

**DESIGN AND IMPLEMENTATION OF
DISTANCE LEARNING ARCHITECTURE
BASED ON ELECTRONIC GOVERNMENT
METHODOLOGIES**

KAMEL F. K. SHBAIR
M.Sc. Dissertation

Computer Engineering Program
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JÜRİ VE ENSTİTÜ ONAYI

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	Adı-Soyadı	İmza
Üye(TezDanışmanı)	:Prof.Dr.Yaşar HOŞCAN
Üye	:Yard.Doç.Dr. Mehmet KOÇ
Üye	:Yard.Doç.Dr. Alper Kürşat UYSAL

Anadolu Üniversitesi Fen Bilimleri Enstitüsü Yönetim Kurulu'nun
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Enstitü Müdürü

ABSTRACT

M.Sc. Dissertation

DESIGN AND IMPLEMENTATION OF DISTANCE LEARNING ARCHITECTURE BASED ON ELECTRONIC GOVERNMENT METHODOLOGIES

KAMEL F. K. SHBAIR

**Anadolu University
Graduate School of Sciences
Computer Engineering Program**

**Supervisor: Prof. Dr. Yaşar HOŞCAN
2015, 75 Pages**

Nowadays, the advent of technology has accelerated rapidly; this is going parallel with the increasing of our demands. New technologies have been invented in order to make our life easier. Therefore, this dissertation deals with one of these technologies, which is the Distance Learning (DL). It provides more facilities to the clients in the societies where the people are living in unstable areas, such as Palestine, South Africa, Syria, Iraq, Afghanistan, and so on.

Distance Learning provides good environment for all the users where a portal site is used to manage the available data solve. The Electronic Government Methodologies & Models (EGM) is used for the system design services for all the users especially for students in the field of educational process. In addition, the advantage and characteristics of the concept of DL have been used to design and implementation services for this system and blending its concept with EGM for production the system. This dissertation proposes a portal site with a Distance Learning Architecture (DLA) based on EGM. An integrated portal site will be analyzed in their functions. However, the program “portal site” is designed and it is implemented as a case study in Palestine. Finally, the portal site has been developed using PHP & MySQLi.

Keywords: Distance Learning & Architecture, Electronic Government & Methodologies, PHP, MySQLi, DL portal site, Design & Analyze system.

ÖZET

Yüksek Lisans Tezi

E-DEVLET METODOLOJİLERİ TEMELLİ UZAKTAN ÖĞRENME MİMARİSİNİN TASARIMI VE GERÇEKLEŞTİRİMİ

KAMEL F. K. SHBAIR

**Anadolu Üniversitesi
Fen Bilimleri Enstitüsü
Bilgisayar Mühendisliği Anabilim Dalı**

**Danışman: Prof. Dr. Yaşar HOŞCAN
2015, 75 Sayfa**

Günümüzde teknolojinin gelişimi hızlı bir şekilde ivme kazanmıştır. İsteklerimiz de bu gelişime paralel olarak artmıştır. Yaşamlarımızı kolaylaştıracak yeni teknolojiler geliştirilmiştir. Bu nedenle bu tez çalışmasında, bu teknolojilerden biri olan Uzaktan Eğitim (Distance Learning) ile ilgilenilmiştir. Uzaktan Eğitim özellikle Filistin, Güney Afrika, Suriye, Irak, Afganistan gibi bir çok istikrarsız ülkelerdeki insanların eğitim alabilmeleri anlamında önemli bir imkan sağlamaktadır.

Uzaktan Eğitim (UE), barındırılan bilgiyi yönetmek için kullanılan bir portal sitede tüm kullanıcılarına iyi bir ortam sağlar. Elektronik Devlet Metodolojileri ve Modelleri (EGM) özellikle eğitsel süreçte bulunan öğrenciler olmak üzere tüm kullanıcılara sistem dizayn hizmetleri sunmak için kullanılır. Ayrıca bu sistemin tasarım ve uygulama aşamasında uzaktan eğitim kavramının avantajları ve karakteristiği kullanılmış ve sistemin üretimi için EGM sistemi ile harmanlanmıştır. Bu tez çalışmasında, EGM tabanlı Uzaktan Eğitim Mimarisi (DLA) ile oluşturulmuş bir portal sitesi önerilmektedir. Entegre edilmiş bir portal site fonksiyonları ile birlikte incelenecektir. Bunun yanı sıra, "Portal Site" adlı program Filistin'de bir durum çalışması olarak tasarlanmış ve uygulanmıştır. Sonuç olarak portal site PHP ve MySQLi kullanılarak geliştirilmiştir.

Anahtar Kelimeler: Uzaktan Eğitim & Mimari, Elektronik Devlet & Metodolojileri, PHP, MySQLi, UE Portal Sitesi, Tasarım & Analiz Sistemi.

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ABBREVIATIONS

DL	:	Distance Learning
EGM	:	Electronic Government Methodologies & Models
EG	:	Electronic Government
EGMA	:	Electronic Government Models & Architecture
G2C	:	Government to Citizens
G2E	:	Government to Employee
G2G	:	Government to Government
G2B	:	Government to Businesses
B2C	:	Businesses to Citizens
B2B	:	Businesses to Businesses
C2C	:	Citizens to Citizens
DL	:	Distance learning
MOOCs	:	Massive Open Online Courses
RGB	:	Red & Green & Blue Colors
CMYK	:	Cyan & Magenta & Yellow & Black Colors
PSD	:	adobe PhotoShop Document file.
DFD	:	Data Flow Diagram
LZ	:	Level Zero Diagram
NFR	:	Nonfunctional Requirements
FR	:	Functional Requirements
CD	:	Context Diagram
ERD	:	Entity Relationship Diagram
PK	:	Primary Key
FK	:	Foreign Key

1. INTRODUCTION

In our world, Technology is entered into each detail of our lives, that is because the technology is growth reapidly. Therefore, all the developed countries are working on harnessing the technology to serve its citizens and its nation. One of the these technolgy is the Electronic Government (EG) [13, 14] which is used to serve the people while they are sitting in their homes. In the follwoing sections we are going to demonstrate the basic concepts that will be used in our study.

1.1. Introduction to Electronic Government

In the last few years, the scientists, intellectuals, and engineers specialists in the field of Information Technology (IT) have done a lot on the developments in the IT infrastructure of the government action, among both of citizens and government regulation, or between governments. In the following subsections we will discuss the most important terms that illustrate the concept of the Electronic Government (EG) and how it works and which models it uses.

1.1.1. Traditional Government Agency Structure

Figure 1.1 shows the traditional government agency structure:

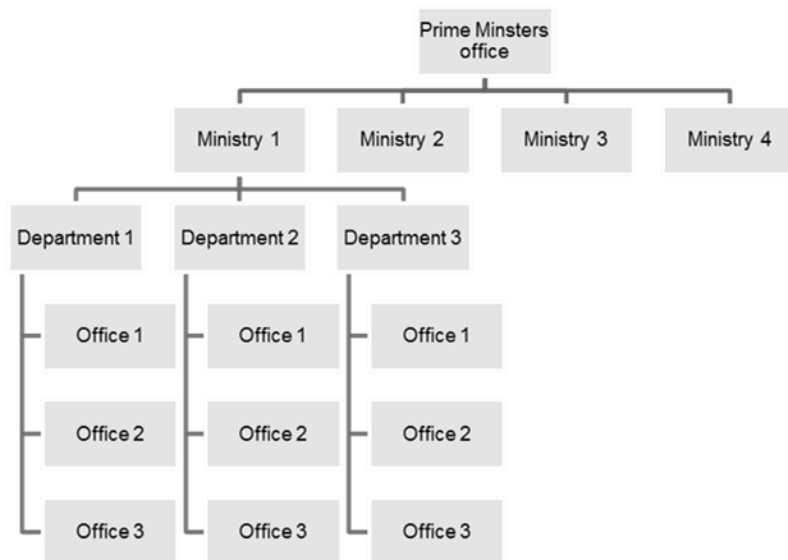


Figure 1.1. Traditional Government Agency Structure.

This is a sample shape for any government, and from this shape we conclude that all the ministries are connected to each other. That means we have huge data that the government is dealing with.

1.1.2. The Concept of Electronic Government

The Electronic Government (EG) trading as **e-Gov**, E-Government, internet government, digital government, online government, electronic government, and connected government.

Electronic Government is an ongoing process of transformation of government towards the provision of government services represented into information, and transactions through electronic means, including access to government information and the completion of government transactions in an “anywhere, anytime” basis [1]. Information Technology (IT) and the Internet are the enabling tools to enable us to deliver information and conduct transactions on an anywhere and anytime basis. In other words, our goal is to leverage technology to enhance our service.

The key word here is transformation. Information and Communication Technologies (ICT) [12] are only the means, not the ends to Electronic Government (EG). Electronic Government means that we should treat our citizens as our customers, as our clients, and our job is to provide top quality service to our customers.

On the other side, others define the Electronic government essentially as the utilization of Information Technology (IT), Information and Communication Technologies (ICT s), and other web-based telecommunication technologies to improve and/or enhance the efficiency and effectiveness of service delivery in the public sector.[2]

In simple words the definition can be shortened as: using the technology in our life. For example, technology has to be used in our daily transactions, getting information, getting a service from the competent authority, doing business, and also for learning, so on.

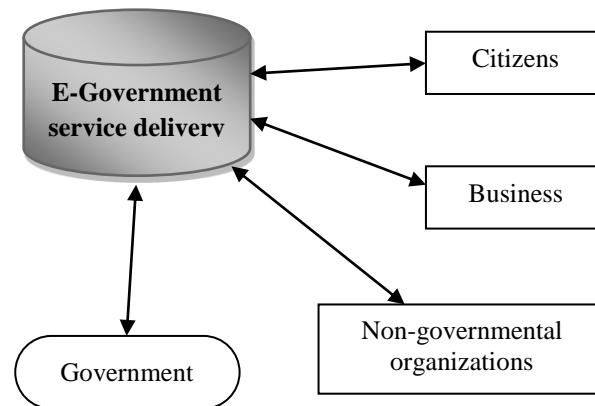


Figure 1.2. E-Government target agents.

1.1.3. Electronic Government Models & Architecture

Primarily, Electronic Government Models and Architecture (EGMA) can be handled briefly in a summed up depending on electronic services as follow:

1.1.3.1. G2C Models

This model depends on two basic elements, consumer “citizen” and government. A model applies the strategy of Customer Relationship Management (CRM) with a business concept. It can provide the needed services to fulfill the needs of the customer. Under this model, Government to Employee (**G2E**) model has been included. This is due to the fact that the nature of the employee is a citizen. The **G2E** Model based on two elements: Government and employees. The government will enable for the employee to work within a safe environment, and work will be as soon as possible and efficiently. **G2E** model is the online interaction between local and central government and other ministries through the employees of the government. For example, the transactions between different ministries in a government, such as between the interior ministry, health ministry, education ministry, the agriculture ministry and etc, all of these deals are under the G2E model.

1.1.3.2. G2G Models

E-government is a fairly broad subject matter; it is related to how the services and representation are now delivered and how they are being implemented. This model depends on one basic element, Government. Nowadays, the strategy governments are trying to use their efficiencies of their techniques to cut down any wasting of the resources. The international deals between different governments in different countries can be done by using electronic systems methods. One of the good example for applying the electronic system is the passport systems, where the passengers can access by using their passports depending on the existence of their data electronically in several databases.

1.1.3.3. G2B Models

The **G2B** Model is based on two elements: Government and businesses. The government will allow the customers to access to the data, services, and information that will help them to do their business. This model refers to the conduction through the Internet between government agencies and trading companies, for example, the general or professional transactions between the company and the district, city, or federal regulatory agencies.

1.1.3.4. B2C Models

It refers to the conduction of transactions between business bodies and citizen via the internet. This service can be sold or bought or any other activity can be done via the internet.

1.1.3.5. B2B Models

It refers to the conduction of transactions between business bodies and business bodies via the internet. It is between companies or businessmen officially.

1.1.3.6. C2C Models

It refers to the conduction of transactions between Citizens and Citizens via the internet.

The Electronic Government Models and Architecture (EGMA) is illustrated in **Figure 1.3**.

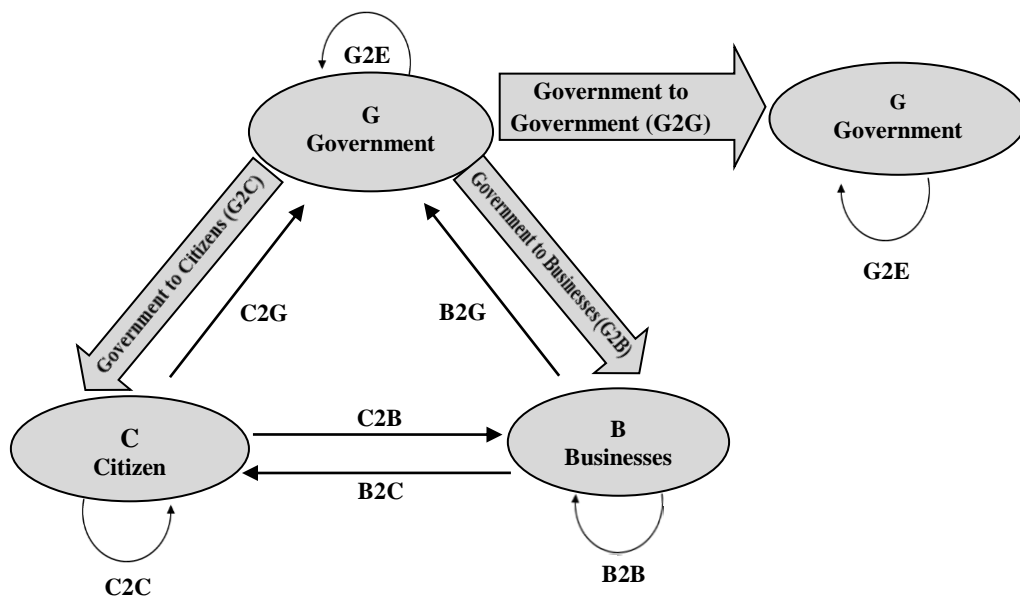


Figure 1.3. E-Government Architecture Models.

The strategic objective of EG is a support and simplify governance for both citizens and government and also for businesses. Also, the internal objective of EG is significant cost savings (per transaction) in government operations could be the result. Finally, an external objective of EG is fulfilling the public as needs and expectations satisfactory on the front-office side, by simplifying the interaction with various online services. Finally, EG is defined as the relationship between the citizens and the government. EG is ICT, efficiency working, productivity, reach, sharing of information, service delivery and welfare. The subsections under the EG are e-Health, e-Education, e-Municipal works, local government, and e-Personnel citizens etc. **Figure 1.4** explains the focal domain for the EG initiatives.[9]

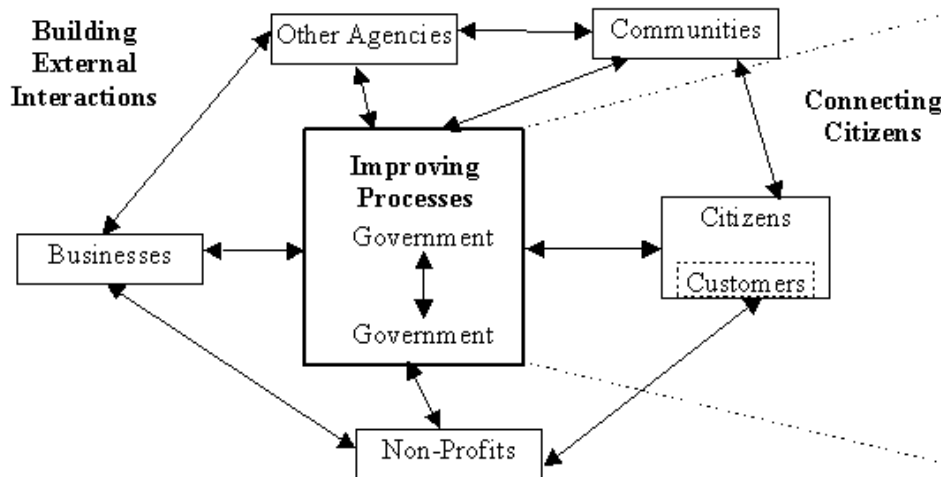


Figure 1.4. Focal Domains for EG Initiatives.

1.2. The Concept of Distance Learning

The distance education through the distance learning architecture has a great importance in our daily life. The basic concepts and characteristics of the both terms will be explained in this study.

1.2.1. Distance Learning

Distance Learning (DL) is a procedure of delivering education and instruction. It is used in some circumstances, such as with students who have disabilities which do not allow them to educate in normal classrooms. In addition, it uses in unstable areas for education due to wars. In general, distance learning provides access to learning when the source of information and the learners are separated by time and distance, or by both.[3]

Distance education courses that require a physical on-site presence for any reason “excluding taking examinations” may be referred to as hybrid [4] or blended [5] courses of study. Massive Open Online Courses (MOOCs) [15, 16], aim to large-scale interactive participation and open access via the web or other network technologies, are developed in distance education recently. A number of other terms (distributed learning, e-learning, online learning, etc.) are used

roughly synonymous with distance education. However, distance is the oldest and a most commonly used term globally.

1.2.2. The Characteristics of Distance Learning

The main elements which are connected to the distance learning are:

- o Quasi-permanent separation of teacher and learner throughout the learning process.
- o The majority of educational communication between the teacher and students occurs non-contiguously.
- o Must involve two-way communication for supporting the educational process.
- o Influence of an educational organization.
- o Use of technical and technology media.
- o Two-way communication between teacher and learner.
- o Quasi-permanent absence of learning group.

1.2.3. The Services Provided From Distance Learning

The services have provided by this dissertation can be divided to employees within the educational institution, students and the government. Details are as follows:

1.2.3.1. Students

The most important points that are related to the student areas:

- o Accessibility, Ease of use.
- o Availability, Easy access to educational materials.
- o Appropriateness, Ease of working and learning within a safe environment.
- o Ease of communication with faculty members.
- o Progress to the demo exams.

1.2.3.2. Teachers

The most important points that are related to the teacher areas:

- o Accessibility, Ease of use.
- o Communicate and provide the required support to the student.
- o Performance of the required work.
- o Control and add educational materials
- o Computerized online exam.

1.2.3.3. Educational Organization

The most important points that are related to the educational organization areas:

- o Will be able to provide educational services.
- o Enable it to follow up the students and put them under observation.
- o The success of its work means success for their own.

Finally, DL has some advantages are available at any time “delayed interaction between teacher and student”, The material can easily be kept up-to-date, and available at any place “computer and internet connection are necessary”. At the same time, DL has some disadvantages for the students' and teachers' perspective. The disadvantages for students are no direct contact with teachers, the student cannot interact with other students, and might take time until questions of the students are answered. In other side, the disadvantages for the teacher do not know his students, the teacher takes a lot of time to prepare or update good teaching material provided in the web, and finally, the teachers get a lot of questions outside his business hours.

This disadvantages will have solved in our a portal site with determining an online lesson at least one time in a week. It will be the interaction between all the students and the teacher. Also, the teacher will be able to answer most questions from students at the time.

1.2.4. The Dissertation and Organization of Work

The preliminary study of distance learning architecture based on Electronic Government (EG) is explained in Section 2. This section covers description of the project, the definition of the system, the system goals, beneficiaries of the system, boundaries of system, building of the system tool, and feasibility study of the system. The system development methodology and the advantage of the used of the concepts of Electronic Government (EG) and Distance Learning (DL), besides the strategy and methodology that are used in this dissertation will be presented in Section 3. In Section 4, the data collection, Classification of Requirements (CR), Nonfunctional Requirements (NFR), Functional Requirements (FR) and the analysis are presented. Section 5 presents the design and the algorithm, Data Flow Diagrams (DFD), Context Diagram (CD), description of DataBases (DB), Entity Relationship Diagram (ERD), tables, and Web Interfaces. Finally, overall concluding remarks of the dissertation and potential future works are discussed in Section 6.

2. PRELIMINARY STUDY FOR DISTANCE LEARNING ARCHITECTURE BASED ON ELECTRONIC GOVERNMENT

Before starting the work and the details of the project within a systematic plan to avoid errors, we have provided the actions of inspection for the project properties. So we explain all of the details in a preliminary study.

2.1. Description of the Project

This project is one of the dozens of projects that are intended to ease and facilitate daily transactions for citizens, exactly for the students. The project will save the efforts and time of the “students” during the process of learning and education. It also serves the students within the circumstances that hinder the educational process such as wars, the lack of a sufficient number of schools and classrooms, the economic situation of each of the state and the students alike and so on.

On the other side, the system serves the government and the state. It economizes for the government economically and it allows the governments to work under difficult circumstances.

Finally, it facilitates the work of teachers by providing good channel of communication between them and their students.

2.2. Definition of the System

Definition of System can be determined from each of subjects, services, reasons and the goals of the system.

2.2.1. Subject of the System

It is an integrated portal site system that serves both of educational organization, students and ministry of education represented by government in any state and the students through the internet, it is working quickly and it facilitates the completion of tasks for all parties.

2.2.2. Reasons for Choosing the System

- o Science and technology are evolving dramatically and immediately. It is worthwhile to be using all of that for citizens, students, and government service.
- o The bad learning environment that result from a bad economy, war, poverty and poor living conditions in the countries.
- o To benefit from the concept of an Electronic Government technology and the concept of distance learning, and connect those parts to serve the students.
- o An online work for both of students and government will save more of the wasted resources.
- o When building such its system, will master all skills and concepts of Electronic Government (EG), distance education and learning, databases, system analysis, information security, and other concepts of Object Oriented programming (OOP) [19, 20].

2.3. System Goals

Simply, the system will use to serve both of the students, educational organization and government through the following points:

- o Create a suitable environment for students learning and education.
- o Provision of the time and effort of the staff and students.
- o High-speed in data mining, data retrieval & access, data transfer, data updating, data documentation, data recovery, data flow and query.
- o Accuracy in the entry and output by putting the necessary controls.
- o Provide high efficiency in the contact between the government and students.
- o Save and store historical data for a previous year.
- o Speed of a completion of administrative processes.
- o Working on the development work in educational organization.

- o The Government can access to the students information and their education levels.

2.4. Beneficiaries of the System

Will be addressed in more detail in section 4 and 5. But now point out to the most important points of the beneficiaries of the system.

2.4.1. Government

The government will be able to provide educational services under any circumstances through a portal site, as well as it enables to follow the students and put them under observation.

2.4.2. Students

- o The student can view the educational process news and declarations.
- o Students can access to educational materials through the portal site.
- o Students can communicate with the teachers to discuss the topics, lessons and guidance services.
- o The student can submit their duties and their homework's.
- o Students can benefit from the online exam, known as Demo Electronic Exam (DEE).

2.4.3. Faculty Members & Educational Organization

It can be classified the employee of an educational organization as faculty members 'Teachers' for educational materials and education; and a project manager for management of the system.

2.4.3.1. Project Manager

The project manager can endorsement of grades, making a decision, then pass it, concurrently he can control the system in general. Also, he manages

semesters, educational materials, teachers, and administrative affairs for both students and teachers and finance. Therefore, in section 4 will be analyzing the requirements project manager after divided into academy director, administrative director, and financial manager according to their respective functions.

2.4.3.2. Teacher

- o The teacher can control and add educational materials according to its competence.
- o Teachers can communicate with the students to discuss the topics, lessons and guidance services.
- o Teachers can create and prepare computerized online exam.
- o Initially and in principle, teacher control adoption of grades for their students.

2.5. Boundaries of System

The project is accommodating a request of an operation of students. It has taken into consideration the secrecy and security through specialization of a username, password and the security of users.

2.6. System-Building Tools

It can divide the system building tools into four sections database building tools, Web page building tools, image processing tools and tools for dynamic access to data.

2.6.1. Database Building Tools

MySQLi will be used as database in this portal site. They are considered as one of the relational databases. In addition, they are considered as a one of the famous databases in the building of dynamic web applications. As distinguished from the other databases it considers as free and open source which lead to the acceleration of development for MySQLi and it's widely usage.

2.6.2. Web Pages - Building Tools

Below, will reviewing the tools that will be used in the implementation of the system. Where these tools are divided to perform specific tasks in the construction phase of the system.

2.6.2.1. Adobe Dreamweaver Programming

Adobe Dreamweaver is a proprietary web development tool developed by Adobe Systems. Dreamweaver was created by Macromedia in 1997 [6]. It was maintained by them until Macromedia was acquired by Adobe Systems in 2005.[7]

Following Adobe's acquisition of the Macromedia product suite, releases of Dreamweaver subsequent to version 8.0 have been more compliant with W3C standards. Recent versions have improved the support of Web technologies such as CSS, JavaScript, and various server-side scripting languages and frameworks including ASP (ASP JavaScript, ASP VBScript, ASP.NET C#, ASP.NET VB), ColdFusion, Scriptlet, and PHP.[8]

2.6.2.2. Atom Programming

Atom editor is one of the most awaited editor in developer zone. The atom is modular and that means if we want to add some extra features to our editor, we can write some lines of code and add them as module. These modules are called 'packages'.

Atom, by Github, is a relatively new addition to the text editor options, but it is making quite an impression so far. The atom is free, open source, and highly customizable. Built around a minimal core Atom comes with 50 open-source packages (plus a growing library of user submitted packages) that allow you to create just the right software for your needs.

The key features of this editor: file system browser, fuzzy finder for quickly opening files, fast project-wide search and replace, multiple cursors and

selections, multiple panes, snippets, code folding, a clean preferences UI, import TextMate grammars and themes, highly extendable and highly theme-able.

2.6.2.3. Server

A server is a running instance of an application “software” capable of accepting requests from the client and giving responses accordingly. Servers can run on any computer, including dedicated computers. It connects the web pages with the web browser to make sure the work of the portal site is done, exactly it's an environment for the work.

2.6.3. Image Processing Tools

Adobe Photoshop program has been used in this system, it's one of the best an image processing software, the production company is Adobe. Adobe Photoshop is a raster graphics editor developed and published by Adobe Systems for Windows and OS X.

Photoshop was created in 1988 by Thomas and John Knoll. Since then, it has become the de facto industry standard in raster graphics editing, such that the word “photoshop” has become a verb as in “to photoshop an image”, “photoshopping”, and “photoshop contest” and etc. It can edit and compose raster images in multiple layers and supports masks, alpha compositing and several color models including RGB, CMYK, Lab color space, spot color and duotone. Photoshop has vast support for graphic file formats, but also uses its own PSD and PSB file formats which support all the aforementioned features. In addition to raster graphics, it has limited abilities to edit or render text, vector graphics (especially through clipping path), 3D graphics and video. Photoshop feature sets can be expanded by Photoshop plug-ins, programs developed and distributed independently of Photoshop that can run inside it and offer new or enhanced features. [10]

2.6.4. Tools for Dynamic Access to Data

Nowadays, complex IT environments, data are being created on distributed systems at a staggering rate and accessed through a plethora of devices. Compliance with regulatory standards and the need to secure leakage of business critical and personal data present major challenges for businesses and corporate IT. The key pillars for data compliance and leakage prevention are controlling who has access to information and having the ability to report who actually accessed specific information.

There are many dynamic tool to access data such as PHP, ASP “it’s a shorter for Active Server Pages”, ASP.NET - it is a new technology from Microsoft to ASP language depends on the dot Net environment (.NET). PHP is used in the system so that we must talk about this subject.

PHP is an acronym for “PHP: Hypertext Preprocessor”, is a widely-used open source general-purpose scripting language that is suited for web development and can be embedded into HTML. PHP was created in 1994 by Rasmus Lerdorf. During mid-1997, PHP development entered the hands of other contributors. Two of them, Zeev Suraski and Andi Gutmans, rewrote the parser from scratch to create PHP version 7 (PHP7).

PHP can perform any task that any CGI program can do, but its strength lies in its compatibility with many types of databases. Besides, PHP can talk across networks using IMAP, SNMP, NNTP, POP3, or HTTP.

2.7. The Financial Cost of the Project (Feasibility Study)

In this dissertation, it takes the portal site as a special case for Palestine. According to the International Central Bureau of Statistics (CBS), in 2014, the population in Palestine is 5.9 million. According to estimates, the proportion of young people in Palestine is representing 30.7%; this means that 1890000 of students are at university stage in Palestine. The “portal site” will contain the following:

1. Two Server:

The first server is the main server and the second server will support the first server when the first server will have a malfunction. In addition, the second server will take a Backup of data whenever a data will have a new action. The server specification will be selected to suit the system, as will be reserved the servers for a period of 10 years. **Table 2.1** will be Explains Specifications and characteristics of selected servers.[22]

Table 2.1. Specifications and Characteristics of the Selected Servers

Characteristics	Specifications
Speed	16 CPU Cores
Storage	2 TB
Ram	64 GB Available
Bandwidth	4 TB
Included Domains	1
Ip Addresses	2
Promise	Money-back guarantee
Support	24/365

2. Five Thin-Client :

- o Two computers to control the servers.
- o One for a project manager.
- o One for a teacher.
- o One for a student.

3. Two Printer:

It will allow the print of any documentation of data and Information, input, output and other operation. The following table shows the material costs of the project and the feasibility study:

Table 2.2. System Feasibility Study

Item	Quantity	Price	Total cost
Server	2	~ 10.000 \$	~ 20.000\$
Thin-Client	5	400\$	2000\$
Printer	2	400\$	800\$

3. SYSTEM DEVELOPMENT METHODOLOGY STRATEGY

In order to achieve this portal site, will selected a selection methodology & strategy to achieve the objectives they had adopted two steps as follows:

3.1. Selection Methodology

We have a lot of System Development Methodology (SDM) and there are different characteristics between each of them. But in our portal site; the Hoover methodology has been used. Hoover methodology known as the Waterfall Approach Model (WAM). Anyway, it is a framework that describes the activities performed at each stage of a software development project. It is very simple to understand and use. In a waterfall model, each phase must be completed before the next phase can begin and there is no overlapping in the phases. The waterfall Model illustrates the software development process in a linear sequential flow. It is also referred to as a linear sequential life cycle model. This means that any phase in the development process begins only if the previous phase is completed. In the waterfall, model phases do not overlap. The composed of six stages and known as the System Development Life Cycle (SDLC) as shown in **Figure 3.1**.

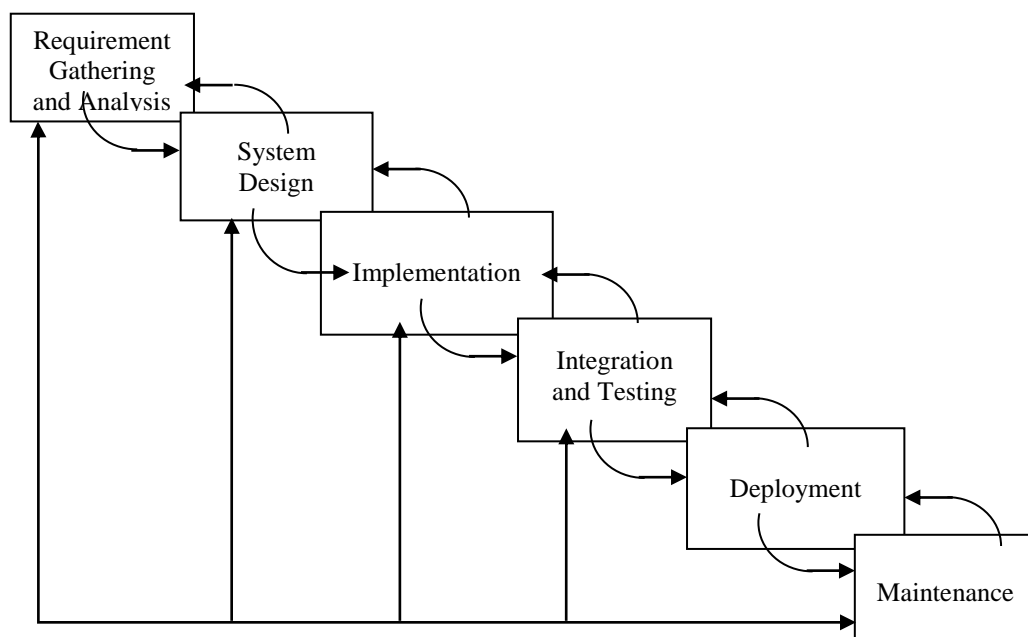


Figure 3.1. SDLC for Waterfall Model

3.1.1. Requirement Gathering and Analysis

All possible requirements of the system to be developed are captured in this phase and documented in requirements specification doc. Defines needed information, function, behavior, performance, and interfaces.

In this study, the mission statement is the design and implementation of a distance learning architecture based on electronic government methodologies.

3.1.2. System Design

The requirement specifications from the first phase are studied in this phase and system design is prepared. System Design helps in specifying hardware and system requirements and also helps in defining overall system architecture. Precisely a data structures, software architecture, interface representations, algorithmic details.

3.1.3. Implementation

With inputs from system design, firstly, the system is developed in small programs called units, which are integrated with the next phase. Each unit is developed and its functionality is tested in the Unit Testing. This test is done for all of a source code, database, user documentation, testing.

3.1.4. Integration and Testing

All the units developed in the implementation phase are integrated into a system after testing of each unit. Post integration the entire system is tested for any faults and failures.

3.1.5. Deployment of system

Once the functional and non-functional testing is done, the product is deployed in the customer environment or released into the market.

3.1.6. Maintenance

There are some issues which come up in the client environment. To fix these issues patches are released. Also to enhance the product some better versions are released. Maintenance is done to deliver these changes in the customer environment.

Finally, this methodology has been for several reasons, the Waterfall Strengths can be summarized by:

- o Easy to understand, easy to use.
- o Provides structure for inexperienced staff.
- o Milestones are well understood.
- o Sets requirements stability.
- o Good for management control (plan, staff, track).
- o Works well when quality is more important than cost or schedule.

3.2. The Strategy and Methodology have been Used in this Dissertation

As described earlier in Section 1, EG has a big data and this data is a result of a daily working of ministries within the composition of the government. To clarify more details see **Figure 3.2**. This figure shows how to relay, transfer, and access data between the parts of ministries in a structure of an EG.

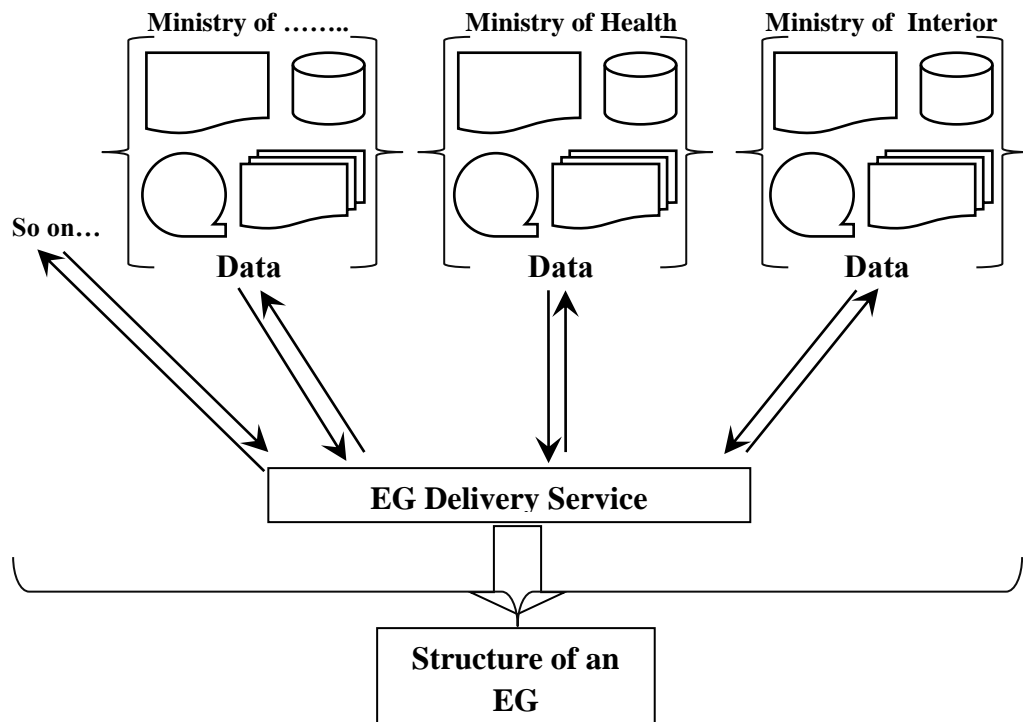


Figure 3.2. Accessing Data between Parts of EG

In general, when a newborn is founded in any state, his new data will be entered in the registers of the Ministry of the Interior, and the baby will have been getting the new IDentification number (ID), it can be working all daily transactions in his life from (ID) will still with him until his death. This idea is shown in **Figure 3.3**. It shows the description, the meaning, and the advantages of this (ID).

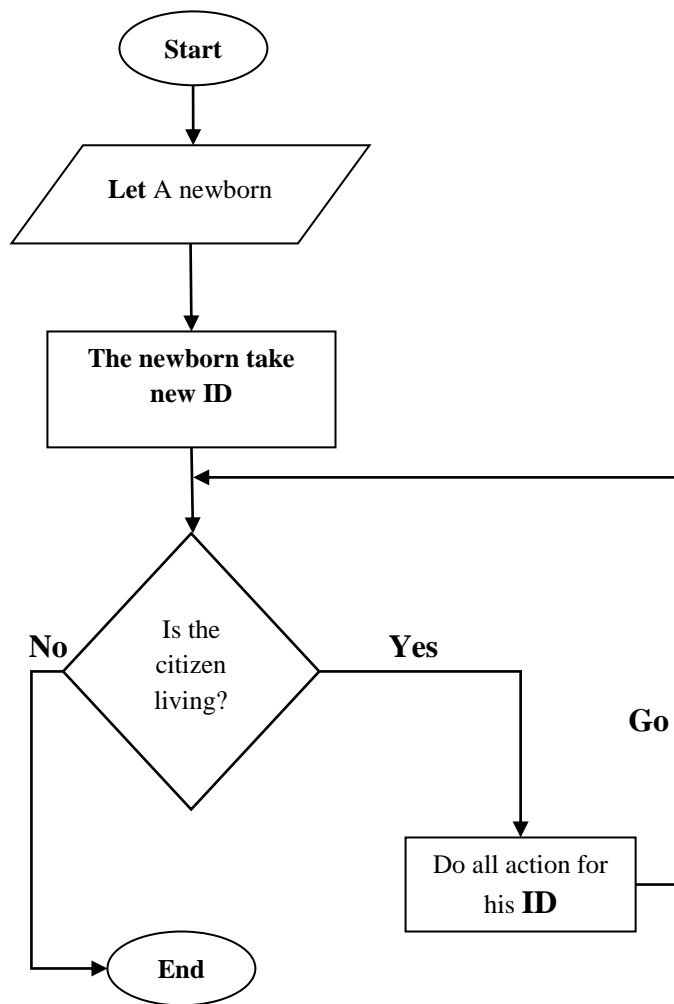


Figure 3.3. Flowchart illustrates the usefulness of citizen **ID**

This newborn will have the health records, and usually it is registered and restrict this data by the Ministry of Health. It contains several information such as health status, blood type, DNA, fingerprints,. etc. Besides, it will contain the marital status, educational status and other. Thus, the Government can restrict the newborn data within databases allow for all ministries to share within the limits both of permissions, controls and restrictions. Note that the **ID** would be unique so it cannot be repeated. This number is used by the citizen to conduct all official transactions within the Government of his country. **Figure 3.4** illustrates this process:

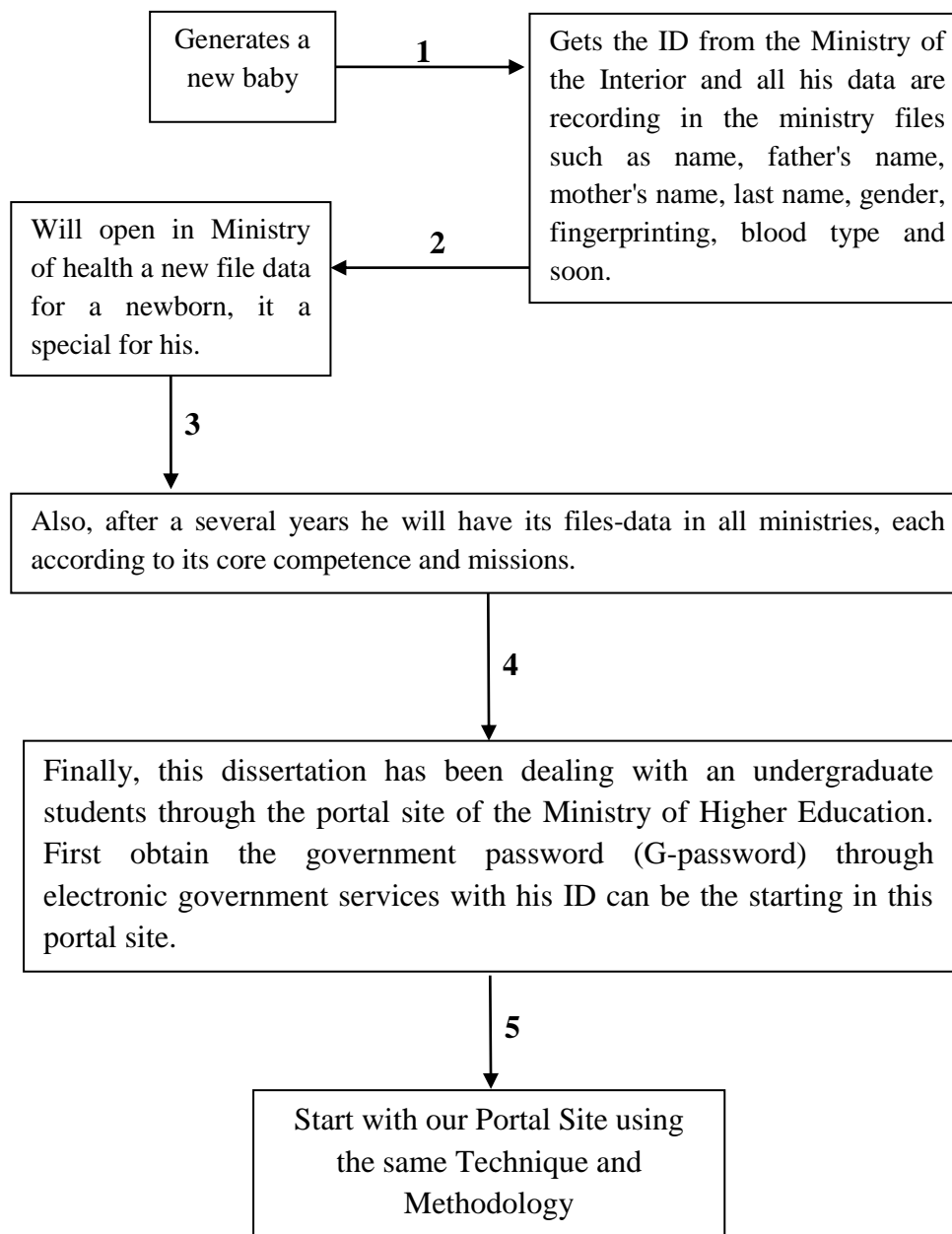


Figure 3.4. Diagram illustrates the strategy for starting work

In conclusion, this dissertation will focus on the class of citizens who are students, to take advantage of distance education service. In this case, will use **B2C**, **C2B** models between an educational institution and students based on the Electronic Government Methodology.

B2G, **G2B** models will be used between an educational institution and Government.

DL-Service, **C2E**, **E2C** models will be used between students and teachers.

Finally; **E2B**, **B2E** models will be used between an educational institution and teachers because the DL system will be controlling and working based on the teachers working.

4. ANALYSIS

The first stage of building any computerized system is the analysis phase. At this point we must understand the nature of the project, which will be built. Therefore, it is important to clarify the processing of analysis pass through several stages.

4.1. Data Collection

Data and information were collected on the system by personal interviews, and observation. By interviewing many undergraduate students, we can guess and identify their needs from the portal site, such as the services, performance, and the mechanism of action. Besides, the interviews give clear idea about the needed visualization to execute the application design. At the same time, a group of teachers were interviewed to find out their needs and perceptions. Finally, it was a group interview of officials within the Government, the Ministry of higher education, and the workers in the Electronic Government system. Their observations and comments were taken among the priorities of our system.

The system is designed for students who have completed the study from secondary school and for who want to start studying the university “undergraduate study”. The educational organization will get on the identification numbers (ID) of successful students through a secure channel between the electronic government “Ministry of Education” and the educational organization sponsoring the process of distance education.

When the student has completed the registration procedure at the educational organization, and after accepting the final acceptance as a student in the organization, he will get a password to be able to login through the system using (ID). Several important points have been taken in the design and the analysis of the system. They are as following:

- Education with distances while there could be online lessons or live lessons using services such as the internet, satellite, and so on.

- The study system; for each course recorded in the system will provide with a first exam, second exam, short exam (Quiz) and homework, finally final exam.
- The teacher determines the value of each part as appropriate.
- Attend online lectures maybe with satellites, Skype services or other.

4.2. Classification of Requirements

The following subsections discuss the different results obtained during the process of analysis, and then assemble the system requirements. The collecting requirements are classified into two groups.[17]

4.2.1. Nonfunctional Requirements

- Effectiveness and efficiency of the system.
- Security and maintain an order of the hack.
- Ease of use.
- The degree of confidence of the user of the system.
- Scalability the maintenance to system.
- Create a suitable environment for users.

4.2.2. Functional Requirements

The functional requirements of the system are divided into each of the requirements of students, teachers and Ministry of education. Consequently, we take every item in detail as follows:

4.2.2.1. Students Requirements

Students can benefit from the following services:

- Register a course as determined by site management.
- Withdrawn the course within a period determined by site management.

- Get educational materials and files for each course.
- Communication with the teachers with Email.
- Attend online lectures.
- Demo exam service.
- Electronic transcript service.
- Academic plan review service.
- Quiz service.
- Read the news and announcements for an organization.

4.2.2.2. Educational Organization Requirements (Employee)

The employees of the educational organization are divided with respect to works and services. The employees are divided into teachers and project managers. There are three types of the project managers “Academy Director, Administrative Director, Financial Manager” , they can use this system, and can set their operations and services for all employee as following:

1. Teacher:

Teacher can benefit from the following services:

- Add, modify and delete educational materials as (text, picture, video and sound) files.
- Prepare and modify demo exams.
- Enter degrees and accreditation its.
- Add, modify, and delete announcement of course for the students.
- Prepare and modify quick exams (Quiz) for students.
- Communicate with students; send messages and Emails.
- Distribution of grades for exams and homework.
- Identifying the mark of success.
- Read the news and announcements for an organization.
- Adoption of grades.
- Gives the encoding marks.

2. Academy Director:

Academy director can benefit from the following services:

- Add, modify and delete announcement.
- The possibility of querying teacher data and edit data.
- The possibility of querying students data and edit data.
- Ability to inquire about courses.
- Modification of students ' grades and querying.
- Adopt and graduated student after completion of courses and achieve graduation requirements.
- Evaluation of teachers and educational materials.
- Communication with the Ministry of Education and submit periodic data on graduating students.
- Open a new semester. And modify and delete a semester data.
- Open courses for each new semester. Then Add, modify and delete for semesters.

3. Administrative Director:

Administrative director can benefit from the following services:

- Add a new employee then modifies and delete his data.
- Add, modify and delete the announcement.
- Provide the recommendations and guidance to all staff (teacher, academic director, financial director).
- Upgrade the employees.
- Restrict data to students for the first time to give his password to enter into the system.
- Add, delete and modify the student data.
- Reset the Password for employee and student (If necessary).

4. Financial Manager:

Financial director can benefit from the following services:

- Give permission for students to register after confirming the financial disclosure of student.
- Add, modify and delete the announcement.
- Manage and adjustment of salaries of employees.
- The preparation of financial reports.

4.2.2.3. Government

Governments can benefit from this portal site services. The Government can get data the graduating student and can query for any graduate through the site database. We also remind that the powers of the academic director send data of graduates to the government through EG services.

Finally, the different requirements for all beneficiaries of the system obtained from the analysis process will be implemented in the system taking into account some criteria. These criteria can be the shortcut of ensuring consistency and compatibility requirements for each of the beneficiaries of the system with each other. Besides, it ensures consistency and compatibility requirements with each other when it is assembled.

5. DESIGN

The design is one of the most important stages in building any system. This stage occupies the second phase after the analysis system stage. It depends on the structure of the waterfall (Waterfall Approach) [11]. At this stage, the general visualize for the portal site will be produced with the key components identified in advance. In addition, it will clarify the Data Flow Diagram (DFD) and database tables and their relationship with each other.

5.1. Detailed Designs

Ppreviously in Section 4, we discussed all requirements of system according to the beneficiaries of the system. In the following sections, the flows process in the system will be designed by using Data Flow Diagram and Context Diagram (CD). On the other side, the database designs and tables illustrate the structures of tables and relationships between them. Besides, it will illustrate the properties for each field in the tables.

5.1.1. Data Flow Diagram

The Data Flow Diagram (DFD) is a maps that is used to describe data transfer, path and processes of them to convert from one representation to another, without attention to equipment, hardware or software used. These maps do not include a clear definition of priority implementation processes and sequence, but if we look to the map from left to right we understand implicitly the implementation of processes and data flow direction.

5.1.1.1. Context Diagram

Context Diagram (CD) displays the system in general. It identifies each external entities and its affect or affected by the system. In addition, they are limited to determine the nature of the relationship system. **Figure 5.1** represents Context Diagram for the system:

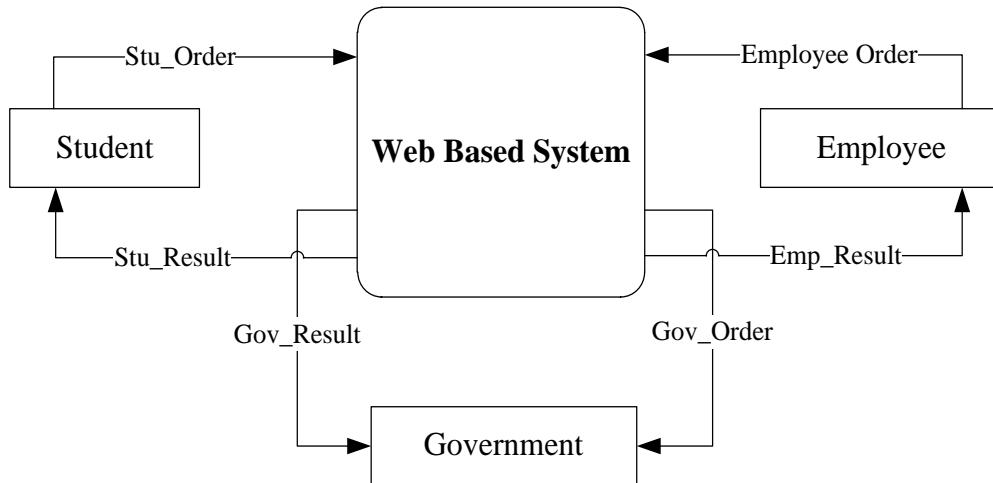


Figure 5.1. Context Diagram

All abbreviations in the Data Flow Diagram are detailed in **Table 5.1.**

Table 5.1. Abbreviations used in DFD

Abbreviations	Description
FM	Financial Manager
ADD	Administrative Director
ACD	Academy Director
ANN	Announcements
DLdb	Distance Learning Database
Stu	Student
Emp	Employee
Gov	Government
NStu	New Student

5.1.1.2. Level Zero

Level Zero (LZ) demonstrates the basic operations that take place within the system and the inputs and outputs for each of these processes and also shows storage data. **Figure 5.2** shows the Data Flow Diagram Level 0.

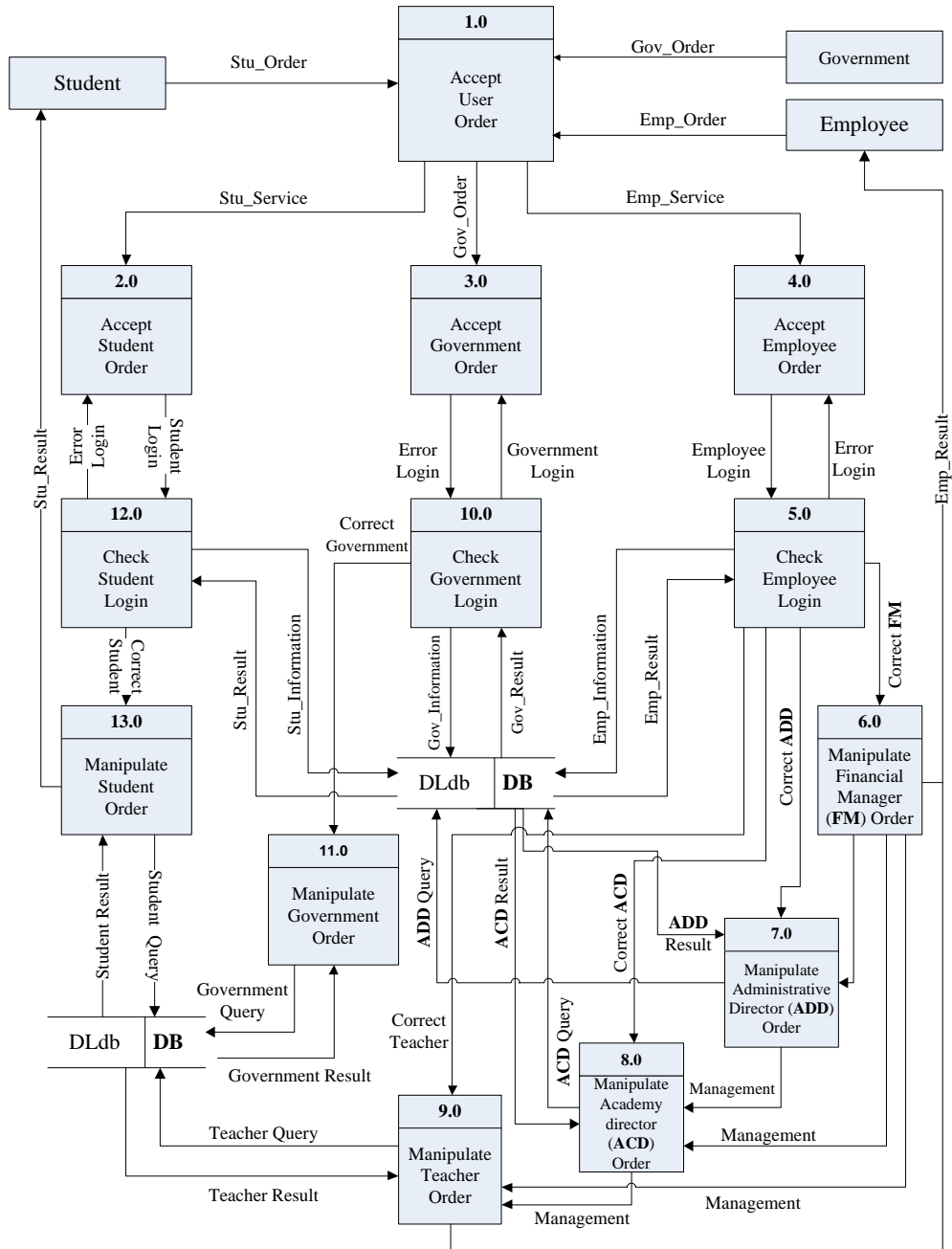


Figure 5.2. Data Flow Diagram Level 0

5.1.1.3. Child Levels

If an operation at Level Zero needed to more detail to avoid complexity in it, it will be done the detail of this process in Child Level Diagram (CLD) while maintaining the number of inputs and outputs of this process.

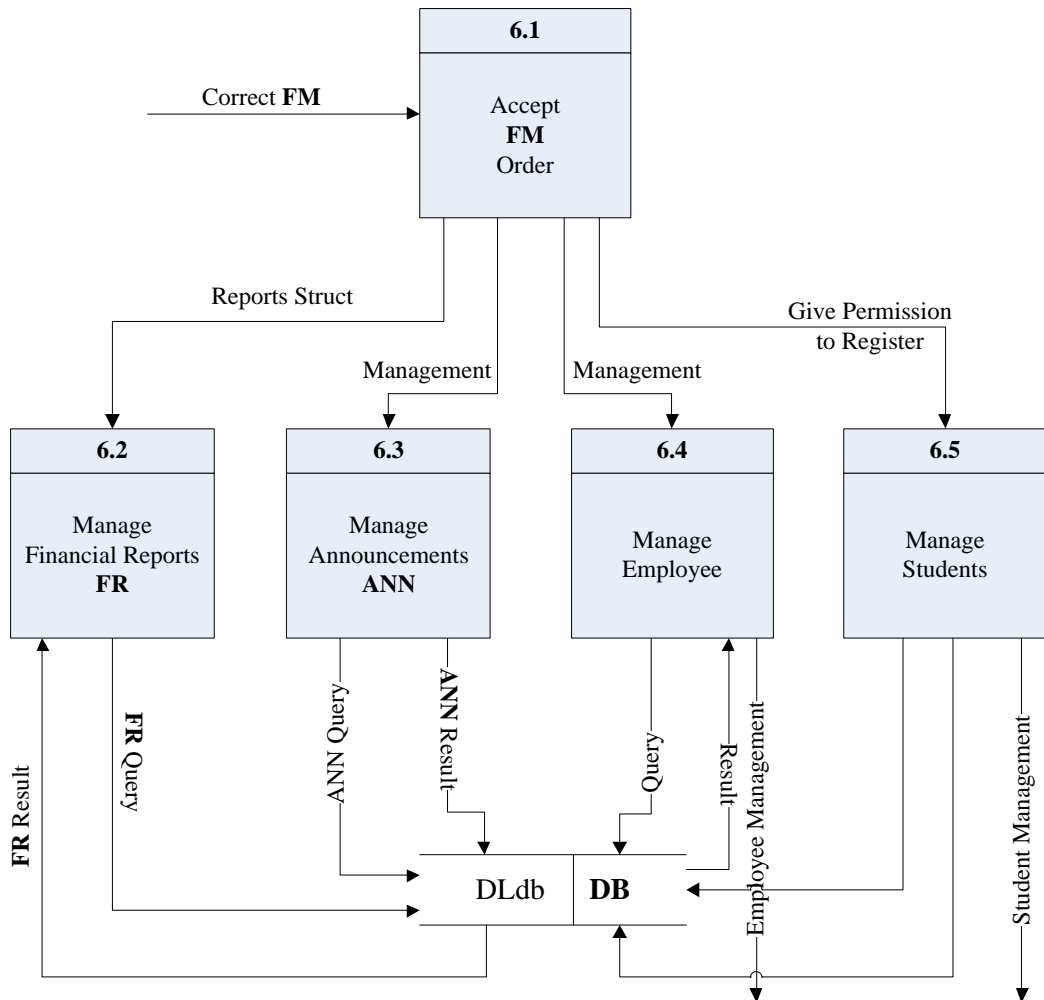


Figure 5.3. Data Flow Diagram Level 1 for process 6.0

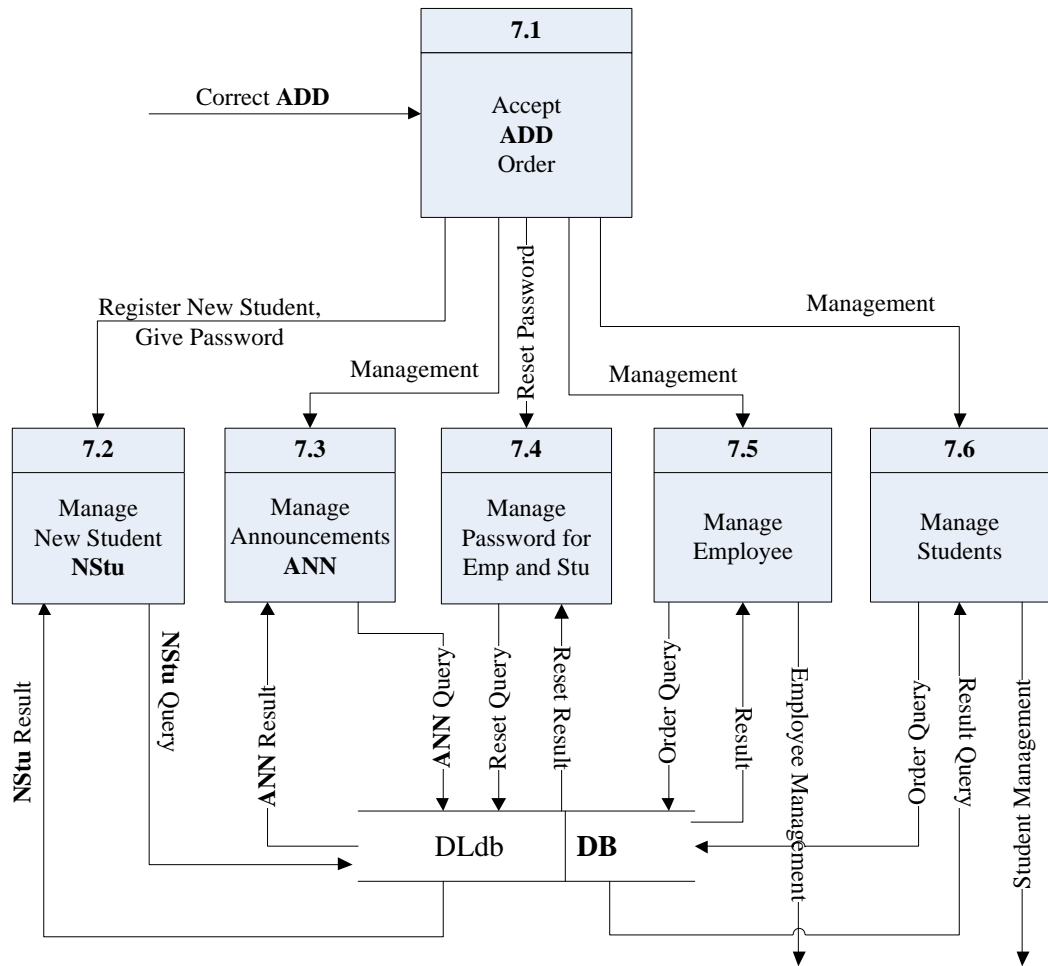


Figure 5.4. Data Flow Diagram Level 1 for process 7.0

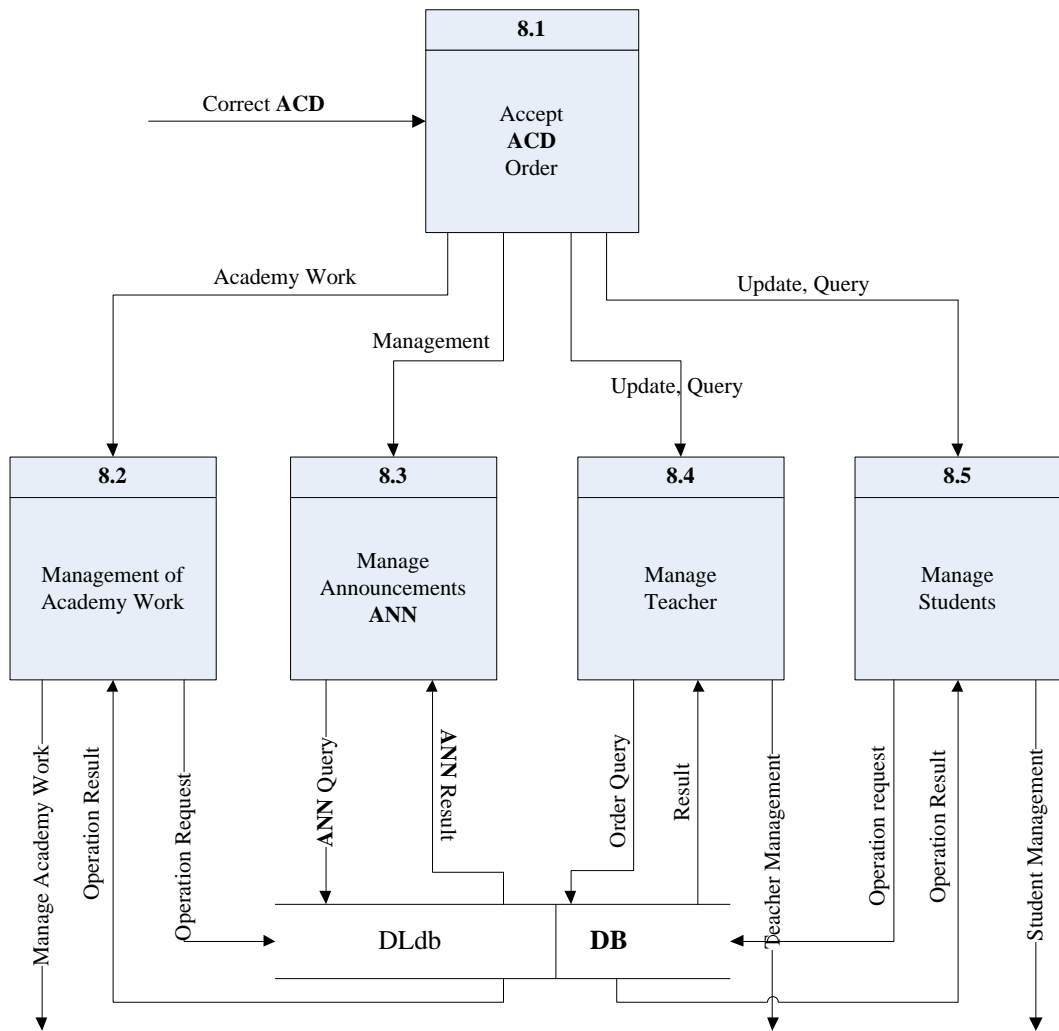


Figure 5.5. Data Flow Diagram Level 1 for process 8.0

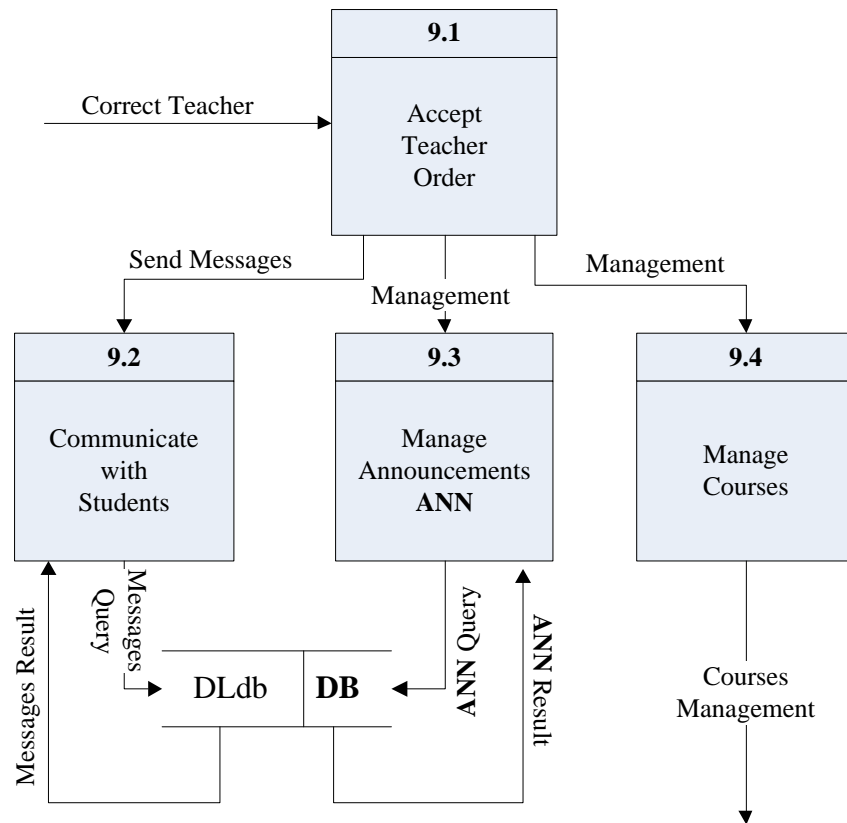


Figure 5.6. Data Flow Diagram Level 1 for process 9.0

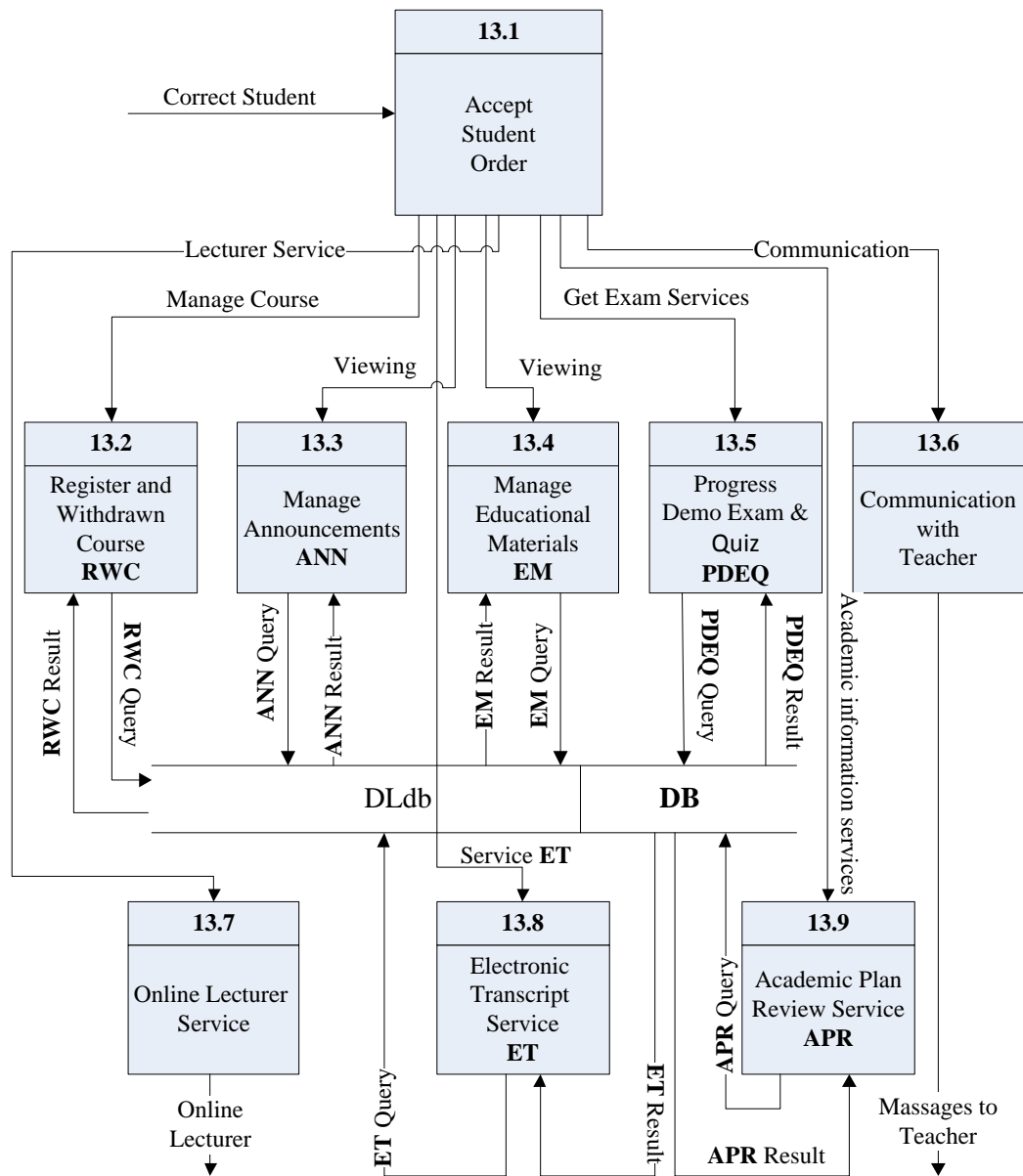


Figure 5.7. Data Flow Diagram Level 1 for process 13.0

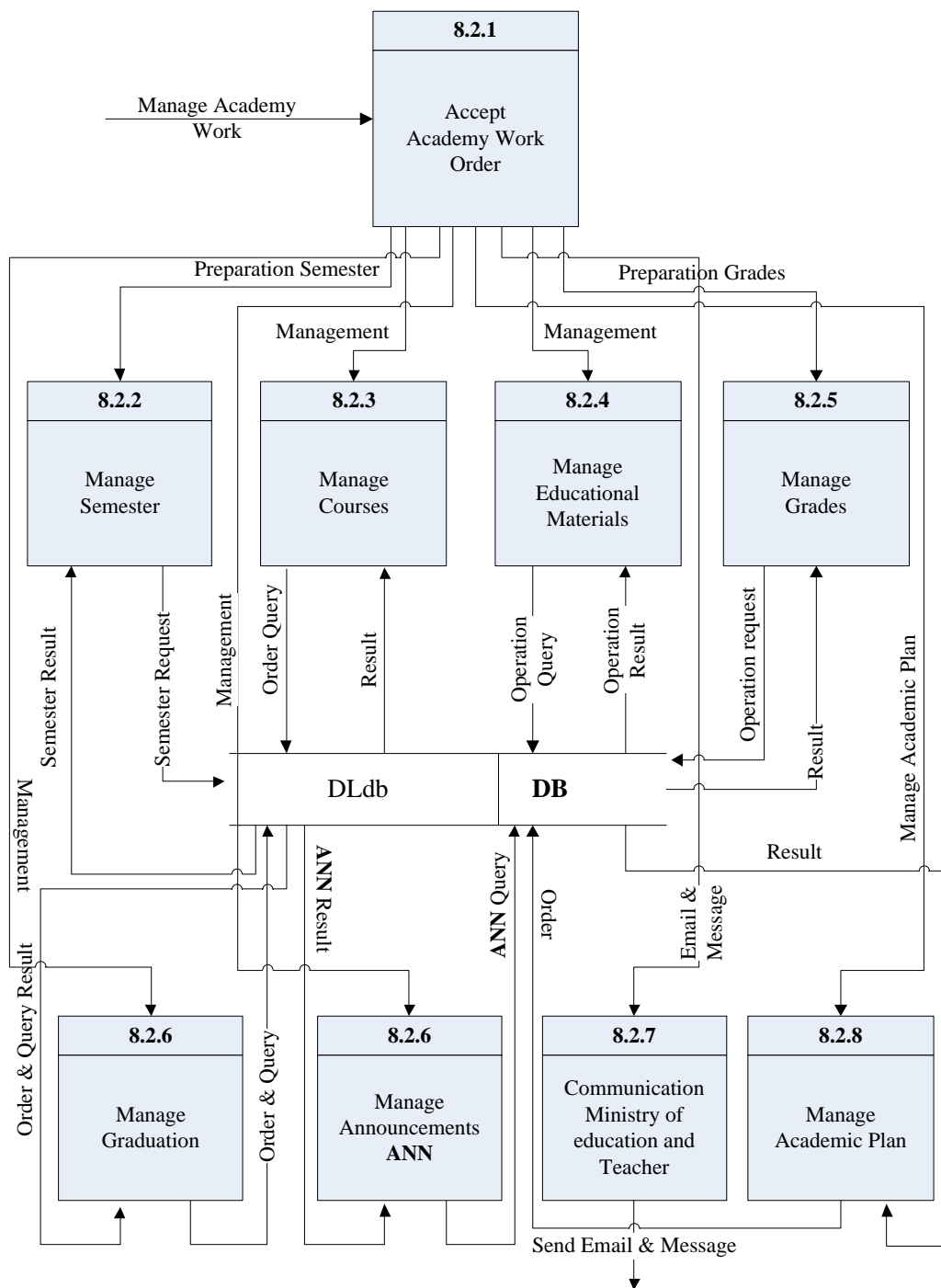


Figure 5.8. Data Flow Diagram Level 2 for process 8.2

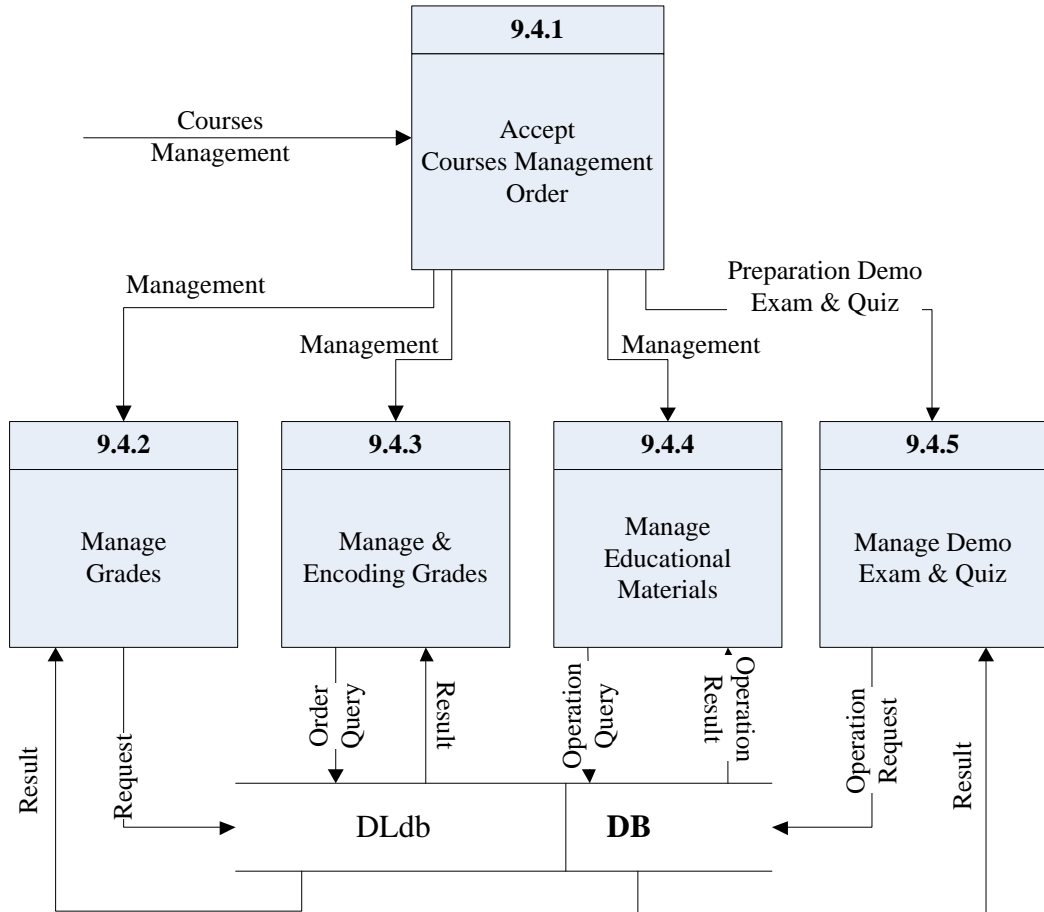


Figure 5.9. Data Flow Diagram Level 2 for process 9.4

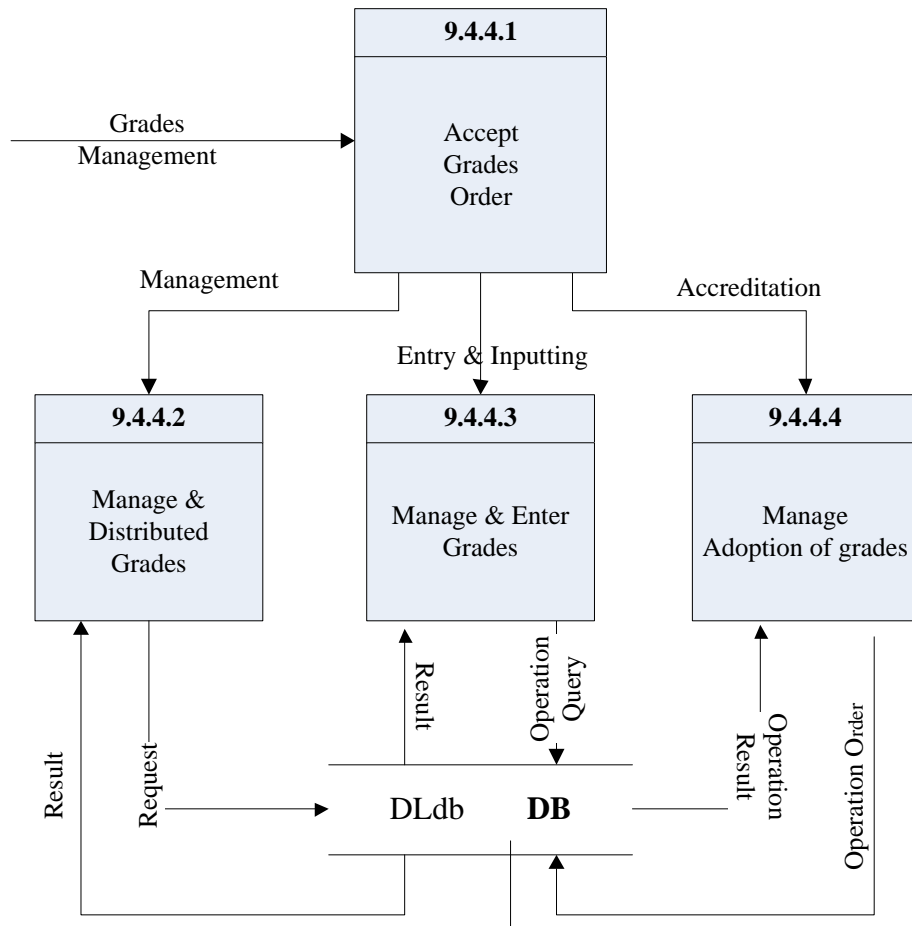


Figure 5.10. Data Flow Diagram Level 3 for process 9.4.4

5.1.2. Description of Databases

The database can be defined such as an organized collection of logically related data. Good database design will get through poor programming better than good programming will be getting through poor database design. Below will be description and explanation of the database used for this a portal site through an entity relationship diagram and tables.

5.1.2.1. Entity Relationship Diagram

Entity Relationship diagram (ER) is widely used in database design to represent the conceptual level of a database system. In addition, it describes things and their relationships in high level. This model incorporates some of the important semantic information about the real world. A special diagrammatic technique is introduced as a tool for database design. An example of database design and description using the model and the diagrammatic technique is given [21]. Relationships between entities are represented by values stored in columns of the corresponding tables. This makes it easy to link an order with its users.

Therefore, it has been drawing the ER diagram of the proposed DL_db database, relations among units. **Figure 5.11** shows ER Diagram.

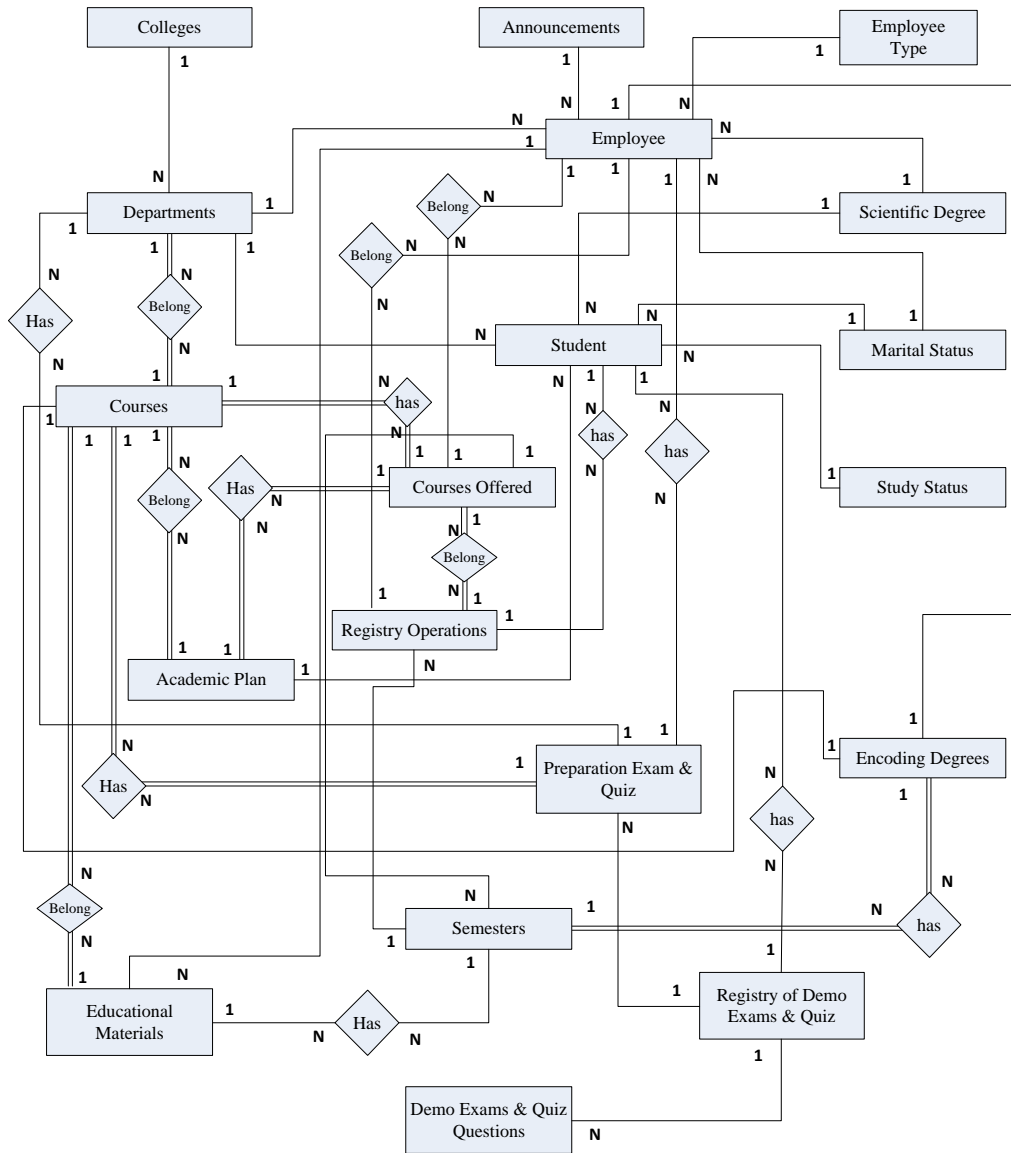


Figure 5.11. ER Diagram For DLdb

5.1.2.2. Tables

The relational databases view all data in the form of tables; Each column (**Field Name**) represents an attribute in a table. Below we explain the tables and fields within **DLdb** database. Also, will offering used data types for each field.

Table 5.2. Employee Table

Field Name	Data Type	Relation Name	Description
S_id	<i>bigint(20)</i>		Series
E_id	<i>bigint(11)</i>	PK	Identification number
F_name	<i>varchar(50)</i>		First name
L_name	<i>varchar(50)</i>		Last name
Sdegree_id	<i>int(9)</i>	FK	Scientific Degree
SD_work	<i>datetime</i>		Start date of Work
Dep_id	<i>varchar(50)</i>	FK	Department
D_birth	<i>datetime</i>		Date of Birth ***
Mstatus_id	<i>int(2)</i>	FK	Marital Status ***
N_children	<i>int(2)</i>		Number of Children ***
Address	<i>tinytext</i>		Address ***
E_type	<i>int(3)</i>	FK	Employee Type (Flag)
Salary	<i>double(9,3)</i>		Salary
Password	<i>varchar(30)</i>		Employee password
E_image	<i>varchar(30)</i>		Image of employee

Table 5.3. Scientific Degree

Field Name	Data Type	Relation Name	Description
SD_id	<i>int(9)</i>	PK	ID of Scientific Degree
SD_dec	<i>varchar(50)</i>		Scientific Degree Description

Table 5.4. Colleges

Field Name	Data Type	Relation Name	Description
Col_id	<i>varchar(50)</i>	PK	ID of College
Col_name	<i>varchar(150)</i>		College Name

Table 5.5. Departments

Field Name	Data Type	Relation Name	Description
Dep_id	<i>varchar(50)</i>	PK	ID of Department
Dep_name	<i>varchar(150)</i>		Department Name
DepCol_id	<i>varchar(50)</i>	FK	Its College

Table 5.6. Marital Status

Field Name	Data Type	Relation Name	Description
MS_id	<i>int(2)</i>	PK	ID of Marital Status
MS_name	<i>varchar(100)</i>		Marital Status Name

Table 5.7. Employee Types

Field Name	Data Type	Relation Name	Description
ET_id	<i>int(3)</i>	PK	ID of Employee Type (Flag)
ET_desc	<i>varchar(200)</i>		Employee Type Description

Table 5.8. Students

Field Name	Data Type	Relation Name	Description
S_id	<i>int(11)</i>	PK	Identification Number
SF_name	<i>varchar(50)</i>		First name
SL_name	<i>varchar(50)</i>		Last name
Sdegree_id	<i>int(9)</i>	FK	Scientific Degree
Dep_id	<i>varchar(50)</i>	FK	Department
SSS_id	<i>int(2)</i>	FK	Study Status for Student
D_birth	<i>datetime</i>		Date of Birth ***
Mstatus_id	<i>int(2)</i>	FK	Marital Status ***
N_children	<i>int(2)</i>		Number of Children ***
Address	<i>tinytext</i>		Address ***
APCode	<i>varchar(50)</i>	FK	Academic Plan Code
DGrad	<i>datetime</i>		Date of Graduation
Password	<i>varchar(30)</i>		Student password
S_image	<i>varchar(30)</i>		Image of student

Table 5.9. Study Status for Students

Field Name	Data Type	Relation Name	Description
Sstatus_id	<i>int(2)</i>	PK	ID for Study Status
SSDesc	<i>varchar(100)</i>		Study Status Description

Table 5.10. Academic Plan

Field Name	Data Type	Relation Name	Description
APcod_id	<i>varchar(50)</i>	PK	ID for Academic Plan Code
AP_name	<i>varchar(100)</i>		Academic Plan Name
AP_desc	<i>tinytext</i>		Academic Plan Description
S_date	<i>datetime</i>		Start Date for Academic Plan
NH_plan	<i>int(3)</i>		Number Hours of Plan
Sem_id	<i>char(6)</i>	FK	Semester

Table 5.11. Semesters

Field Name	Data Type	Relation Name	Description
Sem_id	<i>char(6)</i>	PK	ID for Semester (20151,20152)
Sem_name	<i>varchar(70)</i>		Semester Name

Table 5.12. Courses

Field Name	Data Type	Relation Name	Description
C_code	<i>varchar(50)</i>	PK	Course Code
C_name	<i>varchar(100)</i>		Course Name
C_desc	<i>tinytext</i>		Course Description
C_dep	<i>varchar(50)</i>	FK	Course Department
C_nhours	<i>int(3)</i>		Number of Hours for Course
CP_code	<i>varchar(50)</i>	FK	Course Plan Code
C_type	<i>int(1)</i>		Course Type (1=Obligatory , 2=Preparation)
CA_date	<i>datetime</i>		Add Date Course

Table 5.13. Courses Offered

Field Name	Data Type	Relation Name	Description
S_id	<i>bigint(20)</i>	PK	Series
C_code	<i>varchar(50)</i>	FK	Course Code
T_no	<i>int(11)</i>	FK	Teacher Number
S_code	<i>char(6)</i>	FK	Semester Code
AP_code	<i>varchar(50)</i>	FK	Academic Plan Code

Table 5.14. Educational Materials

Field Name	Data Type	Relation Name	Description
S_id	<i>bigint(20)</i>	PK	Series
File_name	<i>varchar(50)</i>		File Name
File_type	<i>char(5)</i>		File Type
C_code	<i>varchar(50)</i>	FK	Course Code
T_no	<i>int(11)</i>	FK	Teacher Number
S_code	<i>varchar(50)</i>	FK	Semester Code
Add_date	<i>datetime</i>		Addition date

Table 5.15. Encoding Degrees

Field Name	Data Type	Relation Name	Description
S_id	<i>bigint(20)</i>	PK	Series
C_code	<i>varchar(50)</i>	FK	Course Code
T_no	<i>int(11)</i>	FK	Teacher Number
S_code	<i>char(6)</i>	FK	Semester Code
E11_code	<i>char(2)</i>		1.1 Encoding
E12_code	<i>char(2)</i>		1.2 Encoding
E21_code	<i>char(2)</i>		2.1 Encoding
E22_code	<i>char(2)</i>		2.2 Encoding
E31_code	<i>char(2)</i>		3.1 Encoding
E32_code	<i>char(2)</i>		3.2 Encoding
E41_code	<i>char(2)</i>		4.1 Encoding
E42_code	<i>char(2)</i>		4.2 Encoding

Table 5.16. Registry Operations (Student & Courses)

Field Name	Data Type	Relation Name	Description
S_id	<i>bigint(20)</i>	PK	Series
Stu_no	<i>int(11)</i>	FK	Student Number
S_code	<i>char(6)</i>	FK	Semester Code
C_code	<i>varchar(50)</i>	FK	Course Code
T_no	<i>int(11)</i>	FK	Teacher Number
M_exam1	<i>int(3)</i>		Midterm exam I
M_exam2	<i>int(3)</i>		Midterm exam II
Hq_mark	<i>int(3)</i>		Homework & Quiz
Final_mark	<i>int(3)</i>		Final Exam
Total_mark	<i>int(3)</i>		Total Mark
M_encod	<i>char(2)</i>		Mark Encoding
R_date	<i>datetime</i>		Registration Date

Table 5.17. Preparation of Exam & Quiz

Field Name	Data Type	Relation Name	Description
EQ_code	<i>varchar(30)</i>	PK	Exam & Quiz Code
EQ_name	<i>varchar(150)</i>		Exam Name
C_code	<i>varchar(50)</i>	FK	Course Code
S_code	<i>char(6)</i>	FK	Semester Code
D_code	<i>varchar(50)</i>	FK	Department Code
T_code	<i>int(11)</i>	FK	Teacher Number
EQ_mark	<i>int(3)</i>		Mark
EQ_flag	<i>int(1)</i>		Flag (1=Quiz, 2= Demo exams)
Add_date	<i>datetime</i>		Addition Date

Table 5.18. Demo Exams & Quiz Questions

Field Name	Data Type	Relation Name	Description
Q_id	<i>bigint(20)</i>	PK	Question No.
EQ_code	<i>varchar(30)</i>	FK	Exam & Quiz Code
Q_desc	<i>varchar(250)</i>		Question Description
Q_mark	<i>int(3)</i>		Question Mark
F_option	<i>varchar(150)</i>		The First Option
S_option	<i>varchar(150)</i>		The Second Option
T_option	<i>varchar(150)</i>		The Third Option
F4_option	<i>varchar(150)</i>		The Fourth Option
Fifth_option	<i>varchar(150)</i>		Fifth Option
CA_noOp	<i>int(1)</i>		The Correct Answer
Add_date	<i>datetime</i>		Addition Date

Table 5.19. Registry of Demo Exams & Quiz

Field Name	Data Type	Relation Name	Description
S_id	<i>bigint(20)</i>	PK	Series
Stu_no	<i>int(11)</i>	FK	Student Number
EQ_code	<i>varchar(30)</i>	FK	Exam & Quiz Code
Q_no	<i>bigint(20)</i>	FK	Question No.
Q_status	<i>char(1)</i>		Question Status (T=True, F=False)
QD_answer	<i>Datetime</i>		Date of Answer

Table 5.20. Announcements

Field Name	Data Type	Relation Name	Description
Ann_id	<i>bigint(20)</i>	PK	Announcements Series
Emp_no	<i>int(11)</i>	FK	Employee Number
Ann_titel	<i>varchar(200)</i>		Announcements title
Ann_detail	<i>text</i>		Announcements details
Ann_date	<i>Datetime</i>		Date of Announcements

5.1.3. Web Interfaces

The interfaces sites are most important points because the user will deal with the system through its. Therefore, they designed on being simple interfaces meet the needs of their users. Following are the some interfaces to the portal site.

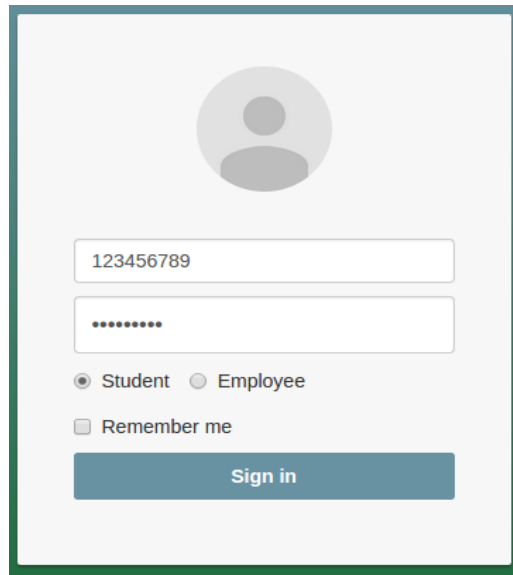


Figure 5.12. Login Page

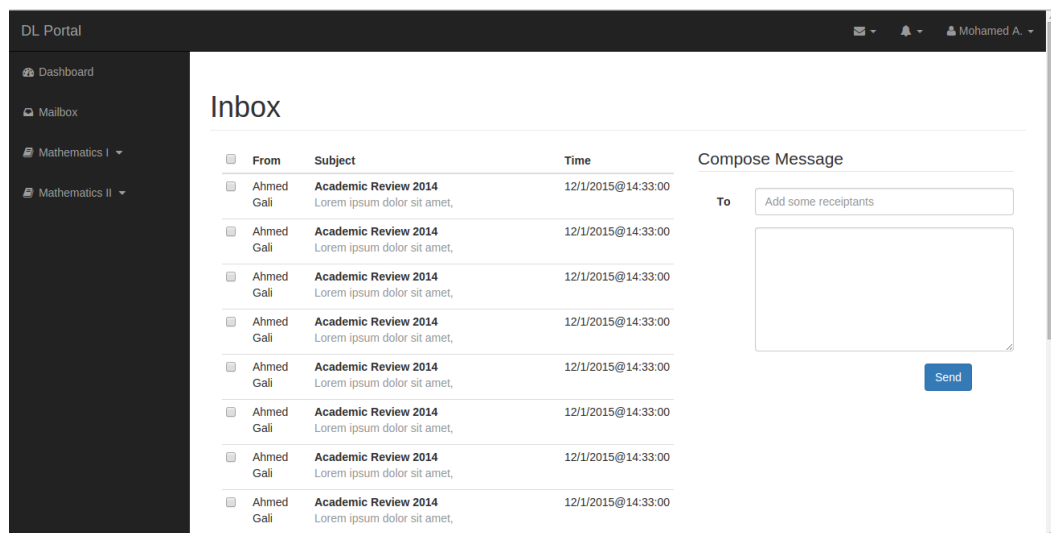


Figure 5.13. Mailbox Page

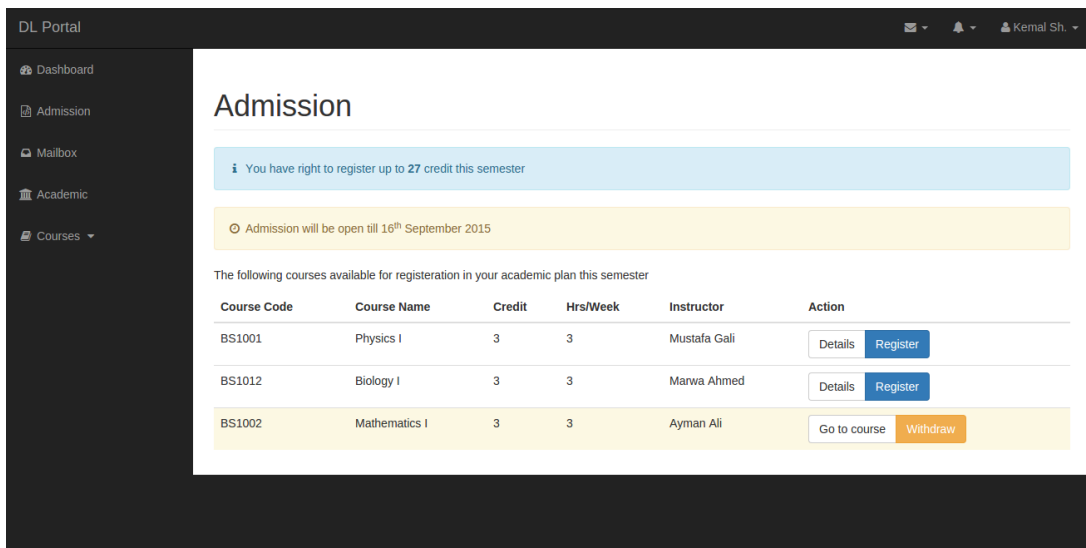


Figure 5.14. Student Admission Page

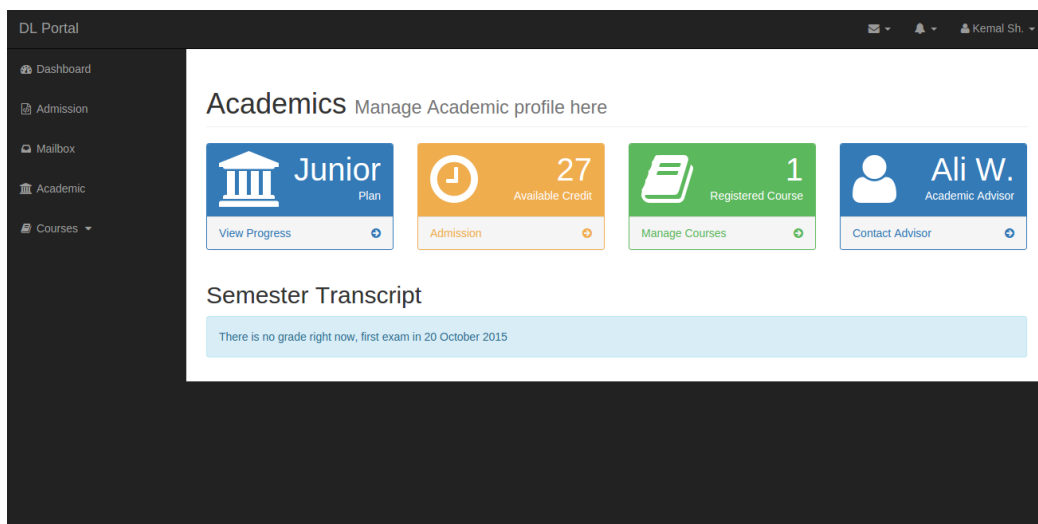


Figure 5.15. Student Academic Page

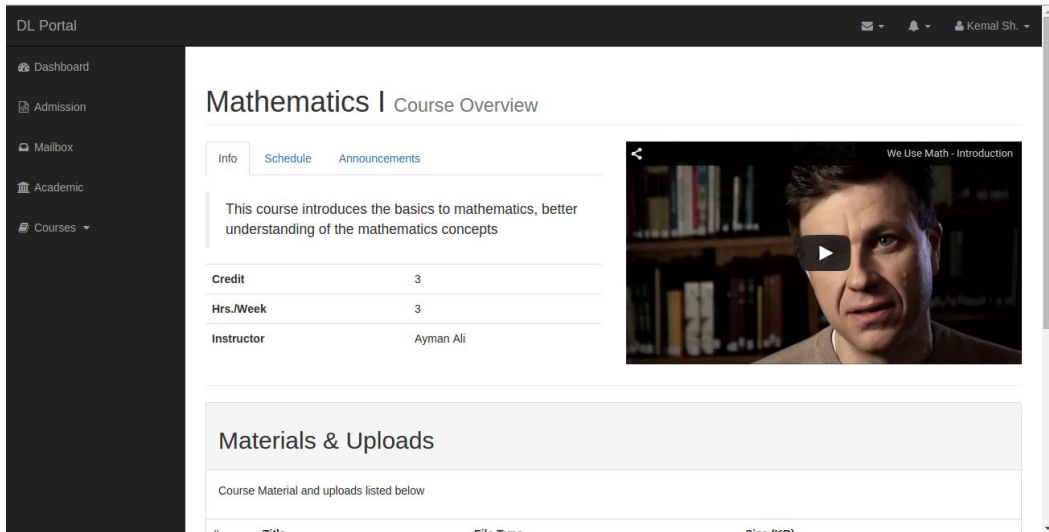


Figure 5.16. Student Course Page

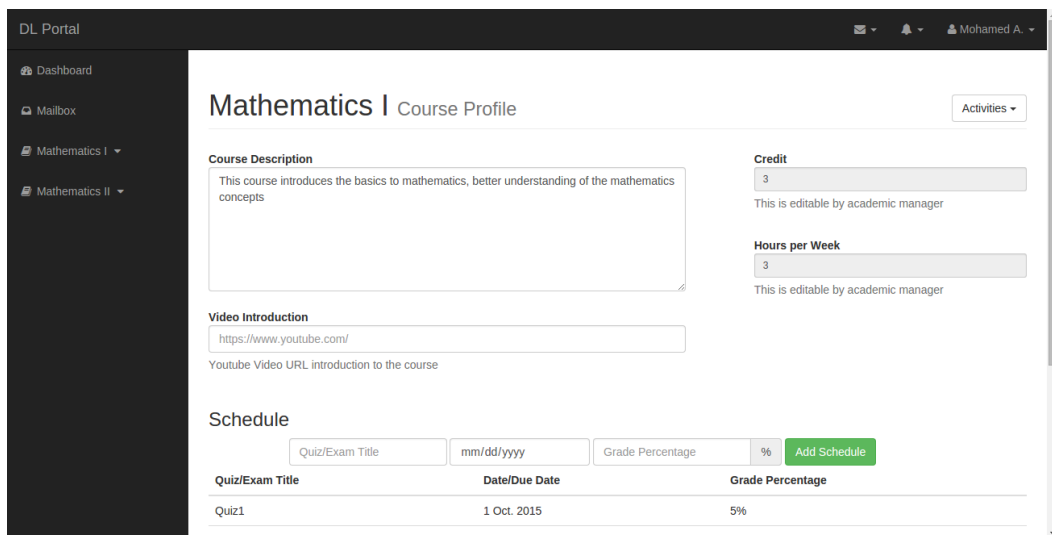


Figure 5.17. Teacher Course Profile Page

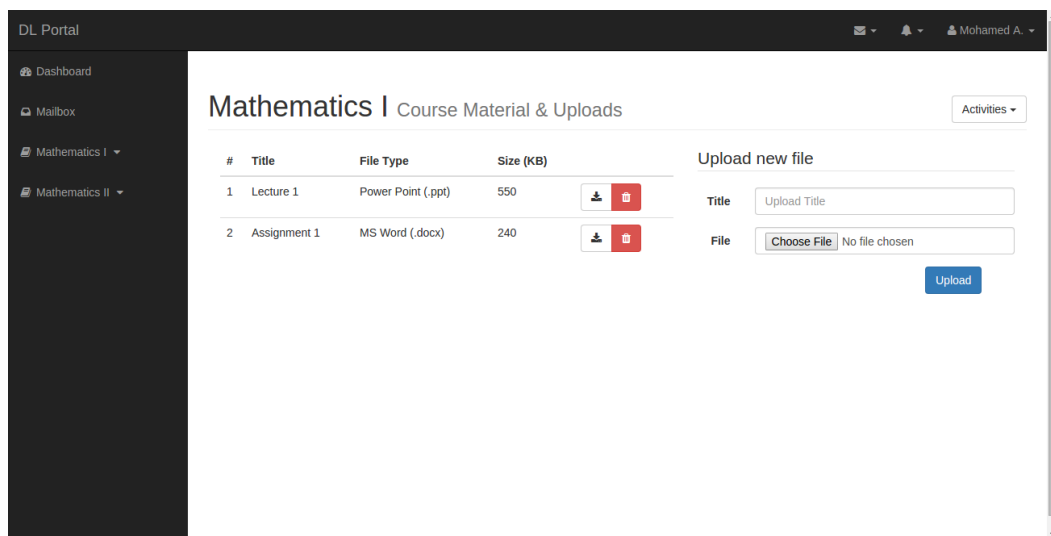


Figure 5.18. Teacher Course Material Page

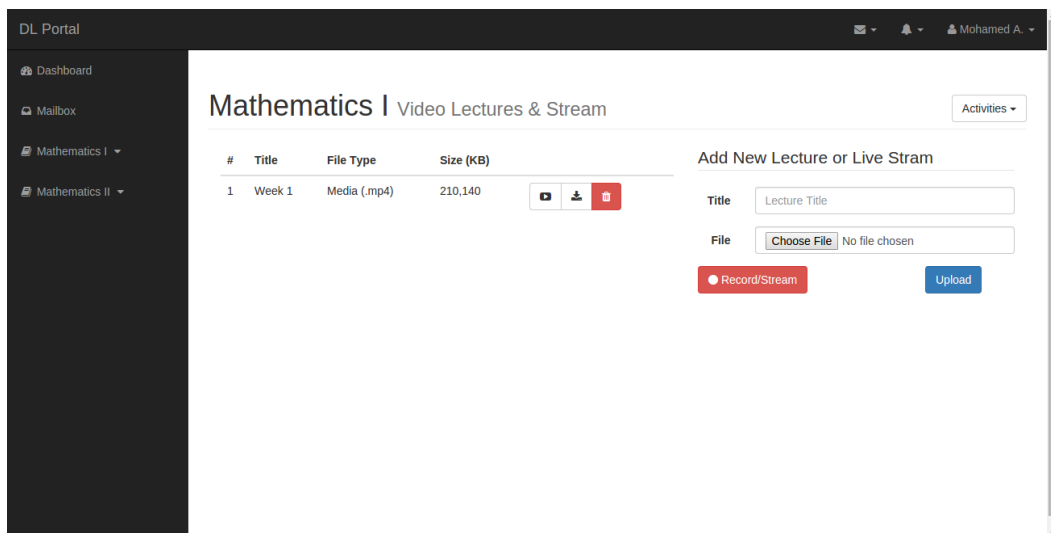


Figure 5.19. Teacher Course Lectures and Video Page

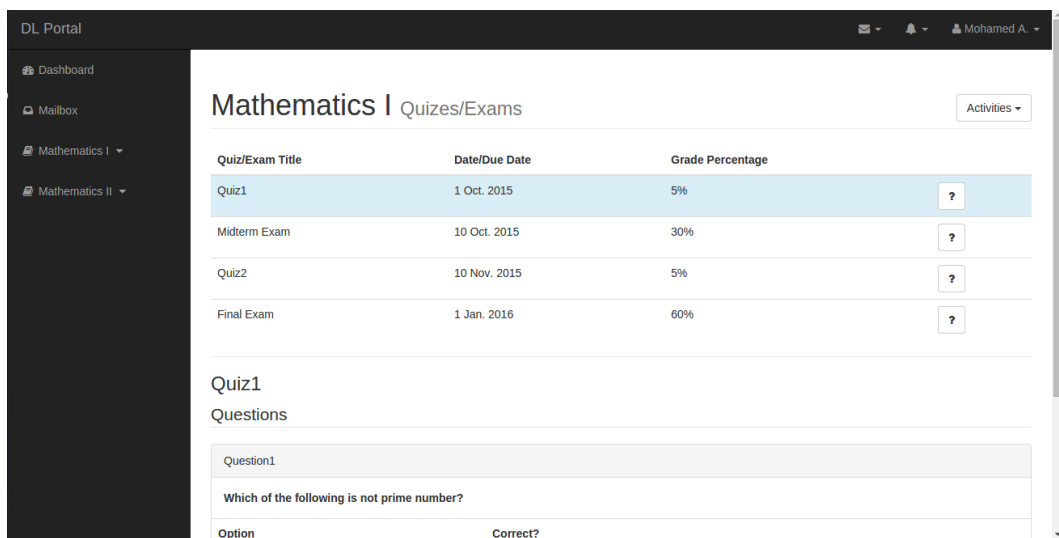


Figure 5.20. Teacher Course Quiz Management Page

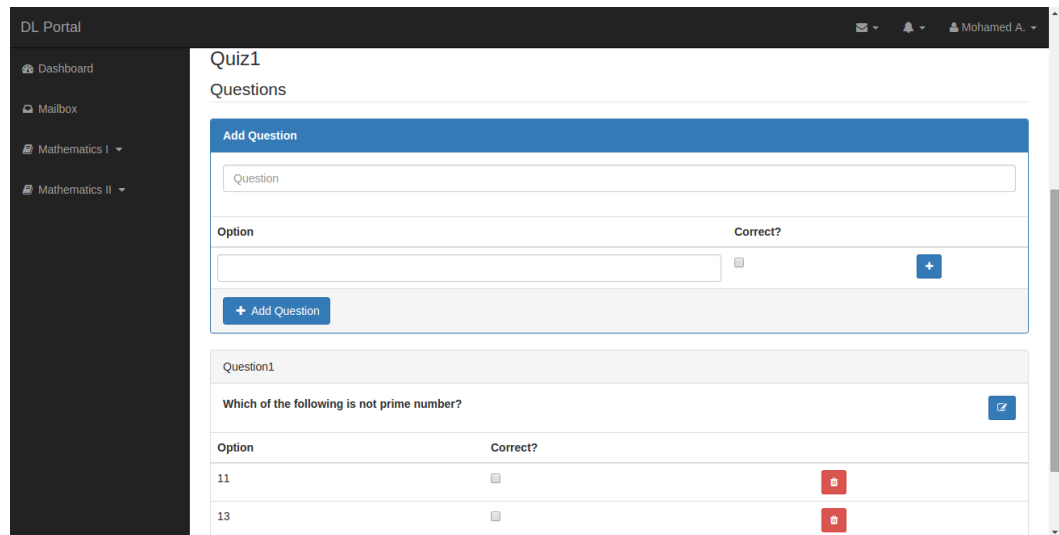


Figure 5.21. Teacher Course Quiz Questions

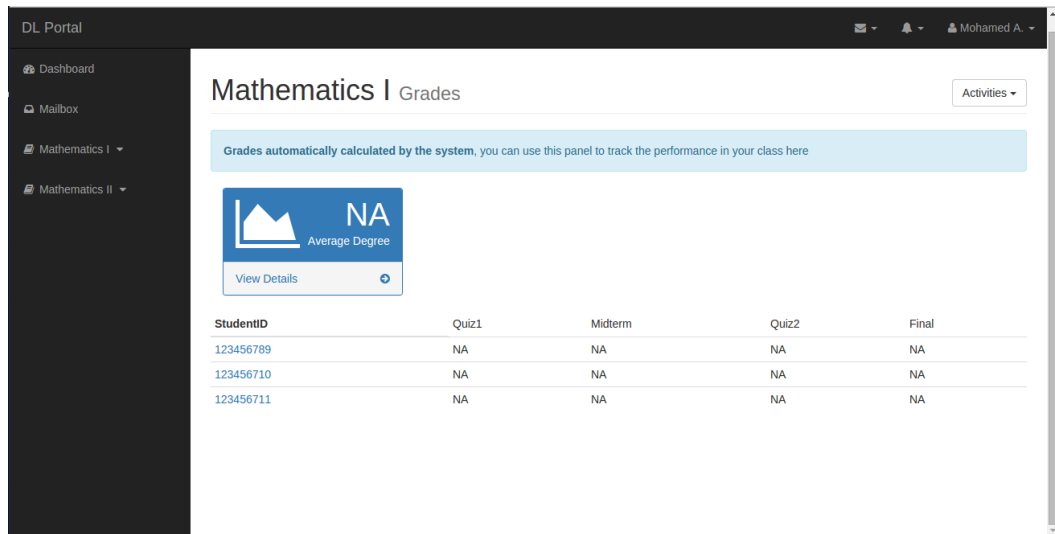


Figure 5.22. Teacher Course Grades

In the end, the work and coherence within the system through testing have been making sure.

6. CONCLUSIONS AND FUTURE WORK

This dissertation aims to provide education services for students in difficult circumstances. It also serves both Government and educational institutions to provide service continuity of education and employment. Design and analysis of site using modern technological methods has been done. We took the advantage of previous experience in each concepts used in this dissertation. Data analysis and requirements imposed on the work to clarify all of the set goals, and the conduct of operations within the system. It was also clarified the databases that required for such a system.

The system has been divided of users of the system depending on the needs and requirements of the categories. The student is the primary beneficiary of the education service, secondly the institution, and finally the Government. Therefore, the concept of distance learning has been used and harnessed in order to provide education service based on design methodologies of the Electronic Government represented by B2C, C2B, E2G, B2G, and G2B Models.

The student will receive a certificate and becomes a graduate through the educational institution; This deal according to EG methodology by C2B, B2C. Given to students and teachers, it has been used C2C.

With that, regarding the Government will be fully informed of their graduation students and fully informed on all their data electronically through providing this service on the electronic Web. For that, E2G, B2G, G2B Models has been used. Also, the educational institution has been used the methodology of E2G, G2E Models within its structure.

This system provides services to all beneficiaries as very good but recommends to improving the services of each of beneficiaries. It is also recommended to improve the efficiency of the system through data sharing and access data for both staff and students concerning to marital status, place of residence, the number of children, age, and others through the electronic government services can be obtained with the compliance agreement. As a consequence, the educational institution to get access data after giving them permission to do so through electronic government services. Thus; The accumulation, overcrowding, and repeating of data and congestion within the

database will be less efficient functioning for the working. It will be working efficiency and capacity for continuity is much greater than it is now.

Meanwhile, the dissertation provided an optimum solution to the problems of education in the difficult and dangerous environments. So that the educational process continues as long as the system and all users can access it.

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APPENDIX

```
<?php
session_cache_limiter(false);
session_start();
require_once 'vendor/autoload.php';
ActiveRecord\Config::initialize(function($cfg){
    $cfg->set_model_directory('app/Model');
    $cfg->set_connections(array(
        'development' => 'mysql://root:root@localhost/distance'));
});

$actionMenu = [];
$actionMenu['student'] = [
    // ['url'=>'', 'icon'=>'', 'title'=>'']
    ['url'=>'', 'icon'=>'dashboard', 'title'=>'Dashboard'],
    ['url'=>'student/admission', 'title'=>'Admission'],
    ['url'=>'inbox', 'icon'=>'inbox', 'title'=>'Mailbox'],
    ['url'=>'student/academic', 'icon'=>'institution', 'title'=>'Academic'],
    ['url'=> '#', 'icon'=>'book', 'title'=>'Courses', 'dropdown'=>[
        ['url'=>'student/course/BS1002', 'title'=>'Mathematics I']
    ]
];

$actionMenu['teacher'] = [
    ['url'=>'', 'icon'=>'dashboard', 'title'=>'Dashboard'],
    ['url'=>'inbox', 'icon'=>'inbox', 'title'=>'Mailbox'],
    ['url'=> '#', 'icon'=>'book', 'title'=>'Mathematics I', 'dropdown'=>[
        ['url'=>'teacher/course/BS1002/profile', 'title'=>'Course profile'],
        ['url'=>'teacher/course/BS1002/material', 'title'=>'Material & Uploads'],
        ['url'=>'teacher/course/BS1002/lectures', 'title'=>'Lectures'],
        ['url'=>'teacher/course/BS1002/exams', 'title'=>'Exams'],
        ['url'=>'teacher/course/BS1002/grades', 'title'=>'Grades Sheet'],
    ]
],
```



```

[url'=>'#', 'icon'=>'book', 'title'=>'Mathematics II', 'dropdown'=>[
    [url'=>'teacher/course/BS2002/profile', 'title'=>'Course profile'],
    [url'=>'teacher/course/BS2002/material', 'title'=>'Material & Uploads'],
    [url'=>'teacher/course/BS2002/lectures', 'title'=>'Lectures'],
    [url'=>'teacher/course/BS1002/exams', 'title'=>'Exams'],
    [url'=>'teacher/course/BS2002/grades', 'title'=>'Grades Sheet'],
]
],
];

```

```

$app = new \Slim\Slim(array(
    'templates.path' => 'view/',
    'view' => '\Slim\LayoutView',
    'layout' => 'layout/master.php',
));

```

```

$defaultMenu = 'student';
if(isset($_SESSION['dl']))
    $defaultMenu = $_SESSION['dl']['level'];
$mwidget = new KS\lib\SideMenuWidget($actionMenu[$defaultMenu]);
$app->get('/', function() use ($app, $mwidget){
    if(isset($_SESSION['dl']['logged']))
        $app->render('dashboard.php', array('menu'=>$mwidget->render()));
    else
        $app->render('login.php', array('layout' => false));
});

```

```

$app->post('/signin', function() use ($app){
    $natId = $app->request->post('natid');
    $pass = $app->request->post('pass');
    $utype = $app->request->post('utype');
    $modelClass='KS\Model\StudentModel';
    if($utype == 'employee')
        $modelClass='KS\Model\EmployeeModel';
    $user = $modelClass::find([

```

```

        'conditions' => $utype."_id='$natId' AND ".$utype."_password='".$pass.'"
    );
    $resArray = ['status'=>false, 'msg'=>'Invalid Username or Password'];
    if(isset($user->{$utype."_id"})){
        $_SESSION['dl']['logged']=time();
        $_SESSION['dl']['uid']=$natId;
        if($utype=='student')
            $_SESSION['dl']['level']=$utype;
        else
            $_SESSION['dl']['level']=$user->employee_level;
        $_SESSION['dl']['name']=$user->{$utype."_name"};
        $resArray = ['status'=>true];
    }
    $app->response->headers->set('Content-Type', 'application/json');

    echo json_encode($resArray);
});

$app->get('/logout', function() use ($app){
    unset($_SESSION['dl']);
    $app->response->headers->set('Location', '/index.php');
});

$app->get('/inbox', function() use ($app,$mwidget){
    $app->render('mailbox.php', array('menu'=>$mwidget->render()));
});

$app->get('/student/admission', function() use ($app,$mwidget){
    $app->render('student/admission.php', array('menu'=>$mwidget->render()));
});

$app->get('/student/academic', function() use ($app,$mwidget){
    $app->render('student/academic.php', array('menu'=>$mwidget->render()));
});

$app->get('/student/course/:course_id', function($course_id) use ($app,$mwidget){

```

```

$app->render('student/course.php', array('menu'=>$mwidget->render()));
});

$app->get('/teacher/course/:course_id/profile', function($course_id) use
    ($app,$mwidget){
    $app->render('teacher/course_profile.php', array('menu'=>$mwidget->render()));
});

$app->get('/teacher/course/:course_id/material', function($course_id) use
    ($app,$mwidget){
    $app->render('teacher/course_material.php', array('menu'=>$mwidget->render()));
});

$app->get('/teacher/course/:course_id/lectures', function($course_id) use
    ($app,$mwidget){
    $app->render('teacher/course_lectures.php', array('menu'=>$mwidget->render()));
});

$app->get('/teacher/course/:course_id/grades', function($course_id) use
    ($app,$mwidget){
    $app->render('teacher/course_grades.php', array('menu'=>$mwidget->render()));
});

$app->get('/teacher/course/:course_id/exams', function($course_id) use
    ($app,$mwidget){
    $app->render('teacher/course_exams.php', array('menu'=>$mwidget->render()));
});

$app->run();

```