Faculty of Computer Science and
Information Technology
University of Malaya

Name : Wong Ai Yieng
No.Matrik:WEK 98131
Title : Accounting Learning Package
Supervisor: Ms Norizan Mohd.Yazin
Moderator: Dr.Zainab Awang Ngah

Table Of Contents

List Of Figures

List Of Tables

Abstract

The most important concern confounding the education in the world today is the development of computer-assisted teaching materials, especially interactive multimedia programs that run on personal computers. The first signs of computer-delivered electronic system allowed the user to control, combine and manipulate many different types of media, such as text, sound, video, computer graphics and animation.

This project is concerned with the development of an interactive multimedia educational package based on the Sijil Pelajaran Malaysia (SPM) Accounting. This project is implemented as a courseware with the CD-ROM as the storage medium.

Besides course materials, this educational package also includes accounting system modules that can let students key in the accounting data and directly check their balance sheet correctly or not. For the purpose maintenance in the future, system administration also provide for teacher.

This project is developed by the aid of some authoring tools such as Macromedia Director 7.0 and Visual Basic 6.0, as well as some utility tools, for example Adobe Photoshop used to modify images to get better effect.

Acknowledgement

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A special word of thanks is reserved for my teammates, Miss Leaw Chai Sze and Miss Yaw Chooi Fun for their support and useful suggestions, as the project is a team project.
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Chapter 1
Introduction

Chapter 1 Introduction

1.1 Introduction

Nowadays, school especially secondary school makes the account subject an important subject for social sciences student. However, some student might boring with the teaching format in school which all the subject are teaching in similar style. Besides that, some student might be cannot catch up the lesson. When in a discussion group, some of them may not willing or scared to speak up their problem in front of friends and teacher. Many of them facing a lot of problem to prepare their SPM especially in accounting.

EasyAccount is a special software that been produce just for form five accounting student to prepare them for SPM. It has several benefits:

I. **EasyAccount is an easy learning tool.**

Student can learn all the accounting term, theory and calculation step by step in the package. Student can click at the learning lesson they want at the main user interface. Besides that, they can also more understanding certain accounting term by print up the notes. Furthermore, student even can check their understanding through the exercises and quiz lesson.

II. **EasyAccount is a multimedia interactive and useful learning tool for the student.**

EasyAccount is one type multimedia production, which combines different media types such as text, video, animation, audio and graphics. Alone, each of these types is effective but when combined, they can dramatically improve effectiveness of the presentation. So, with these creative, innovative and interactive features, it will help student interested with the step-by-step learning and have innovative want to learn accounting. Besides that, EasyAccount also has voice description to make student easy understand the content of accounting package. More over, this system has back, next, skip buttons for student. Students have option whether go to next page, go back to previous back or skip some lessons.

III. EasyAccount is easy to bring.

EasyAccount is easy for student to bring from one place to another. The accounting references are not a burden for them any more.

IV. The time needed to learn accounting is shorter.

Student can read and understand the entire lesson in EasyAccount in a short time. That mean, students can made their revision quickly and have time to do revision on other subjects. Time is important for them because they need to prepare for another 9 subject.

1.2 Objective

This project is intended to help SPM students who are taking Accounting as their core subject by providing a better way to present the information or facts regarding this subject. Multimedia technology should be implemented here of course to present the information and relevant facts in a more interactive way, rather than just reading form a bundle of text and static calculation as appeared on the textbook.

The learning package help student to:

I. Provide easy learning tools

This system provide an easy and interactive accounting software that suite the needs of form five student. It supplies the basic knowledge of accounting that can be learning in a short time.

II. Provide multimedia interactive and useful learning tool for the student.

This system provides an interactive and easy understand accounting package for students. Student will have innovative want to learn accounting if compare with reading the textbook or reference books. So that, this system can bring out the objective of the learning tool clearly and enhance the effectiveness and efficiency of the learning package.

III. Reduce redundancy process by create an automatic posting.

This system reduce redundancy process by create an automatic posting of data into various accounts. That means, students can save time and energy in re-keying data. It also eliminates the possibility of error in re-keying. For example wrongly key in the amount.

IV. To improvise the features of the accounting software available in the market currently.

Nowadays, there are only a few account packages in the market that suite the student, especially form five student. This will provide better study module to student.

V. To reduce the double recording process

With this software, various kind of transaction and process can converted from manual system to computerize system. Normally, user will record all transaction into accounting book and accounting system. This means recording process is carried out twice. EasyAccount allow user to do away from double recording process by just to make a copy or direct print it up. Through this way, it expedites the work.

1.3 Project Scope

The scope of the project covers the development of an interactive multimedia-learning package for SPM Accounting. The project will be developed on windows operating system.

Below are list of all the function in the package:

a) Develop an accounting package for form five students.
b) Create an interactive user guide for accounting study.
c) Develop a database system that used to store all records to system
d) Organize all records pertaining to the system
e) Additional features: Quiz module, Exercise module, Help module

1.4 Fact Finding

Fact-finding refers to the method of gathering information regarding a system. It is necessary to employ fact-finding techniques in order to establish understanding of the state and future requirement on the system study and provide the groundwork for the system design.

The following method are used to gather information for the new system:

- **Books and references**

Books and references are used to get the information that needed to develop the system. This including information from accounting references, multimedia references, programming references, database references and computer security.

- **Internet surfing**

The Internet is the largest information warehouse in the world. As such, it is used to get information on programming language, multimedia, database and accounting.

- **Accounting software**

Other accounting learning software for business or company can be used as a guideline for developing the accounting learning package for student. For example, UBS is used in this case.

- **Document Room**

FSKTM's document room has a lot of senior's thesis that can be used as a guideline for me to write my thesis.

1.5 Project Outcomes

As suggested, the result of the project will be an accounting learning package. However, this package is a combination effort from three students (me, Chai Sze and Chooi Fun). So that, the functions or modules expected are listed as below:

- **Multimedia learning tools**

This section giving an interactive learning format to student, which is more creative and interesting. The accounting principle include in this section are 14 chapter from SPM accounting syllabus. It supplies the basic knowledge of accounting that can be learning in a short time.

- **Automatic Accounting System**

The main purpose of this system is to provide a user-friendly interface to generate an accounting statement. In this system, student will allow to access and key in the data. Students also allow maintaining their data into database by using some buttons such as update, delete and view.

- **System Administration**

The main purpose for this section is enabled future maintenance and enhancement works will be simpler and consumes less time.

- **Additional features of accounting package – Help and Quiz module**

Quiz module will be given to student as exercises to examine their understanding through lesson. Besides that, help module also provided as a guideline to student while facing problem in the process of learning. From this additional features, student can learn from error and more confident for SPM.

1.6 Project Development Methodology

For this project, Prototyping Model is used to develop the program. The prototyping model consists of six steps as shown in Figure 1.

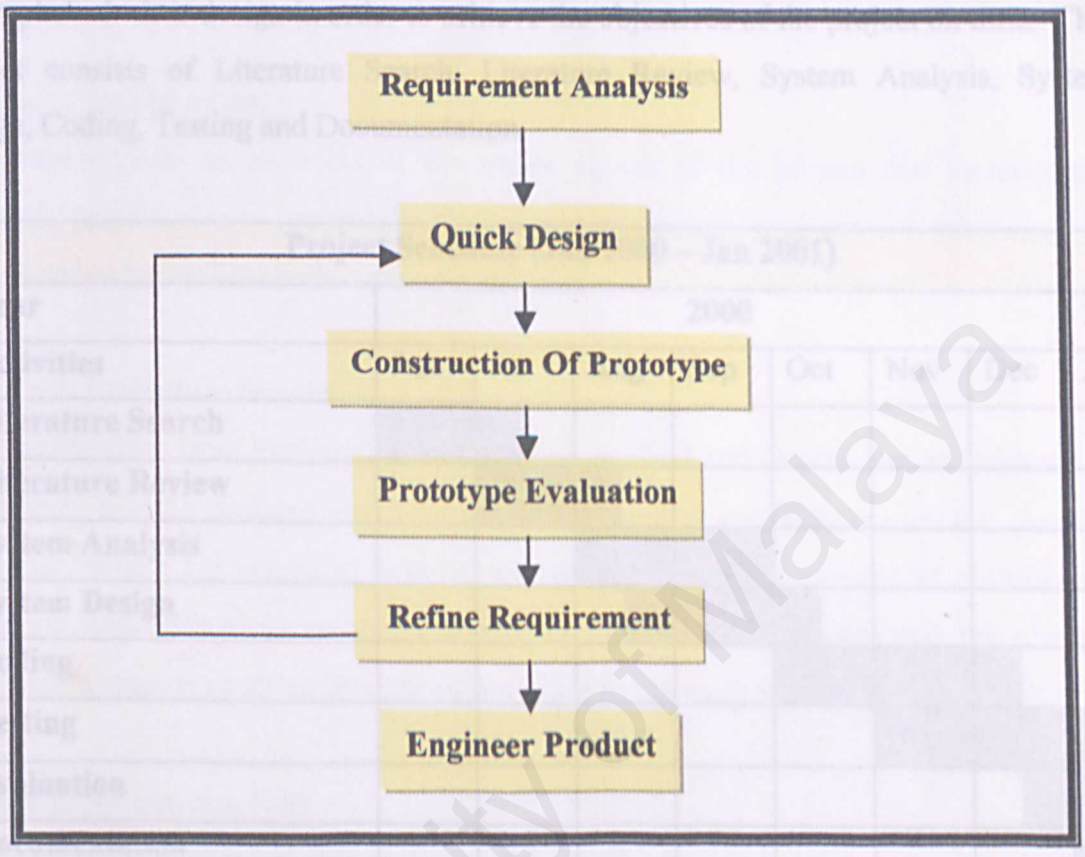

Figure 1 Prototyping Model

The prototyping model is selected to be used in the development of the package. The prototyping method is used for Easy Account for SPM Accounting is evolutionary prototype. This model is selected for the development of the project because

- The potential for changing the system early in its development.
- The possibility of developing a system that more closely addresses user's needs and expectations.
- Misunderstanding of the requirement or missing functions can be identified and redefined.
- Time saving

1.7 Project Schedule

Project schedule was planned as guideline to manage the time and tasks that need to be accomplished. It is design in order to achieve the objectives of the project on time. This project consists of Literature Search, Literature Review, System Analysis, System Design, Coding, Testing and Documentation.

Project Schedule (Jun 2000 – Jan 2001)								
Year	**2000**							**2001**
Activities	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Literature Search								
Literature Review								
System Analysis								
System Design								
Coding								
Testing								
Evaluation								
Documentation								

Table 1 Project Schedule

1.8 Report Layout

The purpose of this layout is to give an overview of the major phases involved during development of the project. Below is the report layout:

Chapter 1: Introduction

This chapter gives an overview of the major phases of the project that includes the objective, project scope, project development methodology and project schedule. In addition, this chapter covers the project outcomes.

Chapter 2: Literature Search

This chapter gives brief explanation on topics researched and studies that are relevant to this project. It is the combination between literature search and literature review. Among the discuss topics are operating system, advantages and disadvantages of multimedia, accounting, authoring tools, authoring languages and database. Besides that, this chapter also makes a study on current accounting software in the market.

Chapter 3: System Analysis

This chapter emphasizes on the analysis of the project's requirements. It explains how the requirements for this project were acquired and the results of the analysis.

Chapter 4: System Design

This chapter explains the conceptual and technical design of the system. It covers the Structure chart, content design, data flow diagram, database design and user interface design.

Chapter 2
Literature Search & Review

Chapter 2 Literature Search & Review

This chapter covers 3-sub topic. There are project background study, consideration of development tools and finally comparative study of accounting learning package in market.

2.1 Project Background Study

2.1.1 Operating System

2.1.1.1 Windows 98

Windows 98 is designed for the personal computer market. Windows 98 is a graphical user interface operating system. This means it is a way of allowing the user (being the person in front of the computer) to interact with the computer in a way that uses pictures or graphics. It will run on Intel based processors only and will not support motherboards with multiple processors. It will, however, support long file names, and have networking capabilities built-in, including connection to Windows NT server or workstation. Windows 98 is not completely 32-bit. For backward compatibility reasons, the developers at Microsoft used a mix of 32-bit and 16-bit code to provide maximum compatibility between old and new applications.

Windows 98 is a kind of got ripped off with the 512-entry limitation. The number 512 comes from the fact that FAT requires that the root directory fit into one disk cluster. With the introduction of long file names in Windows 98, and the imposition of the 512-entry maximum, it turns out that if you use long file names in the root, it will further limit the number of actual entries that the root can store. On the other hand Windows 98 has many shared system resources that limit the system's flexibility and this may result in slowdowns and potential crashes.

2.1.1.2 UNIX

Specifically, UNIX is a trademark of Santa Cruz Operations (SCO). Generally, UNIX is the name given to operating systems as an interactive time-sharing system that evolved from the mainframes systems developed in the early 1970s at Bell Laboratories. It supports running a wide range of computer software.

The UNIX operating system comprises three parts: The kernel, the standard utility programs, and the system configuration files.

a) The kernel

The kernel is the core of the UNIX operating system. Basically, the kernel controls the allocation of hardware resources. The kernel knows what hardware resources are available (like the processor(s), the on-board memory, the disk drives, network interfaces, etc.), and it has the necessary programs to talk to all the devices connected to it.

b) The standard utility programs

These programs include simple utilities like cp., which copy files, and complex utilities, like the shell that allows user to issue commands to the operating system.

c) The system configuration files

The kernel, and some of the standard utilities read the system configuration files. The UNIX kernel and the utilities are flexible programs, and changing the standard configuration files can control certain aspects of their behavior.

2.1.2 Multimedia

2.1.2.1 What is multimedia?

Contrary to popular belief, multimedia is not only "many media". Multimedia is a hybrid of video, image, audio, graphics, text and animation, which is delivered to the consumer electronically. Some experts restrict that multimedia means the use of different types of media information, together with facilities that allow users to navigate, communicate and interact with the data presented. An important point here, however, is that multimedia is able to add interactive features that allow users accessing the information to respond to it immediately.

In this stage, it is perhaps better to explain a number of aspects of the terminology associated with multimedia development. A multimedia product consists of a program, which may be written or developed either using a package multimedia authoring system, or by using a multimedia authoring language, which allows more control over the results but requires a greater commitment in terms of human programming resources. On the other hand, it may also be created using a bespoke system, which uses a conventional imperative programming language such as C++. The multimedia under the development uses assets, which are the digitized video clips, images, sound and text in multimedia development and on average, accounts for 80% of the effort associated with a particular development project.

In fact, multimedia has a number of unique attributes, especially when it is compared to a conventional software product. Consequently, the rules and conventions governing its use vary considerably from custom and practice in the software world. Multimedia is capable of providing a user with vast amount of information, stored in physically small data reservoirs (CD-ROM, database, DVD, etc.) that were previously unattainable in terms of what they could practicably offer. This revolution has been accompanied by tumbling prices of storage media, computer memory and great, yet economical,

enhancements to processing power. In addition to this, many multimedia products offer interaction with the product that provides an added value in great proportions.

The are basically two types of multimedia product available to users:

1) **"Fixed"** multimedia consists of products which content that is purchased in a complete form. They may be stored on CD-ROM, DVD, or may be accessible on the Internet or downloaded from an FTP site directory. These products are often highly interactive and cover a wide range of domains including education, public information, work-place applications, computer games and "the arts".

2) **"Real-time"** multimedia generally involves systems that are on-line (within LANs, MANs, WANs etc.) and largely portray an existing current time frame of a particular situation. This type of multimedia allows the user to analyses situations; make decisions and effect change immediately. It is extensively used in operating theatre surgery, remote learning via teleconferencing and in diagnostic work in heavy engineering applications.

Multimedia technology has gained popularity recently in social, economic and political terms because it is a powerful way to present information. Information can be presented in such a way that invokes the use of more than one of the senses simultaneously. Information may be very receptive and is exemplified by considering why television is such a powerful medium, when compared to radio and newspapers. According to a survey conducted by a researcher, the percentages of information-retention conveyed through the human senses are as shown in Table 2.

Senses	Percentage of Information Retention
Sight	75%
Hearing	13%
Touch	6%
Taste	3%
Smell	3%

Table 2 The retention of information by senses

From Table 2, it is easy to understand why information disseminated through television has a high retention rate, because it involves both sight and hearing simultaneously. The newspaper and radio involve the use of either sight or hearing at one time: their (often-tremendous) power lies in the unique ability of writers or speakers to communicate through a single medium.

2.1.2.2 Advantages of Multimedia

The pedagogical strength of multimedia is that it uses the natural information-processing abilities that we already posses as humans. Our eyes and ears, in conjunction with our brain, form a form; enable system for transforming meaningless sense data into information that is data imbued with meaning. The old saying that " a picture is worth a thousand words " often understates the case especially with regard to moving images, as our eyes are highly adapted by evolution to detecting and interpreting movement.

For instance, a recording of a politician's speech can allow us to discern significant semantic factors, which would not be apparent in a written transcript. Even when an image or sound can be described accurately and concisely in words it can still be processed by the brain more quickly and easily than its text equivalent because text, as a symbolic system, incurs "processing overheads" – the symbols have to be decoded before their information content is released.

To the student, on the other hand, one advantages of multimedia courseware over the text-based variety is that the application looks better. If the courseware only includes a few images at least this gives relief from screens of text and stimulates the eyes, even if the images have little pedagogical value. More often than not, however, the inclusion of non-textual media into courseware describing a dig at an archeological site would be of much more value to the student if it include image of the site, such as enhanced aerial images showing interesting features like old field boundaries, or diagrams illustrating where digging and scanning took place, than if it merely used text even in an imaginative and interesting way.

2.1.2.3 Disadvantages of Multimedia

Multimedia places considerable demands on computer hardware in terms of processor speed, memory, disk space and data throughput sound, images, animation and especially video constitute bodies of data magnitudes greater in size than text files. As a result of the challenge this has presented to hardware designer's multimedia has been a late arrival on the desktop, particularly in the PC arena and this means that there are many machines currently in use that struggle with multimedia elements. Although at the time of writing a standard, mid-range desktop PC is capable of displaying multimedia documents, most machines only 2 to 3 years older struggle to do so and in many cases require significant modifications in term of extra memory and expansion cards to handle multimedia to an acceptable standard. Hence a major disadvantage of writing multimedia courseware is that it may not be accessible to a large section of its intended audience that does not have access to multimedia-capable machines.

This is particularly the case in the academic sector where the provision of microcomputers for staff and students is a significant item of expenditure and one that the institution is not likely to want to repeat every 2 or 3 years. For this reason, courseware developers should think very carefully about which multimedia elements to incorporate into applications and only include those that have significant value.

2.1.2.4 Authoring process

Authoring multimedia applications involves choosing the right media elements and to synchronies them together to create a final multimedia presentation that razzes and dazzles. However, to be able to create a good multimedia application, user need to understand the multimedia authoring process involved.

The step involved in authoring a multimedia application include (shown in Figure 2):

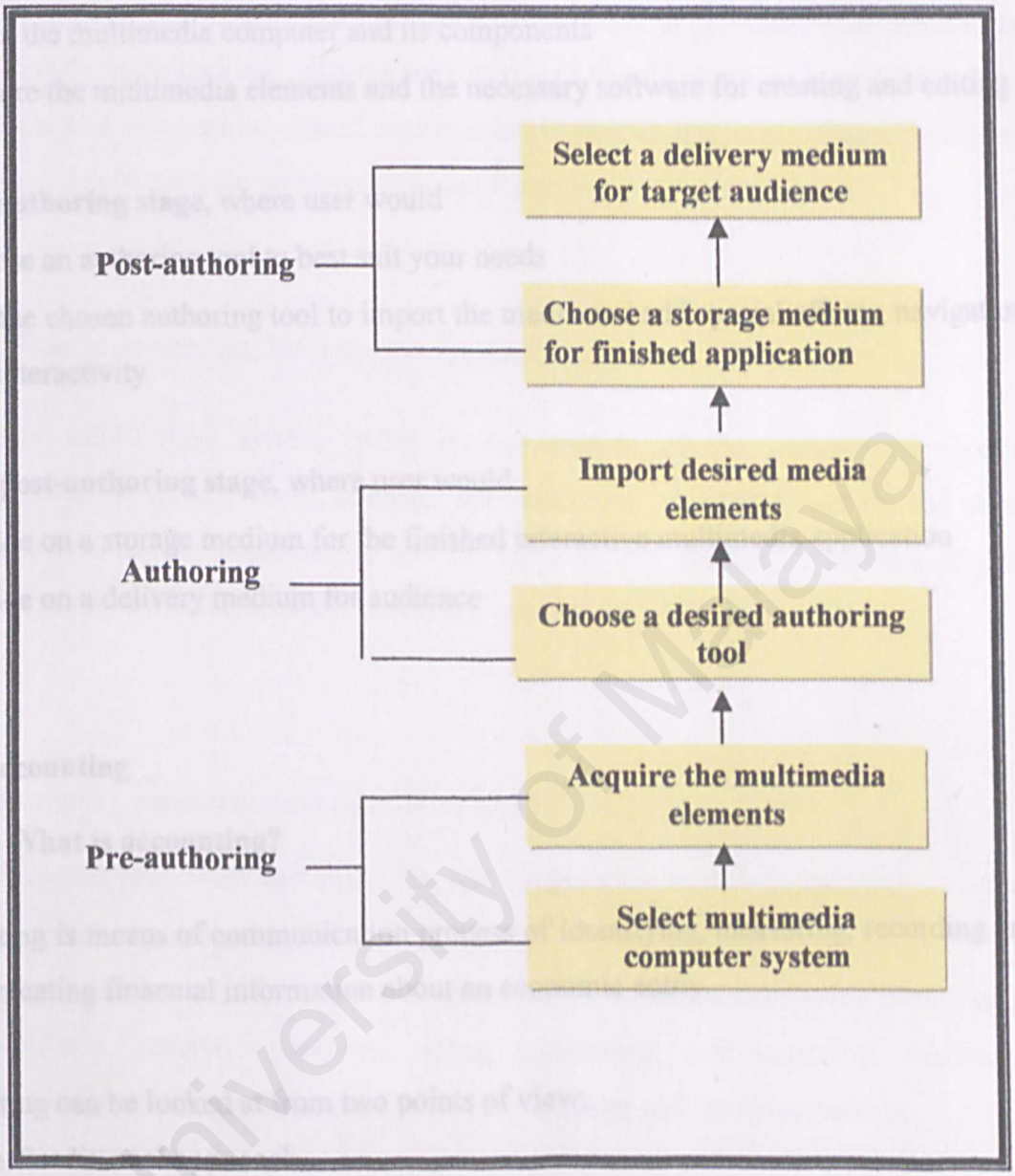

Figure 2 The Authoring Process

(Source: Neo Mai & Ken Neo TK, 1999)

1) The **pre-authoring stage**, where user would

- Select the multimedia computer and its components
- Acquire the multimedia elements and the necessary software for creating and editing

2) The **authoring stage**, where user would

- Choose an authoring tool to best suit your needs
- Use the chosen authoring tool to import the media and add special effects, navigation and interactivity

3) The **post-authoring stage**, where user would

- Decide on a storage medium for the finished interactive multimedia application
- Decide on a delivery medium for audience

2.1.3 Accounting

2.1.3.1 What is accounting?

Accounting is means of communication process of identifying, measuring, recording and communicating financial information about an economic entity.

Accounting can be looked at from two points of view:

1) The Traditional approach

The first accounting systems focused on recording financial information to keep an 'account' of the way in which the scarce resources of the business had been used. This approach focuses on the record keeping of historical events and transactions. In modern times these records enable the user to work out the financial position of the business and the profit that has been made over time.

2) The Conceptual Approach

These days' accountants have turned their attention to providing information that is useful for decision-making. Information provided should assist with evaluating past performance and information should enable users to predict the future. General purpose Accounting Reports provide information about Financial Position and Profit

2.1.3.2 What is accounting information system?

Accounting information system (AIS) is that portion of the information system concerned with the measurement, analysis, and prediction of income, wealth, and other economic events of the organization and its subunits and entities. Elements of AIS include hardware, software, database, controls, procedures and personnel.

2.1.3.3 Is quality measurements part of an AIS?

The AIS Supports Business Functions. The AIS supports three basic functions:

- **Transaction processing**

The transaction processing function involves the recording of day-to-day events such as purchases, receipts, payments, sales, collections, and personnel activities. Transaction processing provides the basis for reporting and decision-making.

- **Reporting**

The reporting function includes both internal and external reports and both preformatted (canned) and ad hoc reports. Internal reports include product cost reports. External reports include financial statements.

- **Decision Making**

The decision making function involves making decisions about business activities and controlling those activities, including choosing which product to manufacture or market, or how to market the product, scheduling service or product activities, planning budgets and strategic moves, etc. Reports are needed to assist decision makers in many diverse areas of business activities. The AIS may provide routine reports (e.g., monthly branch activity reports), ad-hoc reports and inquiries (e.g., special delivery of widgets), exception reports (e.g., variance reports), and predictive reports (e.g., budget forecasts).

2.1.3.4 Accounting And The Computer

Before the invention of calculators and computers, all business transactions were recorded by hand. Now the computer performs routine record keeping and prepares reports that sometimes took accounting workers months to summarize manually. The computer is ideally suited to accounting work, and accountants were among the earliest users to recognize its practical applications. Found only in large businesses at first, computers are now commonplace. Microcomputers given even one-person business the option of using a computerized accounting system.

Regardless of how or whether a business uses computers, the nature of accounting system remains the same. Information may be recorded in a manual accounting system and computerized accounting system in different ways, but the same financial reports will result.

2.1.4 Authoring Tools And Authoring Language

2.1.4.1 What is Authoring Tools ?

For the purpose of this project- learning section, an authoring tool is simply something that helps to develop front ends for applications, cut development time in doing so, and increases programmer efficiency due to ease of use. However, a common definition would be a software package which has pre-programmed elements for the development of interactive multimedia software titles that can create multimedia presentation, training courses, on screen video productions, demo disks, guided tours, interactive kiosks, simulations and prototypes through scripting languages and intuitive icon-based construction environments.

Authoring tools provide true interactivity, not just button pressing and powerful control over media elements, including words, images, animations, sound and video. Authoring systems vary widely in orientation, capabilities and learning curve. There is no such thing (at this time) as a completely point-to-click automated authoring system; some knowledge of heuristic thinking and algorithm design is necessary. Whether you realize it or not, authoring is actually just a speeded-up form of programming because you do not need to know the intricacies of a programming language, or worse, an API, but you do need to understand how programs work.

There are literally hundreds of software packages available to assist the developers in designing web site. In fact, a great majority of them are freeware, shareware and public domain.

Web-based authoring tools seem to fall roughly into three categories:.

a) **"Developer"** tools are typically multimedia tools-turned-web-production gadgets with some tacked on administrative capabilities. The learning curve is fairly steep for non-tetchier types as serious programming or scripting is requires to best

utilize these tools. Examples of this category are Authorware, IconAuthor and ToolBook II Iustructor.

b) **"Instructor"** tools are developer-tools-made-simple. These no-programming required tools are ideal for the subject matter expert, but they lack some of the power and flexibility of the more difficult to master tools. One of the well-known tools is ToolBook II Assistant.

c) **"Delivery"** tools are not really authoring tools at all, but "containers". They really are class management tools. They organize content into classroom like formats: chat rooms, threaded discussions, class scheduling, registration, class rosters, student records, grading, and all manners of administrative details. Typically, the content is created and organized externally and imported. TopClass, WebCT, LearningSpace, Firstclass and Vitual-U are example of this category.

2.1.4.2 Advantages Of Authoring Tools

Advantages of authoring tools includes:

- Ability to do fast prototyping
- Ease of expanding the prototype to a full system
- Ease of use
- Built in multimedia capabilities
- Less need of programming expertise

2.1.4.3 Disadvantages Of Authoring Tools

- Slow execution
- Poor data handling

2.1.4.4 Authoring Language

In contrast, an authoring language is a program that allows more control over the results. However, it requires a greater commitment in terms of human programming resources. Anyway, it will be using to develop a system section for students to key in their data and get their balance sheet.

2.1.4.5 Event-driven Programming

Any programs that respond to the user actions and system events known as event-driven programming. Windows programs provide the user with the ability to interact with the object that made up the programs interface to a much grater extent. Programs would now respond to occurrences such as mouse movements and click, and would respond differently depending upon where the mouse pointer was located. Because this programming structure would no longer work in such a wide-open environment, a new model was needed: the event model. These programs provide almost immediate feedback to the users and given them control over the program's activity.

2.1.5 Database

2.1.5.1 What is a database?

A database is an orderly collection of information. When user store information in a database, user can easily add information to the collection, update the information, manipulate the information and display and print reports using selected information in the database.

User can store on just about anything in a database – employees in a company, the names and addresses of friends, members of club, or even user's CD collection. [2]

Database provides numerous advantages over the file system's management by making it earlier to eliminate most of the file system's data in consistency, data anomalies and data structured dependency problems. In the market now, it has a lot of database software, like Microsoft SQL Server, Microsoft Access, Lotus Note, Informix $GL, oracle and other.

2.1.5.2 What is a Database System and DBMS?

A database system consists of two parts: the *Database Management System* (DBMS), which is the program that organizes and maintains these lists of information, and the *database application*, a program that lets us retrieve, view, and update information stored by DBMS. Databases are everywhere: a company's personnel system (the application) written in dBASE (the DBMS) on a PC; an inventory system (application) of the parts in a warehouse maintained in Rdb/VMS (DBMS) on a DEC VAX; or patient records (application) stored in DB2 (DBMS) on an IBM mainframe.

It is common for both the DBMS and application to reside and execute on the same computer; in many cases the two are combined in the same program. Most of the database systems available today are designed this way. However, a lot of attention is

Now focused on one of the latest stages in the evolution of DBMS technology – *Client/Server* (C/S) database technology.

A Client/Server database increase database processing power by separating the DBMS from the database application. The application runs on one or more user workstations (which are usually PCs) and communicates over a network with one or more DBMSs running on other computers. Client/Server Database Systems make the best use of today's powerful computers.

2.2 Consideration Of Development Tools

2.2.1 Consideration Of Authoring Tools

Authoring tools will be use to develop one part of the project, that is multimedia learning section. The suitable authoring tool should be choosing to develop an interactive and creative learning tool for students.

2.2.1.1 Macromedia Director 7.0

Macromedia Director is an essential piece of software for multimedia authoring, even if user has broad programming experience. Director is actually frame-based animation program. Someone who applied animation cell management to a computer spreadsheet originally designed it. Each cell of the spreadsheet contained graphic information in the form of a bitmap. Then, the spreadsheet becomes a "score." When the score's cell was automatically sequenced using the computer's built-in clock, the bitmap images would sequence on the screen in a window. There you have it... animation controlled by a spreadsheet.

To really unlock the power of Macromedia Director, user must understand how to do command scripting. Macromedia's scripting language is called Lingo. With Lingo, user can write scripts to control objects, branching and even outside devices – like disk players. But the best thing about Director is that user can create run-time versions of user's programs, called projectors, that user can distribute freely. Anyone can run your projector, whether or not they have the program.

Director started out on the Macintosh platform, but it has grown more robust throughout its evolution to become a true cross-platform multimedia-authoring tool. In order to create cross-platform applications, however, user mush has both the Windows and Macintosh versions in user stable.

2.2.1.2 Macromedia Authorware 4.0

This cross-platform authoring program uses an icon-and-diagram approach to laying out user interface objects. In the development of interactive training materials, this program is quite comprehensive.

Authorware has the ability to combine a broad variety of multimedia objects, videos and animations, but its real power lies in its ability to store and retrieve libraries of reusable test question models – a valuable feature for anyone involved in the ongoing production of computer-based training.

Once user creates an application in Authorware, user can create run-time applications on both Macintosh and Windows machines. The distribution rights to application created in this program are liberal, as is customary with Macromedia development products.

Table 3 below show up the overall preview between Authorware and Director.

2.2.1.3 Comparison between Macromedia Director and Macromedia Authorware

Macromedia Director and Macromedia Authorware is both multimedia-authoring tool. However, Authorware has some drawbacks if compare with Director as below:

- Authorware (US 3000) is expensive than Director (US 850). [Gary Olsen ,1997]
- Authorware is not ideal for complete animations. Animations need to be created using other tools, such as Paint Pro Shop and imported into Authorware.
- Authorware cannot run on computers that have little memory.
- Like most tools, file IO is not possible over the Internet. Authorware's local hard disk file IO is good, but all the built-in functions are disabled when the program is run over the Internet.

	Authorware 5.1	Director
Overview	Authorware is the industry-leading tool for creating interactive, rich-media learning applications for delivery over the Web, LANs and CD-ROM.	Director is the standard for creating and delivering powerful multimedia for the Internet, CD-ROMs and DVD-ROMs.
Positioning	The leading tool for interactive learning.	The standard for creating and delivering powerful multimedia.
Main use	• Computer-based training • Web-based training	• Web-based multimedia • Demos, presentation
Primary Users	• Training developers • Instructional designers • Subject matter experts	• Web developers • Multimedia professionals • Corporate presentation specialists
Skill Level of User	• 60% of projects require very little technical proficiency • 30% of projects require medium level of technical proficiency • 10% of projects require high level of technical proficiency	• 25% of projects require very little technical proficiency • 25% of projects require medium level of technical proficiency • 50% of projects require high level of technical proficiency
User Interface	Icons on a flowline.	Frame-based using a score, powerful scripting language.
Media Support	**Import** Text Graphics Animation Audio Video **Create** Text Shapes Animation	**Import** Text Graphics Animation Audio Video **Create** Text Shapes Animation
Media Control	Provides some synchronization of graphics, animations, sound and video. Create hyperlinks between any media types.	Provides tight synchronization and extensive control of media elements.

Table 3 Authorware 5.01 vs Director 7

Source: http://macromedia.com/solutions/executive/learning/productinfo/choosing [15]

2.2.1.4 Asymetrix ToolBook

Asymetrix ToolBook is one type of script-based authoring tool. A script-based authoring tool is one where the actions of the multimedia elements on the screen are controlled by scripts and are executed line by line.

ToolBook's metaphor is that of a book. The finished application is called a book and is divides into pages (or the screen). These pages can have fields (for text), buttons and graphics and can be shared among pages throughout the book. ToolBook allows user to import media elements saved in popular file formats into the presentation. It also provides a toolbox to create graphical elements like shapes and fields and buttons for user pages, as well as being able to import a wide variety of multimedia file types.

The scripting language used in ToolBook is called OpenScript . These scripts handle the actions to be performed by buttons and other multimedia elements and control the branching structure of the application.

2.2.1.5 Comparison between Macromedia Director VS Asymetrix ToolBook

Asymetrix ToolBook is a powerful tool that can control over the precise functions of the application. However, Asymetrix ToolBook have some drawbacks if compare with Macromedia Director, as below:

- ToolBook has limited animation capabilities other than animation on a path. Therefore, any animation or video or sound files have to be created in third-party software like Autodesk 3D Studio, Adobe Premier or Creative Labs' SoundBlaster respectively.
- Requires strong programming skills

2.2.2 Consideration Of Authoring Language

Authoring language is choosing to develop one part of the EasyAccount, that is Automatic System Section. With this, user will have a user-friendly interface to key in their data and get the balance sheet.

2.2.2.1 Visual Basic 6.0

Visual Basic is a programming language that evolved from a long line of BASIC programming languages. Visual Basic is based on three fundamental aspects: Control (like list boxes), Properties (like size and color) and Methods (actions that a control can do). Visual Basic have characteristic below that makes it is a good choice for user:

a) A stand-alone language designed to easily written to work under Microsoft's windows.
b) It is rich, powerful languages that uses built-in objects
c) It is a compiled language and is distributable using runtime support for applications.

Besides that, Visual Basic incorporates a number of new and enhanced features that makes it more powerful. These features are:

- The development environment has been enhanced to make entering code and designing forms easier.
- A native code compiler anima proved forms engine that makes programs run faster.
- It can create Multiple Document Interface (MDI) programs, which have one main "parent" form, and one or more internal "child" forms.
- A variety of programs types-other than just the Standard EXE, each as Dynamic-link Library (DLLs) and OCX's can be created.

2.2.2.2 Multimedia And Visual Basic

Multimedia devices can be accessed in one of two ways in Visual Basic. The first is through Windows API functions. There are many functions in the Windows API that enable access and control of multimedia devices. The other way is through the Multimedia Control Interface (MCI). This control is really a nice interface to the Microsoft Multimedia function built into windows. It has many properties that greatly simplify using multimedia.

2.2.2.3 Java

Java is a full-featured computer language that incorporates the best of modern thinking about Object Oriented (OO) programming. Java is simpler and more robust than other computer languages and combines features, which make it ideal for programs, which must deal with networks. The designers of Java emphasized securities, ease of programming and independence from any particular hardware. These features brought Java near-instant acclaim in the programming word and meteoric rise in public consciousness.

Java can be used to create tiny programs (called applets), which can live on web page and interact with users; thousands of web pages incorporating Java appeared within a few months of Java's initial release.

Java is not limited to applets, many people feel that there will be major applications downloaded over networks and running the same code on many different combinations of hardware and operating systems, write once / run anywhere is the Java rallying cry.

2.2.3 Consideration On the Database Implementation

Analysis has done to determine the most appropriate database management system for storing and managing data. Selection is based on consideration for usability and effectiveness in the context of cross platform deploying storage space required and the portability of the records.

2.2.3.1 Microsoft Access 2000

Microsoft Access is a Windows-based relational database management system. It is one of the programs in the Microsoft Office. It runs under the Windows 95/98/NT operating systems. Since its first introduction in 1992, Microsoft Access has become a leader in the desktop database category among a wide variety of users. Experienced database users were impressed that such a powerful desktop database could be so easy to use.

Access 2.0 continued to change the way end users understand and use databases. When Access was first included with the Microsoft Office suite, Office users began recognizing the strong need for a relational database for finding and managing data as an integral part of overall desktop productivity to make better business decisions.

The popularity continued in late 1995 with the introduction of Access 95, the world's first 32-bit RDBMS. Access 97, which was available in January 1997, combined the best of a database with the best of the Web by offering the capabilities to easily share static and dynamic data via the corporate intranet.

Today, the popularity of Access has soared to include not only experienced database users, but also first-time database users. With Access 2000, newer users will appreciate the strong integration with Office applications and the familiar look that makes it easy to get up and running quickly. Access power users and developers will find new and

exciting ways to take advantage of Access' popularity among end users by increasing the scalability of Access 2000 with stronger integration to enterprise level databases.

2.2.3.2 Microsoft SQL Server 7.0

Microsoft SQL Server is a scalable, high-performance database management system designed specifically for distributed client/server computing. Its built-in data replication, powerful management tools, Internet integration and open system architecture provide a superior platform for delivering cost-effective information solutions.

2.2.3.3 Lotus Notes / Domino

Lotus Notes is a GroupWare technology from Lotus Development Corporation. It supports communication, collaboration and coordination between people working in-groups. The most important component of any Notes application is the Notes database, which is an unstructured database as opposed to relational databases. Through its databases, Notes offer e-mail, calendar, and scheduling capabilities.

Lotus Notes is categorized as groupware. Groupware is a relatively new concept in software that seeks to facilitate group activities, such as sharing documents, storage, work routing and escalation, and quick development of new shared applications. Correctly applied, groupware will foster teamwork, improve business processes, and extend the reach of the individual and the organization. Unlike simple word processors, e-mail, database or spreadsheets, Lotus Notes combines many functions into a single piece of software. Through a single consistent interface, Notes makes all of the available functions easier to integrate and simpler to access. This is why Lotus Notes has been referred to as the "Swiss army knife of computer software." Notes is very flexible, with extensive capabilities that lend themselves to a variety of projects. With all these tools in one package, Lotus Notes makes it easier for you to share ideas and exchange information. You decide who gets to see what-- when, where, and how. Lotus Notes provides a work place where you allow others to read, write, and make suggestions directly on your

documents. Notes encourages and supports collaboration and team work by making your documents more accessible to the right people at the right time--making your documents more useful. Ultimately, placing documents in Lotus Notes can reduce paperwork. [13]

Lotus Notes or Notes also a software tool for communicating and sharing information. It has components for e-mail, calendaring, to do lists, sharing documents, accessing the Internet, and BCIT developed applications, etc. Notes runs on the BCIT network and the software and data are stored on a Notes server. You can access Notes from your office desktop PC or from home and other remote locations. [14]

Each database consists of documents, which in turn may contain fields containing textual information, images and OLE objects. The Notes database is not a relational database and therefore does not have primary keys and relationship between databases. Any relationship that needs to be established needs to be coded.

Notes replace the PROFS (or OV/VM) system that we have had at BCIT since the mid-1980. PROFS are a text-based environment that was developed before PCs became common place. Notes take advantage of PC computing and the Windows graphical user interface (GUI), which makes it far more powerful, much easier to use and expands the functions available.

2.2.3.4 Visual Basic

The native database engine for Visual Basic is the same system as Access uses. It is called the JET engine. Queries and other database functions are done using the SQL language. Visual Basic has no direct way of creating tables and queries; all must be done using coding (or in some instances the Database Access Object). With Access, queries and tables can be easily created and modified. Since Access is a database system by nature, it is best suited for mainly database jobs.

2.2.3.4 Disadvantages Lotus Notes/ Domino

Lotus Notes have some disadvantages that not suitable using in EasyAccount, as below:

a) Lotus Notes have it own database. The database is not a Relational Database Management System (RDBMS). If the user needs to store 100 records into the system, the user needs to save the records 100 times. Problem will arise when user needs to store few hundreds or thousands of record into the database or system. This will make the process of saving data tedious and inefficient.

b) The format of database is like form, where user needs to key in all the related data, although this feature is more advanced, but it is not suitable for the system where the data is not centralized or the database size is small.

c) Lotus Notes and Domino required considerable more memory space compared to other applications. As a result, the Lotus Notes application frequently hung-up and had to be rebooted. The size of Lotus Notes also large, if the computer installs this software, it will make the computer slow down. If the user not use this software frequently or maximum, it will waste the space and memory.

2.3 Comparative study of current accounting system

As a guideline for EasyAccount, I has made a comparative study on available accounting learning package in the market. In this context, the example is UBS. UBS Service Pack is a system designed by UBS to improve the quality of training and support on the range of UBS Software. It is specially designed for small to medium sized businesses. The system will consist of UBS Service Pack Centre and Service Pack Trainers, where the main priority is to provide quick response time and nation wide support. It operated under Windows 95/98, Windows 2000 or NT.

2.3.1 Basic Features and Drawback of UBS

Standard basic features for UBS Accounting for Windows Version 8.1 include: -

- Multiple Company
- Multiple languages – English, Bahasa Malaysia, Chinese and Thai.
- 18 months accounting period
- Manufacturing Account
- Instant posting
- Export to Excel facility
- Bank reconciliation
- Easy entries for omitted transactions of previous months
- Bank and Cash Book

However, UBS have some drawback:

- UBS start the lesson from ledger. There is no guidance from Journal to General Ledger. The beginner will have difficult to understand the following learning section.
- UBS doesn't have automatic posting from ledger to trial balance, finance statement and balance sheet. It enhances the possibility of user wrongly key in the data. Besides that, it wasting the time and energy of user.
- User interface for learning section doesn't have back, next and menu button. The button for UBS is minimizing at the bottom. It is difficult for beginner to find it.

2.3.2 Features of EasyAccount

EasyAccount have many feature that not consist in UBS, as below:

i. *Direct Posting*

One of the good features in EasyAccount is direct posting. Once the student key in the data in journal, the system will automatically link the data from journal to ledger, trial balance, finance statement and finally balance sheet. Student not need to enter data once by once start from journal to balance sheet. That means, student can save time and energy in re-keying data. It also eliminates the possibility of error in re-keying. For example wrongly key in the amount.

ii. *Security and maintenance*

EasyAccount is software that still can be use in future. It has maintenance function. Besides that, it also has security function. Teacher is allowed to change the content of exercise and quiz. With this, student will not be boring with the existing question. Anyway, teachers do not have this priority if they don't have password and ID. They need to log in first.

iii. *Help file*

With EasyAccount, it has help section in automatic accounting section. For anyone doesn't understand accounting term, they can refer to it. With this, students can know their weakness and learn from it.

iv. *Guidelines using accounting system*

Before start using the accounting system, user has two choices. For beginner, they can refer to guidelines - *how to using the system* and learn the system themselves step by step. Anyway, for those that already familiar with the system, they can directly use the system by key in the data.

v. *Bahasa Malaysia (BM) as a main languages*

To fulfill the syllabus of SPM, BM is used as main languages in EasyAccount. With this, student doesn't have any problem in understanding the accounting term.

vi. *Learning section is more flexible*

EasyAccount's learning section is more interactive and flexible compare with other accounting learning software. It have back, next and menu button at each user interface. If user doesn't understand one page of lesson, they can jump back to previous page. For those want to exist one lesson, they can jump back to menu and choose new lesson at main user interface.

Chapter 3
System Analysis

Chapter 3 System Analysis

After the literature search and review, the next step is to perform a detailed analysis. System analysis is a stage or a process of gathering and interpreting facts, diagnosing problems as well as using the information to recommend improvement to the system. In this stage, the information gathered has provided alternative strategies to develop this system.

3.1 Methodology

As mentioned earlier in Chapter 1 Introduction, prototyping Model has been use in developing whole project. This methodology is very important in order to make sure that the project has been well planned from the beginning stage until the end of this project. To guarantee the success of this project, research has been done on the related fields and system planning based on the approaches provided.

3.1.2 Analysis Procedures

The process of analysis involves the following procedures:

- Problem Identification
- Evaluation and synthesis
- Modeling
- Specification

3.1.2.1 Problem Identification

Before a new system can be built, we must identify the problem that needs to be solved in order to ensure the success of this project. For "EasyAccount", we need identify the suitable accounting syllabus content to student. After that, how the chosen syllabus can present in an interactive multimedia presentation? Beside that, the problem is how to store, retrieve and manage a large amount of data in a database system in an effective and efficient way. Another problem would be to determine how to direct posting of data into related account.

3.1.2.2 Evaluation and synthesis

In this state, analysis of the problems needs to be done by dividing the problems into smaller parts (invoking the "divide and conquer" technique) so that the problem will be easier to be understood and solved.

The following problems are the system requirement that must be considered:

- What is the suitable software for multimedia presentation?
- How to manage the large amount of accounting term?
- What kind of database is used to store the data?
- Using the relational DBMS or object oriented DBMS?
- How to stored data in the entire account?
- How to direct posting the data into related account?

3.1.2.3. Modeling

We create model to gain a better understanding of the actual entity to be built. The model focuses on what the system must do; usually a graphical notation (such as data flow diagram) is used to depict information, processing, system behavior and other characteristics.

3.1.2.4 Specification

The requirement specification is a complete listing that defines what the system should do. It will be used in the system design and system analysis testing

3.2 Requirement Analysis

Requirement analysis covers the area of functional and non-functional requirements of the EasyAccount. Anyway, this phase needs proposed users (SPM teachers and students) as well as the outline and the technology to be used in the system development are defined.

It is indeed an important feature of the system or a description of something that makes the system capable to proceed while fulfilling the system's intention.

3.2.1 Functional Requirement

The functional requirement of the package is to fulfill the SPM syllabus set and approved by the Majlis Peperiksaan Malaysia. Besides that, the material course needs to be comprehensive.

There are three sections in the EasyAccount. There are Accounting Learning Section, Automatic Accounting Section and System Administration Section. As this complete project is a corporation effort from 3 students, we have divided the work. All the section and modules discuss detailed below are the part need to complete by myself.

EasyAccount have 3 main sections as below:

a) Accounting Learning Section

Accounting Learning Section is designed to present interactive multimedia presentation to students. It has useful and comprehensive text. This section contains the following module:

- **Learning module**

This module contains 14 chapter accounting lesson which fulfill SPM syllabus set. I will need to present 8 chapter accounting lesson from entire 14 chapters to students. Students can learn accounting term including asset, liabilities, journal, and balance sheet in an interactive multimedia environment. The main title for each chapter will show in appendix A.

- **Notes Module**

This notes module has description of accounting term. Each chapter will have it own notes. I will need also to build up 8 chapter notes from entire 14 chapters notes. If student need more explanation on one word, they can refer to it. Besides that, they can print up the notes also.

- **Exercise module**

This exercise module has an interactive exercise for each chapter. Each chapter will have 2 set of question. I will need to build up 16 set of exercise from entire 28 set exercise. Students can check their understanding of lesson through the questions in each set. Mark will be given for the correct answer.

- **Past Year module**

Besides that, it also includes a quiz part at the end of all lessons. All the question in this module will be a past year question for SPM accounting from 1998 to 1999. Besides that, this module also includes forecasting question for SPM accounting. I will need to build up the entire question. Through this module, students can practice the quiz by key in the data and check the mark they have. Solution also provides step by step if students don't know the way to solve it. With this module, it will help student more understanding the style of actual examination and make a preparation early.

b) Automatic Accounting Section

Automatic Accounting Section is a system that need user to install to computer first. By just key in the accounting data, user can check their balance sheet correct or not. This section also a good way for students to check their accounting procedures step by step start from journal until balance sheet. The modules for automatic accounting section will show in Appendix B.

- **Direct posting from trial balance to balance sheet**

  Start from trial balance, l will need to direct posting the figures from trial balance to balance sheet. Each figures will arranged in appropriate place at balance sheet. This step is very important because students will know their answer correct or not through this step.

- **Help**

  If students need any help, help section is a best solution for them. I will need to build up one help file for students. They can search the accounting term that their don't understand and find it in the index.

- **Guidelines using accounting system**

  This module consist description of automatic accounting section. I will need to build it. For beginner, they can refer to it and learn the system themselves step by step. Anyway, for those that already familiar with the system, they can directly use the system by key in the data.

c) System Administrator Section

System Administrator Modules is a module especially for administrator. Anyway, they need to log in to system first with user ID and password. With this module, future maintenance and enhancement works will be simpler and consumes less time.

3.2.2 Non-Functional Requirement

Nonfunctional requirements are as important as functional requirements. It is defined as constraints under which the system must operate and the standards, which must be met by the delivered system.

The non-functional requirement of the system includes reliability, usability, manageability and user friendliness.

a) Reliability

Reliability is the extents to which a system can be expected to perform its intended functions with required precision and accuracy. Reliability is also responsible to convince the users that the system developed will make the correct respond and provide error-handling ability.

b) Usability

The package should be developed in such a way that it is easy to use. Human interface need to be designed as intuitive and consistent as it could be with other modules in the environment and within themselves. Furthermore, the package should be able to help students to understand well and perform as an important reference for examination.

c) Manageability

The modules within the system should be easily distributed and managed. A better manageability will make the future maintenance and enhancement works simpler and consumes less time.

d) User Friendliness

The system is required to have a very user-friendly interface because most of the users are computer illiterate. The usage of suitable and meaningful captions and

icons will help the user to consume the system with more confidence, easy and save time.

3.3 Run-time Requirement

3.3.1 Hardware Requirement

To have better performance of this package, the user's computer system should have the following basic requirements as listed below:

- Intel Pentium 166 MHZ or higher
- 4* CD-ROM or greater speed
- 16 bit sound card
- 4 Mb SVGA Video Card
- Mouse (PS II or Serial – depends on individual system)
- Speakers

3.3.2 Software Requirement

In order to host and run the full version of the educational package, the user's computer system must have one major operating system and two supporting software as listed below:

Software	Description
Windows 98	Operating System
Visual Basic 6	Create Windows application
Microsoft Access 2000	Databases
Macromedia Director 7	Multimedia Presentation
Paint Shop Pro 5.01	Photo and graphic editing
PhotoShop 5.0	Editing graphic
Microsoft Sound Recorder	Record sound
Microsoft Word 2000	Documentation

Table 4 Software Requirements

Chapter 4
System Design

Chapter 4 System Design

In this stage, the information collected earlier was used to accomplish the design of the system. System design phase is an iterative process of two important stages, namely the conceptual design and technical design. The conceptual design indicates to the users what the system will perform. Once the users have satisfied and approved the conceptual design level, then the design phase will automatically move or translate into a more detailed document named technical design. The documents generated enable the developers to understand the hardware and software that are needed in order to solve user's problem.

4.1 Consideration on the Programming Technology and Languages

The main task in this section is to choose suitable programming technologies and languages that used to develop the system. After all the requirements have been reviewed and analyzed, the most suitable and appropriate tools for developing the system are identified and selected. The tools to be selected include the development software as well as the entire platform on which the development of the package is occurred. The major criteria to be considered are not only the suitability of the tools perhaps; the tools to be used must be able to interact with each other. The following programming technology and languages are chosen in order to develop the EasyAccount.

4.1.1 Operating System And Platform

In this phase, the Microsoft product is used as the main technology producer that is Microsoft Windows 95/98. In this case Windows 98 was chosen dual to the following features:

- It is the popular operating system which many users using this operating system as their daily job.
- Most of the software runs on Windows base operating system.
- EasyAccount is most suitable using this operating system because it is easier for student to install. Besides that, most of the students already familiar with this operating system compare with other software.

- Microsoft Access is a Windows based database system. It has been chosen to develop EasyAccount. With windows, developing or modifying code is much easier and faster, hence cheaper, than doing the same thing in DOS.

4.1.2 Development Software

Software in general is an application that helps users to do a particular task. In EasyAccount development, software is the application used to develop the system, such as authoring tools and programming tools. Once the suitable software has been selected, it will make the process of development is simpler and reduce the time needed to build a specific project. This software is capable in creating multimedia presentations, training courses, on screen video productions, guided tours, interactive kiosks, simulations as well as prototyping through scripting language and intuitive icon-based construction environments

4.1.2.1 Macromedia Director 7.0

Macromedia Director 7.0 was chosen as main platform or tool used in developing accounting learning section (multimedia learning section in EasyAccount). It is because Director is an essential piece of software for multimedia authoring, even if user have broad programming experience. It is not all that easy to learn, but it's extremely powerful. With Director's scripting language called Lingo, user can write scripts to control objects, branching and even outside devices like disk players. But the best thing about Director is that user can create run-time versions of programs, called projectors, that user can distribute freely. Anyone can run your projector, whether or not they have the program.

4.1.2.2 Microsoft Visual Basic 6.0

Finally, Visual Basic is chosen to develop Automatic System Section for EasyAccount and multimedia database due to the following reasons:

- **Support database connectivity**

Visual Basic 6.0 can be used to access the database that is built in the Microsoft Access Visual basic application will act as a front-end tool for the user to add, delete and view the contents of the database. In addition, searching by name or terms of accounting is more accurate and efficient.

- **Easy to create windows application**

Visual Basic is a programming language enables the developer to rapidly create a windows based application. It provides a complete set of built-in windows objects like buttons, text boxes, option boxes, database list, pictures and etc.

- **Easy to learn Visual basic**

Visual Basic is based on the Basic Programming Language. This means the code written in Visual Basic is easy to read, easy to write and easy to understand.

- **Error Handling Functions**

Error handling in Visual Basic can be implemented efficiently. It is used to respond to unexpected events in the program.

- **Integrated Debugger**

Debugging a program is a crucial process to remove bugs from the program. So this function is provided by Visual Basic programming environment. The Visual Basic debugger functions are the single or procedure stepping setting breakpoints and watch window.

4.1.2.3 Microsoft Access 2000

The selection of Microsoft Access 2000 was a decision based largely on the selection of Microsoft Visual Basic 6.0 to build the application front end.

Access 2000 also has many powerful database programming features and capabilities. Access 2000 helps organizations meet these demands by focusing on three key areas.

- First, Access 2000 simplifies the skill set needed to create simple, useful databases—the improved interface offers more consistency with other Office applications, plus new features that increase productivity.
- Second, Access 2000 adds Data Access Pages—Web pages that let users interact with data over the Web and maintain live links to a database.
- Finally, Access 2000, through its support of OLE DB, can act as a front end to high-end database engines such as Microsoft SQL Server™, making Access 2000 databases more scalable than ever before. They can improve data management in your organization.

4.1.2.4 Supporting software

i. Adobe Photoshop 4.0

Adobe Photoshop is powerful graphics software used for creating and editing graphic files. This software is the de facto standard for digital image enhancement, photo retouching and image composting.

ii. Paint Shop Pro 5.01

Paint Shop pro 5 delivers professional quality graphics and photo editing tools with unrivalled ease of use, speed and affordable functionality. With Paint Shop Pro 5, user can retouch and edit photos and images, and import photos from scanners and digital camera. It has complete set of customizable paint brushes, multiple layer editing, wide range of selection tools, basic and advanced image adjustments, image filters, deformations and special effects, full set of color enhancements and support over 40 different file formats.

4.2 Process Design

After choosing the suitable development tools, system design can move into conceptual and technical design. In this project, system design is divided into 3 levels: architecture, code design and executable design. Architecture design related to the association of the system capabilities identified in the requirement specification together with the system components that is used to implement the system. Meanwhile the code design is related to the program writing, whereas executable design specifies the flow of the executable product.

EasyAccount is designed based on the structured design technique. Structured design is a process-oriented technique for breaking up a large program into a hierarchy of structure chart of modules that result in a computer program that is easier to implement and maintain.

4.2.1 Structure Chart

Structure chart is a treelike diagram. Structure chart modules are depicted by named rectangles. Modules are factored, from top-down, into sub-modules. Studying the flow of data through the program derives the structure chart. Figure 2 shows the flow of main menu for the EasyAccount after integration.

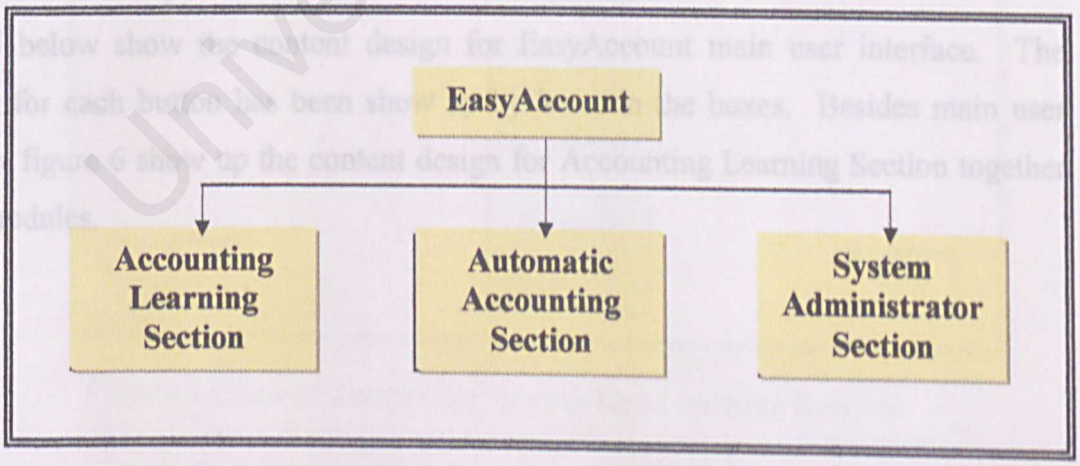

Figure 3 Structure chart for EasyAccount Main System

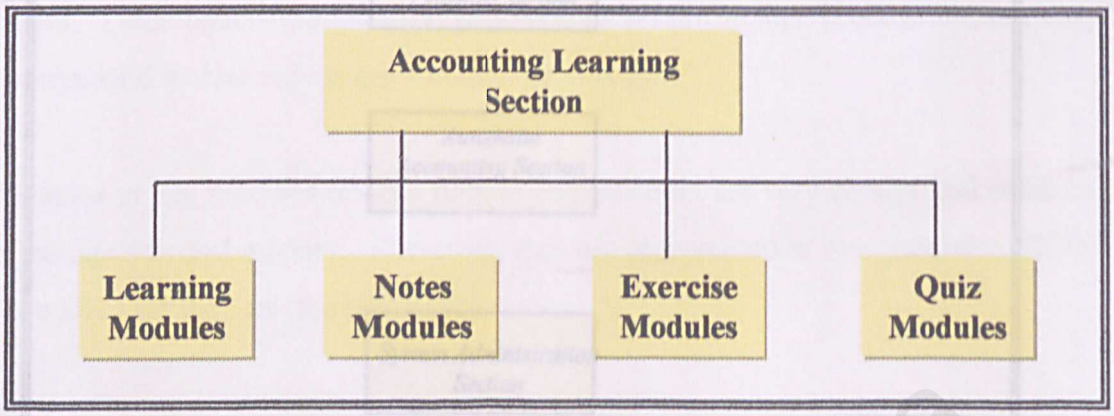

Figure 4 Structure chart for Accounting Learning Section

4.2.2 Content Design

The content design is related to designing the user interface for Easy Account. This process is necessary in order to ease the management as well as the development stage. Besides that, it makes the development much easier in terms of maintainability, reusability, and speed.

Figure 5 below show the content design for EasyAccount main user interface. The meaning for each button has been show up by letter in the boxes. Besides main user interface, figure 6 show up the content design for Accounting Learning Section together with it modules.

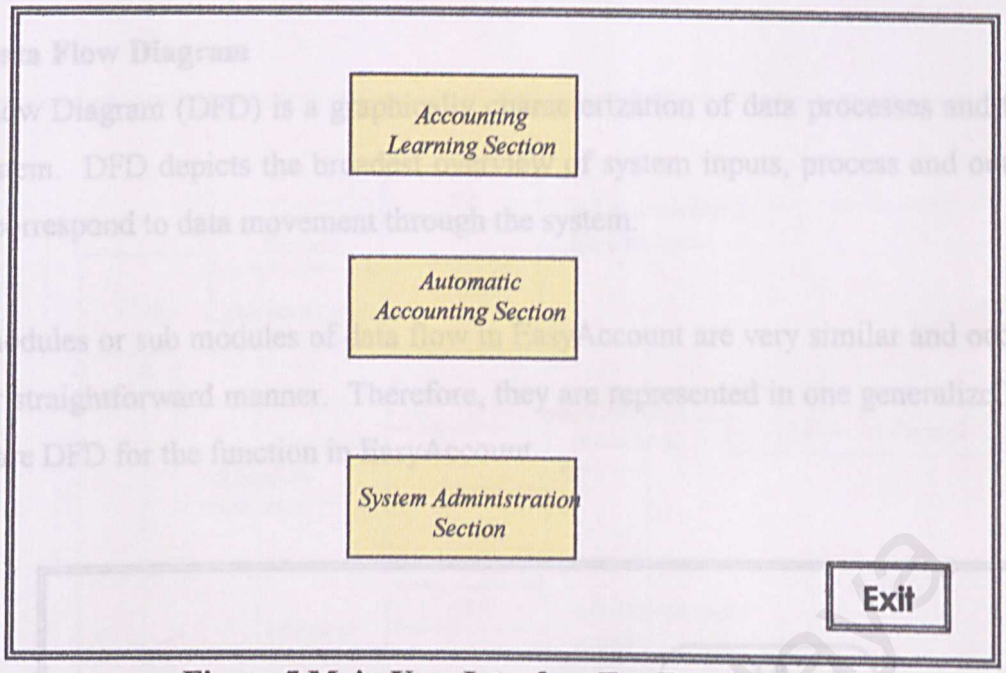

Figure 5 Main User Interface For EasyAccount

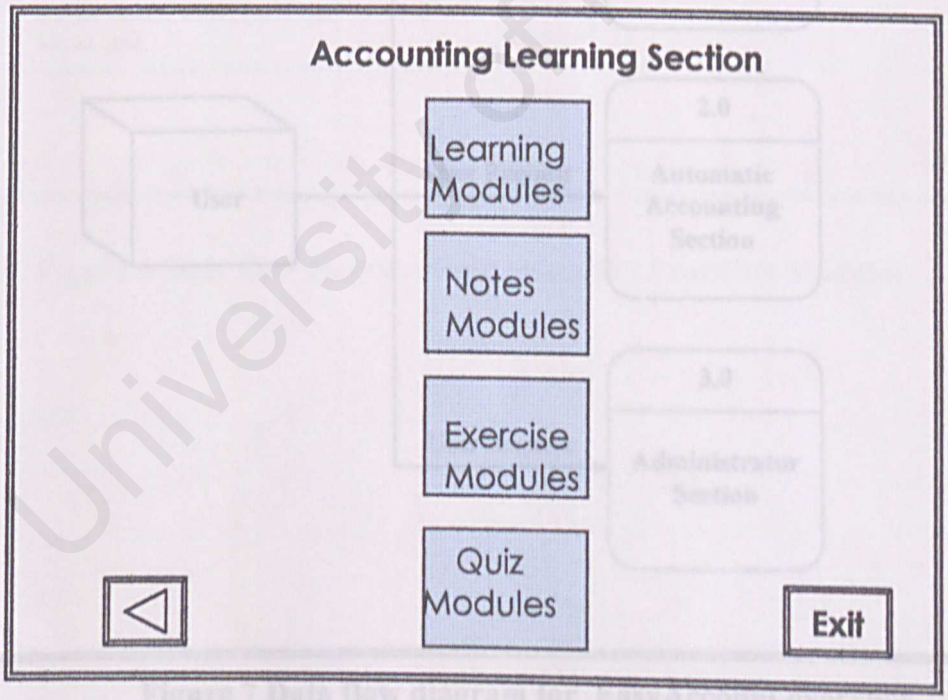

Figure 6 Content designs for Accounting Learning Section

4.2.3 Data Flow Diagram

Data Flow Diagram (DFD) is a graphically characterization of data processes and flows in a system. DFD depicts the broadest overview of system inputs, process and outputs, which correspond to data movement through the system.

Most modules or sub modules of data flow in EasyAccount are very similar and occur in a rather straightforward manner. Therefore, they are represented in one generalize DFD. Below are DFD for the function in EasyAccount.

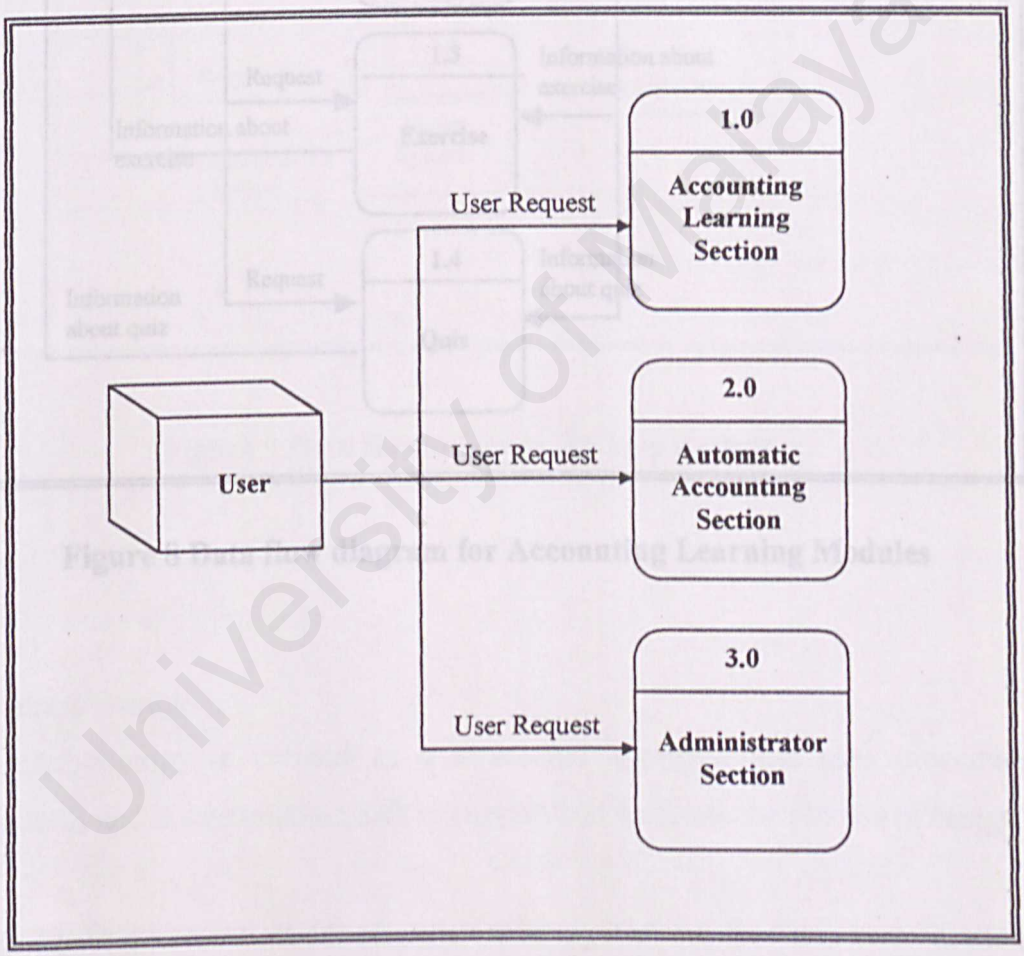

Figure 7 Data flow diagram for EasyAccount overview

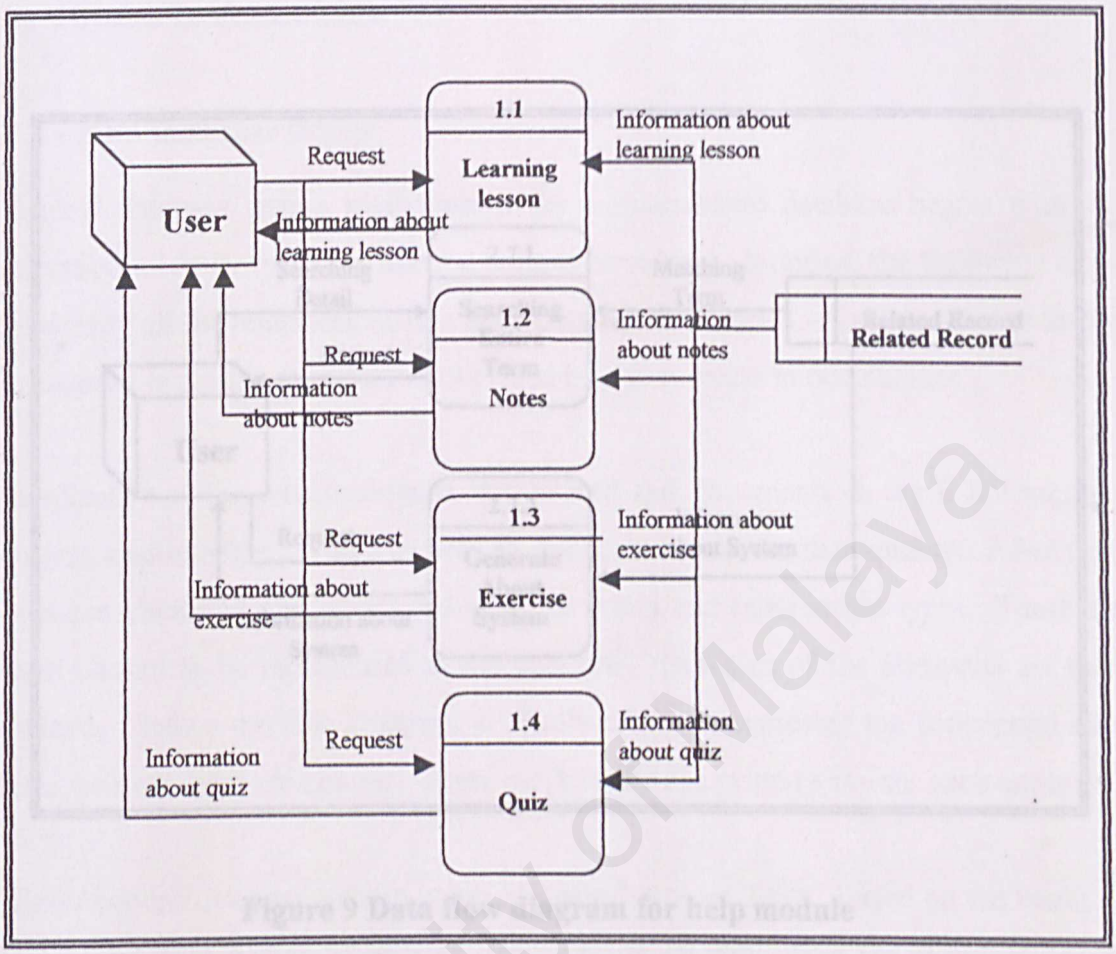

Figure 8 Data flow diagram for Accounting Learning Modules

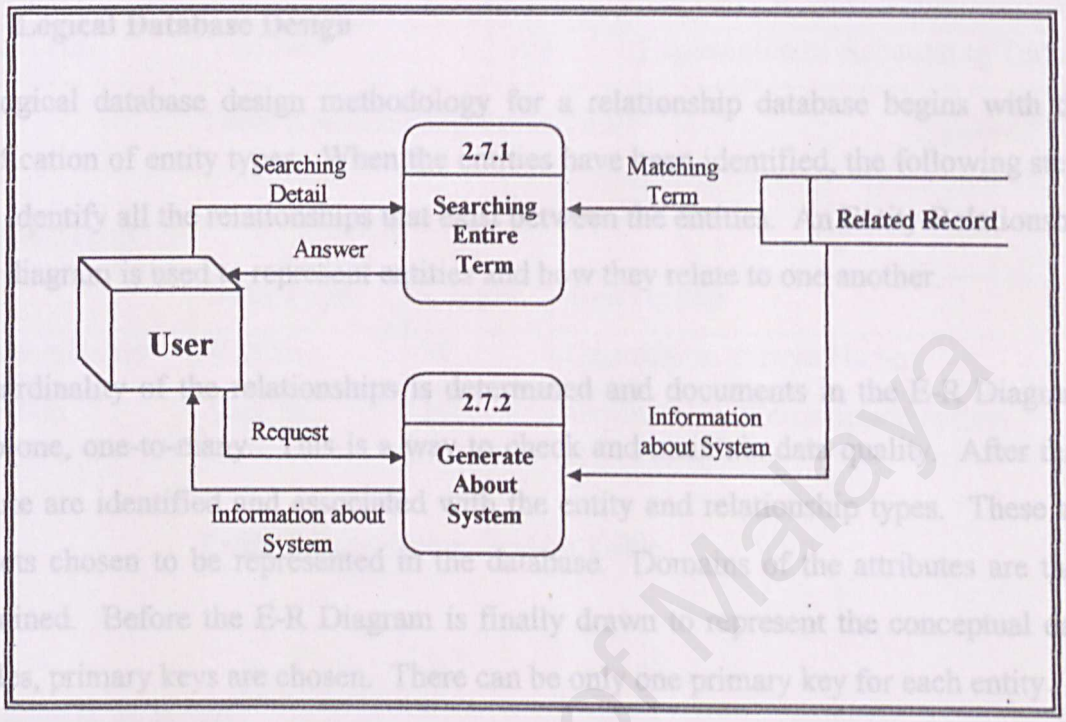

Figure 9 Data flow diagram for help module

4.3 Database Design

A design methodology is defined as a structured approach that uses procedures, techniques, tools and documentation aids to support and facilitate the process of design.

The design of EasyAccount is based on relational database model. In a relational database, a table is a collection of unique instances of similar data. Normalization reduces data redundancies and helps to eliminate data anomalies that result form those redundancies.

Database design can be divided into two phases:

a) Logical database design
b) Physical database design

4.3.1 Logical Database Design

The logical database design methodology for a relationship database begins with the identification of entity types. When the entities have been identified, the following steps are to identify all the relationships that exist between the entities. An Entity-Relationship (E-R) diagram is used to represent entities and how they relate to one another.

The cardinality of the relationships is determined and documents in the E-R Diagram: one-to-one, one-to-many. This is a way to check and maintain data quality. After that, attribute are identified and associated with the entity and relationship types. These are the facts chosen to be represented in the database. Domains of the attributes are then determined. Before the E-R Diagram is finally drawn to represent the conceptual data modules, primary keys are chosen. There can be only one primary key for each entity

The EasyAccount database is built using Microsoft Access 2000. Based on the result of the logical database design as well as requirements gathered from the earlier stages of development, construction of the database began with the design of tables. The detailed tables design is shown in the following sections.

4.3.2 Physical Database Design

Physical database design involves the design of the logical database or in other words in a tables. This database consists of 2 tables. Description of each table will discuss in the following section.

AccTermTable

Field	Data Type	Length	Description
AccTermID	VarChar	30	Accounting Term ID
AccTermName	VarChar	50	Accounting Term Name
DescAccTerm	VarChar	300	Explanation of Accounting Term

Table 5 Accounting Term Table

DescSystemTable

Field	Data Type	Length	Description
DescSystemName	VarChar	30	Description System Name
DescSystem	VarChar	100	Explanation of description system

Table 6 Description System Table

4.4 Interfaces Design

User interface design describes the communications between the software and the users. The design is focus on the effectiveness of the screen layout to attract users by making them complete and easy to handle as well as the user-friendliness of the product.

Some of the most important considerations when designing interfaces are the ones involving how people think and learn (cognition). Below are some guiding principles for cognitive processing.

a) Limit Memory Loads

People have short-term memory, after 20 seconds they will lose the information if they cannot quickly store it in long-term memory.

b) Provide Context

Context provides specific meaning and interpretation. Some ways of providing context are using titles, labels on screen titles, buttons and menus.

c) Be Consistent

One of the ways to facilitate a good mental model quickly is through consistency. People rely on consistency in order to find information quickly, create an accurate mental-model and make decisions.

d) Be Forgiving

The interface has to allow user to explore without doing damage. There has to be built in ways for users to cancel out, go back and undo actions.

Other aspect to be taken into consideration is visual considerations. Visual consideration include:

a) Minimize the eye movement

Screens and windows have to be designed in a way that users can start at the top and work their way down without having to move their eyes back and forth or up and down a lot.

b) Adhere to principles a good format and layout.

Information should be placed to follow the pattern of reading. For example, people who read English and Bahasa Malaysia will tend to look at the top left of each screen and then move both left to right and top to bottom.

c) Use color and highlighting judiciously

Color and highlighting should not be abused or over used. Techniques such as underlining, using boxes or color can be useful and powerful to visually grab attention. Whenever the color or highlighting is used, there should be a reason in doing so. Otherwise, avoid using any techniques in that particular area.

d) Use visual coding

Visual coding such as graying out unavailable options to provide visual meaning to data on specific area on a screen.

4.5 Consideration of HCI Factors

Human Computer Interaction (HCI) factors has been given consideration because of its importance in providing effectiveness in interactive with the users.

Analysis has been done on the discussion of HCI factor in order to study the guidelines of producing good HCI software. It was believed that by adoption appropriate guideline into the development of the EasyAccount, the efficiency and effectiveness of the EasyAccount would greatly improved.

This section of the report will be describing the HCI guideline that was adopted during the design EasyAccount. The styles of interaction, for EasyAccount will also be described.

The desire for usability software should reduce the errors made by the users during the operation.

Flexibility that allows users to adopt certain behavior of the way working habits to the EasyAccount has been taken into consideration by allowing changing of certain user interface color, and different types of commands available to the user.

The combination of color in user interface is important in the productivity and user friendliness of EasyAccount. Therefore, colors that are used in this user interface of EasyAccount will be carefully chosen. Besides, attractive and appropriate color will be used in areas where attention is required. Color will be used whenever necessary for different identification purpose. All the title menus and commands as well as the different kinds of information will be represented by different combinations of appropriate greatly enhance the visibility and comfort of users.

Fonts has many function in addition to provide letterforms for teaching like other visual elements, fonts can be used to create a mood, motivate, people and organize information.

By varying the size, weight and position of fonts, we ca create a hierarchy of information like color, the selection and use of fonts can greatly affect the user attitude towards a user interface. Particular emphasis during the developments of the package was placed on the use of fonts.

Chapter 5
System Implementation and Testing

Chapter 5 System Implementation And Testing

System implementation is the construction of the system and delivery of that system into "production". This phase at time involves some modifications to the previous design. System implementation includes building and testing system, which is also called the construction phase. Construction phase of the system involves the conversion of the system requirements and designs into programs codes.

5.1 Development Environment

Development environment has certain impact on the development of a system. Using the suitable hardware and software can speed up system development or construction. The hardware and software tools used to develop and documented the entire system is as discuss below:

Hardware tools:

- Intel Pentium 300MHZ or higher
- Minimum 32M RAM
- 4x CD-ROM or greater speed
- 16 bit sound card
- 4MB SVGA Video Card
- Mouse (PSll or Serial – depends on individual system)
- Speakers

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Software tools:

Software	Usage	Description
Microsoft Windows 98	System requirement	Operating system
Microsoft Visual Basic 6.0	System development	Coding the system section
Macromedia Director 7.0	System development	Coding the learning section
Cool Edit 2000	System development	Record and edit the sound
Microsoft Access 97	System development	Develop database
Adobe Photoshop 4.0	User interface design	Image design and creation
Paint	User interface design	Image design and creation
Microsoft Word 2000	System requirement	Documentation

Figure 10 Software requirement

5.2 Development of EasyAccount

At the initial stage of development stage, I need to corporate with 2 teammates to create a multimedia accounting learning package and accounting system. This package use Visual Basic 6.0 (VB 6.0) and Macromedia Director 7.0 as main development software.

5.2.1 Accounting System

EasyAccount appropriately use some of the VB 6.0 features and technology in creating, editing, deploying and managing the system. VB 6.0 combines a rich set of database connectivity tools, wizards and design; times controls to increate the functionality and decrease the development time to build the system.

At this stage, I use VB 6.0 to develop a interact two year past year question, eight set of accounting exercise, help file to let user search the vocabulary, and direct posting from revenue statement to balance sheet.

VB 6.0 was use to develop EasyAccount due to the following reasons.

i) Tools to create windows application

VB 6.0 is a visual programming language that enables the development to rapidly create a windows-based application. It provides a complete set of building windows objects such as buttons, text boxes, list boxes, scroll bar, etc.

ii) Easier to learn

VB 6.0 code is based on the BASIC programming language (Beginners All-Purpose Symbolic Instruction Code). This means that the code written in VB 6.0 is easy to read, write and understand. Therefore the time needed to learn this language is shorter.

iii) Support database connectivity

VB 6.0 application can be used to access the database that is built in the Microsoft Access 97. VB 6.0 application will act as a front-end tool for the user to add, modify, delete and view the contents of the database.

iv) Loading word document

Word document can be loaded into the VB 6.0 application using the Rich Textbox control. This control can display the accounting notes that created by the Microsoft Word 2000 (*.rtf).

5.2.2 Multimedia Accounting Learning System

Macromedia Director 7.0 use as authoring tool for developing the multimedia accounting learning section. For this section, I needs to develop 8 set of accounting lesson out from 14 entire accounting lessons.

During developing the system, the principles for these authoring tools are:

1) Scripting

The scripting paradigm is the authoring method closest in form to traditional programming. The paradigm is that of a programming language, which specifies multimedia elements, sequencing, hotspots and synchronization. A powerful object-oriented scripting language is usually the centerpiece of such a system in program editing of elements that tends to be minimal or non-existent. The scripting paradigm tends to be longer in development time (it may take longer time code an individual interaction), but generally more powerful interactivity is possible. Most scripting languages are interpreted, instead of compiled, therefore the run time speed obtains over the authoring methods are minimal. The media handling can vary widely in checking out the system with the contributing package formats carefully.

2) Iconic/Flow Control

This technique tends to be the speediest in terms of development time. It is best suited for rapid prototyping and short development time projects. In addition, most of these tools are optimized for developing computer-Based Training (CBT). The main part of this paradigm is the Icon Palette, containing all useful functions or interactions of a program, as well as the Flow Line, in which indicates or shows the actual links between icons. Moreover, these programs offer the shortest run time due to each interaction caries with all of its possible permutations. In fact, the higher end

packages, such as Director and Visual Basic are extremely powerful and the runtime is considerably the shortest.

3) Frame

The frame paradigm is quite similar to the Iconic/flow control paradigm in the sense that it usually incorporates and icon palette. However, in this paradigm, the links between icons are conceptual and do not always represent the actual flow of the program. This is a very fast development system although it may require a good auto debugging function. On the other hand, the best of these have bundled of compiled language scripting.

4) Cast/Score/Scripting

This paradigm uses a music score as its primary authoring metaphor. The synchronous elements are shown in various horizontal "tracks" with simultaneity shown via the vertical columns. The true power of this metaphor lies in the ability to script the behavior of each of the cast members. In fact, the most popular member of this paradigm is Director as it is extremely useful in the creation of many commercial applications. These programs are best suited for animation intensive or synchronous media applications. In addition, they are easily extensible to handle other functions via XOBJs, XCMDs, and DLLs.

5) Hierarchical Objects

This paradigm makes use of an object metaphor (like OOP) that is visually represented by embedded objects and iconic properties. Although the learning curve is non-trivial, the visual representation of objects can be very complicated.

Besides Visual Basic 6.0 and Director 7.0, Microsoft Access 97 was use to build up the database and use to keep track the data in accounting system.

Microsoft Word 2000 is used to prepare the accounting full notes for multimedia accounting lesson. The powerful tools in Word 2000 make it easy to create great looking documents. So that, user can read the full notes through computer or printer it out. Moreover, Adobe Photoshop 4.0 and Microsoft Paint 98 are used for beautifying the EasyAccount. Photoshop and Paint is a tool for drawing and editing images, and create animated GIF files.

5.3 Testing

Testing is not the first place where faultfinding occurs; perhaps we have seen how requirements and design reviews help us to ferret our problems early in the development stage. But testing is focused on finding faults, and there are many ways to make the testing efforts more efficient and effective.

5.3.1 Type Of Faults

After coding the program components, examining the code is to be taken place, to spot faults and eliminate them right away. Moreover, if no obvious fault exists, some conditions have to be created where the code does not react as planned. Hence, it is important to categorize type of faults.

i. Hardware and system software faults

For many systems, some of the hardware and related system software are prescribed in the requirements and the components are designed according to the specifications of those reused or purchased programs. For example, if a prescribed modem is used for communications, the modem driver generates the commands expected by the modem and reads commands received from the modem. However, hardware and system software faults can arise when the supplied hardware and the system software do not actually work according to the documented operating conditions and procedures.

ii. Timing or coordination faults

In developing real-time systems, a critical consideration is the coordination of several process executing simultaneously or in a carefully define sequence. Timing or coordination faults occur when the code coordinating these events is inadequate. There are two reasons why this kind of faults is hard to identify and correct. First, it is usually difficult for designers and programmers to anticipate all possible system states. Second, because so many factors are involved with timing and processing, it may be impossible to replicate a fault after it has occurred.

iii. Algorithm faults

An algorithm fault occurs when a component's algorithm or logic does not produce the proper output for a given input because something is wrong with the processing steps. These faults are something easy to spot just by reading through the program (called desk checking) or by submitting input data from each of the different classes of data that we expect the program to receive during its regular working. Typical algorithms include branching too soon, branching too late, testing for the wrong condition, forgetting to initialize variables or set loop variants, forgetting to test for a particular condition (such as when division by zero might occur), and comparing variables of inappropriate data types.

iv. Computation and precision faults

Computation and precision faults occur when a formula's implementation is wrong or does not compute the results to the required degree of accuracy. For instance, combining integer and fixed or floating-point variables in an expression may produce unexpected results. Sometimes improper use of floating-point data, unexpected truncation, or ordering of operations may result in less than acceptable precision.

v. Throughput or performance faults

Throughput or performance faults occur when the system does not perform at the speed prescribed by the requirements. These are timing problems of a different sort;

time constraints are placed on the system's performance by the customer's requirements, rather than by the need for coordination.

vi. Stress or overload faults

The requirement specification usually details the number of users and devices and the need for communication in a system. By using this information, the designer often tailors the system characteristics to handle no more than a maximum load described by the requirements. These characteristics are carried through to the program design as limits on the length of queues, the size of buffers, the dimensions of table, and so on. Stress or overload faults occur when these data structures are filed past there specified capacity.

vii. Capacity or boundary faults

Similarly, capacity or boundary faults occur when the system's performance becomes unacceptable as system activity reaches its specific limit. For instance, if the requirements specify that a system must handle 32 devices, the programs must be tested to monitor system performance when all 32 devices are active. Moreover, capacity conditions should also be examined in relation to the number of disk accesses, the number of interrupts, the number of tasks running concurrently, and similar system-related measures.

viii. Recovery faults

Recovery faults can occur when a failure is encountered and the system does not behave as the designers desire or as the customer requires. For example, if a power failure occurs during system processing, the system should recover in an acceptable manner, such as restoring all files to their state just prior to the failure. For some systems, such recovery may mean that the system will continue full processing by using a backup power source. For other; this recovery means that the system keeps a log of transactions, allowing it to continue processing whenever power is restored.

ix. Documentation faults

When the documentation does not match what the program actually does, the program is said to have documentation faults. Often, the documentation is derived from the program design and provides a very clear description of what the programmer would like the program to do, but the implementation of that function is faulty. Such faults can lead to a proliferation of other fault later in the program's life, since programmers tend to believe the documentation when examining the code to make modifications.

x. Standards and procedures faults

Finally, the code should be reviewed to confirm those organizational standards and procedures have been followed. Standards and procedures faults may not always affect the running of the programs, but they may foster an environment where faults are created as the system is tested and modified. By failing to follow the required standards, one programmer may take it difficult for another to understand the code's logic or to find the data descriptions needed for solving a problem.

5.3.2 Unit Testing

Unit testing includes 3 major stages. First examine the code by reading through it, trying to spot algorithm, data and syntax faults, as well as compare the code with the specifications and with your design to make sure that all relevant cases have been considered. Next, compile the code and eliminate remaining syntax faults. Finally, develop test cases to show that the input is properly converted to the desired output.

- **Step 1: Examining the code**

As the design description helps to code and document each program component, the program reflects the interpretation of the designs. The documentation explains in words and pictures what the program is supposed to do in code. Thus, it is helpful to

ask an objective group of experts to review both the code and its documentation for misunderstandings, inconsistencies, and both faults. The process, known as a code reviews, is of code review, is similar to the requirements and design review. There are 2 types of code review, a walk-through and an inspection.

In a walk through, the code and accompanying documentation is presented to the review team and the team comments on their correctness. During the walk-through, the atmosphere is informal, and the focus of attention is on the code, not the coder. Although supervisory personnel may be present, the walk-through has no influence on the performance appraisal, consistent with the general intent of testing: finding faults, but not necessary fixing them.

Meanwhile, a code inspection, originally introduces by Fagan (1976) at IBM, is similar to a walk-through but is more formal. In an inspection, the review team checks the code and documentation against a prepared list of concerns.

Inspecting code usually involves several steps. First, the team may meet as a group for an overview of the code and a description of the inspection goals. Then, team members prepare individually for a second group meeting. Each inspector studies the code and its related documents, nothing faults found. Finally, a group meeting, team members report what they found, recording additional faults discovered in the process of discussing individuals' findings.

Some programmers may feel uncomfortable with the idea to having a team examining their code. However, reviews have been shown to be extraordinarily successful at detecting faults and are often included in an organization's list of mandatory or best practices. The earlier in the development process a fault is spotted the easiest and less expensive it is to correct. It is better to find a problem at the component level than to wait until later in the testing cycle, when the source of the problem may be far less clear.

- **Step 2: Proving code correct**

After the component has been coded, examined and reviewed by a team, the next step in testing is to subject the code to scouting in a more structured way to establish its correctness. For the purpose of unit testing, a program is correct if it implements the function and data properly as indicated in the design and if it interfaces properly with other components.

One way to investigate program correctness is to view the code as a statement of logical flow. If a program can be rewritten using a formal, logical system (such as a series of statements and implications about data), then this new expression can be tested for correctness.

- **Step 3: Testing program components**

Proving code correct is a goal to which software engineers aspire; consequently, much related research is done to develop methods and automated tools. However, in the near future, development teams are more likely to be concerned with testing their programs correct.

In proving a program correct, the test team or programmer considers only the code and its input and output conditions. The program is viewed in terms of the classes of data and conditions described in the design. Thus, the proof may not involve executing the code but rather understanding what is going on inside the program.

5.3.3 Integration Testing

When individual components are tested to be working correctly and meet the objectives, all components are combined into a working system. This integration is planned and coordinated so that when failure occurs, at least there are some ideas of what caused it. In addition, the order in which components are tested affects the choice of test cases and tools. For large systems, some components may be in the coding phase, others may be in the unit-testing phase, and still other collections of components may be tested together. This test strategy explains why and how components are combined to test the working system. This strategy affects not only the integration timing and coding order, but also the cost and thoroughness of the testing.

- **Bottom Up Testing**

One popular approach for merging components to test the larger system is called bottom-up testing. When this method is used, each component at the lowest level of the system hierarchy is tested individually first. Then, the next components to be tested are those that call the previously tested ones. This approach is followed repeatedly until all components are included in the testing. The bottom-up method is useful when many of the low-level components are general-purpose utility routines that are invoked often by others, when the design is object-oriented or when the system is integrating large number of stand-alone reused components.

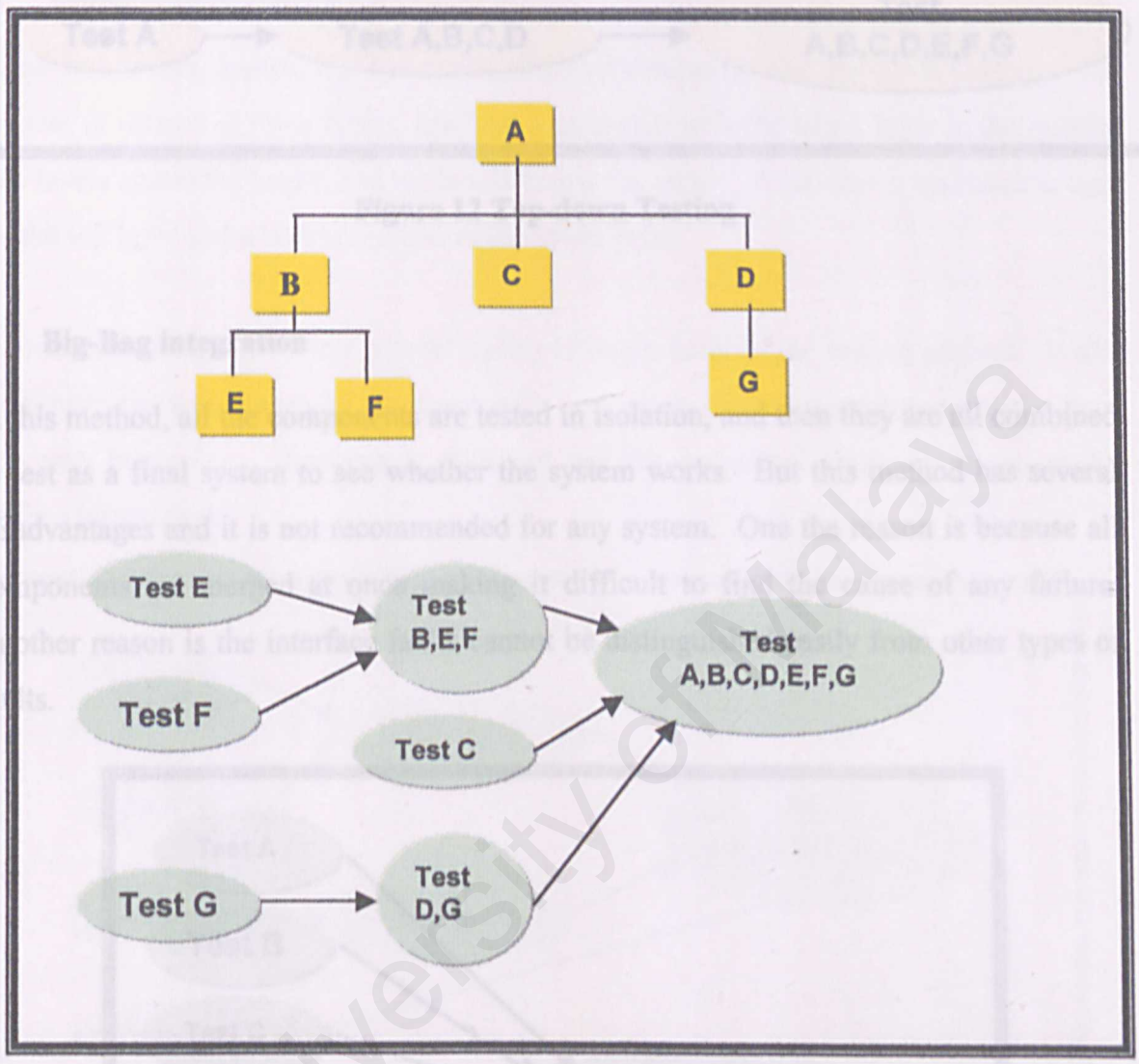

Figure 11 Bottom-up Testing

- **Top-down integration**

This approach is the reverse of bottom-up approach. In this method, the top level, usually one controlling component, is tested by itself. Then all components called by the tested components, are combined and tested as a large unit. This approach is reapplied until all components are incorporated.

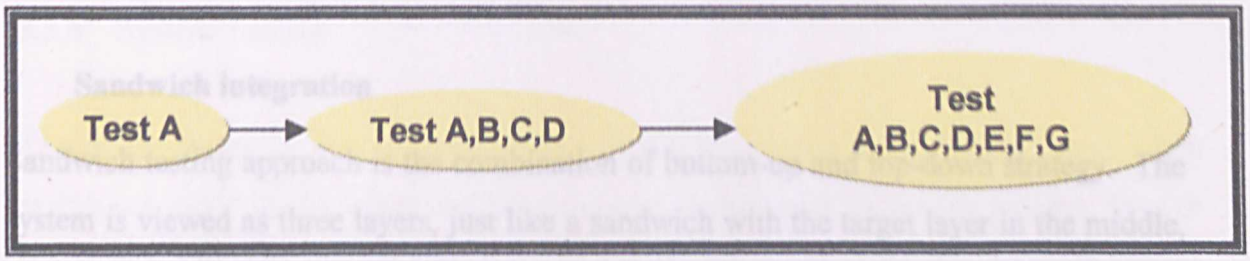

Figure 12 Top-down Testing

- **Big-Bag integration**

In this method, all the components are tested in isolation, and then they are all combined to test as a final system to see whether the system works. But this method has several disadvantages and it is not recommended for any system. One the reason is because all components are merged at once making it difficult to find the cause of any failure. Another reason is the interface faults cannot be distinguished easily from other types of faults.

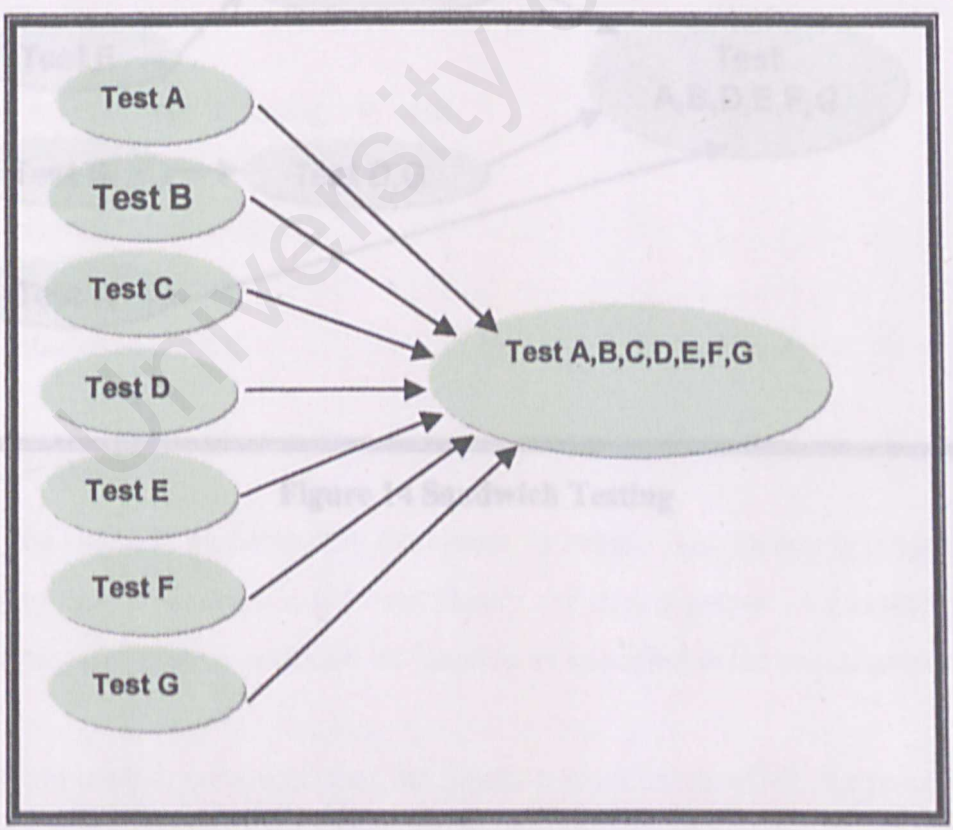

Figure 13 Big-Bag Integration

- **Sandwich integration**

Sandwich testing approach is the combination of bottom-up and top-down strategy. The system is viewed as three layers, just like a sandwich with the target layer in the middle, the levels above the target, and the levels below the target. A top-down approach is used in the top layer and a bottom-up one in the lower layer.

Sandwich testing allows integration testing to begin early in the testing process. It also combines the advantages of top-down with bottom-up testing control and utilities from the very beginning. However, it does not test the individual components thoroughly before integration.

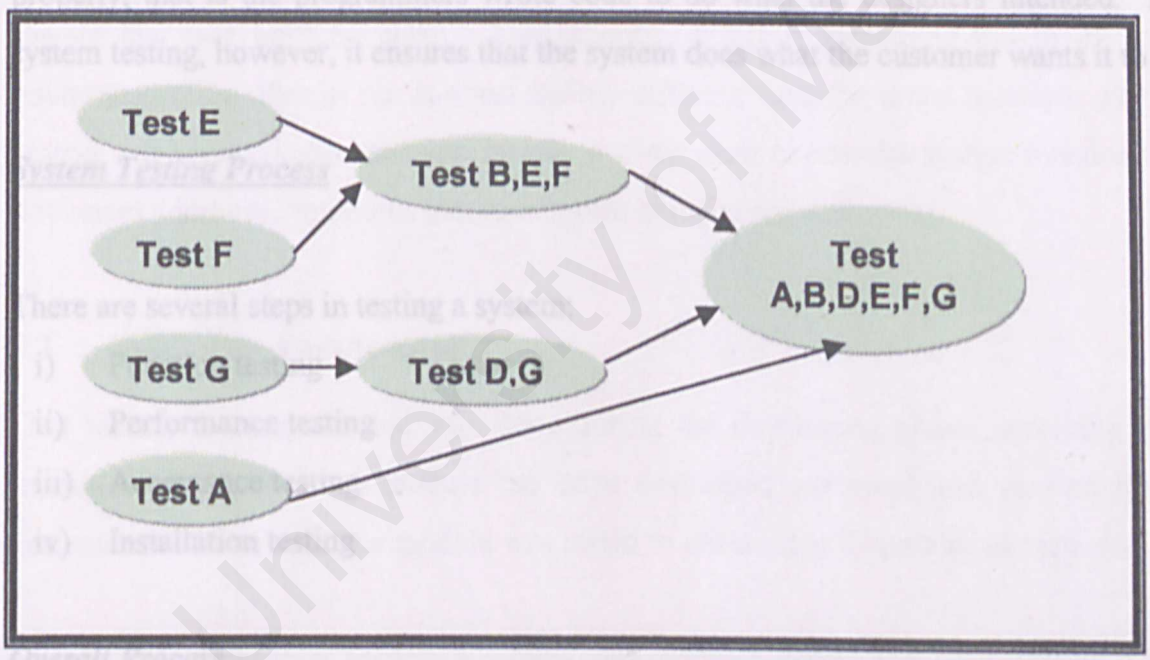

Figure 14 Sandwich Testing

5.3.4 System Testing

Testing the system is very different from unit and integration testing. Unit testing often carries out individually, where one has complete control over the testing process, have to create own test data, design own test cases, and run the tests by its own. Integration testing the developer sometimes works on its own, but often collaborate with a small part of the test and development team. However, for system testing, the developer works with the entire development team, coordinates what the developer did and being directed by the test team leader.

The objective of unit and integration was to ensure that the code implemented the design properly, that is the programmers wrote code to do what the designers intended. In a system testing, however, it ensures that the system does what the customer wants it to do.

System Testing Process

There are several steps in testing a system:

i) Function testing
ii) Performance testing
iii) Acceptance testing
iv) Installation testing

Overall Process

Initially, the function performed by the system is tested. The testing is beginning with a set of components that were tested individually and then together. A function test checks that the integrated system performs its function as specified in the requirements.

Once the test team is convinced that the function work as specified, the performance test compares the integrated components with the nonfunctional system requirements. These

requirements, including security, accuracy, speed and reliability, constrain the way in which the system functions are performed.

At this point, the system operates the way the designers intend. This is called verified systems. It is the designers' interpretation of the requirement specification. Next, the system is compared with the customer's expectations by reviewing the requirements definition document. If the system is satisfied, then a validated system is met, that is the requirement have been met.

The developers, based on their understanding of the system and its objectives, have run all of the tests. The customers also test the system, making sure that it meets their understanding of the requirements, which may be different from the developers. This test, called acceptance test, assures the customers that the system they requested is the system that was built for them. The acceptance test is something run in its actual environment, but often is run at a test facility different from the target location. For this reason, a final installation test may be run to allow users to exercise system functions and document additional problems that result from being at the actual site.

5.3 Testing for EasyAccount

Unit testing for easyAccount was done during the developing phase, involving those modules related. After a module has been developed, reviewed and verified for the correctness of the result, the module was tested to ensure that it operates as expected.

Meanwhile, integration testing approach was applied during the development of the package. The package was constructed and tested in small arguments, where errors were easier to isolate and correct. Error will be corrected before proceeding to the next integration.

System testing verifies the package to be functioning properly and the overall system performance and objective are achieved as planned.

Chapter 6
System Evaluation and Conclusion

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System evaluation is the process of identifying system's strength and limitations and possible enhancements of this project. The evaluation techniques used are similar to those in other disciplines where measurement of key aspects of the products, process and resources has to be taken and the information gathered can be used to determine whether the goals have been achieved for productivity, performance, quality and other desirable attributes.

6.1 Problems Encountered and Solutions

Some problems were faced during project implementation and testing process. The inconsistency and bugs in certain development tools and programming languages cause most of these problems. Those problem that encountered during these phases are explained below:

i) Huge size of the Director file

The size of Director files is getting large when sound file is added into the original file. In addition the images that imported into the original file may also caused the size of the file larger, since all the graphics imported are mostly bitmaps and animated images. The situation become worse especially when I need to complete 8 chapter of Director lesson from entire 14 chapter Director lesson. It makes the storage of 8 chapter accounting Director files and it's backup copy a big problem for me.

Solution to problem 1:

One of the solutions to reduce the size of the file is to encode the sound files into a lower sample rate or into 8-bit format. This will improve the performance of the whole package as well as makes the sounds appear softer and the tones appear longer. Furthermore, the lengths of the sound files are for a few seconds only to minimize the file size.

For images files, images that are imported into Director are converted to GIF or JPEG format rather than BMP format.

ii) Hardware limitations

This package is developed using a computer with 64MB of RAM and 4.0GB of hard disk space, which is quite inefficient to develop a multimedia-learning package and accounting system. It uses a lot of memory space. With all the sounds and images imported, the speed gradually becomes very slow. It is quite frustrating experience to deal with but there are no other options.

Solutions to problem 2:

The only solution to this is to keep the files small and minimize the amount of memory as much as I can. For example, all the sprites dragged into the score have to be keeping short and control by timing because the longer of score, the more memory it takes and the longer it takes to download.

For Visual basic accounting system, open only the form want to develop and close any form that not necessary or not in use. It will minimize the amount of memory need.

iii) Inexperience and difficulties in choosing, learning the development technology, programming language and tools

There are a lot of software tool, programming language available to develop this learning package as our technology is heading into a new era. Since there was no prior knowledge and every tool has their strengths and weaknesses, choosing a suitable technology and tool was a critical process.

Besides that, since this package is a corporation of 3 students and every one assign to each part of the package, there are a lot of studies regarding each software like Macromedia Director 7.0, Microsoft Visual Basic 6.0 and Microsoft Access97 before go in coding stage.

Moreover, this package is an accounting package and unfortunately I doesn't have any knowledge of accounting SPM. A lot of time needs to spend to learn the account and

provide the lesson for multimedia presentation and full notes for each lesson. Since I need to provide 8 lesson of account, 8 set of exercise regarding each lesson, and 2 set of past year question, help section for user to find the vocabulary and direct posting from revenue statement to balance sheet, it is quite pressure for me to complete all of it.

Solutions to problem 3:

In order to solve this problem, seeking advises and views from project supervisor, course mates and even senior engaging in similar project were carried out. Besides that, discussion among teammates was a great help in solving most of the problems faced. Furthermore, surfing through the Internet and visiting the library helped to clarify some doubts. A more efficient method was through trial and error during the coding phase.

iv) Limitations in font support

Director has very limited font types. I has to import most of the fancy fonts to be used in the program. If the fonts used are not in the personal computer where you use the program, then it will replace the fonts with the default fonts in the system.

Solutions to problem 4:

One of the solutions is import the font as cast member in the movie. Another solution is creating the projector file for each Director file where the fonts used are in that personal computer. With this projector file, which computer you open the file; the font will not be change.

v) Undo can be done only once

One of the weakness in using Director and Visual Basic is that once the operation has been done, there is no way the user can undo it back unless it was the last operation done.

Solutions to problem 5:

Restrict to make only one change at any time and if possible avoid not using the undo function at all.

6.2 System Strength

Even though many problems occurred during the development of this project, somehow the system has its own strengths and specialties. Some of the strengths of the system are stressed here:

a) User friendly and attractive interface

EasyAccount is developed based on GUI such as command buttons, radio buttons and drop-down list boxes. With these useful icons together with tool tip, it will allow easier access. Besides that, it has a very user friendly and consistent environment that is similar to other window applications. This will shorten the learning curve and reduce training costs, which include money and time.

b) Implement EasyAccount in a multi-user environment

To benefit all the users, EasyAccount will be enable network accessing. This can be achieved by using the LAN (local area network) environment. In a multi-user environment, EasyAccount is needed to install only in a server and other machine that are connected to the server can gain the access to the system. Every user has his/her own account to access the EasyAccount through network system. This is useful for the school, which they don't need to install in many computers to allow students to use the system.

c) Documentary movie (digital movie)

With accounting documentary and movies, it enhance student understanding with the lesson. The format saved in projector files and running in full screen and digital sound. This will help the students to understand better the concept and theory of accounting.

d) Multiple choice of activities

EasyAccount allow user to interact with three extra activities other than learning 14 chapters multimedia accounting lesson. The additional activities such as exercises, past year question and accounting system are developed to prepare the students for SPM.

Students can tried out the exercises to know their understanding through the lesson. Besides that, students can be tested with 2 set of past year question and one set of forecast question to improve their performance. Moreover, students also can use the accounting system to keep track their data.

e) Language used

There are many educational CD in the marker but a large number of them are in English. This package is developed in Bahasa Malaysia. Consequently, student don't have problem in using it as preparation for SPM.

f) System Transparency

The users of EasyAccount will not need to know about the underlying system structure, where the database resides, the database management system and anything related to the system design. The users are just required to know how to communicate with the user interface.

g) Windows platform

Windows is the most popular and commonly uses operating system in Malaysia even though the number of Macintosh users is growing. This package is developed to operate on windows platform. Thus, it can be easily adapted to most personal computer (PC).

6.3 System Limitations

EasyAccount is a fully operational electronic learning system. However, it is just like other system, it has some limitations. The following are the limitations of EasyAccount:

a) Database not encrypted

Accounting data stored in EasyAccount database is not secured enough because it is stored in a plain text format rather in encrypted format.

b) Number of exercises question

The number of exercise question in 2 set versions is not enough for those students very hardworking in trying all kinds of accounting questions.

6.4 Future Enhancements

The educational package can be further enhanced to obtain a better result such as:

a) Different versions of language

Future enhancement for the EasyAccount will include different versions of language. This will enable information and the system to be displayed in the different languages like English and others. This will broaden the usage of the system.

b) Add sound

EasyAccount will become better if student input the wrong answer in exercises section, a bit sound would provide to warning that error.

c) More administrative tasks

Administrative tasks can be added to include more functionality to ease maintenance process. Among the features that may be included are multiple administrators to managing multiple users.

6.5 Achievement of Objectives and Experienced Gained

The primary goal of this project was to provide an attractive multimedia-learning package for SPM accounting student. The project has accomplished this objective by allowing the student learn all the accounting lesson through 14 chapter and test their understanding through exercises and past year questions. Besides that, students can input the accounting data in accounting system and the data will direct posting from trial balance to revenue statement and finally direct posting the amount to balance sheet.

Since EasyAccount is develop for multi-user environment, so it will benefit the user. Besides, much paper work will be eliminated because electronic form will be used to replace the manual form.

Consequently, I has learned so much from the beginning until the completion of this project. Learning itself is an on-going process. Every day, I discovered new things and with new problems, it helps me to find the solution and mistake. It helps self-confidence and taught me a lot about time management and self-discipline as well as being independent when you have deal with everything yourselves.

Throughout the development of this project, I has learned a lot about Director 7, Visual Basic 6.0 and Access 97. It is a great tool for creating multimedia-learning package. Besides that, I can quickly bring my ideas into life because it is an environment that inspires new ideas ass we explore it.

Conclusion

With the advent of the advanced multimedia technology, the education field gained tremendous advantages by using this new technology. Educational packages are not new to us anymore. There are a lot of educational packages available in the market, but the question now is, whether they are suitable and appropriate to our society, or our local syllabus. Thus, this project is to develop a multimedia educational package strictly based on the syllabus approved by the Education Ministry Of Malaysia.

This paper is the final version of the final year project. This paper exposes to the introduction and literature review. Moreover, this paper also emphasizes on the system analysis, system design, testing and implementation, evaluation and enhancement as well as problems encountered and solutions.

Lastly, this project has been completed on time with satisfactory quality. However, this can only achieve with the guidance of my supervisor, Ms Norizan Mohd.Yazin my moderator, Prof.Madya Dr.Zainab Awang Ngah and the corporation of my project teammates.

Appendix A Contents EasyAccount

Appendix B Modules for Automatic Accounting System

1. Chart of Account

The chart of account module allows the user to view the available account and their respective account ID, account type, description.

2. Specification Journal

The Specification Journal module has four sub-modules, namely Cash Receipts Journal, Cash Payment Journal, Sales Journal, and Purchases Journal.

3. General Journal

The General Journal module handles all transaction that is not included in the specification Journal.

4. Ledger

The Ledger module automatically shows all transaction posting from Journal.

5. Debtor

The Debtor module handles information about the debtors. Information includes person to contact, contact address, contact number owed to the company.

6. Creditor

The Creditor module handles information about the creditors. Information includes person to contact, contact address, contact number owed to the particular creditor.

7. Reports

The Reports module handles trial balance, income statement and balance sheet.

8. Help

If students need any help, help section is a best solution for them. They can search the word that their don't understand and find it in the index.

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User Manual

User Manual

EasyAccount is a package that used to teach and guide the student who faces the SPM examination. It provides an interactive and interesting way for the student during their study by combining words with pictures, graphics and audio.

Overview To The User Manual

This manual contains instruction on how you can make full use of the package. It is well organized. It will cover all the functionality in the package as well as some tips to use the package effectively.

This manual is divided into 3 parts:

Part 1: Installation guideline

Part 2: Accounting System

Part3: Accounting Learning Section

Part 4: Administration System

Part 1: Installation guideline

For EasyAccount, user just needs to install the Accounting system. Follow the instructions given:

1) Insert the CD-ROM into your CD-ROM driver.
2) From the Start, click on the [Run] option, type d:\ Setup
3) Follow the on-screen instruction to install EasyAccount on your computer system. After the installation, the setup process will create a program group and the icon to start up EasyAccount.
4) Click on EasyAccount icon to start this application.
5) First screen is displayed.

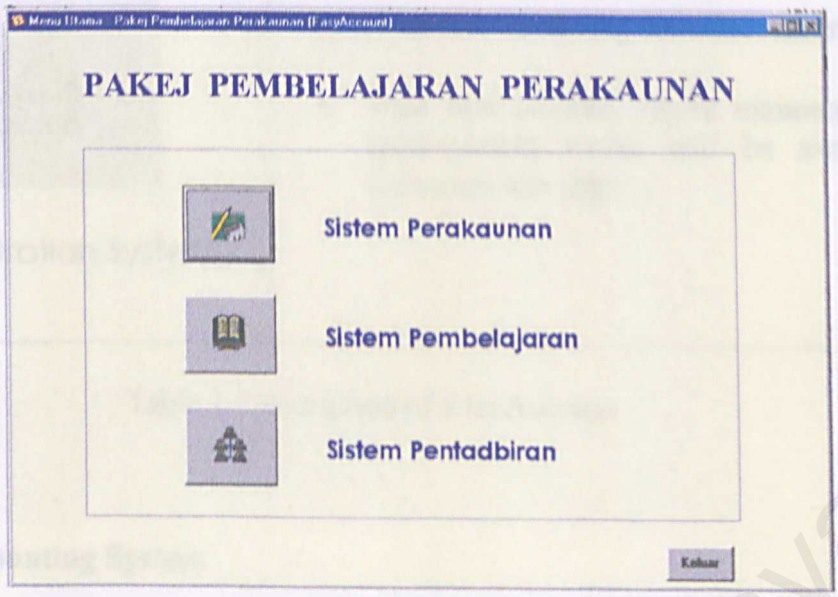


Figure 1: First screen of EasyAccount

6) From the first screen, select the section that you want to use by clicking at the button.
7) Click the "Keluar" button if you want to exit the EasyAccount.
8) All the section are listed as below:

Section	Description
 Accounting System	• Provide direct posting from trial balance until to balance sheet • A useful guidance of how to use the system is provided. • A help system to help students searching the vocabulary.
 Accounting Learning System	• Contains 14 chapter accounting lesson • 2 set of past year question and 1 set forecast question are provided • Provides exercises for each chapter • User can print out the notes for each chapter.

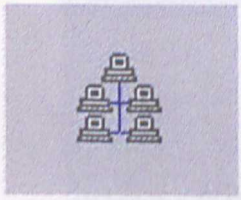
 Administration System	• A module especially for administration. • With this module, future maintenance and enhancement works will be simpler and consumes less time.

Table 1: Description of EasyAccount

Part 2: Accounting System

Accounting System is the only section need to install to computer first. With this module, student not need to enter data once by once start from journal to balance sheet. The system will automatically link the data from journal to ledger, trial balance, finance statement and finally balance sheet.

The first screen for this system is shown below:

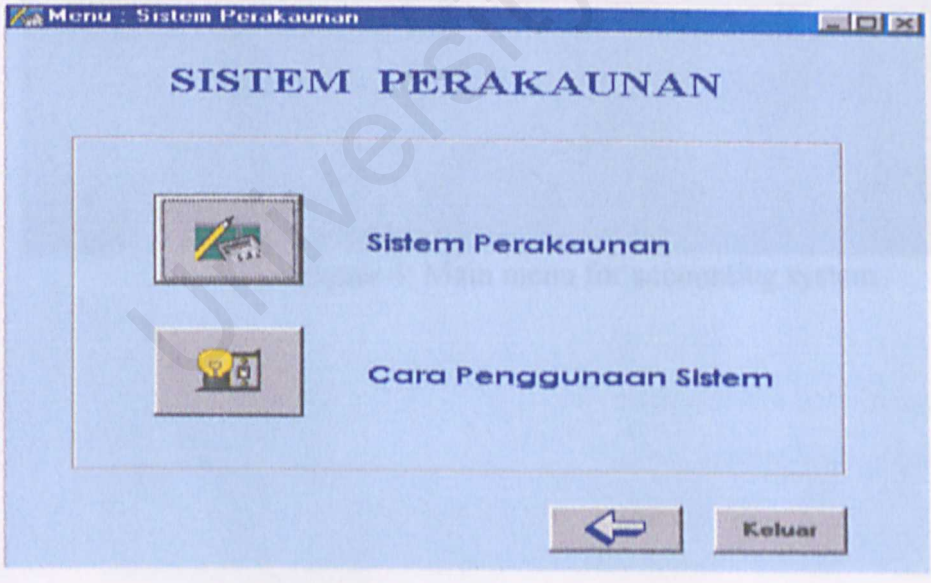


Figure 2: First screen for accounting system

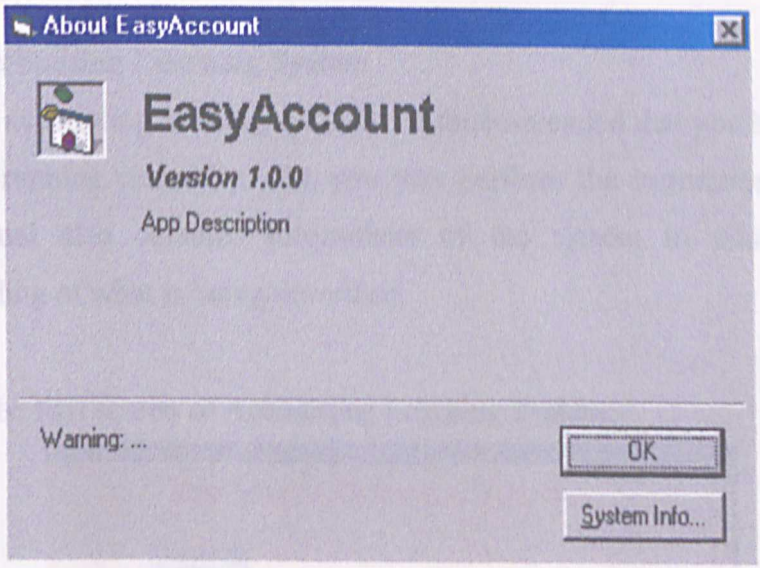


Figure 3: The first screen when loading accounting system

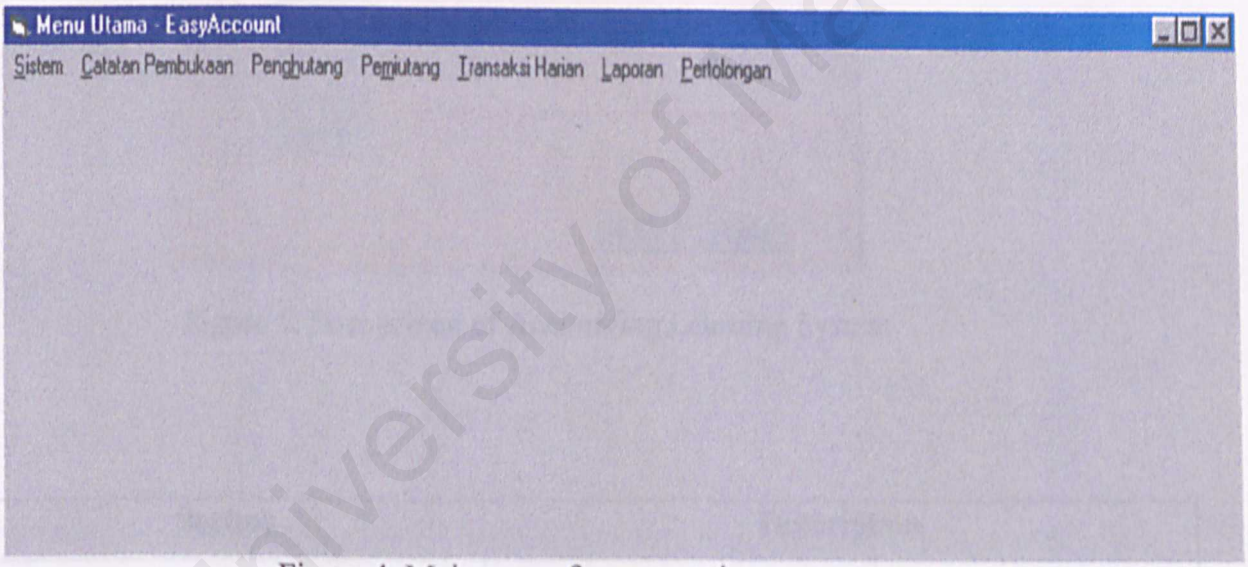


Figure 4: Main menu for accounting system

Part 3: Accounting Learning System

To use the accounting learning system, it is recommended that you have the EasyAccount CD-ROM running closed by. So, you may perform the instructions given as you read. This manual also contains screenshots of the system to allow you to be more understanding of what is being described.

Below is the first screen of Accounting Learning System:

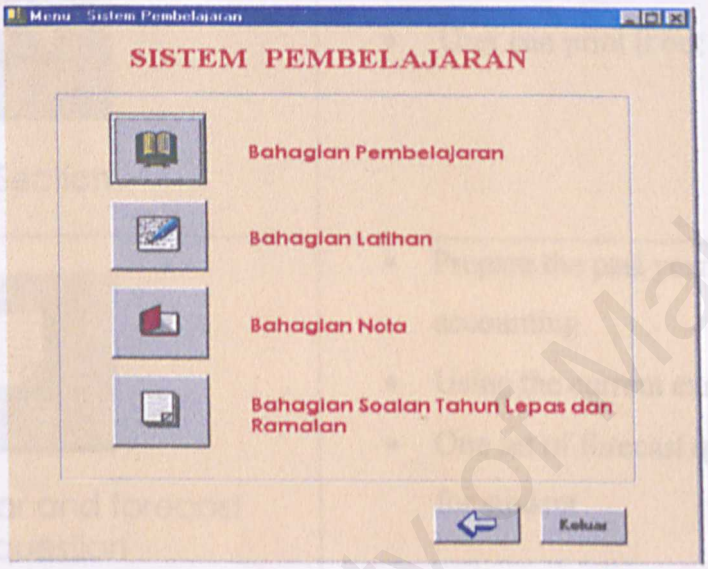


Figure 5: First screen of Accounting Learning System

Section	Description
 Learning Section	• Contain the entire SPM accounting syllabus • Provide user with interactive learning environment with graphic, sound and animation.

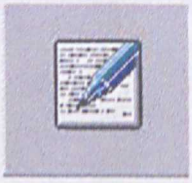
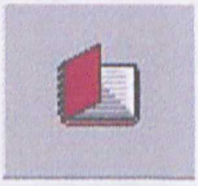
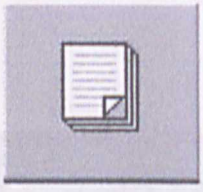
 Exercises Section	• Provides exercises for 14 chapter accounting lesson • 2 set of questions and user can know the result after submit the form
 Notes Section	• Contains 14 chapter notes for each accounting lesson • User can print it out
 Past Year and forecast question	• Prepare the past year question for SPM accounting • Using the current examination paper • One set of forecast question as a guideline for student

Table 2: Description of Accounting Learning System

For user more understanding about accounting learning system, the first screen of each module are displayed in figure below:

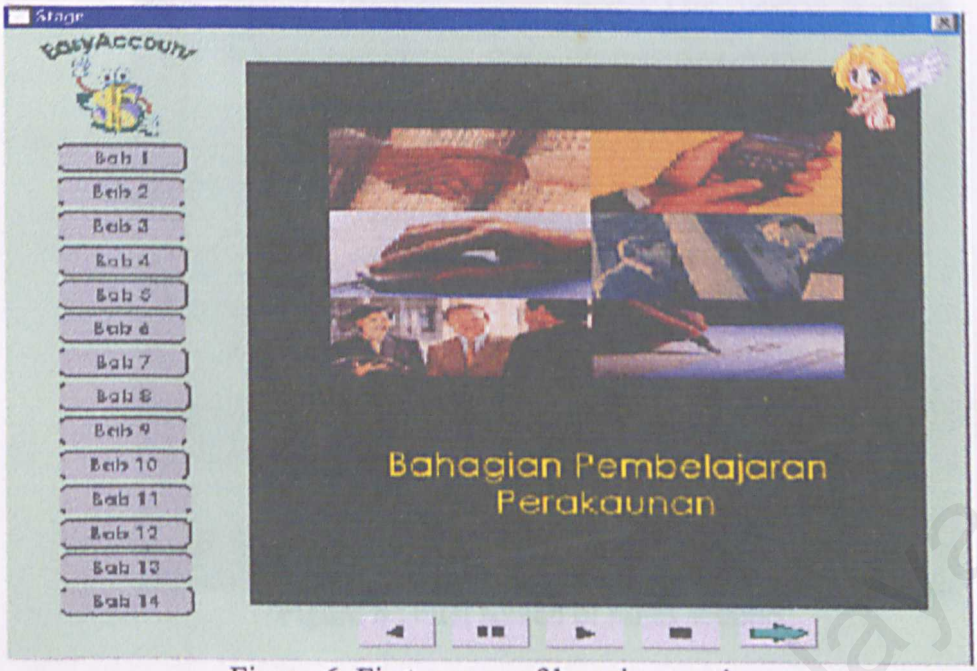


Figure 6: First screen of learning section

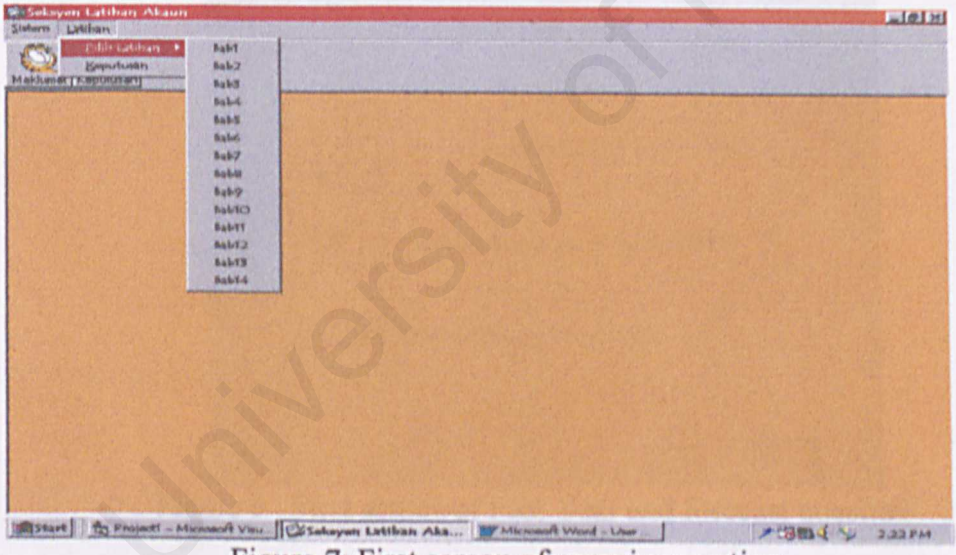


Figure 7: First screen of exercises section

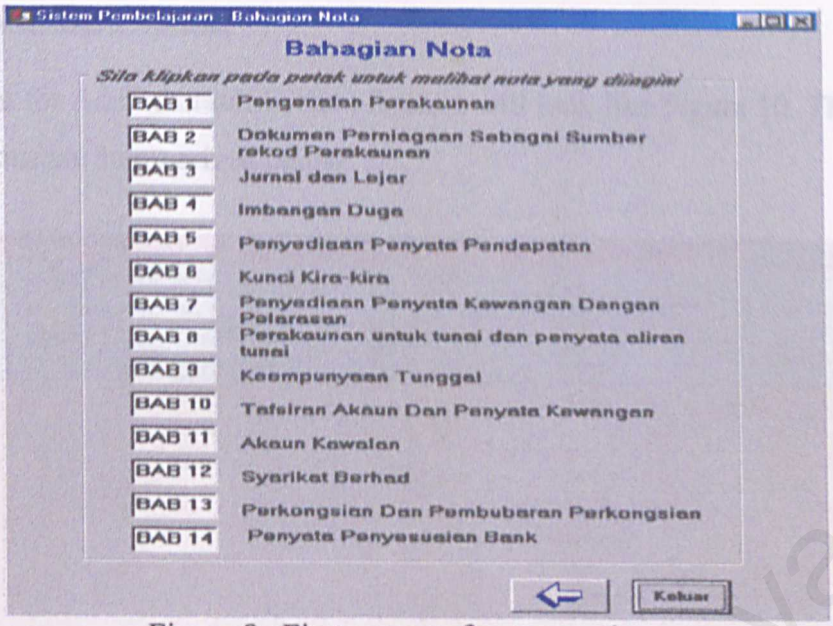


Figure 8 : First screen of notes section

Figure 9 : First screen of Past Year and forecast question

Part 4: Administration System

The main menu for Administrator System Section will look like Figure 10. The functions of the four menus are summarized below.

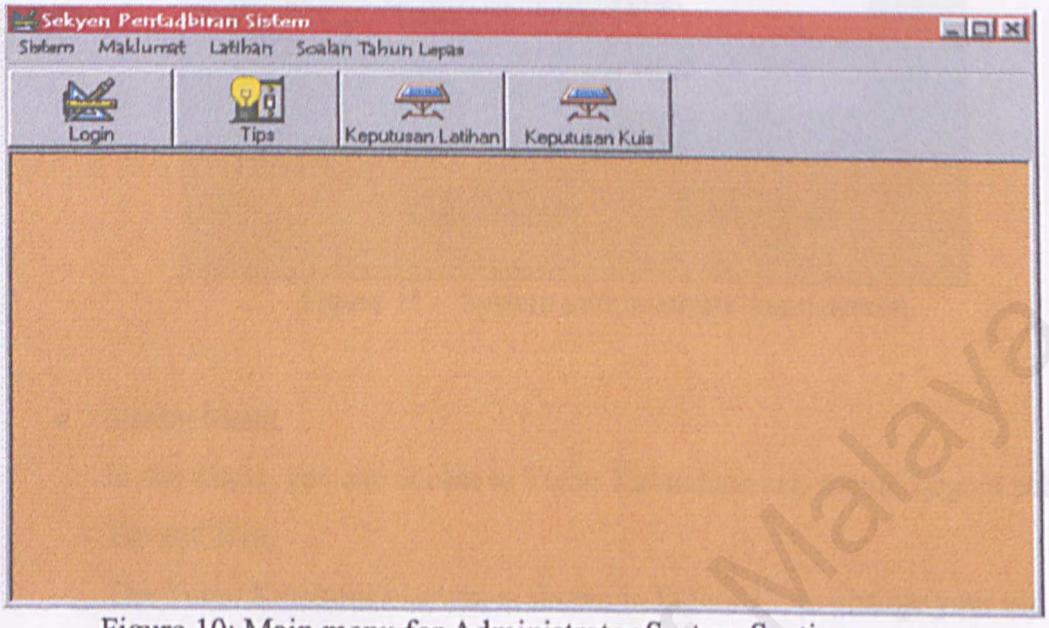


Figure 10: Main menu for Administrator System Section

Administrator System Section including the following modules:

- Login

  This is the login dialog box to verify the login ID and password entered by the teacher where act as administrator. After login successfully, the system administrator main screen is shown as below in Figure 11.

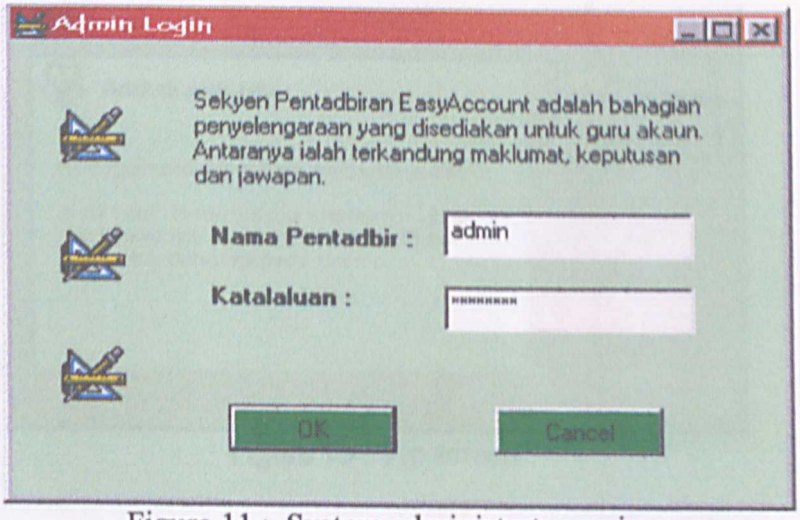


Figure 11 : System administrator main screen

- Sistem Menu

  In this menu, you can access to Tukar Katalaluan sub-menu, Logout sub-menu, Tip and Exit.

  The Tukar Katalaluan screen is shown in Figure 12, to change your old password into new password.

  The Tip screen is shown in Figure 13 to help you to solve some problem.

  If you click the Exit, then you will terminate the SPM Question Section.

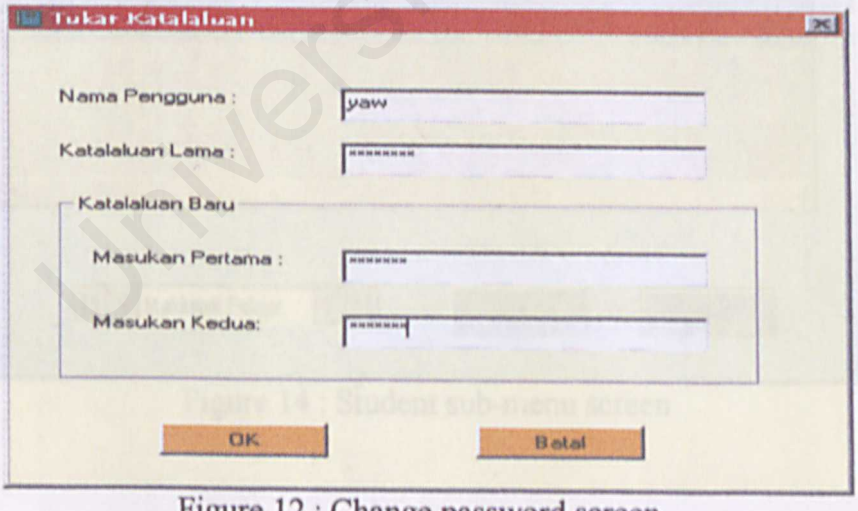


Figure 12 : Change password screen

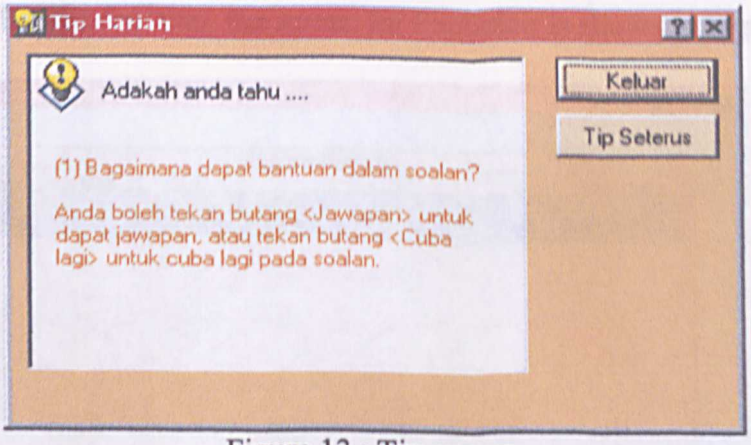


Figure 13 : Tip screen

- Maklumat

  In this menu, you can access to Pelajar sub-menu and Pentadbir sub-menu. If you select the Pelajar menu, then the following screen will display as Figure 14.

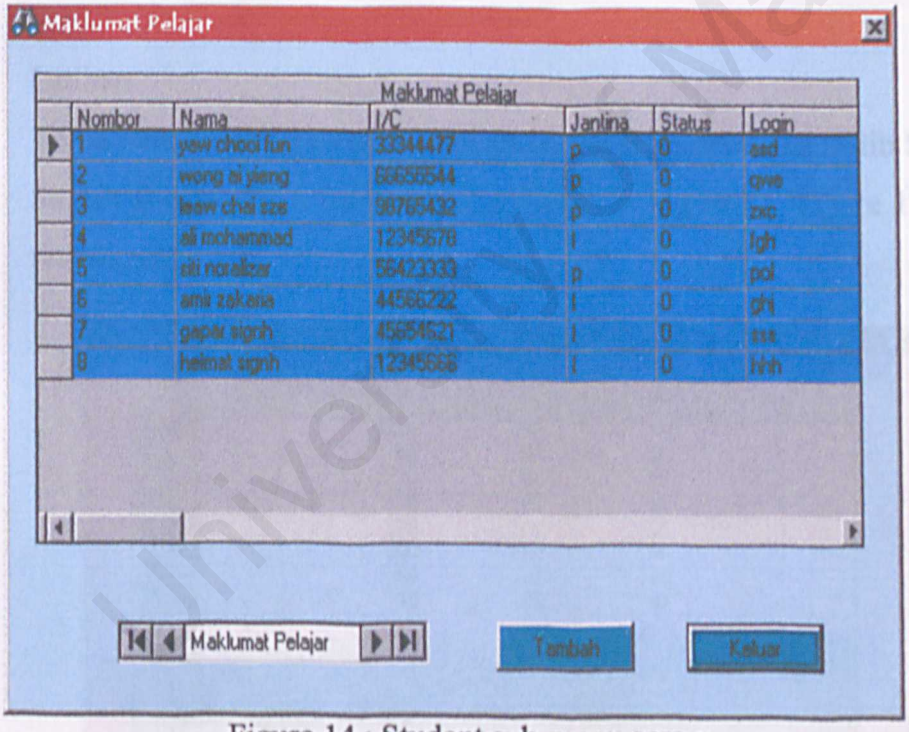


Figure 14 : Student sub-menu screen

Same as the Pelajar function, the screen for Pentadbir is shown in Figure 4.15.

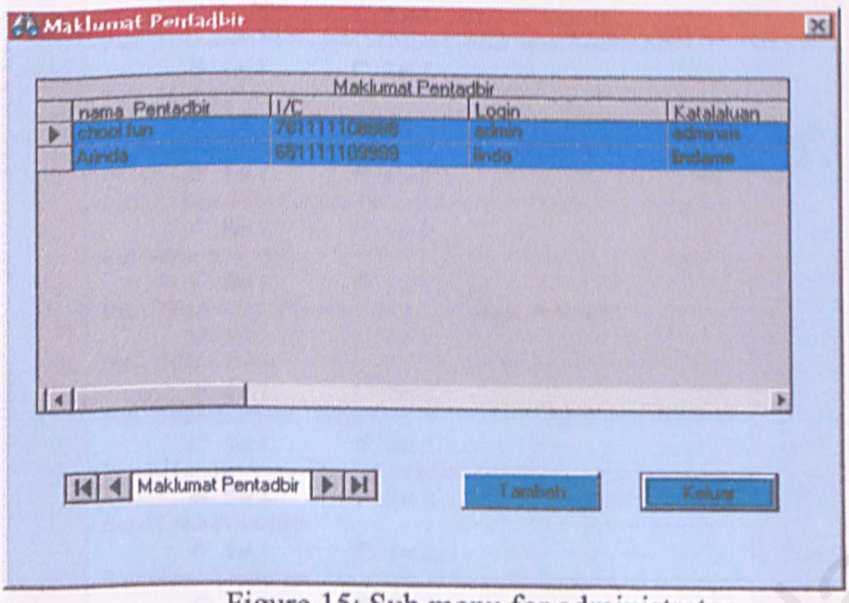


Figure 15: Sub menu for administrator

- Latihan

  There have three types of sub-menu which are Keputusan, Pilih Set Latihan, and Soalan dan Jawapan sub-menu are shown in Figure 16, Figure 17 and Figure 18 respectively.

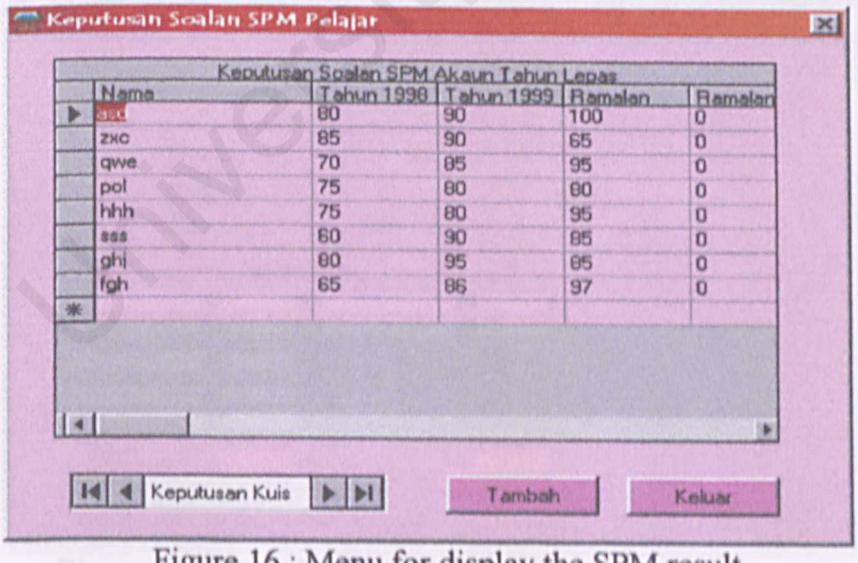


Figure 16 : Menu for display the SPM result

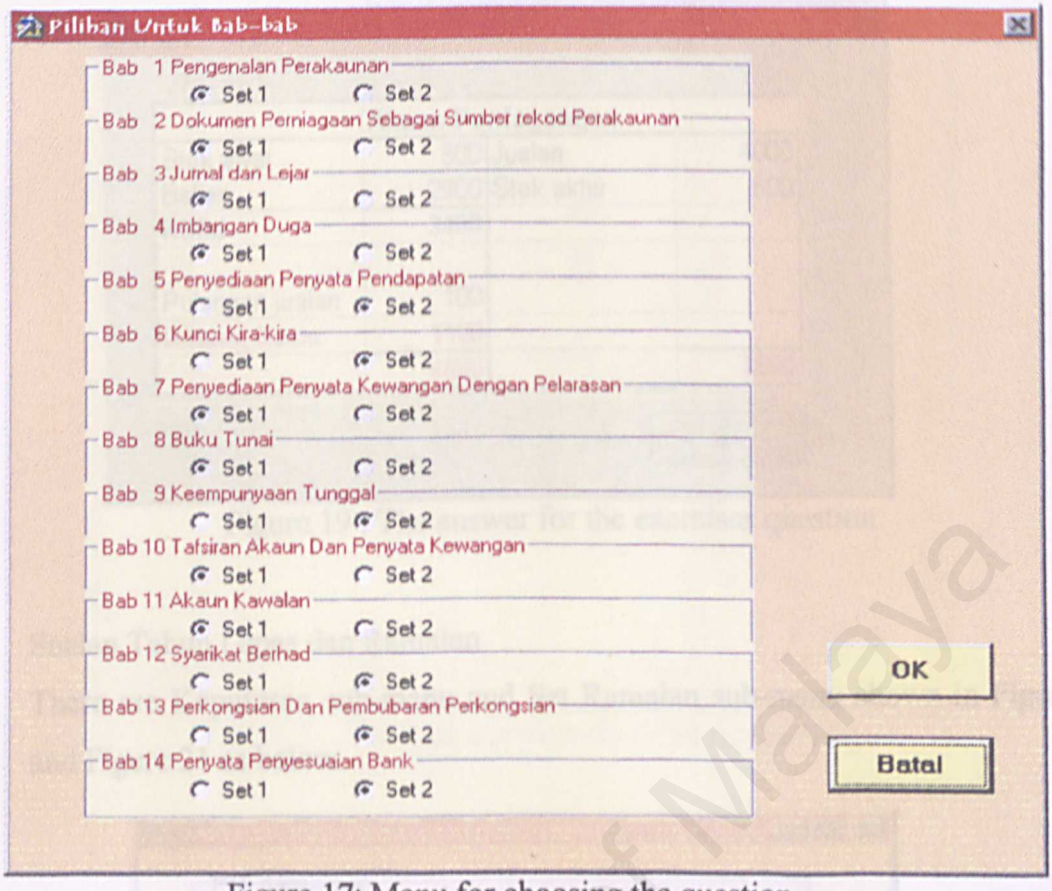


Figure 17: Menu for choosing the question

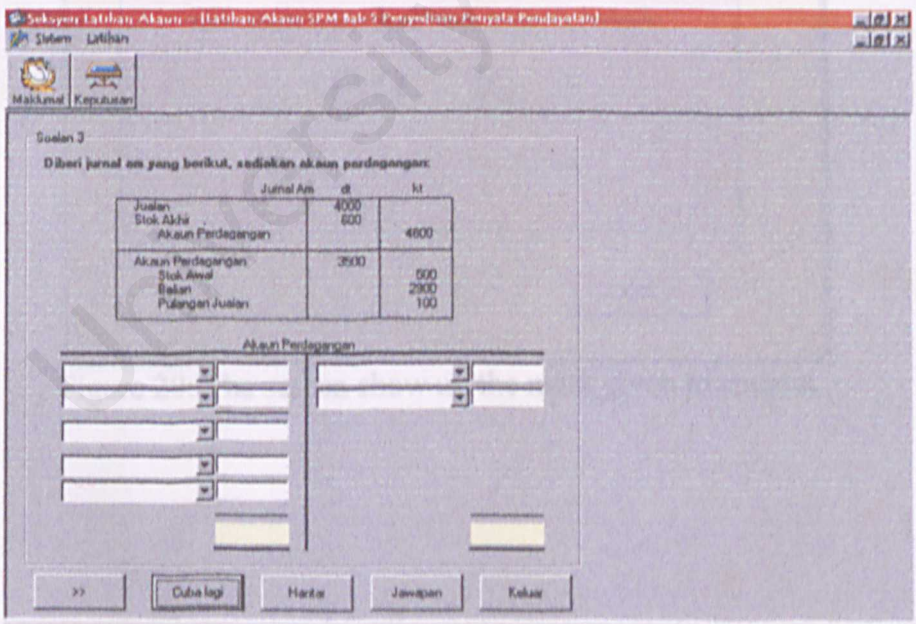


Figure 18: Example of exercises question

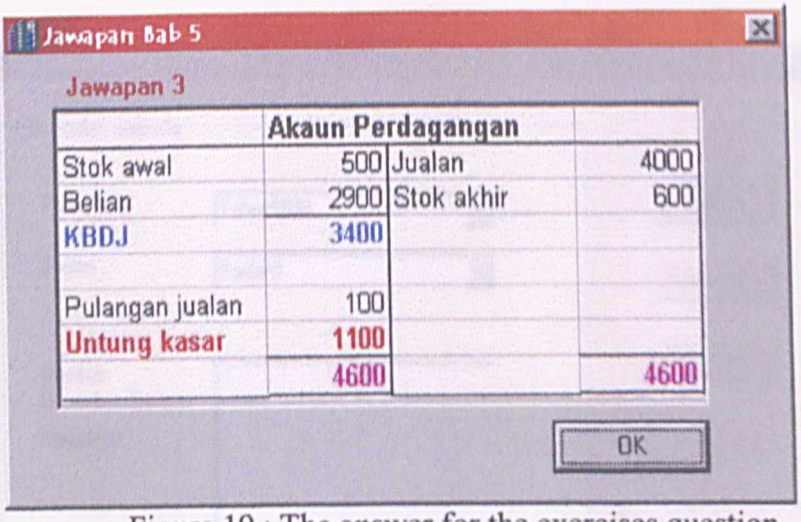


Figure 19 : The answer for the exercises question

- Soalan Tahun Lepas dan Ramalan

  There are Keputusan sub-menu and Set Ramalan sub-menu shown in Figure 20 and Figure 21 as below.

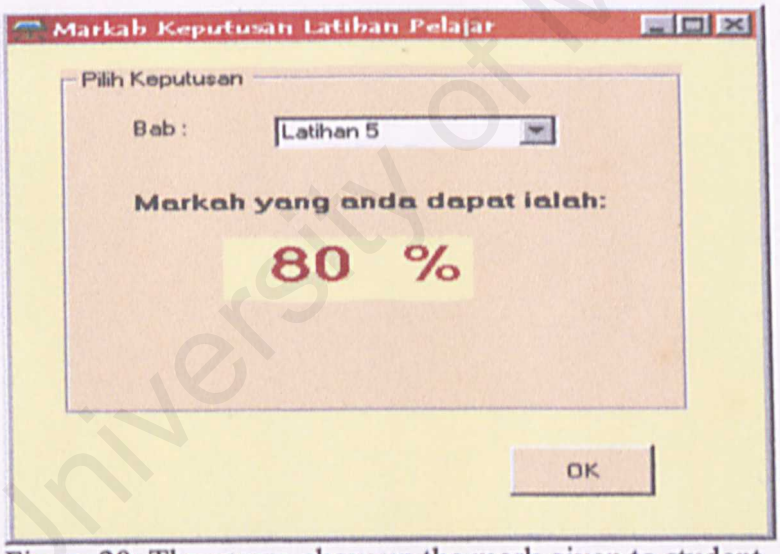


Figure 20: The screen show up the mark given to student

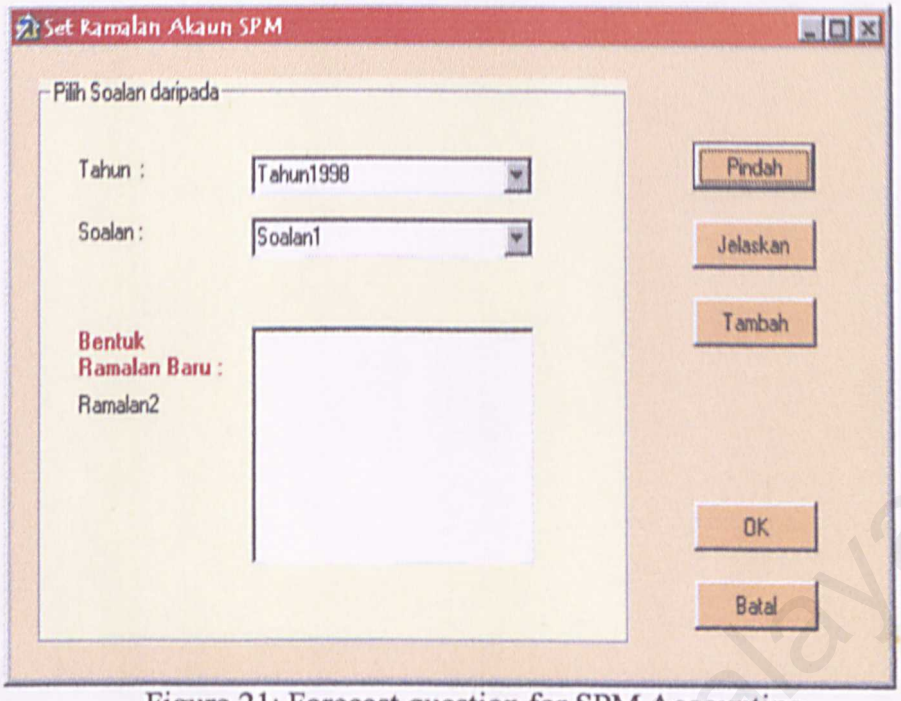


Figure 21: Forecast question for SPM Accounting