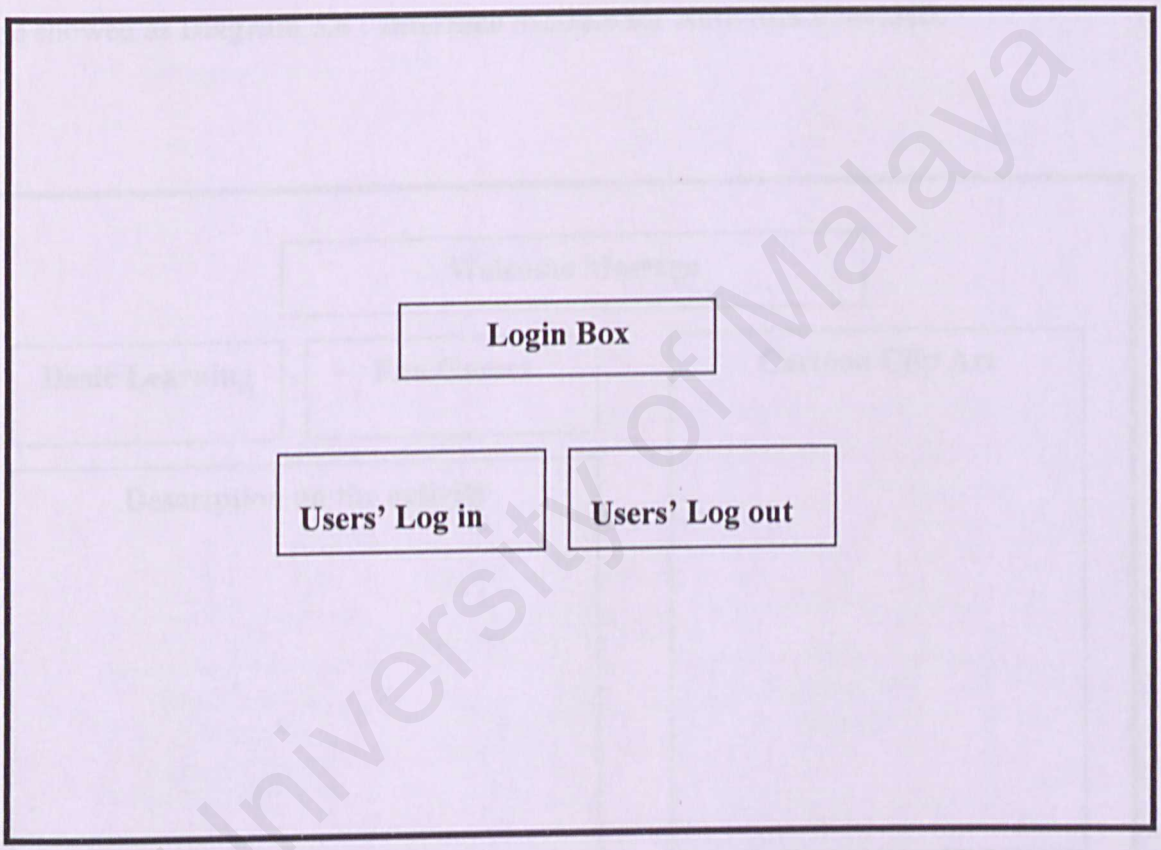



**Diagram 5.3 : Interface Module for Users Log-in**

### 5.3.3. Interface Module for Activities Provided

After the user has succeeded logging in or creating the users' new account, than the main menu will be displayed. All users will be given 50 points for the first use. This point will increase or decreases depend on the users' performance. Users can only proceed to the next level of learning after achieve certain level of points. This interface are showed as **Diagram 5.4 : Interface Module for Activities Provided.**

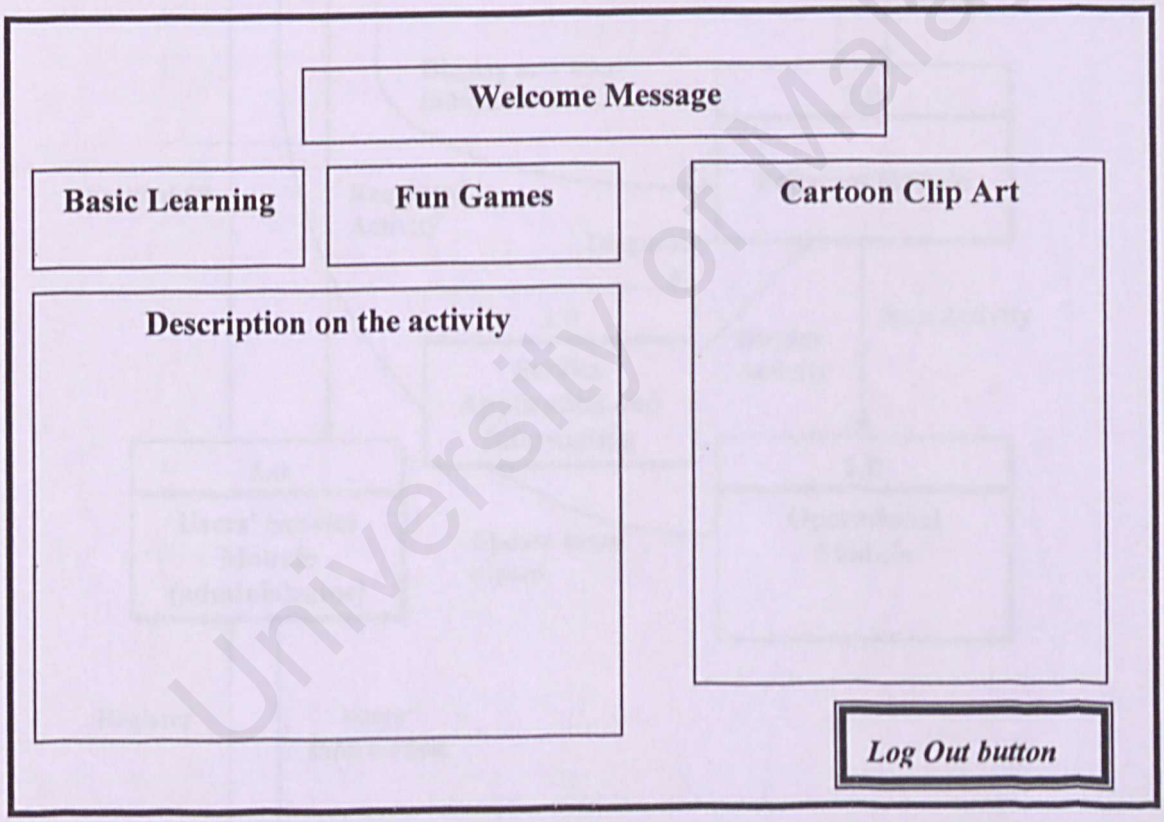



**Diagram 5.4 : Interface Module for Activities Provided.**

## 5.4. Data Flow

**Diagram 5.5 : Data flow Diagram (DFD) for *Cepat Baca BM*** below shows how data are flowing through the system, how do the data exchange and how it left the system. This diagram eventually shows the input and output flow of the system.

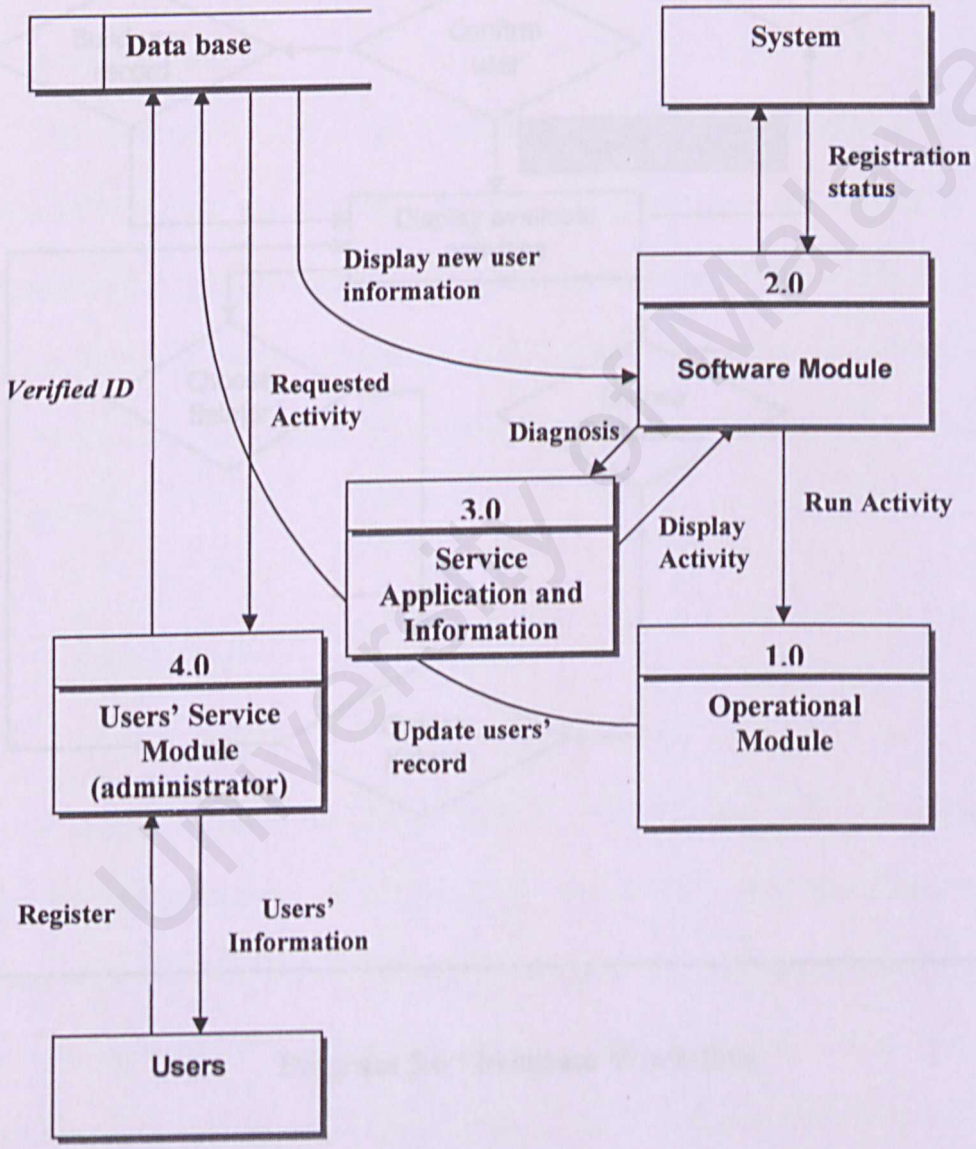



**Diagram 5.5 : Data flow Diagram (DFD) for *Cepat Baca BM***

## 5.5. Program Structure

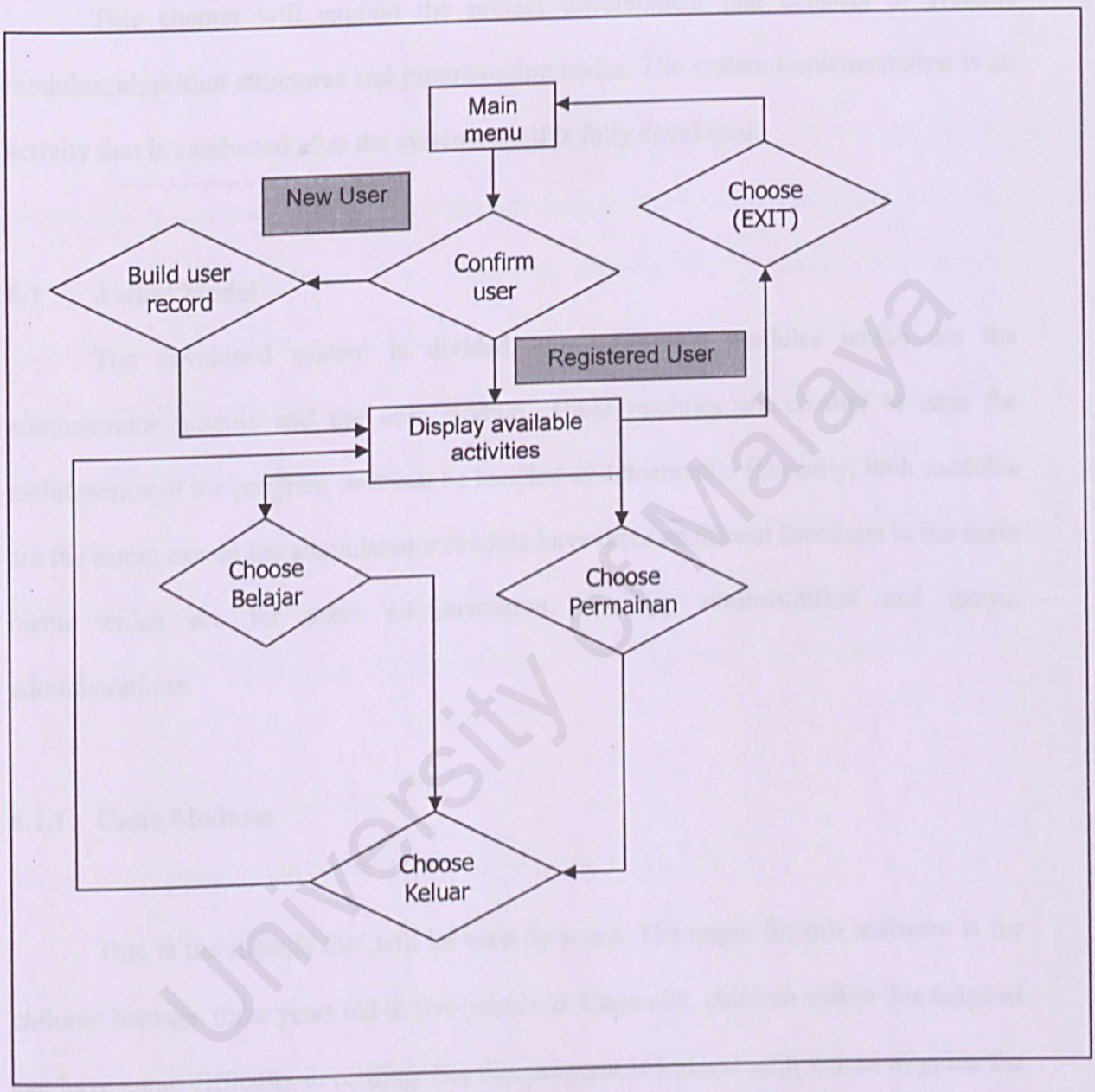



**Diagram 5.6 : Program Work-flow**

This chapter will explain the project development that consists of systems modules, algorithm structures and programming codes. The system implementation is an activity that is conducted after the systems itself is fully developed.

## 6.1 Actual Model

The developed system is divided into two main modules which are the administrator module and the user module. These modules are created to ease the maintenance of the program so it can be handled systematically. Basically, both modules are the same; except the administrator module have three additional functions in the main menu which are for users administration, teaching administration and games administrations.

### 6.1.1 Users Modules

This is the module that will be used by users. The target for this software is for children between three years old to five years old. Generally, children within this range of age have some difficulty in reading. So, this program is imbued with voices to guide the young users each time a new interface activated. Furthermore, each button also equipped with voices to say the words on that particular button each time the mouse pointer on or passing through the button. This will greatly help the users to understand and use the program. However, parents or teachers still need to guide the earlier age users.

### 6.1.2 Administrator Module

The earlier statements have stated that the users' module and the administrator module are basically the same. The only different is there are three additional buttons for system administrator use to maintain the program and controlling the users; and these buttons are invisible to normal users. The first hidden button is users' administration button. The administrator may create username and password for each user so there is no users with two or more different login name. The administrator can also set the privileges of the users, either as normal users or set the users as administrator. The second button is to set the words for each level of learning. Even though each word has been set to its level, the administrator still can change it if it is needed. The third additional button is for "matching sound with spelling" game and "write what the picture show" game.

## 6.2 Hardware Requirements

To run the systems, the minimal requirements are as stated below:

i. 600 MHz Intel Pentium(r) III processor or equivalent
ii. 128 MB RAM (256 MB recommended)
iii. 16 MB Graphic card
iv. 2 GB hard disk drive
v. Windows 2000, Windows XP, or Windows Server TM 2003
vi. 256 color monitor800 x 600 pixels (1024 x 768 pixels recommended)
vii. Mouse, Printer and Keyboard

## 6.3 Software Requirements

All required software is as stated below:

i. Microsoft Windows XP that will be use as operational system.
ii. Oracle 8.1.7.0.0 for system development and information database
iii. SONY Sound Forge 7.0 for recording and updating wave files
iv. Adobe Photoshop 4.5 for image editing.

## 6.4 System Development and Implementation

System Development and Implementation will explain how the system being connected to the database. This relation are vital so any information can be saved and viewed.

## 6.5 Programming

Programming is a process to change the system design into computer language. All generate code need to be functional with the previous generated code so the developed system will fulfill the users need. Here is the programming code I used.

### 6.5.1 Login

```
declare
        i number(5);
begin
        select usr_id, usr_passwd, usr_level into :global.usr, :global.pwd, :global.level
                from proj1_user where usr_id = :usr and usr_passwd = :pwd;
                new_form('main_screen');
        exception when no_data_found then
                i := show_alert('wrong_passwd');
                go_item('usr');
end;
```

### 6.5.2 Main Interface

```
set_window_property ('window1',window_state,maximize);
set_window_property (forms_mdi_window,window_state,maximize);
set_window_property (forms_mdi_window,title,'My First Big Project');
GO_ITEM('sound');
READ_SOUND_FILE('f:\myproject\background.wav','wave','sound');
PLAY_SOUND('sound');
read_image_file('f:\myproject\hand1.gif','gif','exit');
if :global.level = 'Y' then
        set_item_property('user_admin',visible,PROPERTY_TRUE);
        set_item_property('user_admin',enabled,PROPERTY_TRUE);
        set_item_property('tahap_admin',visible,PROPERTY_TRUE);
        set_item_property('tahap_admin',enabled,PROPERTY_TRUE);
        set_item_property('gambar_admin',visible,PROPERTY_TRUE);
        set_item_property('gambar_admin',enabled,PROPERTY_TRUE);
end if;
```

The bold command is to show that the three additional button actually exist for both user and administrator but it is invisible to the users but visible and enabled for the administrator.

### 6.5.3 "Belajar Membaca" Programming

From the button "Belajar Membaca" at Main Interface:

```
call_form('belajar_membaca',hide,do_replace);
```

This will call the "Belajar Membaca" interface. This interface has eight buttons (not including exit button) consist of eight levels. When click on one of this level, for example, the "Tahap 1" button, this command will execute.

```
:global.tahap := 1;
new_form('belajar_by_tahap');
```

If *":global.tahap := 1;"* is *":global.tahap := 2;"* then the form where the flag inside the learning administration is 2 will be activated, and the users will learn the second level for Cepat Baca B M system.

### 6.5.4 "Permainan" Programming

From the button "Permainan" at Main Interface:

```
call_form('permainan',hide,do_replace);
```

This will call the "Permainan" interface. This interface has two buttons (not including exit button). When click on the "Teka Bunyi" button, this command will execute.

```
call_form('teka_bunyi');
```

This will call the "Teka Bunyi" game that has this command. This game has been set a counter that allows users to guess three time before it automatically exit to main menu.

```
synchronize;
default_value('AAA','global.text');
if :system.cursor_value = :global.text then
        go_item('sound');
        read_sound_file('f:\myproject\tahap 1\betul.wav','wave','sound');
        play_sound('sound');
        :global.counter := 0;
else
        go_item('sound');
        read_sound_file('f:\myproject\tahap 1\salah.wav','wave','sound');
        play_sound('sound');
        :global.counter := :global.counter + 1;
end if;

if :global.counter = 3 then
        exit_form;
end if;
```

If the users click on the "Eja Gambar" button, this command will execute.

```
call_form('eja_gambar');
```

This will call the "Eja Gambar" game that has this command.

```
declare
        i number;
begin
 if :answer is null then
                i := show_alert ('kosong');
                go_item('answer');
 elsif :answer = upper(:gbr_spell) then
                i := show_alert('betul');
 else
                i := show_alert('salah');
                if i = alert_button1 then
                        :answer := :gbr_spell;
                end if;
 end if;
end;
```

### 6.5.5 Exit from Forms

When users click on "Keluar", "Menu Utama", "Tahap Belajar" or "Menu Permainan", this command will execute and it will return to the previous forms or to the main menu, depends on where it is set to exit.

```
exit_form;
```

# CHAPTER 7 : TESTING

## 7.1 Introduction

System testing is important to make sure the fully developed system have met all the required specification. Testing was commenced during the system development phase and when the system is completed. This is to make sure the system have already fulfilled the data specification, reliable and usable. There are two type of testing that have to be done which is the unit testing and integration testing.

### 7.1.1 Unit Testing

The objectives of testing are to identify and repair any programming error. This testing is done separately on each subsystem program to ensure the functionality of each module. There are three category of unit testing which are ad-hoc or ad-lib testing, white box testing and black box testing. Ad-hoc or ad-lib testing are done by exploring into the program and make a simple test. Some commands that may causes error will be entered into the system during the test. Meanwhile, The White Box Testing is a detailed testing towards inner program that related to logic. All status in program will be check to ensure the function as it is required. Lastly, the Black Box testing is a functional testing. It is use to test the functional requirement inside the system. This testing doesn't concentrate on implementation but focusing on the generated output to fulfill the users need.

### 7.1.2 Integration Testing

During the integration testing, all tested components will be combined to build a fully functional system. There is four choices to run the integration testing; Top-Down Integration, Bottom-Up Integration, Big-Bang Integration and Sandwich Integration.

#### 7.1.2.1 Top-Down Integration

The complete system or the higher components of the system will be tested first before the smaller components. The test then will move to the components that were called by the tested components. The weakness using this testing is there will be a lot of stub if there are a lot of smaller components.

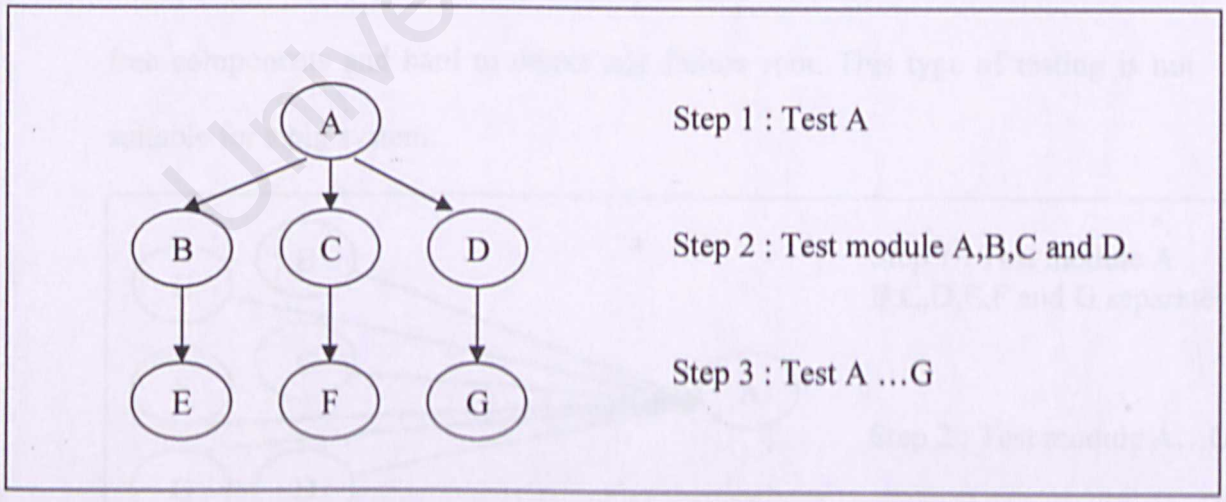



Diagram 7.1 : Top-Down Integration

### 7.1.2.2 Bottom-Up Integration

Each components at end of system hierarchy will be tested individually first before the components that call the tested components being tested. The activity will be repeated until all the components being tested.

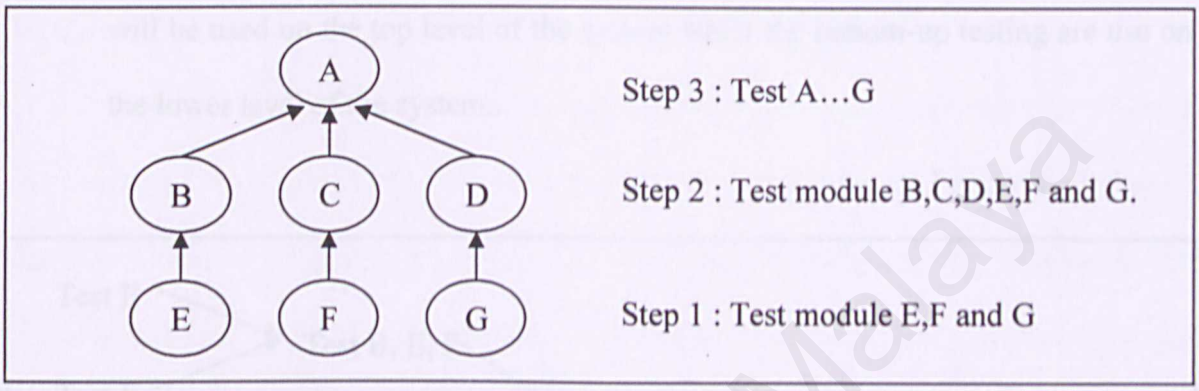



Diagram 7.2 : Bottom-Up Integration

### 7.1.2.3 Big-Bang Integration

Using this testing, all components will be tested individually and will be combine as a final system. The weakness is stud and drivers are needed to test the free components and hard to detect any failure root. This type of testing is not suitable for a big system.

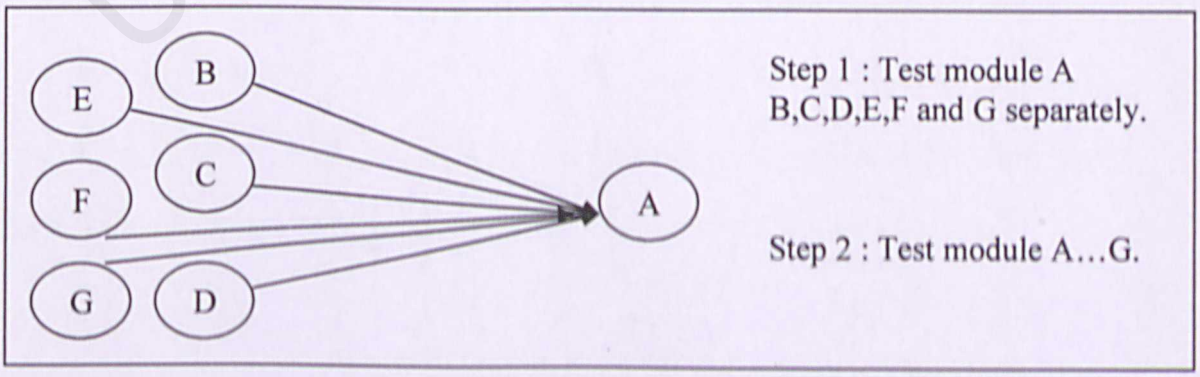



Diagram 7.3 : Big-Bang Integration

### 7.1.2.4 Sandwich Integration

The Sandwich Integration testing combining the top-down testing which will be used on the top level of the system while the bottom-up testing are use on the lower level of the system..

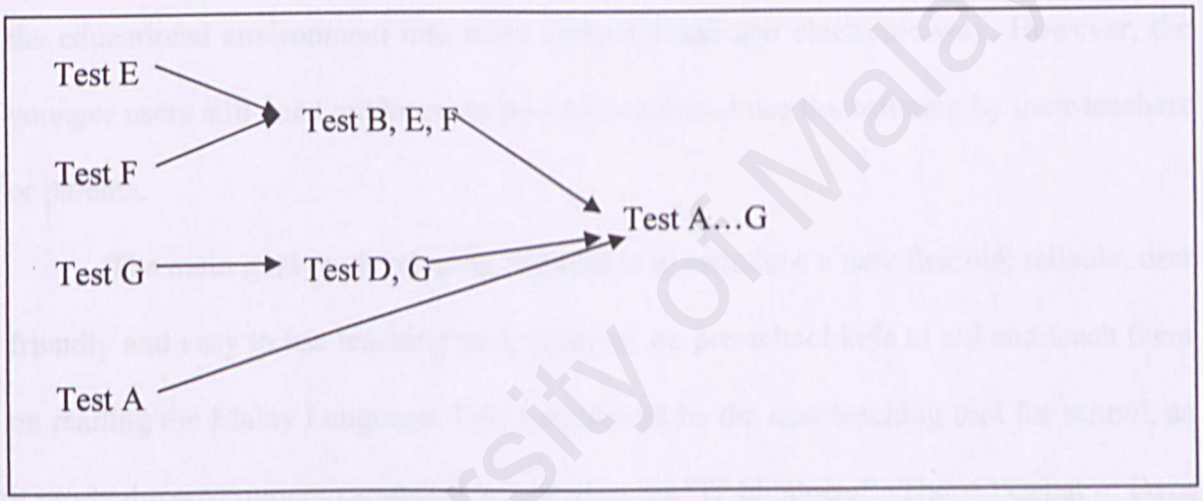



**Diagram 7.4 : Sandwich Integration**

# CHAPTER 8 : CONCLUSION

## 8.1 Introduction

Cepat Baca B M is software that builds to help children in age from three years old to read in Malay. This software is meant to substitute the books material and change the educational environment into more computerized and electronic way. However, the younger users still need guidance on how to install and use the software by their teachers or parents.

The main goal on developing this tool is to introduce a new flexible, reliable, user friendly and easy to use teaching tool, focusing on pre-school kids to aid and teach them on reading the Malay Language. This tool should be the new teaching tool for school, as it meets the government campaign on reducing the "IT blindness". The "Cepat Baca B M" tool is developed to ease the pre-school children learn to read Malay Language, to aid parents and teachers on teaching pre-school children reading Malay Language and to provide an aiding tool that is flexible, reliable, user friendly and easy to use for children. Other than that, this aiding tools also can reduce the physical material of teaching tools (from a set of books to a software) besides it may avoid loses of some teaching material that may occur especially when using set of books.

## 8.2 Advantages

This software is build for users to learn and for the administrator to guide. A lot of features have been set inside the software so it will be different from the old learning types. The advantages of using this software are:

i) it is client-server based

ii) Administrator can control so there is no user with two login name. The administrator can also set the privileges of the user

iii) The administrator can change the learning words using the administrative function

iv) The administrator can also add any image easily into the system to be put inside the games.

v) All buttons will always have sound to aid the users and to tell what and where the button will bring the users to.

vi) Each interface will always start with a voice introduction to ease the user.

vii) There will be a lot of colours while the background of each interface are cartoon based and this might attract children to use this software

## 8.3 Weaknesses

Like a lot of other system, this software still has weaknesses. These weaknesses may cause problems for the system to reach its objectives. Here are the weaknesses that already being detected:

i) The letters on the screen are still considered small.

ii) There is no interactive movement or image in the system. This system can only be categorized as a learning tool with sound.

iii) The activities are limited. Users cannot do other activity than what are programmed in the software.

iv) The users need to install Oracle 8.1.7.0.0 or above and set it before one can use the software

## 8.4 Problems

There is a few problems while conducting and building the software. However, a lot of them are settled by the help of others, especially lecturers, family and friends. These are the problem while develop the software.

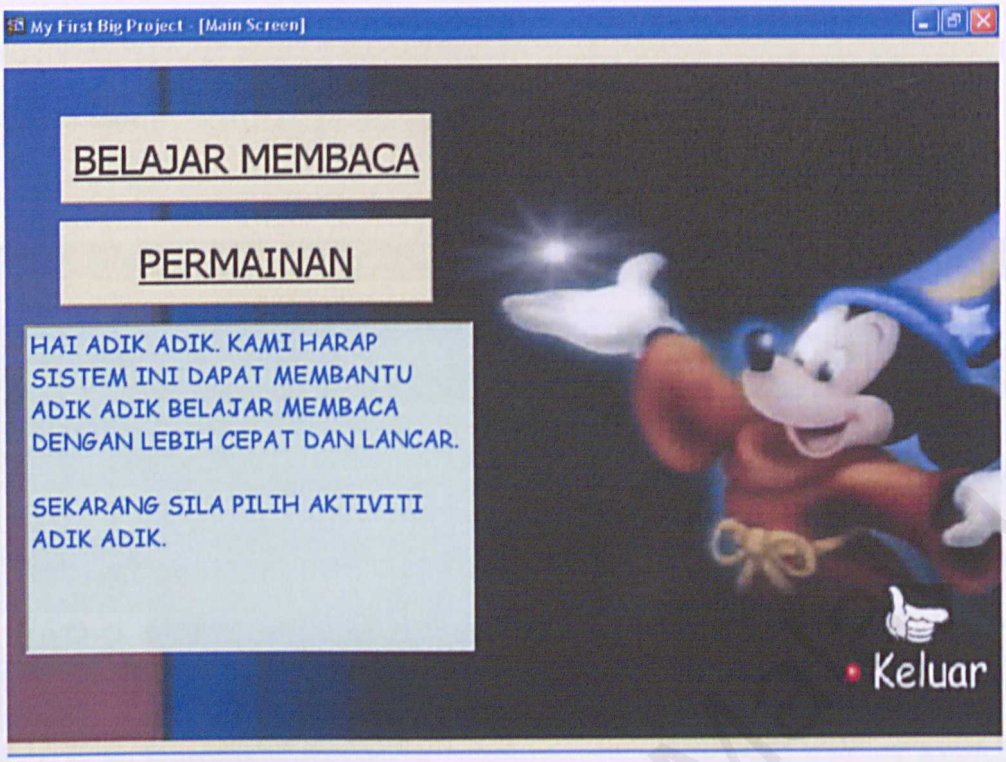
i) Financial: To develop a system, one needs to do some research and buy some software so the developed system will fulfill the objectives.

ii) Time: there is not enough time to develop more function on the system. So only the basic function being build.

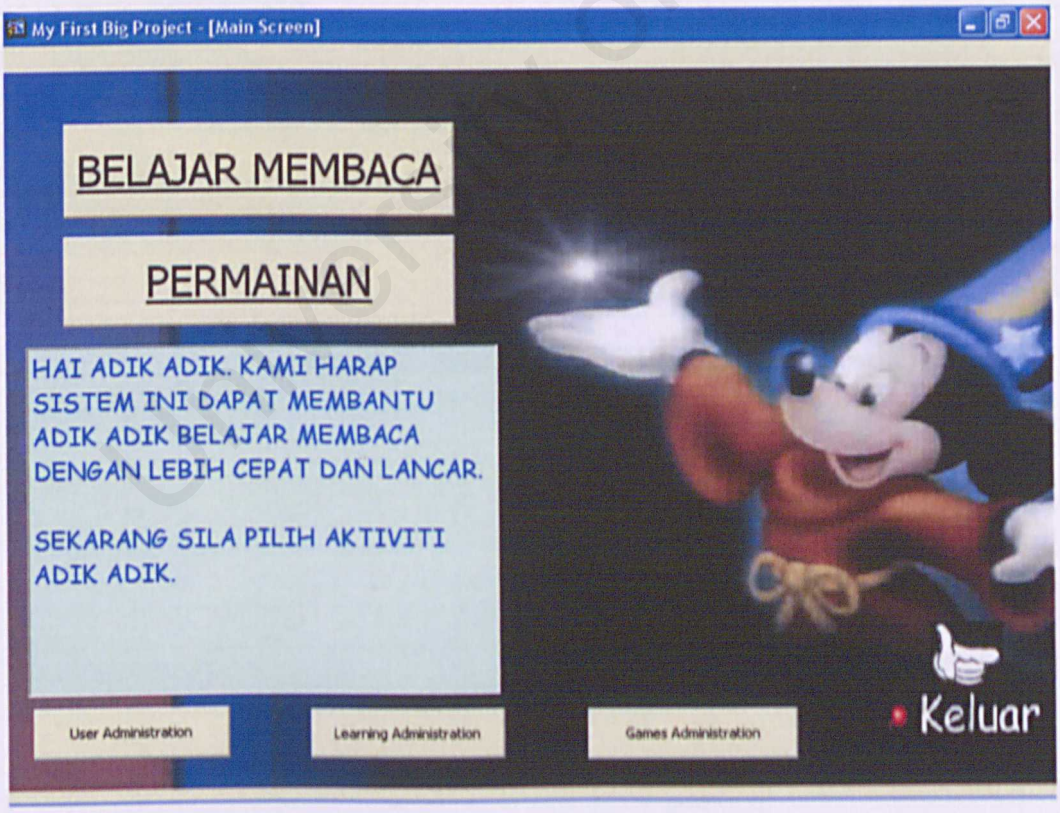
## Appendix A (i)


**Appendix A (i) : Interface Users Log-in**

**Appendix A (ii)**

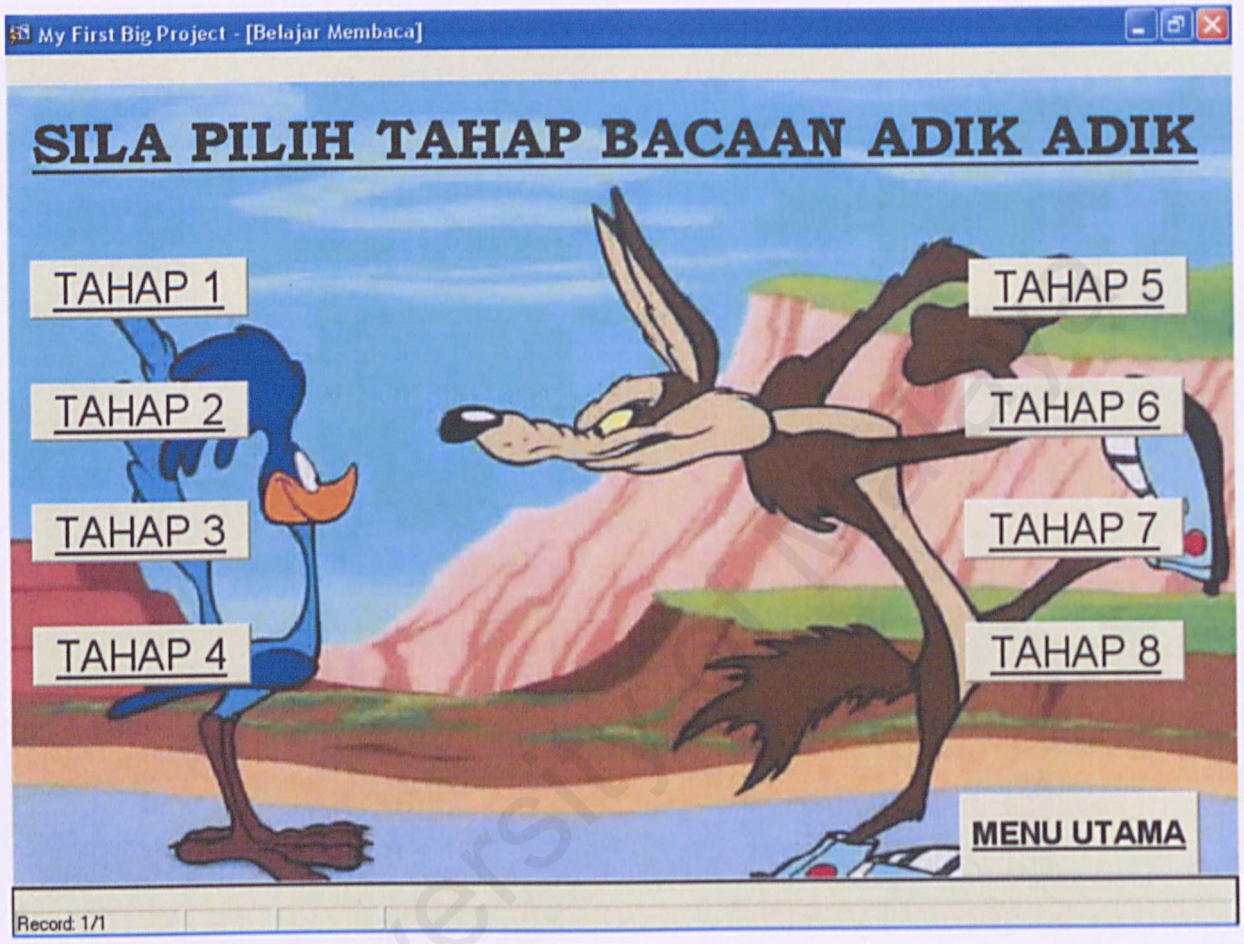



**Appendix A (ii)_a : Interface for Activities (for Users)**



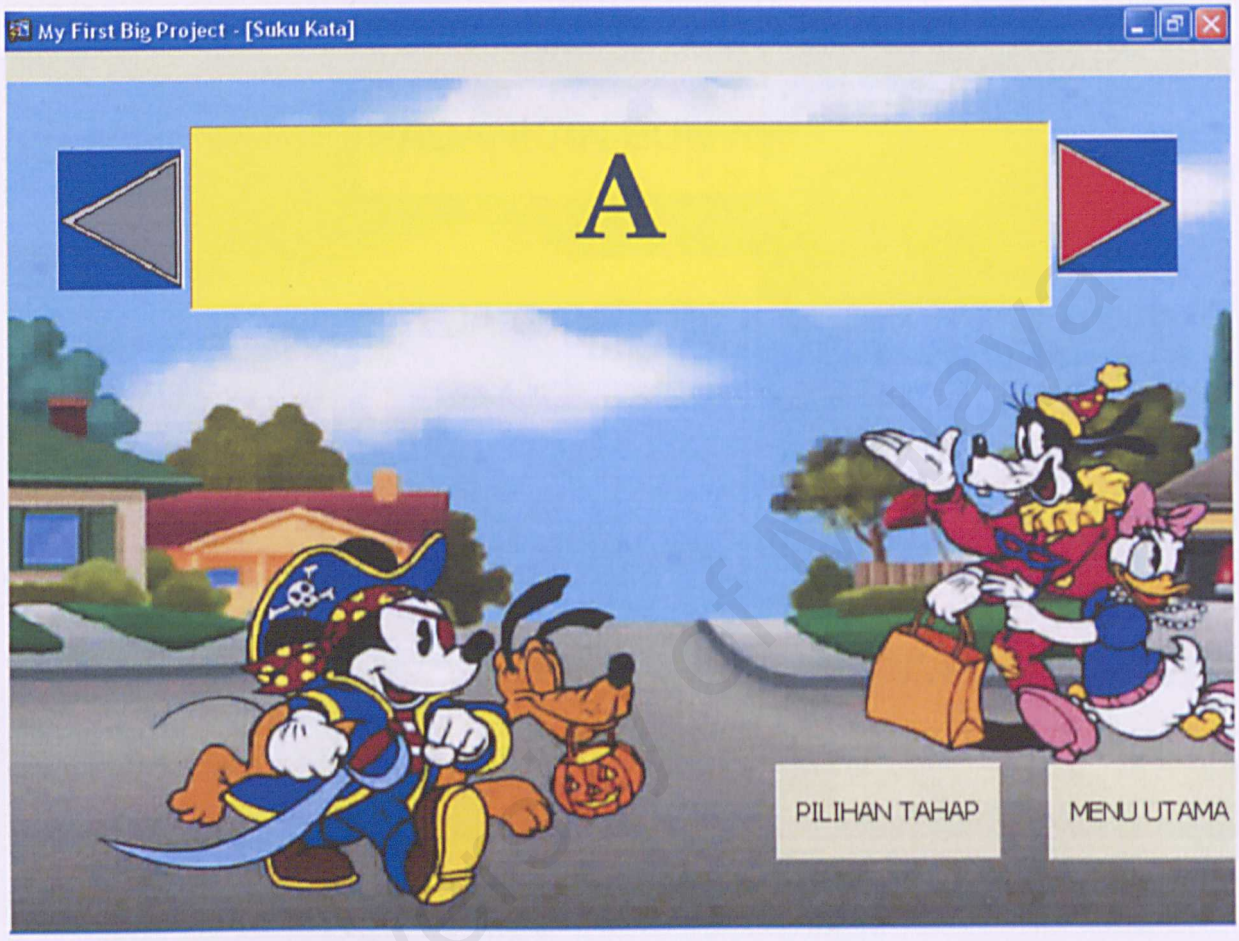

**Appendix A (ii)_b : Interface for Activities (for Administrator)**

**Appendix A (iii)**



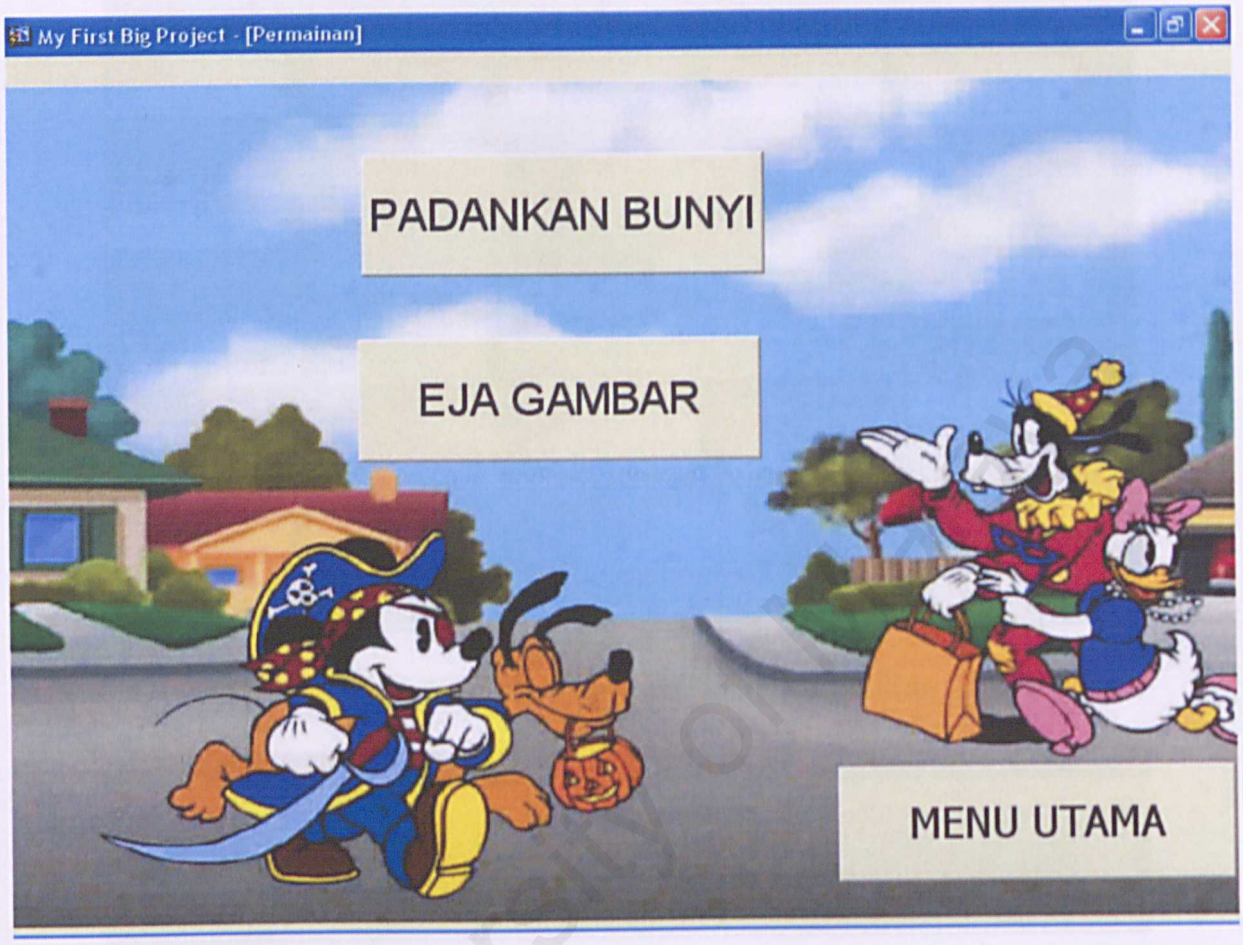

**Appendix A(iii) : Level of Learning**

**Appendix A (iv)**




**Appendix A(iv) : Learning Interface**

**Appendix A (v)**



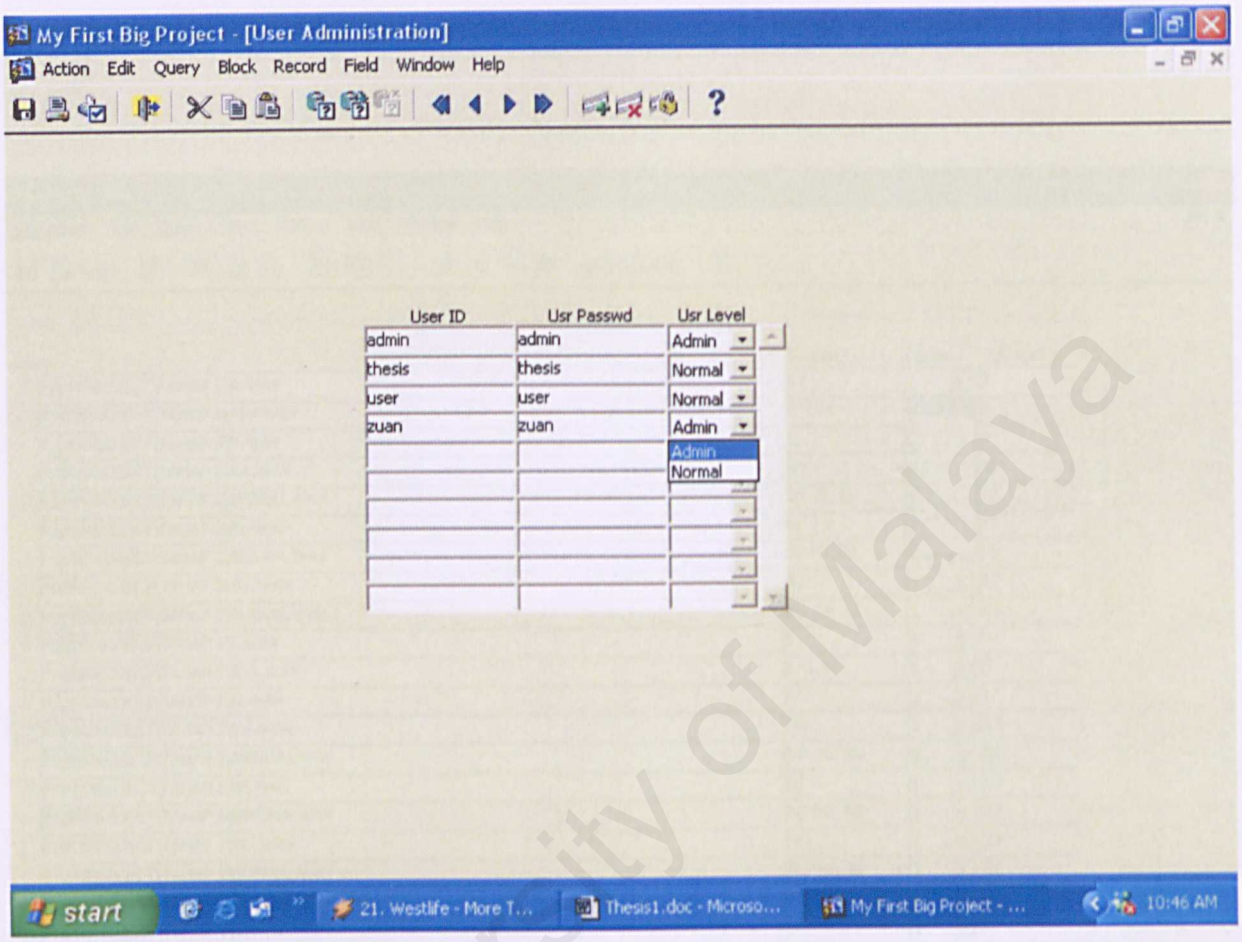

**Appendix A (v) : Choices of Learning Games**

**Appendix A (vi)**


**Appendix A(vi) a : Matching sounds with spelling games**

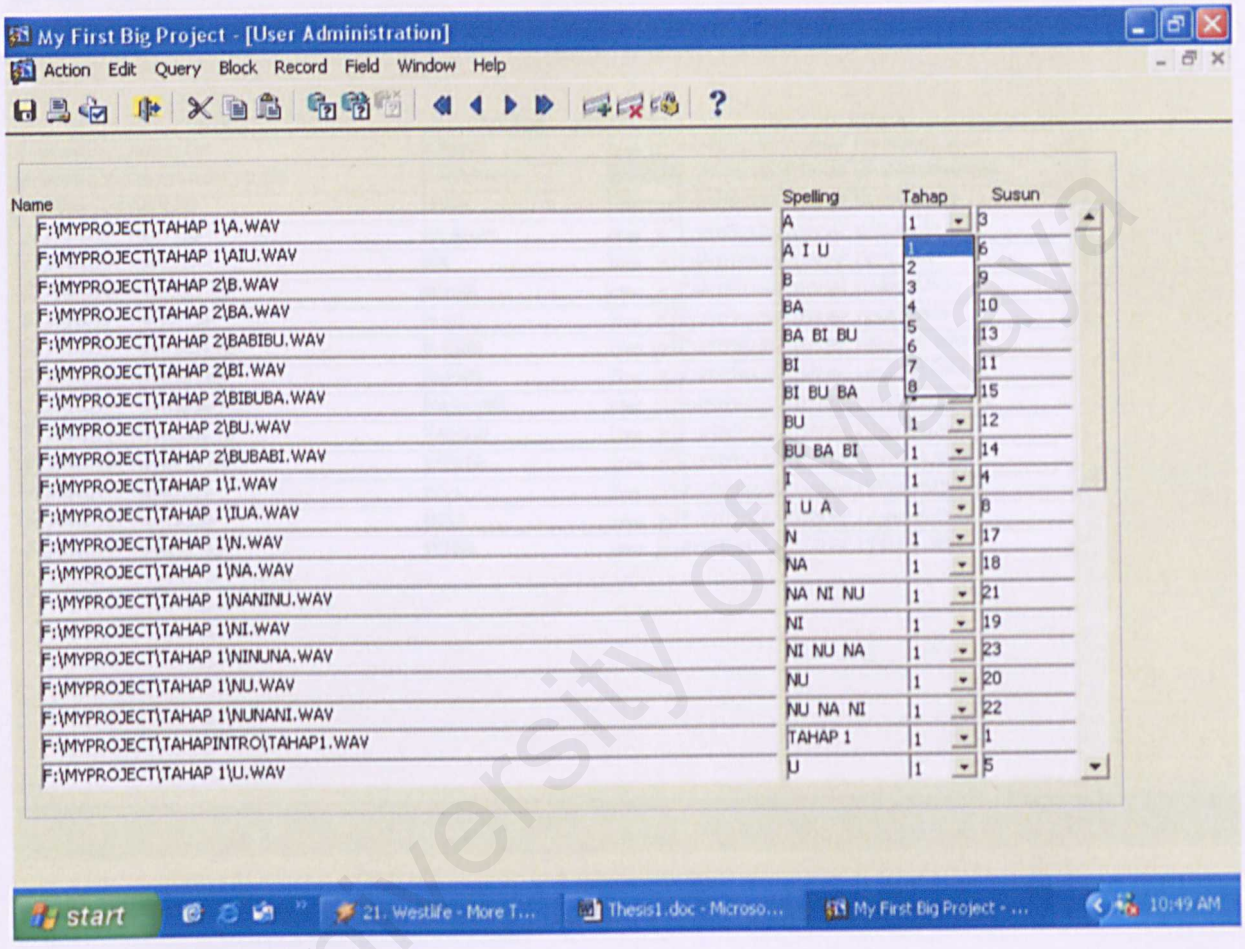

**Appendix A(vi) b : Spell the Picture games**

## Appendix B (i)



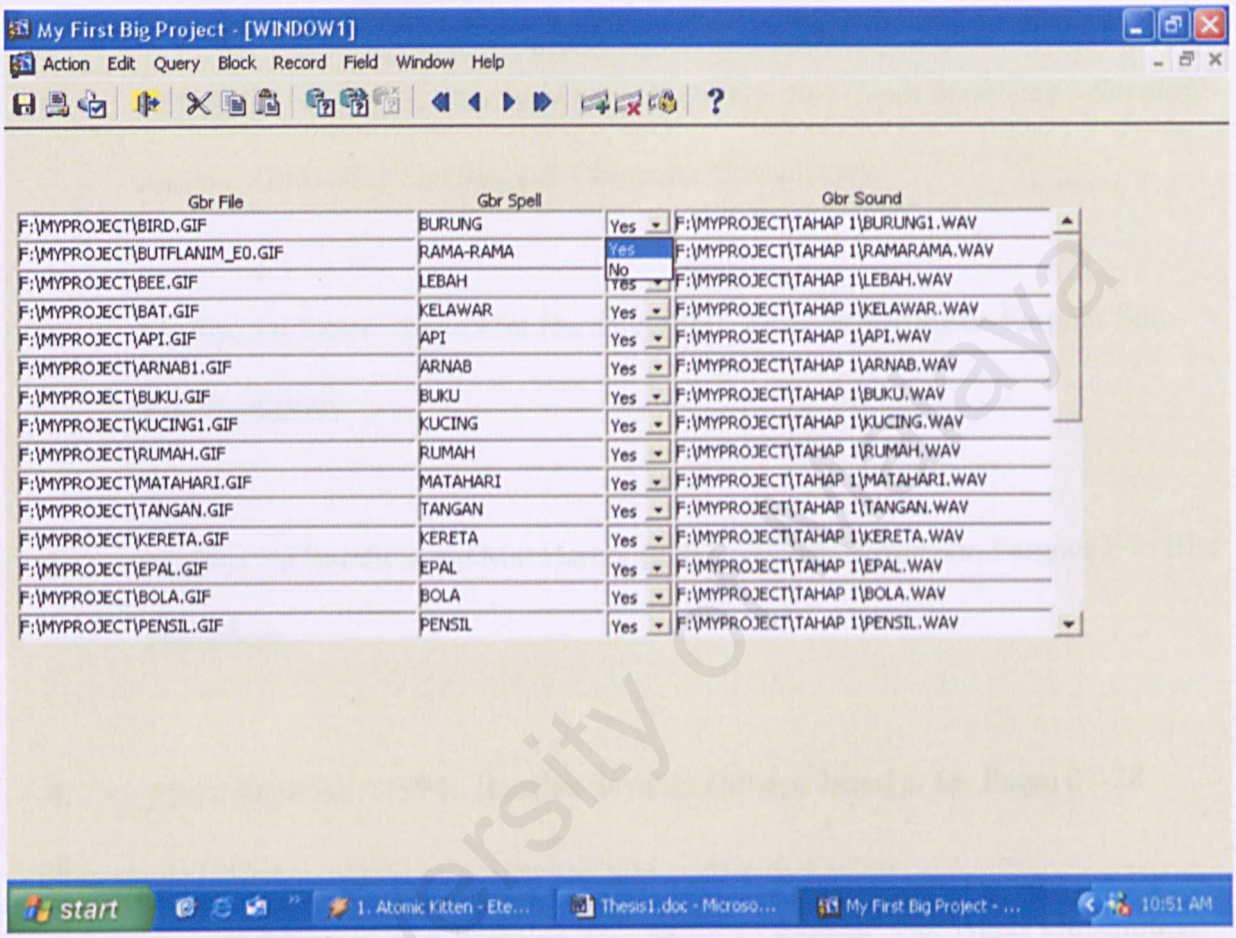

**Appendix B (i) : Users Control Database**

## Appendix B (ii)




**Appendix B (ii) : Learning Administration Database**

## Appendix B (iii)




**Appendix B (iii) : Games Administration database**

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