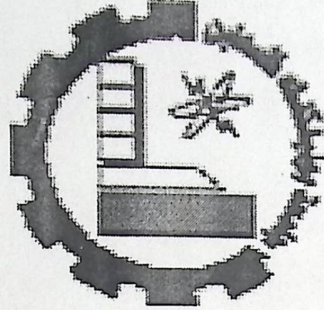


Palestine Polytechnic University  
College of Administrative Science and Informatics  
Department of Information Technology



## Active Multimodal E-learning System

Case study: Context & DFD diagram

### Project Team:

Diana Saleh Haniheen  
Isra'a Azmi Abu Arquob  
Rasha Mohammad Numan

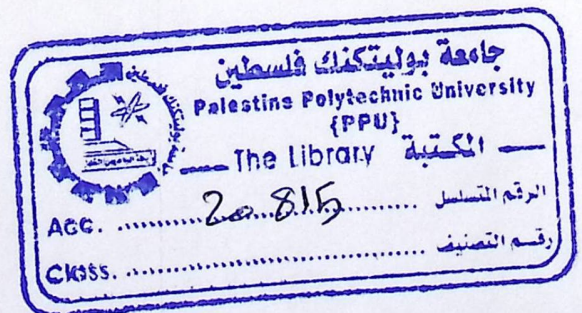
### Supervisor:

Mr. Faisal Khmaisheh

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## *Abstract*

When we talk about e-Learning, we mostly mean an on-line class using Web Technology, with the use of Multimedia and Interactive Technology and multimedia tools the trend nowadays is to enhance the learning process using Interactive technology and tools.

The ultimate aim of this project is to create and develop a new electronic learning module using active e-learning. We have selected some topic from Advance Software Engineering course (ASWE), which one of the most important courses for graduated students. The system enables the teacher to add, delete and set the course material for the purpose of constructing the learning module for students. In addition, the system allows students to login to the course and doing several processes such as browsing material, doing quizzes, and downloading.

The project concludes that e-Learning is seen to be more suited to the delivery of content than to skills building. Hence, e-learning has the capability to enlarge learning skills and facilitate any e-Learners at anywhere and anytime. So, to support this new trend in e-learning we highly recommended the development & implementation of active e-learning courses at PPU.

## *Acknowledgment*

*The team advances great thanks to our great praised God who innovates our soul, enlightens our brains, and illuminates the road of tomorrow ...*

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*Moreover, the team advances special thanks to the generous teacher Mr. Akram Ihshayesh...*

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*"To our dear teachers, lecturers, friends, and to all who contributed in the accomplishment of this project ... we can only say for their gratitude..."*

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## *Dedication*

*To those who have dedicated lives giving us the hope for tomorrow..., to those who have enlightened our knowledge road... to our dear fathers...*

*To those who granted us the tenderness and taught us the patience..., to those whose hearts and souls have given us the protection and power to become what we are now..., to our beloved mothers...*

*To those who have contributed in the knowledge and science process..., to those whose thoughts enriched our knowledge towards a prosperous future ... to our dear instructors...*

*To our soul mates who supported us ...To those who are always there when we need them ... to our friends and lovers...*

*To all of these persons we would like to dedicate this project...*

*Project team.*

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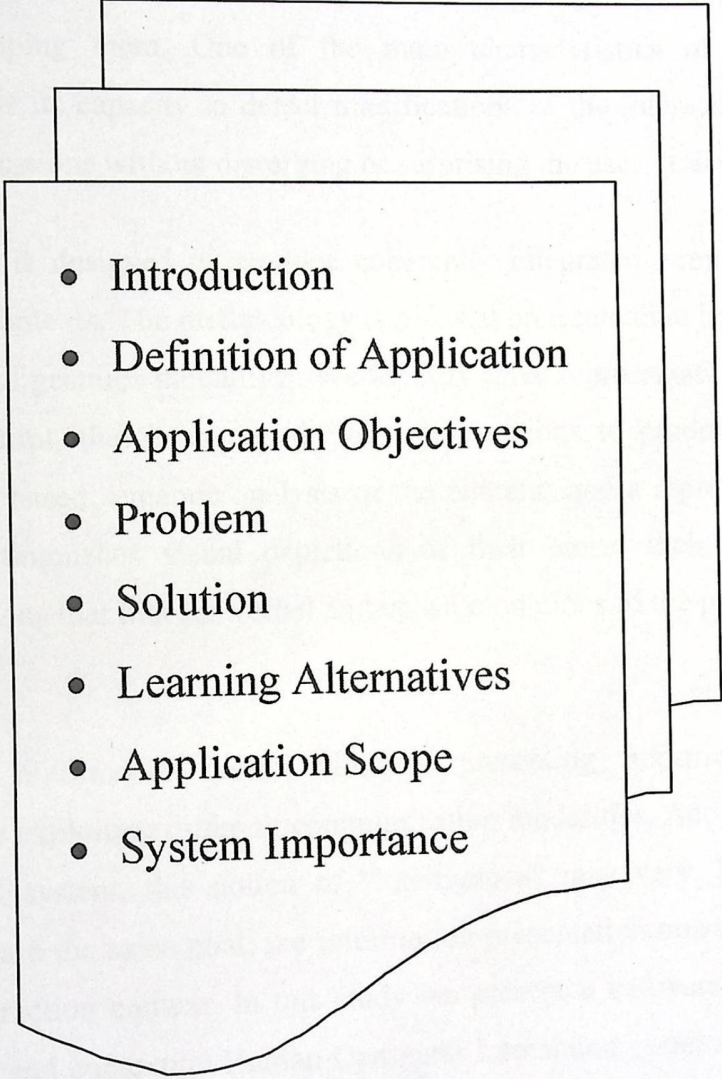
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# Chapter One: Introduction

- 
- Introduction
  - Definition of Application
  - Application Objectives
  - Problem
  - Solution
  - Learning Alternatives
  - Application Scope
  - System Importance

## 1.1 Introduction:

Active multimodal presentation (AMP) referred to constructing effective, stand alone multimodal presentational content. This type of content outlines the basic differences between modes of multimodal presentations in general and the tools required for developing them. One of the main characteristics of an output multimodal system is its capacity to detect modifications of the interaction context and to make right decisions without disturbing or surprising the user. (Camurri, 2006)

AMP which is designed to produce coherently integrated communications within educational contexts. The methodology is focused on a semantic integration of the visual, verbal and gestures modalities. We identify three representational forms - a time based transcript, that is extracted from presentations to produce a speech mark-up; a concept based semantic analysis of the content; and a representation of gestures which distinguishes visual depictions of their icons, their trajectories, referents, and functions that link the verbal and visual modalities of the presentations. (Adel Elsayed, 2005)

An output multimodal system aims at presenting information in an “intelligent” way by exploiting different communication modalities. According to the desired multimodal system, this notion of “intelligence” may vary. However all existing systems share the same goal: the information presentation must be the most suitable to the interaction context. In this study we present a software architecture model for dynamic and contextual Human-Computer Interaction systems( HCI). Our proposed architecture framework is more precisely suited to the output side of multimodal systems and introduces certain mechanisms, which are not available with classical Graphical User Interface (GUI) Architectures, to tailor the information expression to the interaction context. (Roussean, 2006)

E-learning is the one of the learning technology which use multi-software and multimedia according to increase the quality of e-learning, with the growing number of on-line courses, the increasing accessibility of computers, the rapid growth of internet and intranets, and the increasing number of computer users, students of all

ages are taking advantages of distance learning / distance education or are using computers to enhance traditional classroom experience.

E-Learning, which describes the use of Web or Internet technologies to enhance teaching and learning experience, is therefore a suitable solution to encourage education to anyone, anywhere, at anytime. In addition, the overall operating costs for the national education system can be reduced once the e-Learning systems have been implemented.

The aim of this project is to introduce a new e-learning strategy using Active multimodal technology the developed system helps teachers in building the active module and also allows users to actively interact and participate in viewing the contents.

## **1.2 Definition of Application:**

Palestine polytechnic university has been one of the universities that applied e-learning within its e-learning processes. From this point our project team decided to develop our graduated.

The project aims to teaching the intended student a topic using computer self running presentation. Through out the presentation, some questions will be asked for the sake of evaluation of learnability, the system will change the mode based on students inputs and interaction. Examples of such contents are Context and DFD diagrams.

## **1.3 Application Objectives:**

1. Increase the interaction between students and the system.
2. Increase the self learnability and hence fewer teachers centered environment.
3. Better use of multimedia elements to explain the ideas to students more clearly and more easily.
4. Giving the students self evaluation through self exam.
5. Improve quality of e-learning.

6. Introduce more gestures such as use of hand, and head movement.

#### 1.4 Problem:

- Traditional learning needs more effort which is the most difficult problem that faces most of the students in understanding their courses.
- Traditional learning becomes more boring and lack of interactive in the most courses.
- Different abilities that lead to misunderstanding in the same class.
- Large number of students in the learning class.
- Traditional performing and attendance of student's course exams.
- Teachers suffer from conjunctions in traditional preparing, updating, adding and deleting lectures, exams and learning plans.
- Students suffer from boring methods of traditional learning, so they need more powerful and appealing ways to make more exciting learning process.
- Current e-learning lack of interaction.

#### 1.5 Solution:

Some solutions to the previous problems can be classified as the following

1. Developing intelligent system that concern with the special characteristics of each students which help him understand more easily according to their abilities.
2. Using interactive method in learning including multimedia tools. That helps to make students to pay attention to their lessons.
3. Develop self exam within the system that give them ability to measure their understanding.
4. Develop dynamic Modal pages and their corresponding databases to help teachers prepared their online courses.

## **1.6 Learning Alternatives:**

There are many alternatives to achieve the objectives of learning process; the project explains two alternatives of learning process:

### **1.6.1 Traditional Learning:**

In general, the traditional approach to learning is mainly focused on the content, with less emphasis on the development of skills and the nurturing of inquiring attitudes. The current system of education is teacher centered, with the teacher focused on giving out information about "what is known." Students are the receivers of information, and the teacher is the dispenser. Much of the assessment of the learner is focused on the importance of "one right answer." Traditional education is more concerned with preparation for the next grade level and in-school success than with helping a student learn to learn throughout life.

Traditional classrooms tend to be closed systems where information is filtered through layers to students. In general, the use of resources is limited to what is available in the classroom or within the school. Use of technology is focused on learning about the technology rather than its application to enhanced learning. Lesson plans are used to organize the various steps in the learning process for the whole-class approach.

#### **- Advantages:**

1. Outgoing verbal high-achieving students participate the most.
2. All the students have the ability to being educated at limited lecture time at all universities.
3. The students have more obligation and responsibilities about their course.

**- Disadvantages:**

1. The consideration of political situation that limits the students to arrive universities at specific time.
2. Traditional learning techniques need more effort and time especially in traveling between the required learning sites.
3. Students face difficulties in focusing their complete attention to get the required knowledge from the traditional learning course.
4. Lack of interactive contact between teachers and students.
5. Instructors "deliver" knowledge.
6. More "passive" learning.
7. Technology may be used, but is not central to the role of being a learner.
8. Various media may be used, but most delivery is by the spoken word, with some written support.

**1.6.2 E-learning:**

E-learning is an approach to facilitate and enhance learning through both computer and communications technology. Such devices can include personal computers, CDROMs, MP3 Players, and Mobile Phones. Communications technology enables the use of the Internet, email, discussion forums, collaborative software, classroom management software and team learning systems.

E-learning may also be used to suit distance learning through the use of WANs (Wide Area Networks), and may also be considered to be a form of flexible learning where just-in-time learning is possible. Courses can be tailored to specific needs and asynchronous learning is possible. Where learning occurs exclusively online, this is called online education. When learning is distributed to mobile devices such as cell phones it is called M-learning.[1]

#### **- Advantages**

- Learner-focused.
- More "active" learning.
- Instructors "guide" the learners.
- Instructors "model" good learning techniques.
- A much greater percent of students actively participate in discussions.
- Technology helps students explore resources and construct their own meanings.
- Technology may help instructors use multiple forms of media, and reach a wider variety of learning styles.
- Content is easily updated.

#### **- Disadvantages:**

- Internet accessibility any time is not available specially the one depending on telephone lines.
- Telecommunications bandwidth and network capacity are insufficient.
- Lack of trust in e-learning system.

#### **1.6.3 Active E-learning:**

While our genesis are rooted in technology-based training, we are also strong advocates of a blended approach to learning that brings together the best elements of all media to effect the realization of a stated training goal. We recognize that the ideal solution for your business may often include a variety of learning media including synchronous and asynchronous methodologies, traditional classroom training, written supporting materials and one-on-one coaching. [2]

Activating students is found to be the most influential factor for learning effectiveness in innovative pedagogical concepts like action-orientation and in models based on constructivist theories. E-Learning implementations of these educational concepts pose many problems. Special authoring systems supporting teachers in implementing action-oriented scenarios are required. [3]



### **1.7 Application Scope:**

This project serves university students, especially junior students in PPU who studying Software Engineering Course.

### **1.8 System importance:**

- **To project team :**

1. It is considered to be as a final project submitted in partial fulfillment of the requirement for the degree of B.Sc. in information technology.
2. Getting skills and experience that give project team ability to continue working in E-learning filed.

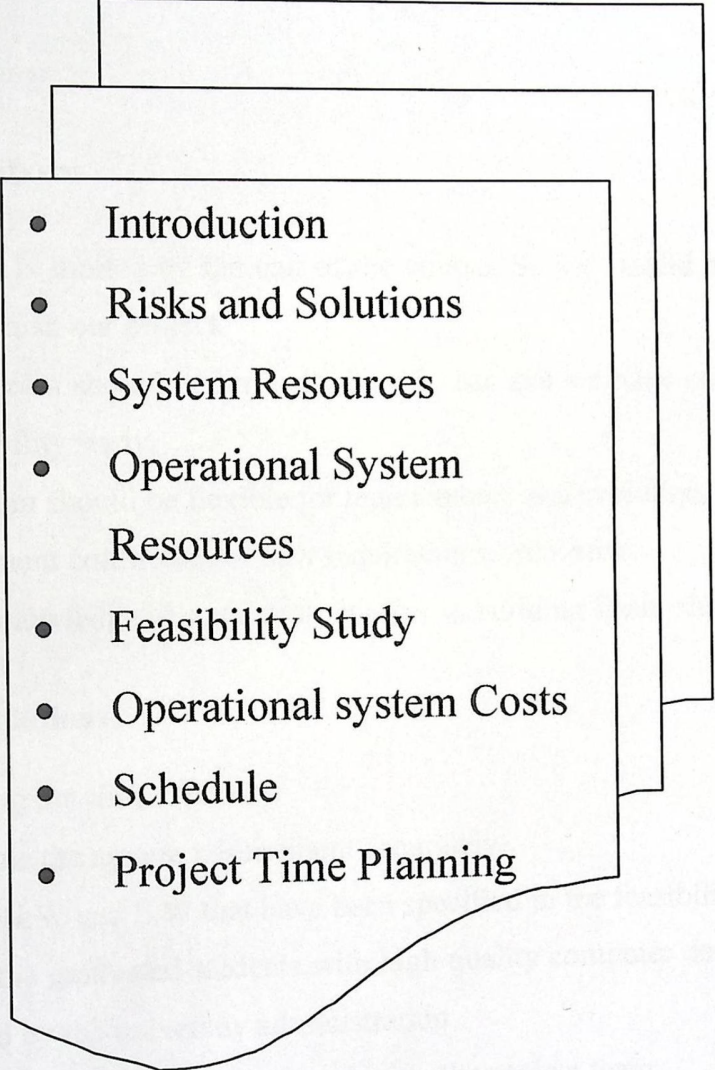
- **To Students :**

1. Develop the students' skills in interacting with computer system.
2. Provide flexibility for the students to learn where and when they choose.
3. Provide quick and suitable method for students to study, learn and remember their courses easily.

- **To Teachers:**

1. Developing the source for their courses so they can change contents of any time as they need.
2. This system provides the teacher with the ability to make additional effort to get better feed back from users and build communication channel between teacher and student throw discussion space, and emails.

# Chapter Two: Planning

- 
- Introduction
  - Risks and Solutions
  - System Resources
  - Operational System Resources
  - Feasibility Study
  - Operational system Costs
  - Schedule
  - Project Time Planning

## **2.1 Introduction:**

As any project, planning stage must apply to study the resources such as: the hardware, software and cost estimation resources also the benefits and risk evaluation that can be arising during the project team development process.

## **2.2 Risks and Solutions:**

### **2.2.1 Risks Analysis:**

1. The time is limited by the end of the course. So we should manage this time to finish our project.
2. Project team should be limited with the cost that we have determined in the feasibility study.
3. The system should be flexible for maintenance and evolution.
4. Requirement confliction or new requirements may arise.
5. Lack of knowledge in some tools such as in building flash, animations.

### **2.2.2 Risks Solutions:**

1. Following the time schedule.
2. Determine the system requirement accurately.
3. Use the H.W and S.W that have been specified in the feasibility study.
4. Supply the graduated students with high quality computer devices, this is provided by the university administration.
5. graphics designer should grouped with the project team

## 2.3 System Resources:

**2.3.1 Hardware Resources:** The following table lists the Hardware Resources required developing this project:

Item	Number of units
Desktop computers Pentium VI, 2 GHz,512 MB RAM,40GB HD, Monitor15 ,Keyboard and mouse	1
HP DeskJet 6840 Printer series.	1
Speakers	1

**Table 0-1 System Hardware resources**

### 2.3.2 Software Resources:

The following programs list includes the software resources required to develop this project:

1. Microsoft windows XP Professional.
2. Microsoft Office 2003 Professional Edition.
3. Microsoft Visio upgrade version.
4. Photo Shop V.8.
5. Macromedia Flash Mx 8.
6. Adobe Acrobat Reader.
7. Internet Explorer.
8. Visual basic .net 2003.
9. Real player 10.0.
10. Macromedia Captivate

### 2.3.3 Human resources:

- The team project consists of three members that exchange their roles to implement this project.
- Supervisor.
- Graphics Designer (Flash MX).

### 2.3.4 Other Resources:

There are other resources that have been used such as:

1. Books And papers.
2. Pens.
3. CDs and Disks.
4. Flash Memory.

## 2.4 Operational System Resources:

### 2.4.1 Hardware Resources:

The following table lists the Hardware resources that are required to operate the e-learning system.

Item	Number of units
Desktop computers Pentium IV, 3GHz, 512 MB RAM, 40GB HD, Monitor17,Keyboard and mouse.	1
Speakers.	2
HP DeskJet 6840 Printer series.	1
Network Adapter.	1
DSL Modem.	1

**Table 0-2 : Operational Hardware Resources**

#### **2.4.2 Software Resources:**

The following programs list includes the software resources required to operate the e-learning system:

- Microsoft windows XP Professional.
- Microsoft Office 2003 Professional Edition.
- Macromedia Flash MX 8.
- Adobe Acrobat Reader.
- Internet Explorer.
- Windows Media Player.
- Visual Studio 2003.
- Macromedia Captivate.

#### **2.4.3 Human Resources:**

The human resources include the following persons in order to operate the e-learning system:

- Course's teachers.
- Course's students.

#### **2.4.4 Other Resources:**

Other resources that needed to operate the system programs and contents are only the CD's.

### **2.5 Feasibility Study:**

The following will describes in details the system technical, legal, and economic feasibility for all of the system resources.

#### **2.5.1 Technical feasibility:**

This project requires good programming capabilities, methods and experience in using multimedia programs and in database application such as access. All these capabilities are available in the work team.

### 2.5.2 Legal feasibility:

According to our situation there is no limitation or a need to tack a license to develop this project.

### 2.5.3 System Resource Cost:

#### 2.5.3.1 Hardware Costs:

The following table lists the costs for the hardware resources required to Develop this project:

Item	Unit cost	Total cost
Desktop computers Pentium VI, 2 GHz,512 MB RAM,40GB HD, Monitor15 ,Keyboard and mouse	\$1000	\$1000
Color Printer (HP DeskJet 6840 Printer series)	\$650	\$650
Speakers	25\$	\$50

Table 0-3 : System Hardware Cost

#### 2.5.3.2 Software Cost:

The following table lists the costs for the software resources required to develop this project:

Item	Cost
Microsoft windows XP <u>Professional</u>	\$300
Microsoft Office 2003 <u>Professional Edition</u>	\$100
Microsoft Visio upgrade version	\$100

Real player 10.0	\$150
Photo Shop V.8	\$100
Macromedia Flash Mx 8	\$100
Adobe Acrobat Reader	\$100
Internet Explorer	\$170
Visual basic .net.2003	\$2000
SQL server2000	\$2000

**Table 0-4 System Software Cost.**

**2.5.4 Human resources :**

Name	Week/hour	Cost/hour	Total/month
Developer 1	30	\$10	\$300
Developer 2	30	\$10	\$300
Developer 3	30	\$10	\$300
<b>Total</b>			\$900

**Table 0-5 System Human Cost**

**2.5.5 Total System Development Costs:**

Resources	Costs
Hardware Resources Development Costs	\$ 1710
Software Resources Development Costs	\$ 5120
Human Resources Costs	\$ 900
<b>Total Costs</b>	\$ 7730

**Table 0-6 : Total System Development Costs**

**2.6 Operational System Costs:**

**2.6.1 Hardware Costs:**

The following table lists the costs for the hardware required to operate this project:



Items	Costs
Desktop computers with the previous mentioned description.	\$ 1000
Internet (DSL Modem, Network adapter)	\$ 200
<b>Total costs</b>	<b>\$ 1200</b>

**Table 0-7 Operational Hardware Costs.**

### 2.6.2 Software Costs:

The following table lists the costs for the software needed to operate this project:

Items	Costs
Microsoft Windows XP Professional (with the previous mentioned descriptions of the required programs: MS Office, Internet Explorer, Acrobat Reader, AutoPlay6 and Visual Studio 2003).	\$ 720  \$2000

**Table 0-8 Operational Software Costs**

### 2.6.3 Other costs:

There is another \$ 0.5 to cover the CD's cost to operate the system programs and contents.

### 2.6.4 Total System Development Costs:

Resources	Costs
Hardware Resources Development Costs	\$1200
Software Resources Development Costs	\$2720
Human Resources Development Costs	\$ 900
Books Development Costs	\$100
Other Resources Costs	\$ 50
<b>Total Costs</b>	<b>\$ 4970</b>

**Table 0-9 : Total Development Costs.**

### 2.6.5 Total System Operational Costs:

Resources	Costs
Hardware Resource Operational Costs	\$ 1200
Software Resources Operational Costs	\$ 2720
Other Resources Costs	\$ 50
<b>Total Costs</b>	<b>\$ 3970</b>

**Table 0-10 Total Operational Costs.**

## 2.7 Scheduling:

### 2.7.1 Time Schedule:

As any project in any field it should be limited to specific time schedule. This project is limited to sixteenth weeks. Project team has managed this time as follow:

### 2.7.2 Project time planning

Nowadays any project either in business, education, or any other field should be limited to a specific time schedule to be adapted. This project is limited by 16 weeks.

Activities	Description	Weeks
Activity 1:	Gathering Data.	13
Activity 2:	System Analysis.	3
Activity 3:	System Requirements.	3
Activity 4:	System Design.	3
Activity 5:	System Implementation.	6
Activity 6:	System Testing.	3
Activity 7:	Documentation.	15

**Table 0-11 Time Activity Schedule**

The following are the proposed and the actual time schedules needed to accomplish the project based on the "Gant Chart" which is considered as the strongest tool for planning and managing the time needed to order the required tasks.

Weeks	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Works																
Planning	█															
Information gathering		█														
System requirements analysis		█	█													
Designing				█	█	█	█	█	█	█						
System implementation									█	█	█					
System testing												█	█			
System maintenance														█		
Documentation	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█

: Expected Time.  
 : Real Time .

### **3.1 Introduction:**

The step of collecting requirements and analysis is important and considered basic step to develop and complete any project.

In this step we analyze these requirements and define its relationships with other surrounded systems, divide the system to several subsystems and analyze the main operations into inputs and outputs. The system requirements in this system can be categorized into functional and non-functional requirements. They have been described in details through this chapter.

### **3.2 Functional Requirements:**

This project contains several functions; here we will describe the main function and their description. Functional requirement can be categorized as: Student Requirements, Material Requirements, and Help Requirements which will be described as follows:

#### **3.2.1 Student Requirements:**

- The ability of the student to register in the system.
- The ability of registered student to login into the system.
- The ability to check the stage that the student arrives at.
- The ability to logout from the system.
- The ability to do quizzes to determine the material that will be represented.
- Providing material for learning.
- Doing final exam.
- Issuing report to show the situation of the student.

#### **3.2.2 Material Requirements:**

- Providing word, PDF documents, and PowerPoint presentations.
- Providing animation.

- Providing sound and video display.

### **3.2.3 System Requirements**

- **Instructor Requirements:**

- Login to the course.
- Logout from the course.
- Display information about the course registered students.
- Add, delete, and update exams, questions, examples, lectures, videos and outline of the course.

### **3.2.4 Student Requirements:**

- The ability of the registered student to login to the course.
- Present the content for student to study the course.
- Logout from the course.
- Providing quizzes with automatically feedback on the answers, in addition to review questions for each level.
- The ability of the system to provide a forum between students with instructors.
- The ability to choose the language of browsing.

### **3.2.5 Administrator Requirements:**

- Update, insert and delete DB tables remotely.
- Update and setting the system design.
- Add and delete any instructor.
- Add, deletes, and updates the materials.
- Grant authorization to instructors and students.
- Logout Administrator account.
- Determine the level of the system security.

### 3.3 Requirement Specifications

#### 3.3.1 Student Requirements Specifications:

- The ability of the student to register to the system.

**Function:** registration.

**Description:** adding the student to the database using username and a keyword.

**Inputs:** User Name, keyword.

**Source:** System Form.

**Outputs:** System Form.

**Destination:** browser.

**Requires :** Nothing.

**Precondition:** Nothing.

**Post condition:** The user can login to the system.

**Procedure:** This function requests the student to register to the system to give him/her the ability to use the system.

- The ability of the registered student to login to the system.

**Function:** Login

**Description:** Identify the student using User Name, and keyword.

**Inputs:** User Name, keyword.

**Source:** System Form.

**Outputs:** System Form.

**Destination:** browser.

**Requires :** Nothing.

**Precondition:** Registered student.

**Post condition:** The student can use the system.

**Procedure:** This function requests a user name and a keyword, if these are correct, then the student can use the system; else a message will appear to tell the student that the user name or keyword is not correct.

- The ability to check the stage that the student arrives to it

**Function:** checking the stage.

**Description:** Identify the student using User Name, and keyword.

**Inputs:** User Name, keyword.

**Source:** System Form.

**Outputs:** System Form.

**Destination:** browser.

**Requires :** Nothing.

**Precondition:** login.

**Post condition:** The student can complete from the stage that he/she arrive to it at the last time.

**Procedure:** This function gives the student ability to complete from the last point that he/she arrive to it.

- The ability to logout from the system.

**Function:** Logout.

**Description:** This function enables the student to logout from his/her account.

**Inputs:** None.

**Source:** Logout screen.

**Outputs:** None.

**Destination:** browser.

**Requires :** Login.

**Precondition:** Logging in Student (Account is open).

**Post condition:** logging out Student (Account is closed).

**Procedure:** This function enables the student to logout from his/her account.

- The ability to do quizzes to determine the material that will be represented.

**Function:** Do quizzes.

**Description:** This function enables the student to enter to the quiz form and do it.

**Inputs:** Answers.

**Source:** quiz Form.

**Outputs:** Result.

**Destination:** the Main Form.

**Requires :** Login.

**Precondition:** Logging in Student.

**Post condition:** Check answers.

**Procedure:** The student selects one of four choices then submits the answer, if the answer is incorrect then the same material will be presented in another way , if the answer is correct the student will moved to the next stage.

- Providing material for learning.

**Function:** Provide material and content for learning.

**Description:** This function will provide the student with different material To be learned.

**Inputs:** None.

**Source:** System Form.

**Outputs:** Materials in different formats.

**Destination:** Main Form.

**Requires :** Login.

**Precondition:** Logging in student.

**Post condition:** Display the material according to the stage that the student arrives to it.

**Procedure:** This function will supply the student with different formats of materials and contents for the learning process.



- The ability to do final exam.

**Function:** Do exam.

**Description:** This function enables the student to enter to the exam form and do it.

**Inputs:** Answers.

**Source:** exam Form.

**Outputs:** Result.

**Destination:** the Main Form.

**Requires :** Login.

**Precondition:** Logging in Student.

**Post condition:** Check answers.

**Procedure:** the student can do the exam to know he/his level.

- The ability to issue report to show the situation of the student.

**Function:** issuing a report.

**Description:** This function enables the student to see a report about his/her situation .

**Inputs:** Nothing.

**Source:** Report Form.

**Outputs:** Report.

**Destination:** browser.

**Requires :** Nothing.

**Precondition:** doing the final exam.

**Post condition:** Check the exam.

**Procedure:** after doing the final exam the system give the student the ability to see a report that evaluates his/her level.

- The ability of downloading different materials

**Function:** downloading material.

**Description:** This function enables the student to download the materials in different form as power point, Acrobat.

**Inputs:** Nothing.

**Source:** System Form.

**Outputs:** download material.

**Destination:** browser.

**Requires :** login.

**Precondition:** logging in student.

**Post condition:** Display the downloaded material.

**Procedure:** This function will allow the student to download different formats of the course's materials such as: PowerPoint, PDF, MS Word, and animation materials

### 3.3.2 Material Requirements specifications:

- Providing MS Word, PDF documents, and PowerPoint presentations.

**Function:** Provide word, PDF documents, and PowerPoint presentations.

**Description:** This function will supply the students with different formats of documents.

**Inputs:** None.

**Source:** System Form.

**Outputs:** Material in different formats.

**Destination:** browser.

**Requires :** Login.

**Precondition:** Logging in Student.

**Post condition:** Display the content.

**Procedure:** This function will supply the students with different formats of document such as: word, PDF documents, and PowerPoint presentations.

- Providing animation.

**Function:** Provide animation with pictures.

**Description:** This function will supply the students with different formats of animation to clarify the idea of contents.

**Inputs:** Nothing.

**Source:** System Form.

**Outputs:** Animation in different formats.

**Destination:** browser.

**Requires :** Login.

**Precondition:** Logging in Student.

**Post condition:** Display the animation.

**Procedure:** This function will supply the students with different formats of animation

- Provide sound and video display.

**Function:** Provide sound and video display.

**Description:** This function supplies the student with sound and video of the required course lectures.

**Inputs:** Nothing.

**Source:**

**Outputs:** Video.

**Destination:** browser.

**Requires :** Login.

**Precondition:** Logging in student.

**Post condition:** display the video with sound.

**Procedure:** This application will allow the student to display the supporting videos with sounds on some topics.

- Providing application with Visual Studio. Net 2003.

**Function:** Provide application with visual studio. Net 2003, 2005.

**Description:** This function allow student to download programming application that is made by visual studio 2003.

**Inputs:** User Name, and Password.

**Source:** Windows Form.

**Outputs:** Application Form.

**Destination:** Browser.

**Requires :** Login.

**Precondition:** Logging in student, enter the application key word.

**Post condition:** Exit the application.

**Procedure:** This function allows the student to download programming application, such as data structure programming windows application that is made by visual studio 2005.

### 3.4 Non-Functional Requirements:

The non-functional requirements are those characteristics that do not affect the functionality of the system. According to our project the non-functional requirements can be categorized into product requirement and process requirement which are described as follow:

#### 3.4.1 Product Requirements:

- **Dynamism:** the system must support another subjects so it is presented as presentation tool.
- **Ease of use:** The system must provide a friendly interfaces and easy to be used across all its functions.
- **Coherency and Consistency:** The system must support consistence interface with its buttons, colors, actions and appearance.
- **Accessibility and availability:** The system must be easy to access, login, navigate and use.

- Accuracy: The system must provide a high level of accuracy.
- Flexibility and high speed display: The system must allow the users to access the website from different locations as faster as possible.

#### **3.4.2 Process Requirements**

- The system and its documents must be delivered on 16, June, 2007.

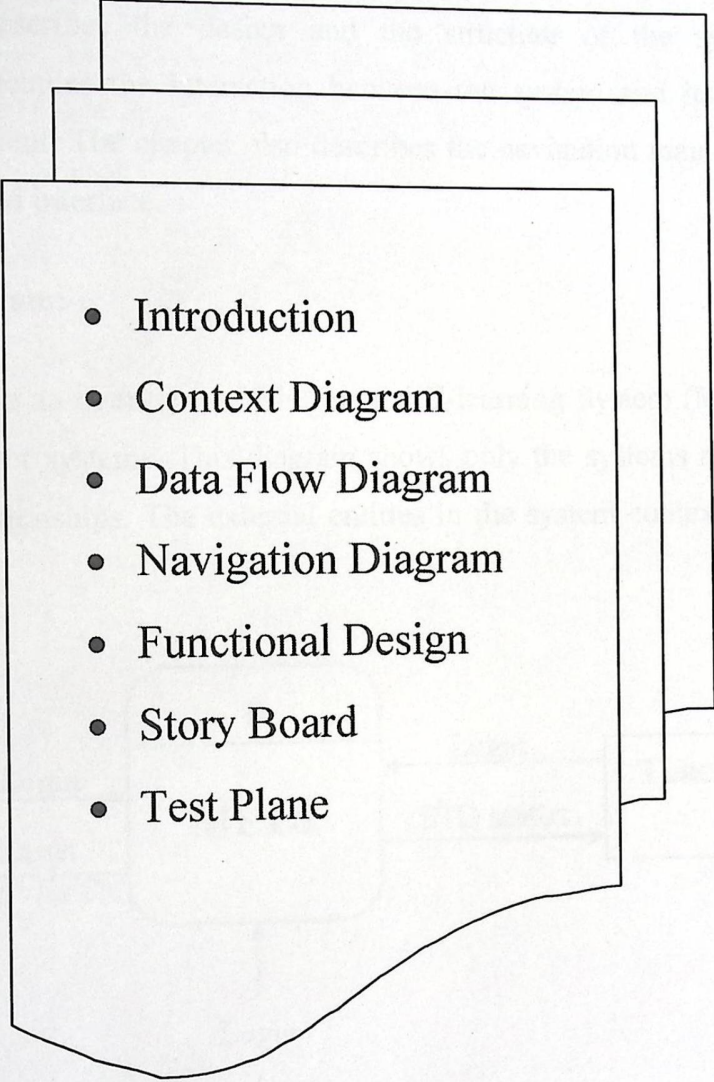
#### **3.4.3 Legislative Requirements**

- Security: The system must Limit and control access to online content, resources and back-end functions.
- Safety: The system must apply different safe authentication and backup methods

### **3.5 System Requirements**

- High availability: Usage of patterns will vary strongly with the specific context of the deployment. However, Modal presents a high-availability web-based interface in general, allowing learners, tutors, and administrators routinely to log in and carry out their daily tasks.
- Scalability: The infrastructure should be able to expand or scale to meet future growth, both in terms of the volume of instruction and the size of the student body.
- Usability: To support a host of automated and personalized services, such as self-paced and role-specific learning, the access, delivery and presentation of material must be easy-to-use and highly intuitive .
- Interoperability: To support content from different sources and multiple vendors' hardware/software solutions.

# Chapter Four: Design

- 
- Introduction
  - Context Diagram
  - Data Flow Diagram
  - Navigation Diagram
  - Functional Design
  - Story Board
  - Test Plane

#### 4.1 Introduction:

This chapter describes the design and the structure of the system to be implemented. This includes the interaction between the system and its surrounding input/output environment. The chapter also describes the navigation map and the story board for each designed interface.

#### 4.2 Context Diagram:

Figure 4.1 shows an overview of Multimodal E-learning System (MELS) and its relationships with other systems. This diagram shows only the systems names without details about the relationships. The external entities in the system context are students and teacher.

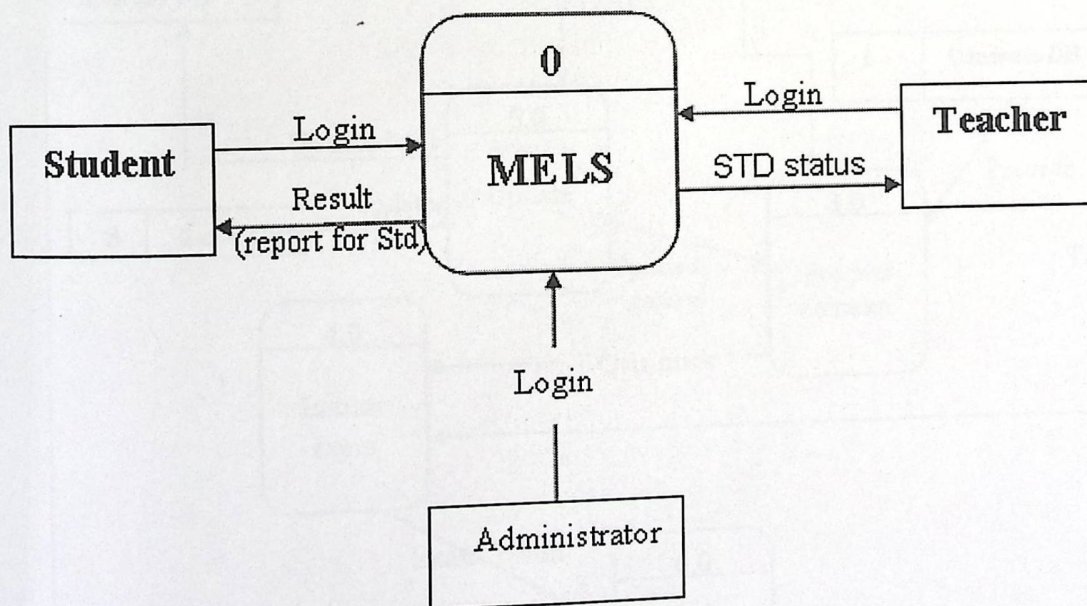


Figure 0-1 System Context Diagram

### 4.3 Data Flow Diagram:

DFD in this project shows the main processes in the project, which we describe in two level of DFD (level1 and level 2).

#### 4.3.1 Level 1:

This level of DFD shows the main processes which are (filling reg. form, enter to system, update, process contents, initiate exam and initiate report).

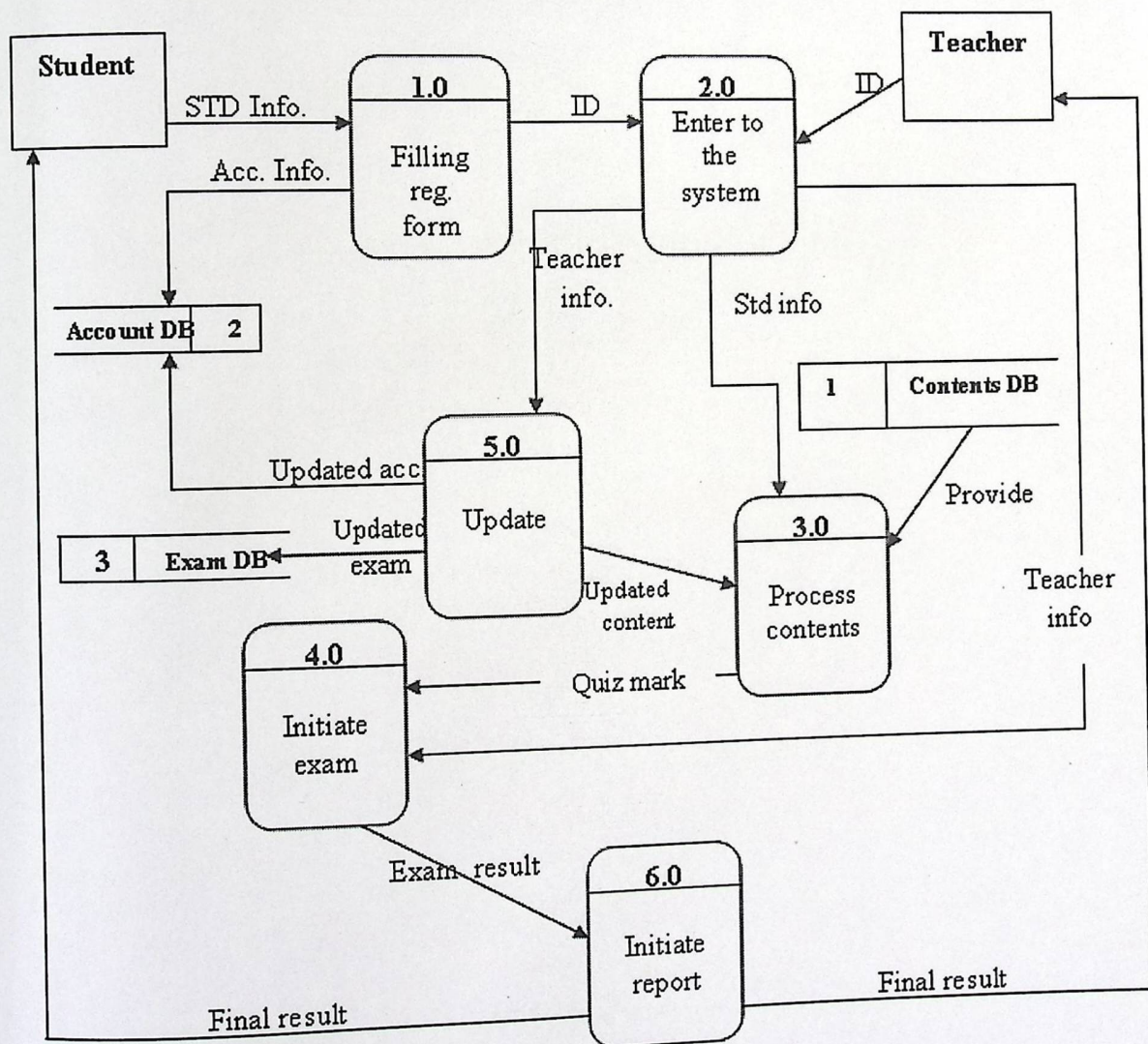


Figure 0-2 DFD level 1



### 4.3.2 Level 2:

In this level of DFD process which is (update) is divided into 3 processes which are (update exam, update account, update material) and process content which divided into (present context, present DFD and present how to draw?) as shown in figure 4.3.

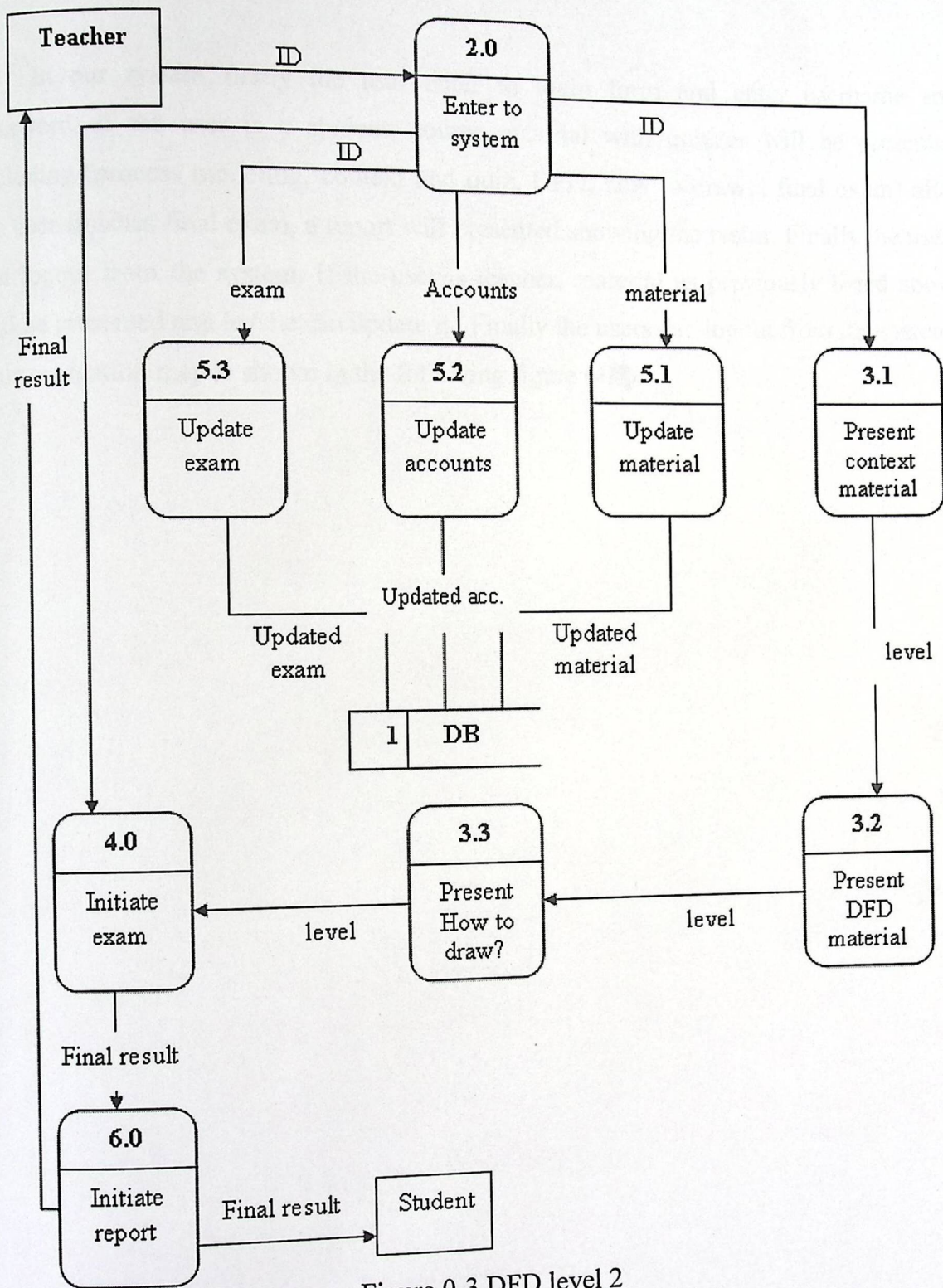
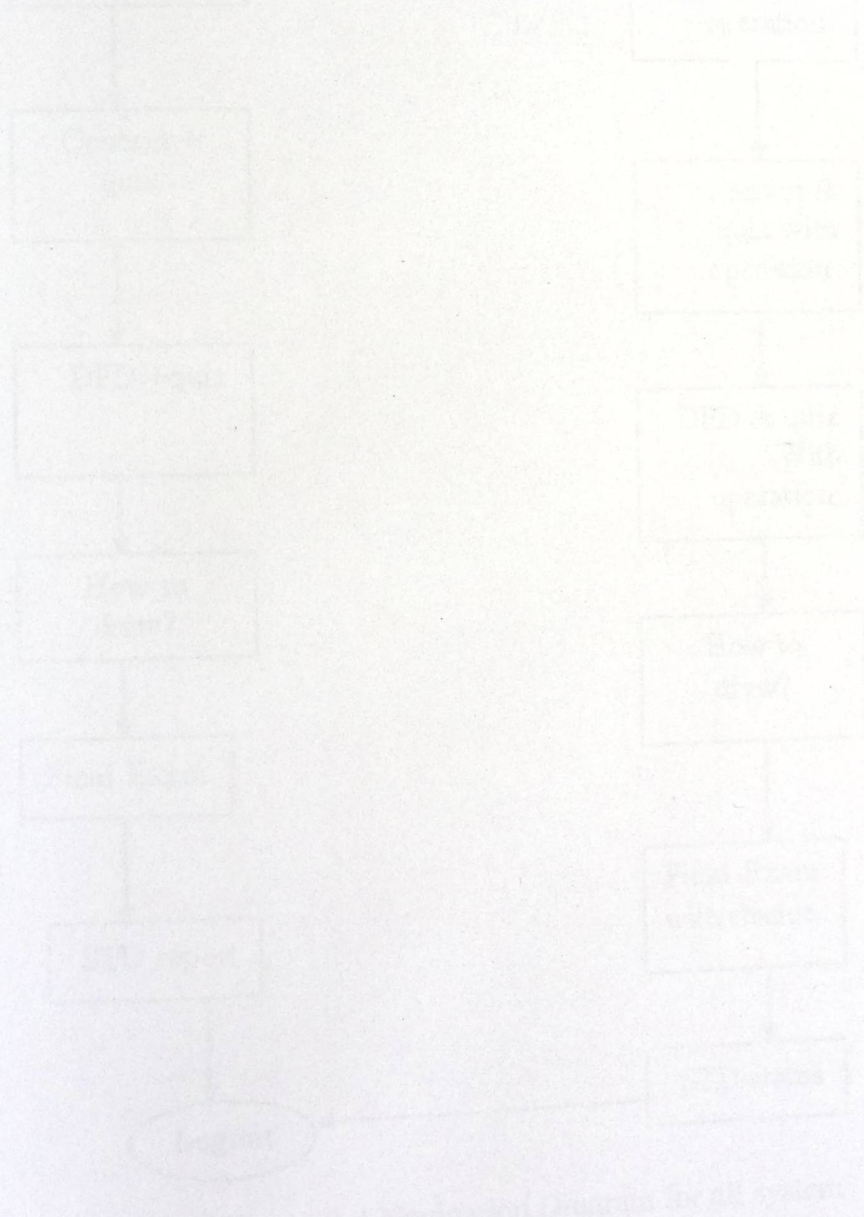


Figure 0-3 DFD level 2

#### 4.4 Navigation Diagram

A navigation page is used primarily to help users locate and link to destination pages. A website's navigation scheme and features should allow users to find and access information effectively and efficiently.

In our system firstly the user enter to login form and enter username and password, if the user is a student, course material with quizzes will be presented including (process modeling, context and quiz, DFD, how to draw.., final exam) after the user finishes final exam, a report will presented showing the result. Finally the users can logout from the system. If the user is teacher, material as previously listed above will be presented and he/she can update it. Finally the users can logout from the system. This navigation map is shown in the following figure (4.4):



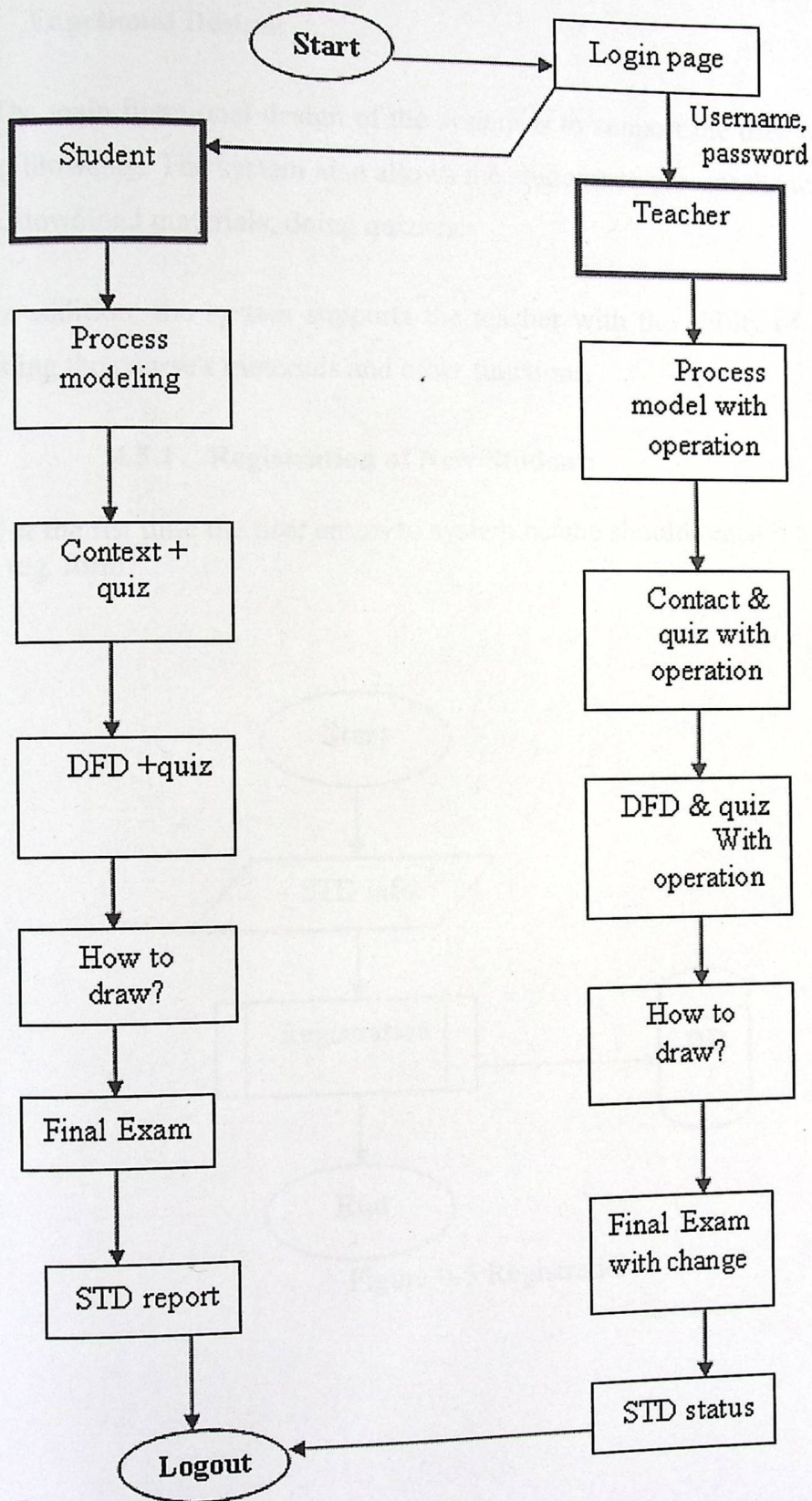


Figure 0-4 Navigation Diagram for all system

#### 4.5 Functional Design:

The main functional design of the system is to support the user with the ability of making browsing. The system also allows the students to present the material of ASWE course, download materials, doing quizzes.

In addition, the system supports the teacher with the ability of adding , deleting and setting the course's materials and other functions.

##### 4.5.1 Registration of New Student:

For the first time the user enters to system he/she should register to system by filling reg. form.

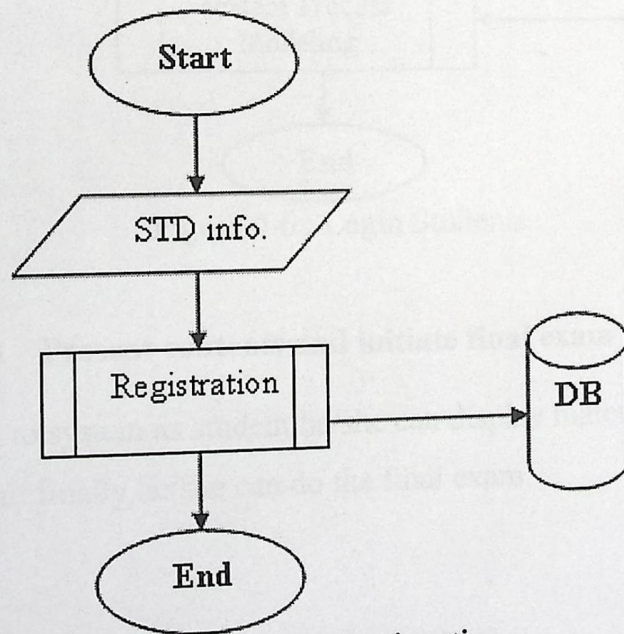


Figure 0-5 Registration

### 4.5.2 Login as Students:

Any user can enter to system through entering username and password.

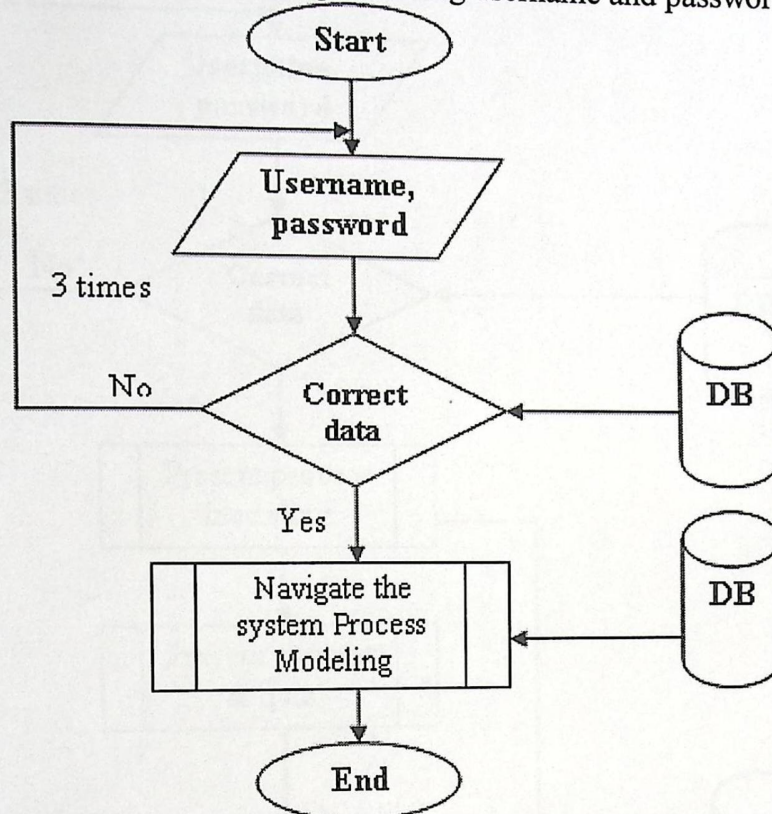


Figure 0-6 : Login Students

### 4.5.3 Present contents and initiate final exam by the student:

After entering to system as student he/she can display materials sequentially depend on quiz result finally he/she can do the final exam.

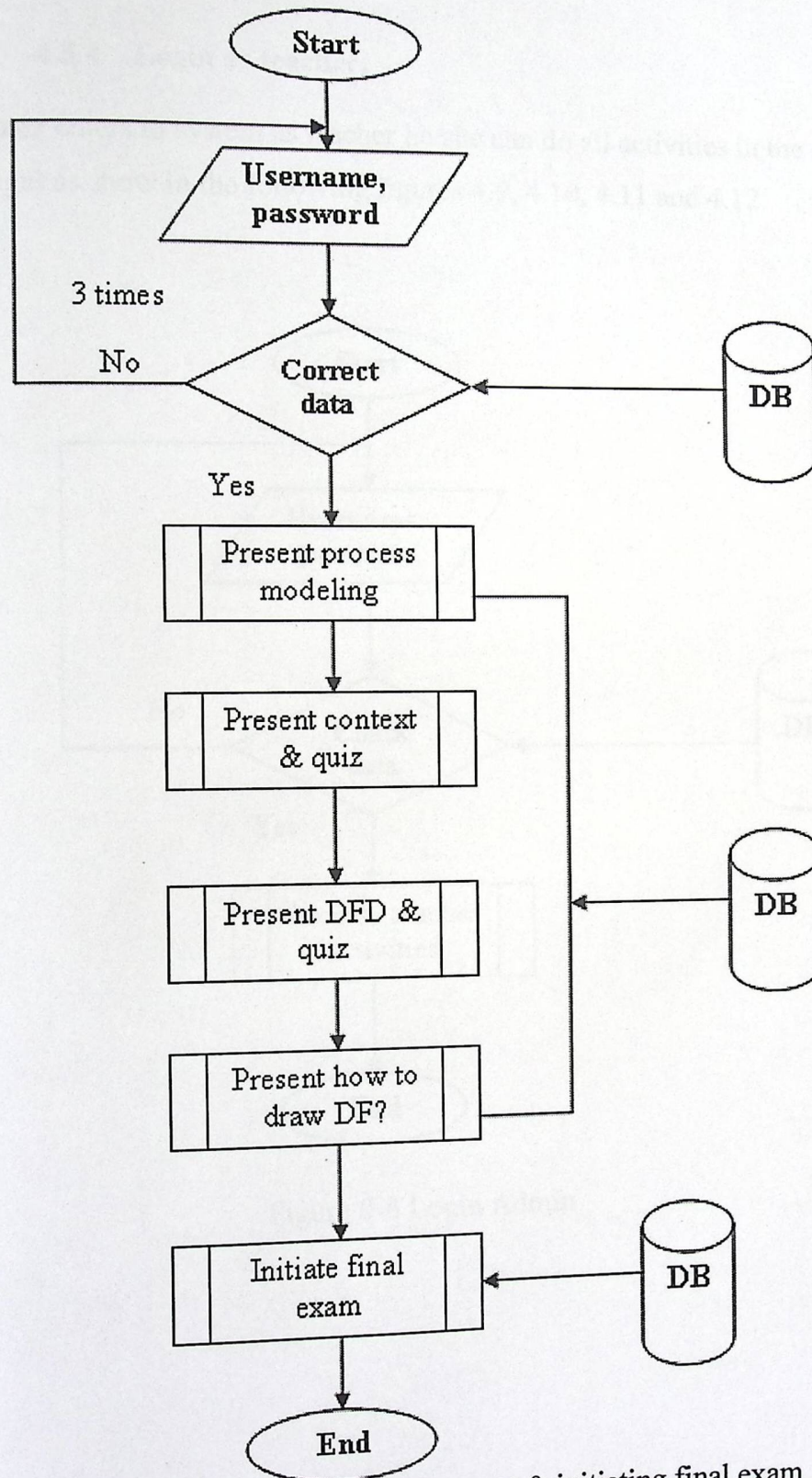


Figure 0-7 Student presenting content & initiating final exam

#### 4.5.4 Login as teacher:

If the user enters to system as teacher he/she can do all activities in the system (high privilege) as show in the following figures 4.9, 4.10, 4.11 and 4.12

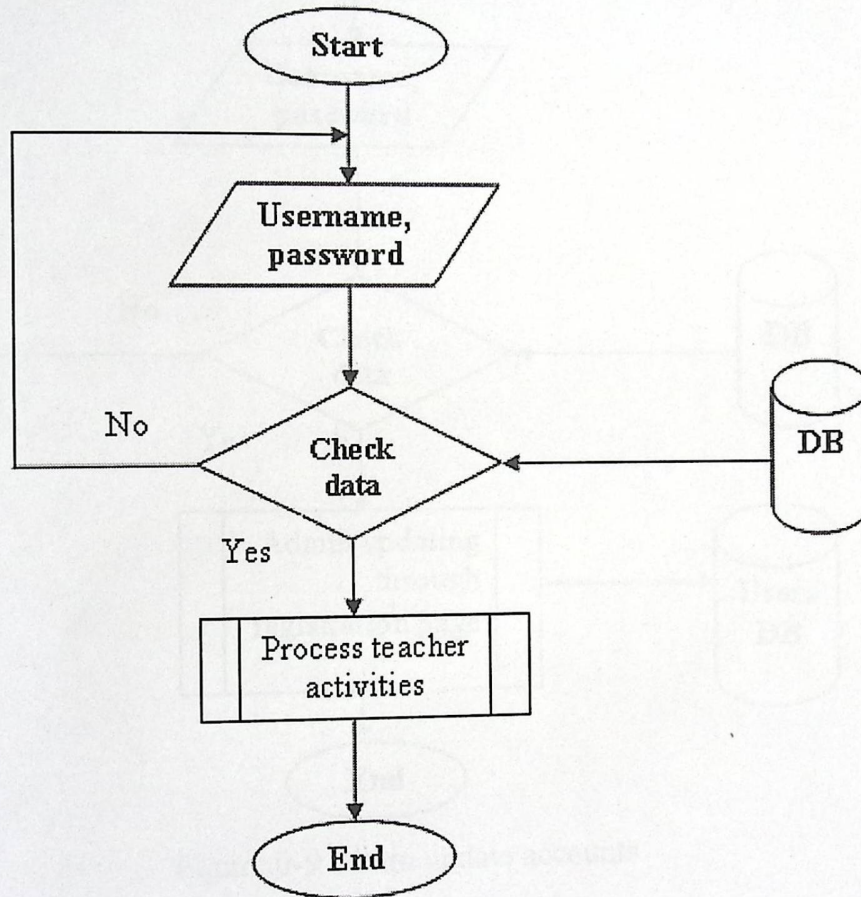


Figure 0-8 Login Admin



### 4.5.5 Update account by Teacher/Admin:

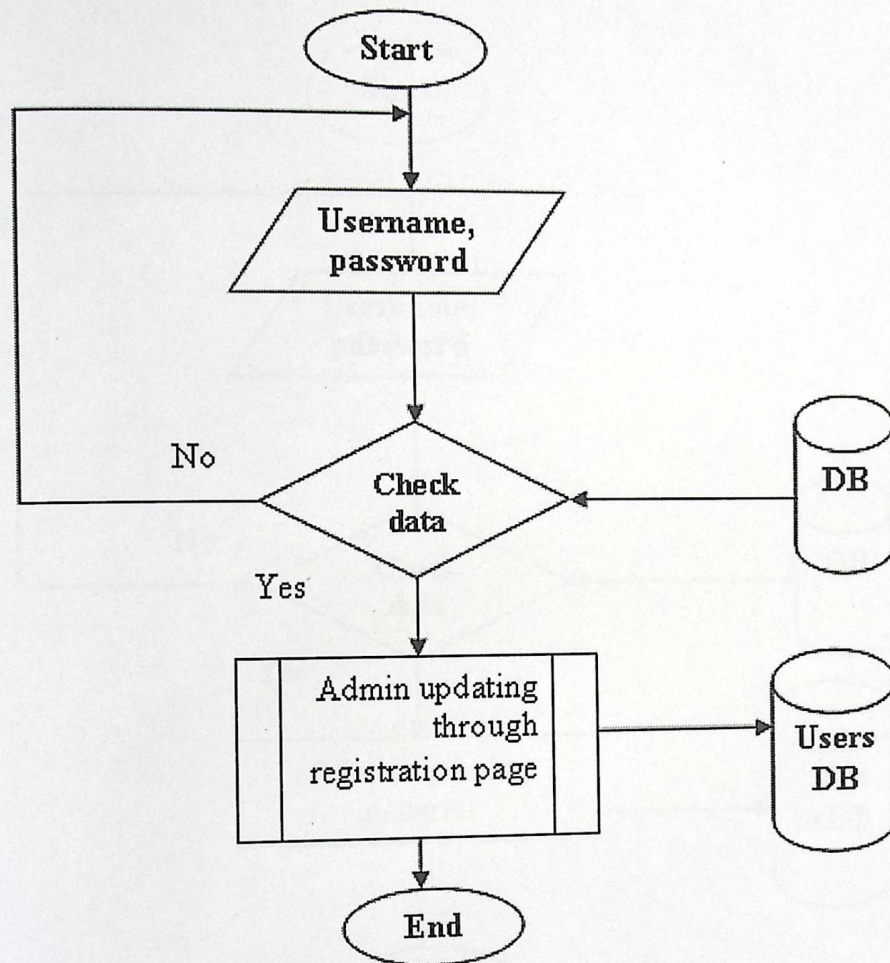


Figure 0-9 admin update accounts

4.5.6 Update material by admin/teacher:

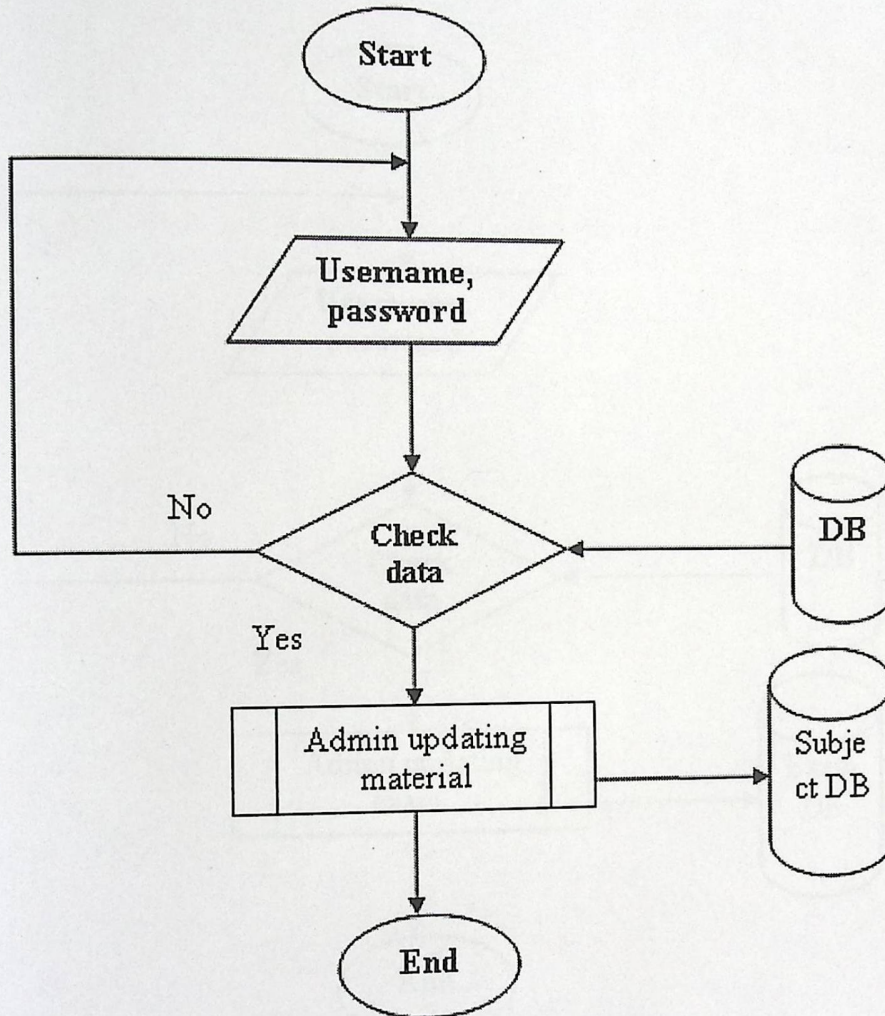


Figure 0-10 admin update material

4.5.7 Update exam by admin:

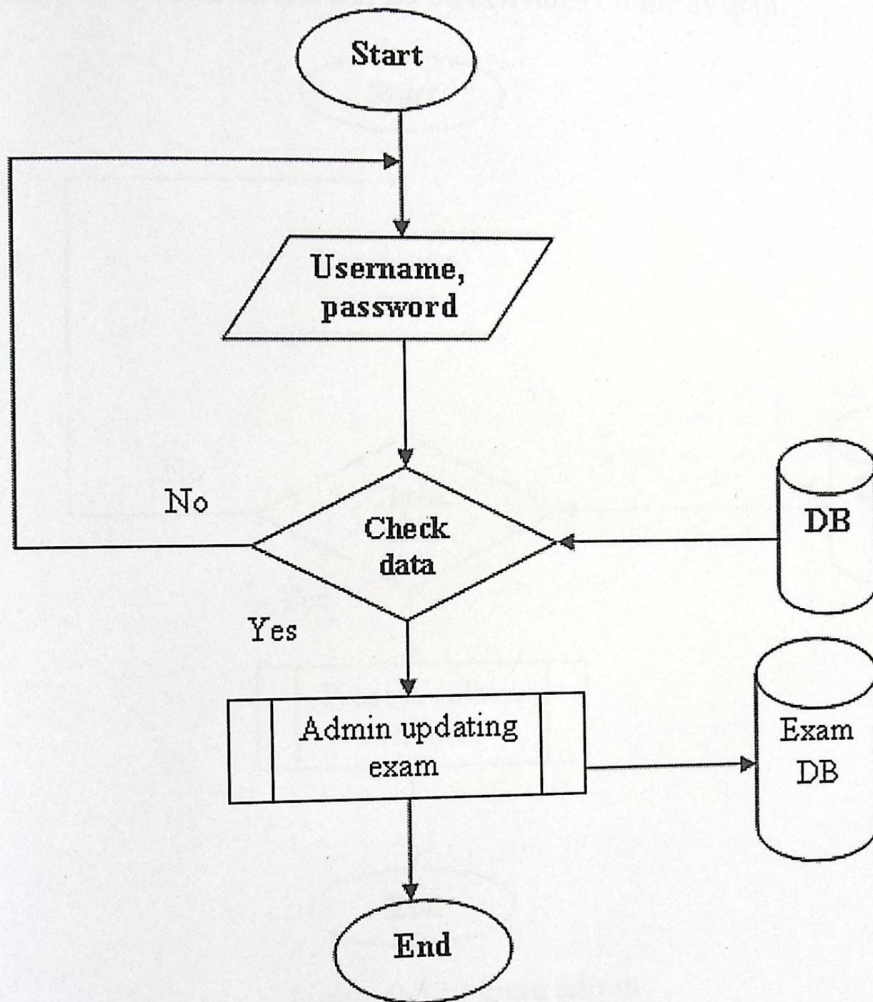


Figure 0-11 admin update exam

#### 4.5.8 Login as Administrator:

When user enters as Admin he/she can do all activates on the system.

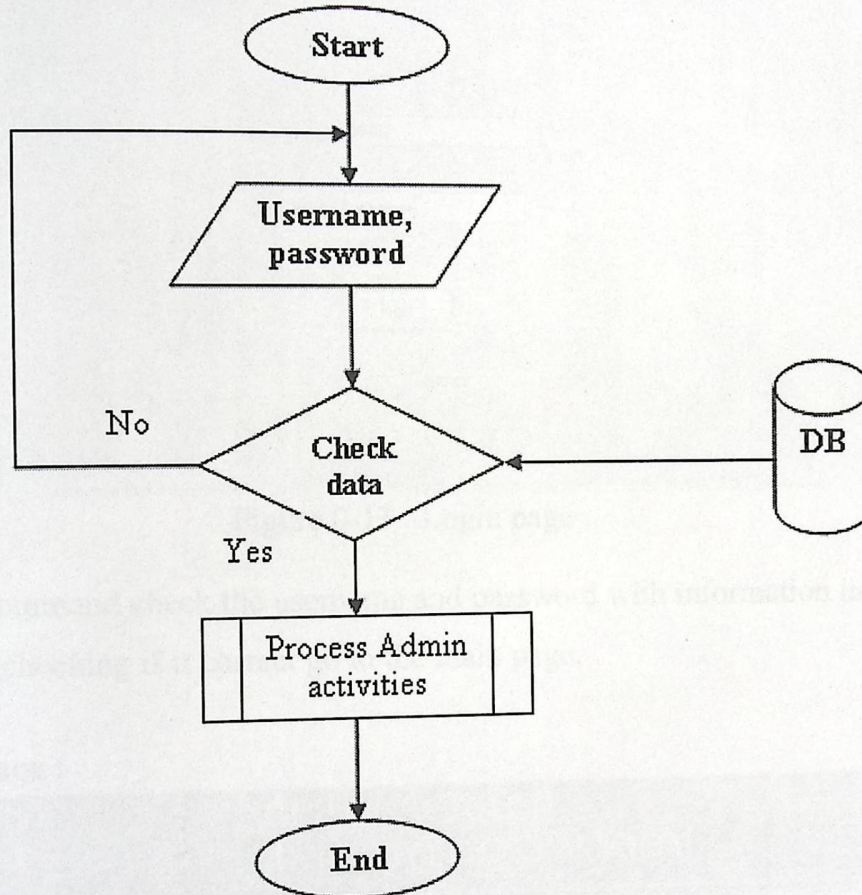


Figure 0-12 : login admin

#### 4.6 Story board:

A storyboard is a graphic, sequential depiction of a narrative. It is a visual document depicting the style, layout, action, navigation and interactivity on every screen of the document. The storyboard organizes the content and functionality of the presentation.

In this section we describe the initial story board that needed to design and implement system interface.

This method is very important for the designers, that it can organize the work path and give the actual project dimensions. The following screens will describe the initial story board for the first interface using Noodle:

❖ **Login page:**

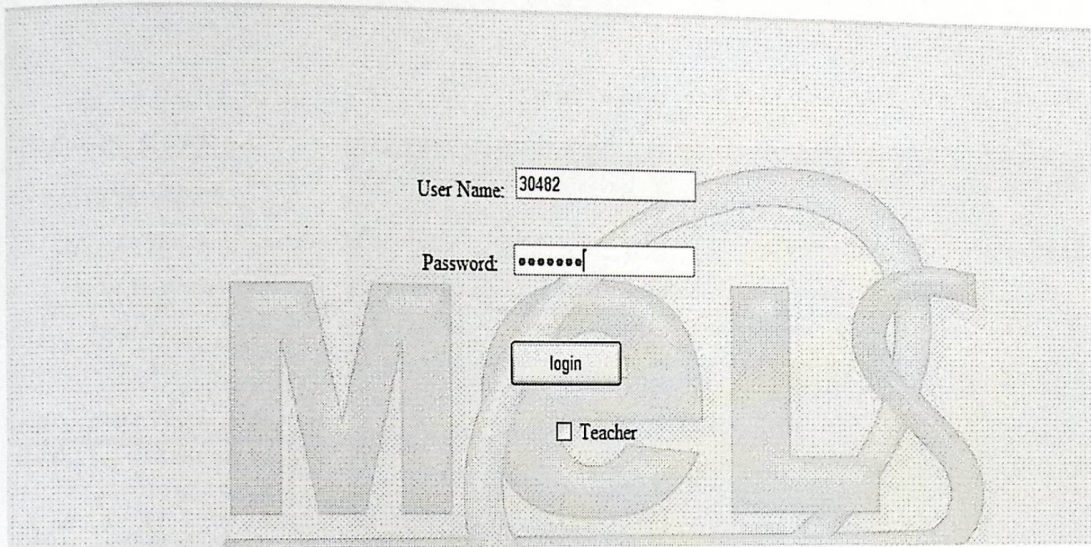


Figure 0-13 : Login page

**Submit:** this command check the username and password with information in the Database, after checking if it correct go to the main page.

❖ **main page :**

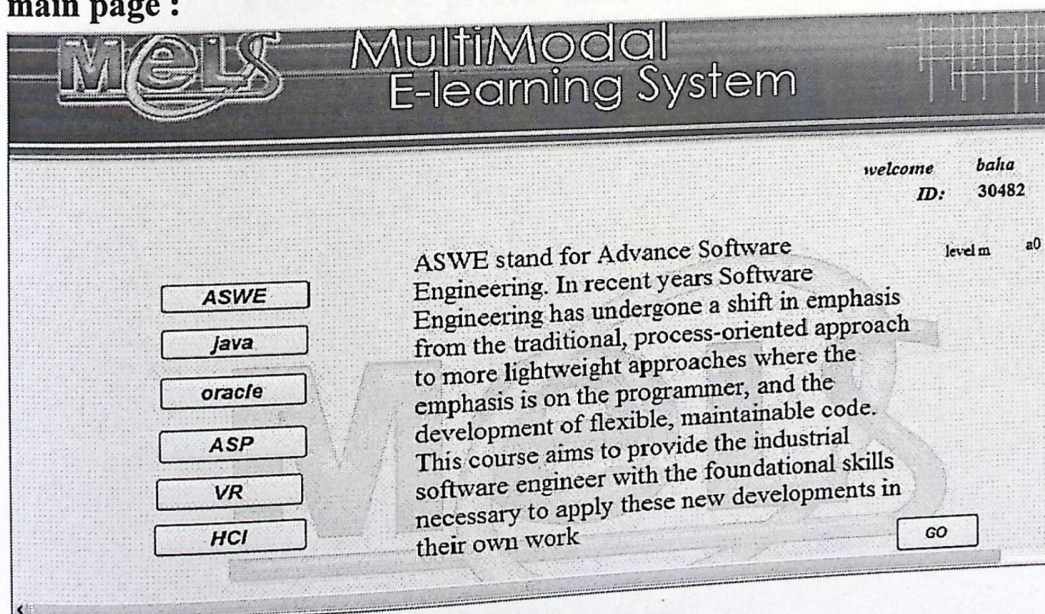


Figure 0-14 main page

ASWE, java, ASP... are buttons that describe course in the IT field.

❖ Presenting Material:

Name *baha*  
ID 30482

Context Diagrams

**Process Modeling**

**context Diagram**

**DFD**

**How To Draw**

**Final Exam**

**Example:**

**Library Context Diagram.**

The context diagram shown on this screen represents a book lending library. The library receives details of books, and orders books from one or more book suppliers. Books may be reserved and borrowed by members of the public, who are required to give a borrower number. The library will notify borrowers when a reserved book becomes available or when a borrowed book becomes overdue. In addition to supplying books, a book supplier will furnish details of specific books in response to enquiries. Note, that communications involving external entities are only included where they involve the 'system' process. Whilst a book supplier would communicate with various agencies, for example, publishers and other suppliers - these data flow are remote from the 'system' process and so this is not represented on the context diagram.

May	June 2007							July
Sun	Mon	Tue	Wed	Thu	Fri	Sat		
27	28	29	30	31	1	2		
3	4	5	6	7	8	9		
10	11	12	13	14	15	16		
17	18	19	20	21	22	23		
24	25	26	27	28	29	30		
1	2	3	4	5	6	7		

[Next](#)

Figure 0-15 : present material in flash

**MELS MultiModal E-learning System**

Name: baka  
ID: 30482

Context Diagrams

Process Modeling  
context Diagram  
DFD  
How To Draw  
Final Exam

What is Context Diagram? Definition: an overview of an organizational system that shows the system boundaries, external entities that interact with the system, and the major information flows between the entities and the system. a context diagram is a top level of data flow diagram (some authors name it as context and start numbering DFD from level 1 data flow diagram, which others start numbering levels from 0). It only contains one process node (process 0) that generalizes the function of the entire system in relationship to external entities.

May June 2007 July  
Sun Mon Tue Wed Thu Fri Sat  
27 28 29 30 31 1 2

Next

Figure 0-16 present static material

❖ Quiz page for the Students:

1 how many processes in contex diagram?

one process  
 multi process

submit

Figure 0-17 Student's quiz

Submit: this command goes to check the answer with correct answer in the DB.

❖ **Database Data Dictionary:**

The following table describes an external database table required to connect with the Modal database tables which are classified into the users, subject, Quiz, and final Exam tables.

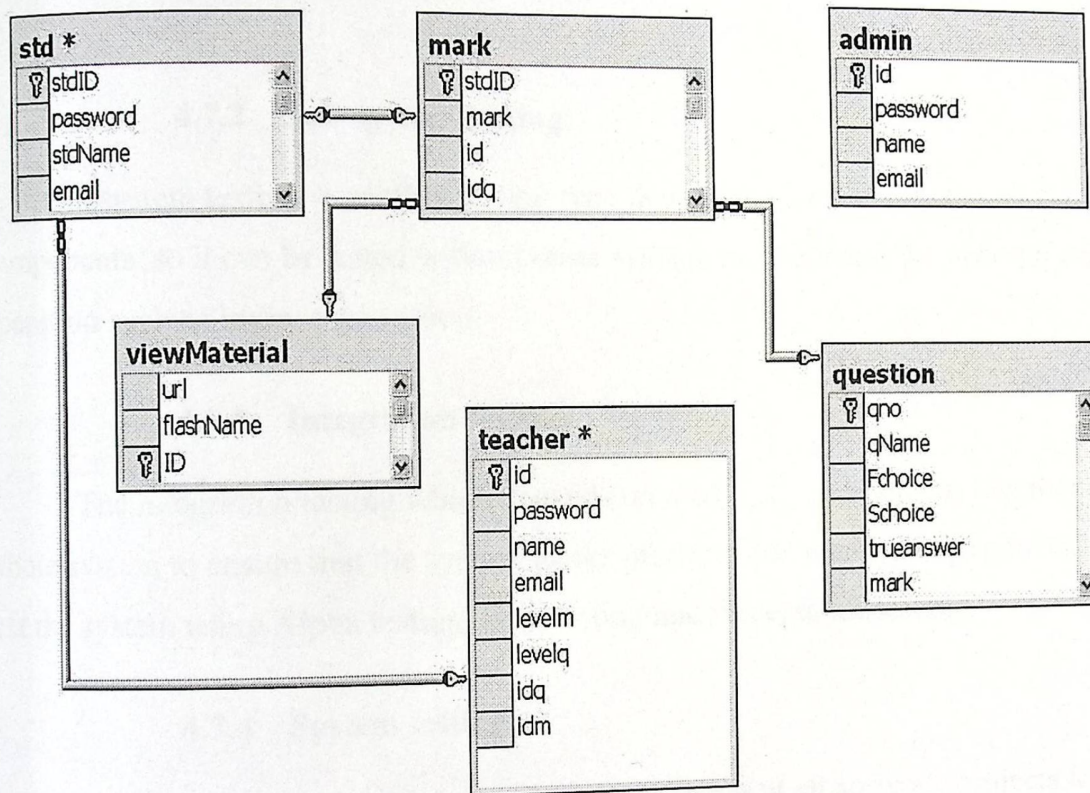


Figure 0-18 DB of the system

4.7 **Test Plan:**

Here the team describes briefly the methodology that is adapted to test the system steps as described below:

Testing Steps:



#### **4.7.1 Unit testing:**

Unit testing is one of the testing types that depend on separating or dividing the system into components to be tested separately to ensure that they are operating correctly and that meet the specifications. In this we will test the flash, browser.

#### **4.7.2 Sub-system testing:**

Subsystem testing is another testing type that depends on testing the related system components, so it can be tested without other system components. We will test the main operation such as login, registration.

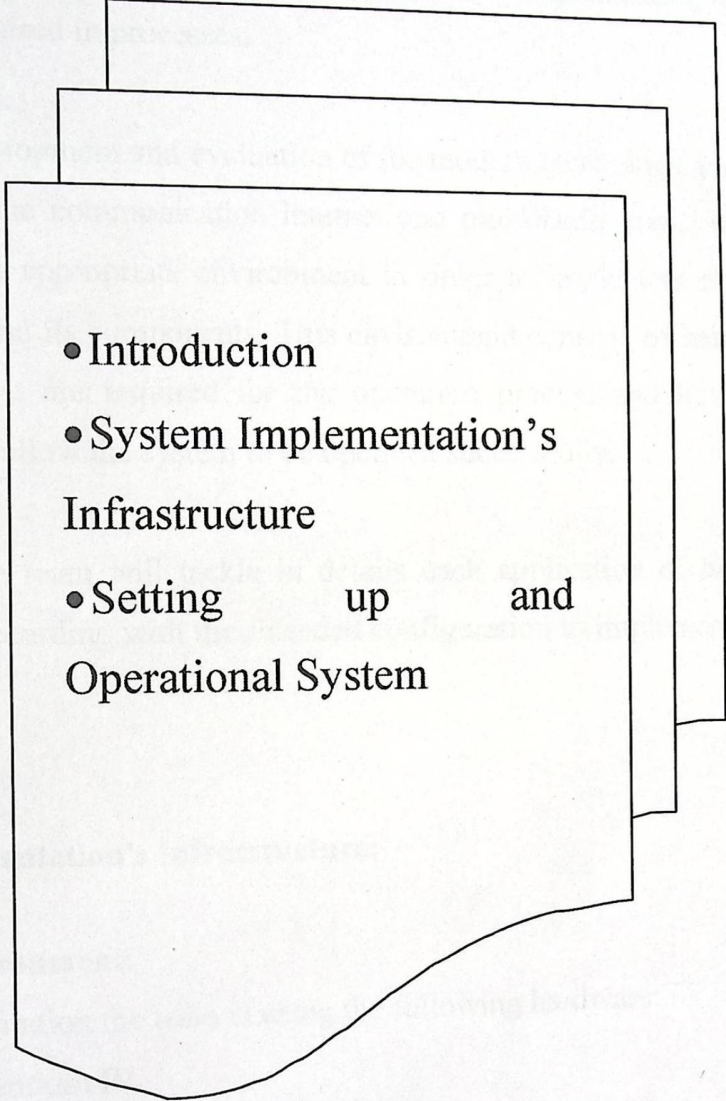
#### **4.7.3 Integration testing:**

The integration testing which depends on testing all components together as a whole system to ensure that the system works properly and meets the specification. We test the system using Alpha testing, Beta testing and Acceptance testing.

#### **4.7.4 System testing:**

System testing is one of the most important stages at all software projects to ensure that the system meets its specifications and is working as properly as expected, and that it avoids any problems and error

# Chapter Five: Implementation

- 
- Introduction
  - System Implementation's Infrastructure
  - Setting up and Operational System

## 5.1 Introduction:

In this chapter the team will take in detail the process of implementing the system and the environment that used in processes.

Convoing the development and evaluation of the modern technology and learning fundamentals for using the communication internet and multimedia tools, it becomes important to develop the appropriate environment in order to implement and operate such e-learning project and its components. This environment consists of hardware and software components that are required for the operation process and how they are installed and prepared to allow the system to be operated successfully.

In this chapter, the team will tackle in details each application of hardware and software requirements according with their needed configuration to implement the system software.

## 5.2 System Implementation's Infrastructure:

- **Hardware Environment:**

For the system implementation the team is using the following hardware:

1. Desktop computers Pentium IV.
  - 2 GHz, 512 MB RAM 40 GB HD, Monitor15, Keyboard and Mouse.
2. Desktop computers (Special).
  - P4, 3 GHz, 1 GB RAM, 30 GB HD.
3. Speakers.
4. Color Printer (HP DeskJet 6840 Printer series) .
5. Network Adapter.
6. Microphone.

- **Software Environment:**

1. Microsoft windows XP Professional.
2. Microsoft Office 2003 Professional Edition.
3. Microsoft Visio upgrade version: to draw models such as DFD.
4. PhotoShop V.8: for images processing.
5. Macromedia Flash Mx 8: to be used in design flashes and animation.
6. Macromedia Captivate: for learning student how to draw DFD.
7. MySQL2000: present the database that we used in the project.
8. ASP.Net 2003: the environment that we used to develop project.
9. DSL Connection (128 KB): for searching the web.
10. Internet Explorer: for browsing project.
11. Adobe Acrobat Reader: used some files that extended .pdf file.

### 5.3 **Setting up the Required H/W and S/W:**

#### 5.3.1 **Setting Hardware and Operating System:**

The operating system required Microsoft Windows XP professional. The team chooses to install Microsoft Windows XP professional which is a powerful operating system; it supports many features needed in this project. Hardware requirements are three PC's and other supporting hardware tools as it is mentioned above.

#### 5.3.2 **Installing MySQL 2000:**

"MySQL, the most popular Open Source SQL database, is developed and provided by MySQL. MySQL is a commercial company that builds its business providing services around the MySQL database.

MySQL is a database management system. A database is a structured collection of data. It may be anything from a simple shopping list to a picture gallery or the vast amounts of information in a corporate Network. To add, access, and process data stored in a computer database, you need a database management system such as MySQL

Server. Since computers are very good at handling large amounts of data, and database management.[4]

"MySQL is downloaded free of charge. It was downloaded from this link: <http://www.mysql.com/downloads/>. After downloading the file (is about 12MB), it was unzipped and run the setup.exe program contained there in. Mysqld-nt.exe. this version of the MySQL is designed to run under Windows NT/2000/XP as a service and the operating system in this system is Windows XP.[3]

#### **- The Reasons of Using MySQL Database Server:**

"The MySQL Database Server is very fast, reliable, and easy to use. If that is what you are looking for, you should give it a try. MySQL Server also has a practical set of features developed in close cooperation with the users. One may find a performance comparison of MySQL Server to some other database managers. This project use SQL server for its database because it can adapt to large number of users and it has high security.

MySQL Server was originally developed to handle large databases much faster than existing solutions and has been successfully used in highly demanding production environments for several years. Though under constant development, MySQL Server today offers a rich and useful set of functions. Its connectivity, speed, and security make MySQL Server highly suited for accessing databases on the Internet.[4]

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stdID	password	stdName	email
1011	123456	isra'	isra@hotmail.com
2022	123	rasha	rara@hotmail.com
3033	4242	diana	hh@hotmail.com
30482	2280277	baha	baha@yashoo.com

Figure 0-19 Creating Data Base Table

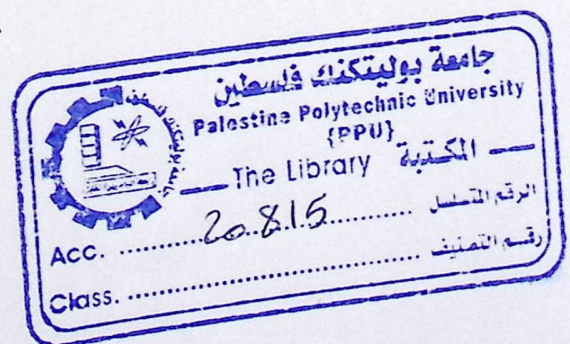
### 5.3.3 Installing Visual Basic.Net 2003:

Latest version of Microsoft Visual Basic programming language. VB.NET is a full-blown programming language that shares the common Language runtime and .NET framework class library with the other .NET Languages.

#### - The Reasons of Using Visual Basic.Net 2003:

- ▶ Ease of use.
- ▶ Integrated development environment.
- ▶ Supports multiple languages within the project.
- ▶ Supports debugging, tracing and error handling.
- ▶ GUI supported development.
- ▶ Large collection of built in controls.
- ▶ Work scenario is a Project.
- ▶ Customizable interface.

This system need integrated development environment.



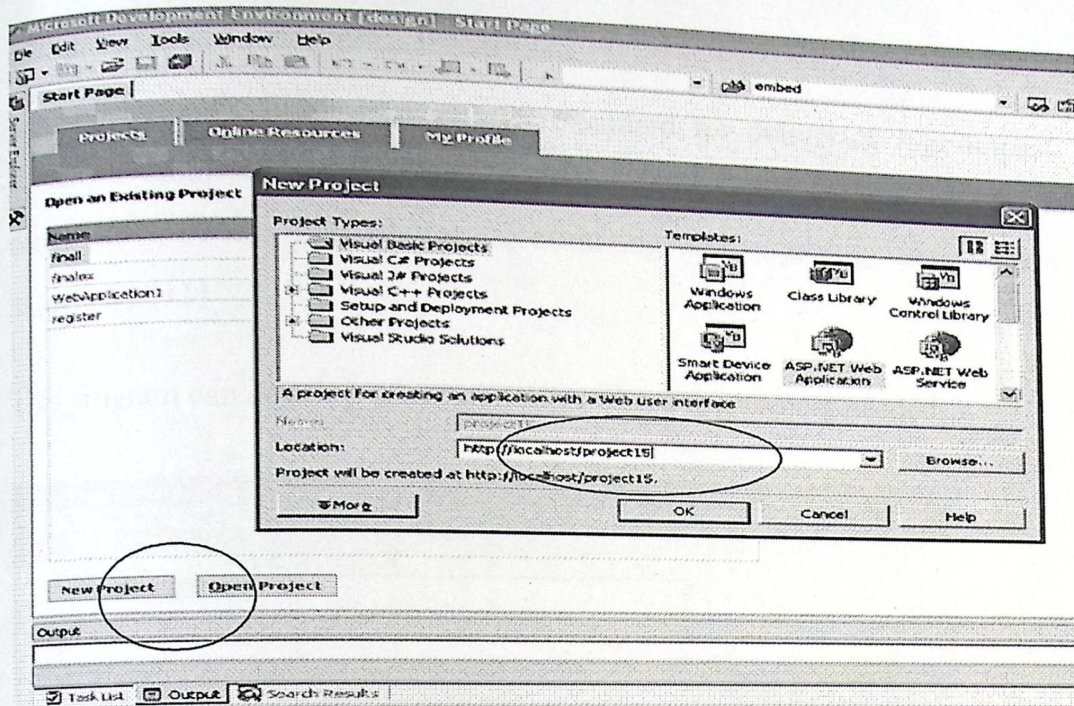


Figure 0-20 Selecting VB Windows Application

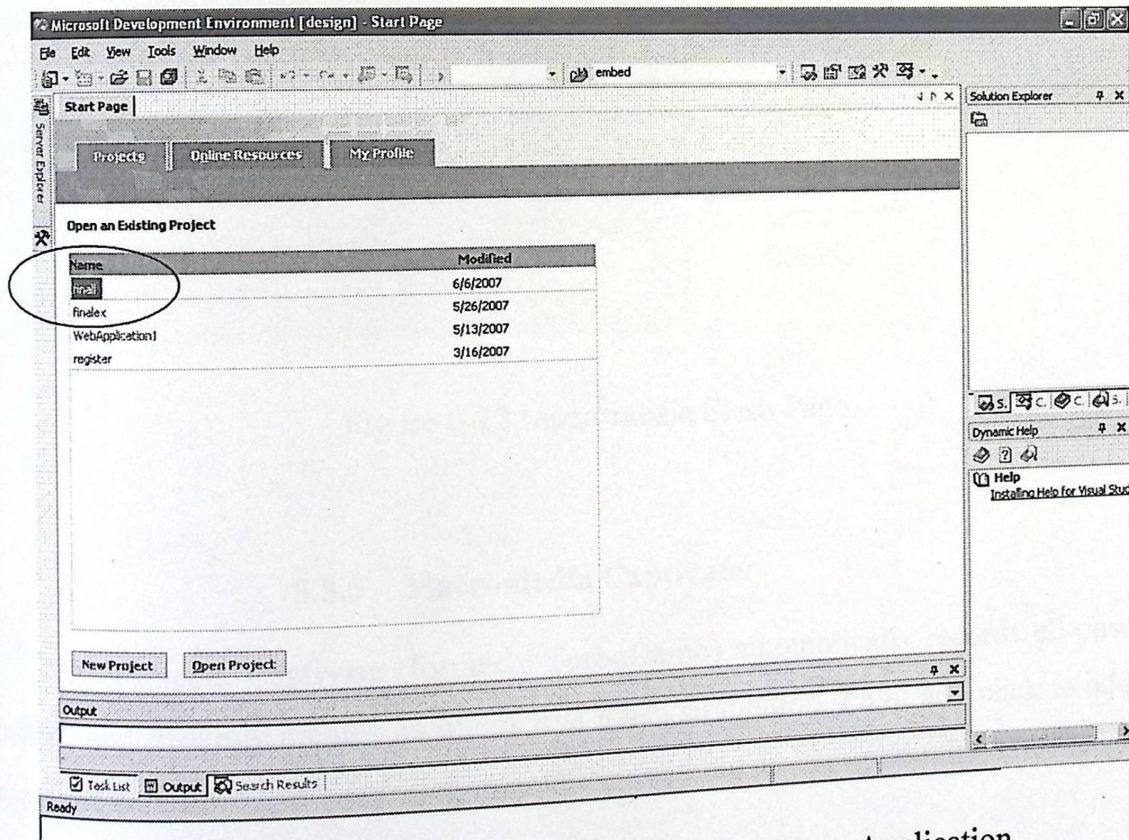


Figure 0-21 Creating and Naming VB Windows Application



### 5.3.4 Installing Macromedia flash:

Macromedia Flash Player is the standard for delivering high-impact, rich Web content. Designs, animation, and application user interfaces are deployed immediately across all browsers and platforms, attracting and engaging users with a rich Web experience.[11]

This program can develop easy animation where this project needed.

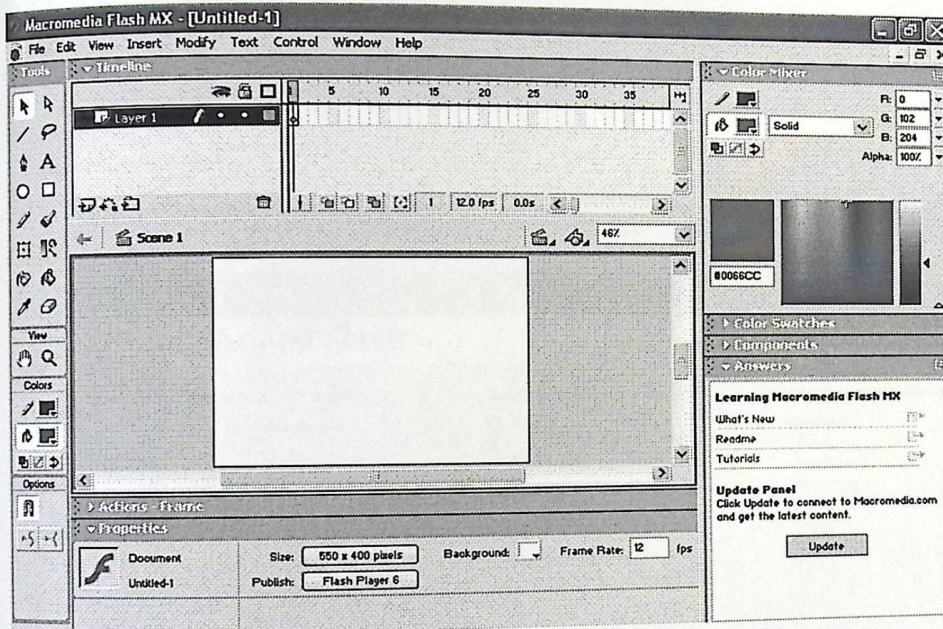


Figure 0-22 Macromedia Flash Page

### 5.3.5 Macromedia Captivate:

Macromedia Captivate (formerly TurboDemo) automatically records all onscreen actions and instantly creates an interactive Flash simulation. Point and click to add text captions, narration, and e-learning interactions without any programming knowledge.

Captivate can automatically generate text captions for you, allowing you effortlessly to generate fully annotated simulations and demos. You can use these simulations as an effective way to show your applications.[5]

Enhance your simulations by easily adding:

- Captions, audio, and images

- Flash animations and video
- Interactions with branching and scoring
- Highlights, hyperlinks, rollovers, and more

This system need movies to describe how we draw the DFD and context diagram, this program can make them easy.

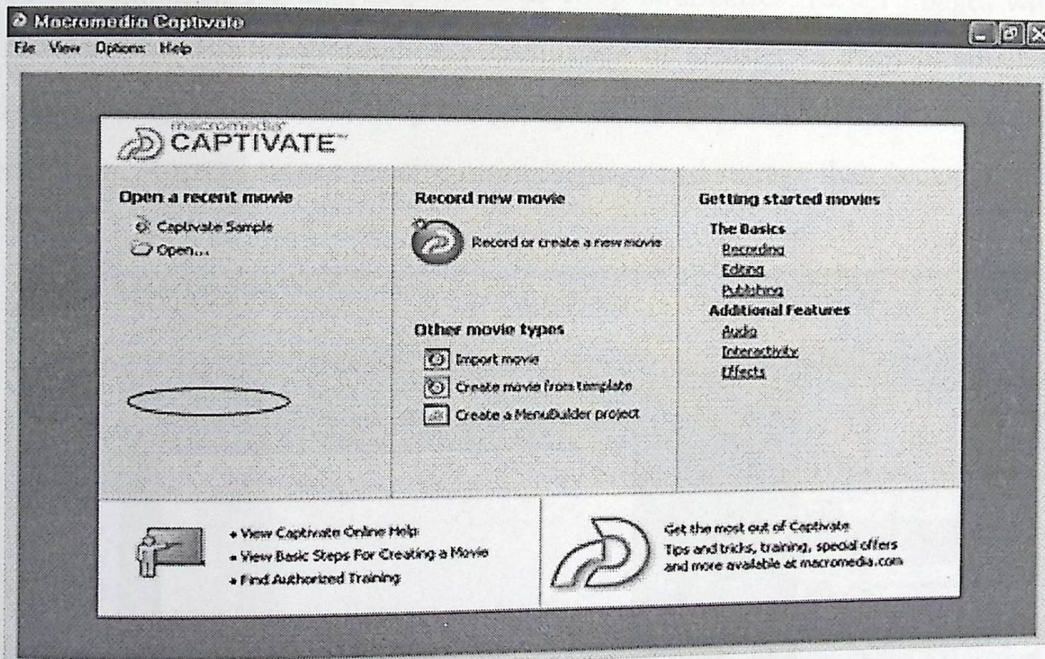


Figure 0-23 Selecting New Captivate Page

### 5.3.6 Installing Photoshop:

Adobe Photoshop is a tool for creating digital graphics either by starting with a scanned photograph or artwork or by creating the graphics within the program. Photoshop can help the user to resize, retouch, and color digital images, and moreover, add other computer effects.

Photoshop is a graphics based program created with images known as raster graphics. Other graphic applications, i.e. Illustrator, Corel Draw and Freehand, create vector graphics. Vector graphics are composed of solid lines, curves and other geometric shapes that are defined by a set of mathematical instructions. Vector images work best for type and other shapes that require clear crisp boundaries. Raster images work best with photographs. Raster graphics are comprised of a raster (a grid) of small squares called pixels. Objects in Photoshop are groups of many pixels – each of which can be a different color. Raster images require more memory and storage than vector images.[5]

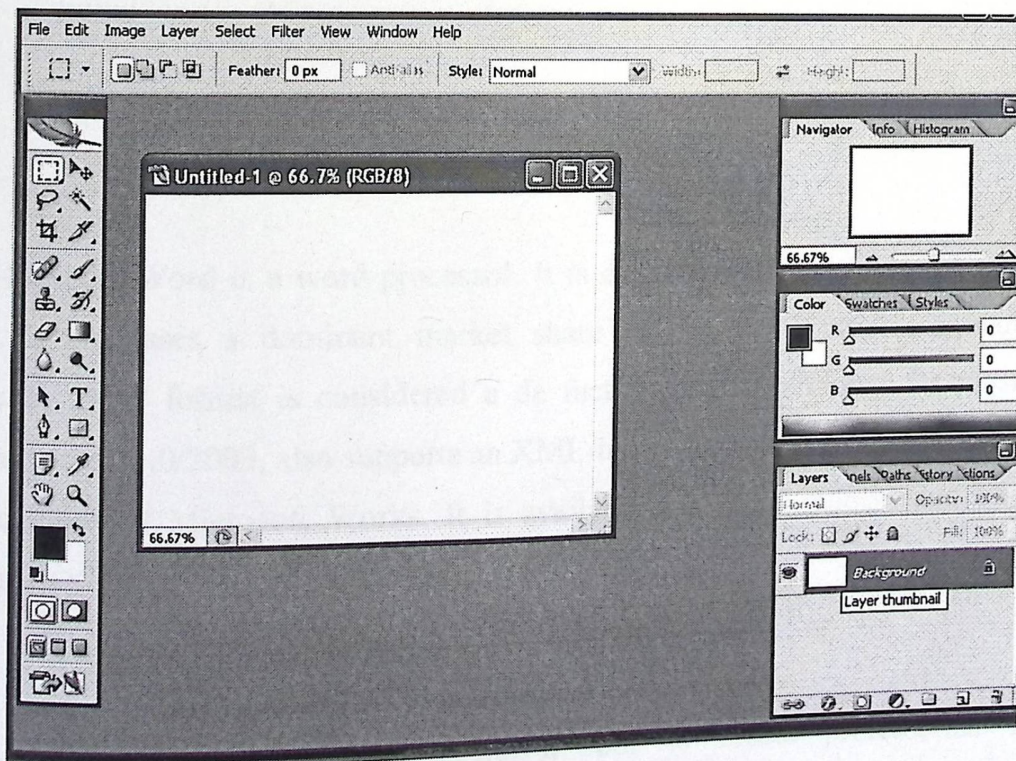


Figure 0-24 Starting Photoshop Page.

### 5.3.7 Installing Microsoft Office:

Microsoft Office is a suite of productivity programs created by Microsoft and developed for Microsoft Windows and Apple Macintosh operating systems. As well as the office applications, it includes associated servers and Web-based services. Recent versions of Office are now called the 'Office System' rather than the 'Office Suite' to reflect the fact that they include Servers as well.

Office made its first appearance in the early '90s, and was initially a marketing term for a bundled set of applications that were previously marketed and sold separately.

The main selling point was that buying the bundle was substantially cheaper than buying each of the individual applications on their own. The first version of Office contained Word, Excel and PowerPoint.

#### - **Microsoft Office word:**

Microsoft Word is a word processor. It is considered to be the main program of Office. It possesses a dominant market share in the word processor market. Its proprietary DOC format is considered a de facto standard, although its most recent version, Word 11.0/2003, also supports an XML-based format. Word is also available in some editions of Microsoft Works. It is available for the Windows and Macintosh platforms.

#### - **Microsoft Power Point:**

Microsoft PowerPoint is a powerful tool to create professional looking presentations and slide shows. PowerPoint allows you to construct presentations from scratch or by using the easy to use wizard.

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#### - **Microsoft Power Point:**

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### 5.3.8 Installing Adobe Acrobat Reader.

Adobe Acrobat was the first software to support Adobe Systems' Portable Document Format (PDF). It is mostly described in those entries. The Acrobat Reader program (now just called Adobe Reader) is available as a no-charge download from Adobe's website, and allows the viewing and printing of PDF files.

Several other commercial PDF-editing programs allow some minimal editing and adding of features to documents, and come with other modules including a printer driver to create PDF files from Macintosh or Microsoft Windows applications.[5]

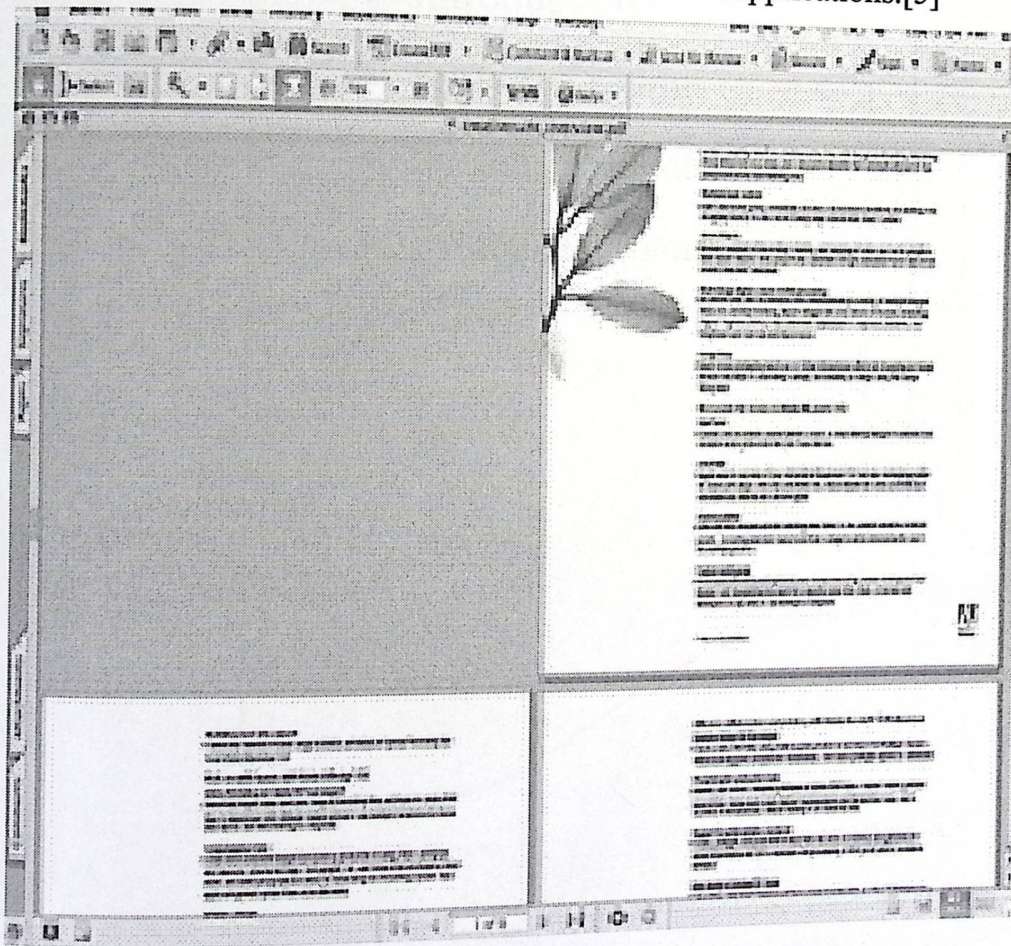
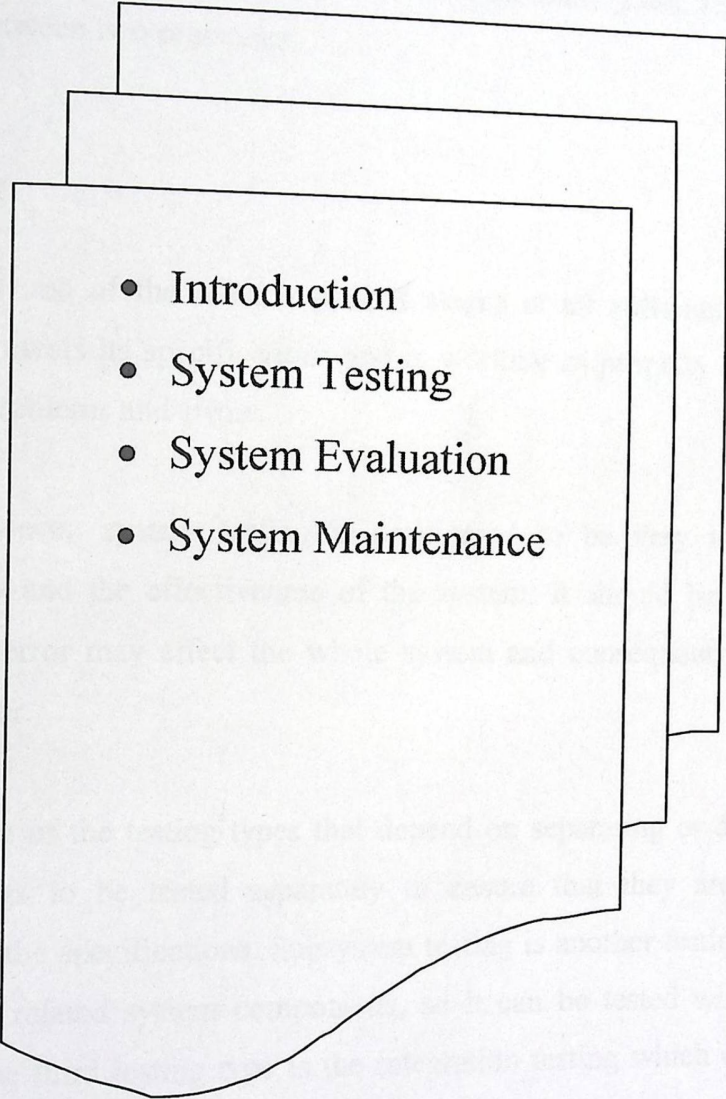


Figure 0-25 Starting Adobe Acrobat Reader Page

# Chapter Six: Testing and Maintenance

- 
- Introduction
  - System Testing
  - System Evaluation
  - System Maintenance

## 6.1 Introduction:

The testing and evaluation are separated processes in almost all software projects, they are considered to be lightly related as they both have the same goals. The following explains the relation between two processes.

## 6.2 System Testing:

System testing is one of the most important stages at all software projects to ensure that the system meets its specifications and is working as properly as expected, and that it avoids any problems and errors.

In e-learning projects, system testing is considered to be very important in checking the efficiency and the effectiveness of the system. It should be taken in to consideration that any error may affect the whole system and consequently any other related errors may appear.

Unit testing is one of the testing types that depend on separating or dividing the system into components to be tested separately to ensure that they are operating correctly and that meet the specifications. Subsystem testing is another testing type that depends on testing the related system components, so it can be tested without other system components. The third testing type is the integration testing which depends on testing all components together as a whole system to ensure that the system works properly and meets the specification.

Integration testing can be divided into alpha testing which may be operated through the system developers or other expert specialists. The second type is Beta testing which is another integration testing operated through common users to whom the system developer can provide a paper including a form of error testing report to be filled by these users in order to check any discovered errors.



Since then, system experts considered this process very important despite of its expensive cost which may be estimated to be about 50% of the whole system cost.

### **6.2.1 Unit Testing:**

The project team starts with testing each unit of the system separately in order to ensure that it meets the specifications and works properly as the following:

- Testing the operation of each button at all system interfaces and other applications.
- Testing the operations of each application links.
- Testing the operation of each multimedia application
- Testing the compatibility between the sound and the respective application for example the operation of the sound with its flashes applications.
- Testing the quality of each required sound.

After testing each system unit the team notices that each separated unit works properly.

### **6.2.2 Subsystem Testing:**

In this stage, the system related units and components are tested with each other such as:

- Testing the operation of the whole system when clicking the login link.
- Testing the operation of each application with its related components when clicking the existing buttons or links.
- Testing the operation of each related applications and that they work properly and meet their specifications.

The project team notices that all system units work properly and meet their specifications.

### **6.2.3 Integration Testing:**

#### **6.2.3.1 Alpha Testing:**

The test is concluded through both the project team members and some experts specialists, and then the discovered errors corrected in order to ensure that the system works properly and meets the specifications.

#### **6.2.3.2 Beta Testing:**

The whole system is tested through some common users with different knowledge and skills, by providing them with a form of report testing to be filled in order to check for any error. After that, the team members solve these errors according to the results of the report.

The project team notices that the system works properly without errors and meets the required specifications.

### **6.2.4 Acceptance Testing:**

This process tests if the system is consistent and compatible with its surrounded environment or not.

At this process, the team tests the following two issues:

#### **a. Functional requirements:**

The team tests the system in order to ensure that the system meets its functional requirements such as: allowing the students to learn and download the course content files from the system.

#### **b. Non-functional requirements:**

The team tests the system in order to ensure that the system meets its non-functional requirements such as: learnability, portability, flexibility, etc.

### 6.3 System Evaluation:

The system evaluation can be defined as the process of forcing the system to work through a number of standards that will explore the successfully of the system.

The project team finds that the system implements these standards which can be explored through the system non-functional requirements that achieve the concepts of usability as the following:

- **Learnability:** The system achieves the ease of learn process in that the student can learn the course through the system pages which allow the students to make browsing in an easy way.
- **Portability:** One of the system advantages is that it can be accessible by registered students through the system pages at different locations according to its portable property.
- **Predictability:** The system achieves this property when the user clicks one button, he/she will expect the way of displaying the content in a similar way.
- **Synthesizability:** The user will be sure that each button will operate its specifications successfully.
- **Consistency:** After testing the whole system, the team members ensure that each unit meets the specifications in a consistence way, in that each button, color, action and appearance will be consistence. And the whole system will operate as a consistence unit.
- **Accuracy:** The system achieves this property in that each action is performed accurately in its specific place.

After the system has been implemented, the team ensures that the system achieves the following e-learning purposes:

1. The system achieves the interaction between the user and the interface of the system.
2. The system achieves the ease of use to both user and teacher.
3. The system achieves the integrity of conveying the learning information according to the level of the user knowledge and skills.

## 6.4 Systems Maintenance

Here in this project, the Modal software support and provides the System Maintenance, so the project team doesn't explain this process as it is available through Modal software.

We can only make maintenance through Check Error Forms (you can see Appendix) to know where the errors are and correct them.

# Chapter Seven: Conclusions & Recommendations

- Introduction
- Conclusions
- Recommendations

## 7.1 Introduction:

This chapter includes project conclusions, and recommendations. Since this project is new experience in Active e-learning, we recommended enhancements on e-learning not to completely replace correct strategy of learning at PPU.

## 7.2 Conclusions:

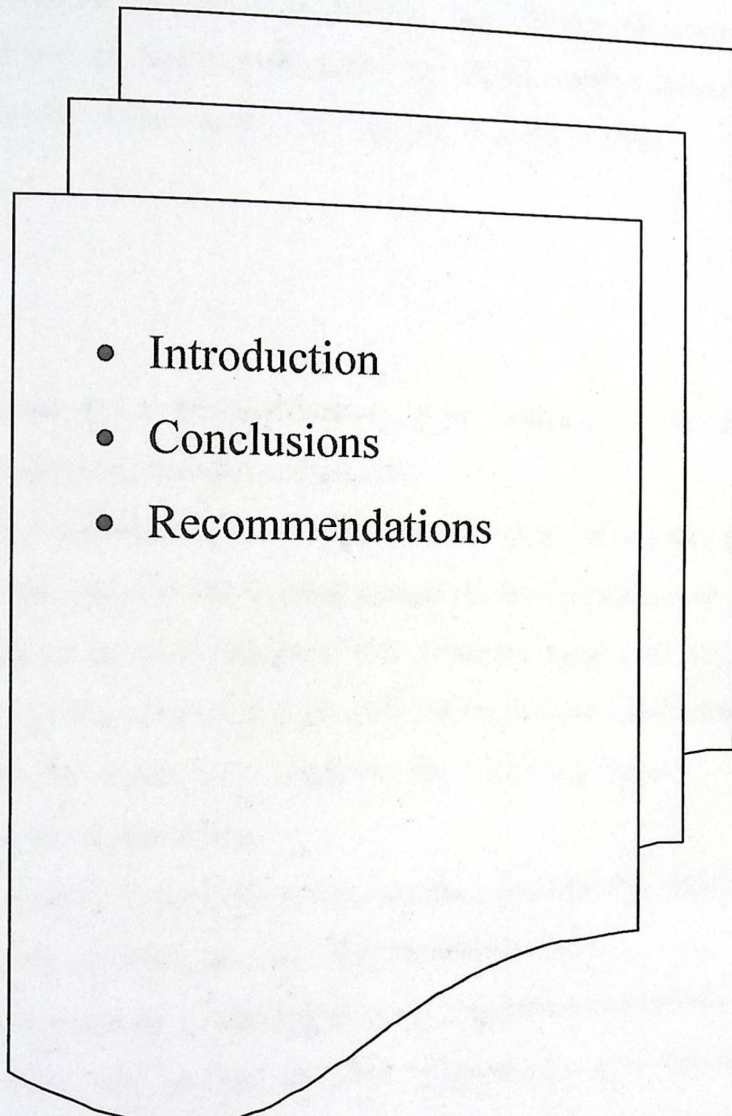
- ✎ E-learning system approves its efficiency as an enhancement learning method of the existing traditional learning techniques.
- ✎ Multimodal environment approves its effectiveness in covering the learning materials and can simplify the leaning process to both teacher and student sides.
- ✎ It is important to provide teachers and students (users of the system) with guidelines about how to use and deal with the multimodal software.
- ✎ Using multimedia tools can improve the learning process by supporting attractive material explanations.
- ✎ Working in a team has positive effects on the productivity, which enhances the work productivity and increases the system effectiveness.
- ✎ Building effective active e-learning projects requires more efforts and long time to be completed; the project requires evaluations and consultations from different views such as graphics, usability, etc. this is one of the project risks the team members face while building the project.
- ✎ To achieve the desired goals of active e-learning, developers must take in consideration the development guidelines and standards.

## 7.3 Recommendations:

- ✎ Motivate e-learning graduation projects and use them to develop e-learning courses.

- ✎ Establish a periodic training program for the students in order to provide them with assistance and guidelines about the active e-learning and other multimedia tools.
- ✎ Continuation to this project includes:
  - ✎ Building a complete courseware based on AMP strategy .
  - ✎ Evaluation of the level of learner engagement related to achievement
  - ✎ Evaluation of the project based on some characteristics of the learner such as behavior and psychology.

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Appendix

# Appendix

## Check Error Forms:

### Bug Reporting Form

**Please Fax or mail completed forms to:**

E-learning Project Team.  
 Palestine Polytechnic University.  
 Palestine, Hebron, Jabal Abu-Ruman St.  
 Phone:2235505  
 Fax:2217248

**Beta program contact:**

Name: \_\_\_\_\_  
 Title: \_\_\_\_\_  
 Company: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_  
 Phone no: \_\_\_\_\_  
 Fax: \_\_\_\_\_

**System configuration:**

CPU: \_\_\_\_\_ Clock speed: \_\_\_\_\_ MHz      Manufacturer: \_\_\_\_\_  
 Hard disk capacity: \_\_\_\_\_ Currently available: \_\_\_\_\_ RAM: \_\_\_\_\_  
 System software: \_\_\_\_\_ Monitor: \_\_\_\_\_

**Summary of the problem:**

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**Description of the bug:**

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**Replication steps:**

If the bug is reproducible, please describe how to do so:

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