Smart CMIS: A FileMaker based Comprehensive Class Management Information System

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Abstract—*The Apple Inc. product FileMaker is a well known RDBMS (Relational Database Management System) to develop & deploy all types of computer applications to manage the business of a small & medium enterprise (SME). This paper presents a complex management information system designed for Cihan University, Erbil. The primary goal of this application is to offer a suitable interface to its users in order to simplify and reduce the time needed to retrieve information and management related to different class related activities of a particular department of the University. Currently this system is designed for a single category of user i.e. teacher. Later on it would be extended to more categories. We aim to present a complete view of our application focusing especially on the design process as well as the functionality.*

Keywords- *RDBMS, FileMaker*

1. INTRODUCTION

These days the database has become one of the most important tools for storing, analyzing complex information and large amount of data as per the figure 1 below:-
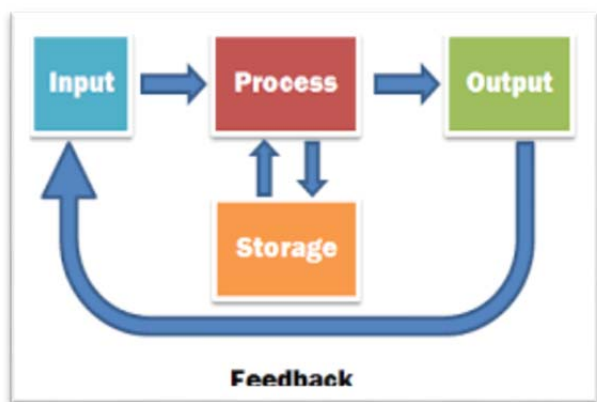

Figure 1- The data-information cycle

A well designed database structure has several plus points like fast, accurate, real-time access, perfect reporting, highly scalable, and error free etc. It is one of the most common tools in business houses, banks, government, industries, and schools, colleges globally to process the data & use the processed information as a result. The information processing cycle refers to the order of events that go into processing information, including input, processing, storage and output. Input consists of acquiring, entering and validating the data, while output consists of interactive queries and the running of reports. Some definitions include a fifth stage, which consists of deleting or archiving data that one does not plan to use [1].

All over the world the schools have already deployed their business oriented information management system to the best of their knowledge as per the data-information cycle shown in Figure 1 above. As a result these schools have been able to perform overall much better than those without it. A typical Class Management System is the usage of a large database comprising of smaller table spaces which can be used to manage any class perfectly well. It consists of recording & retrieval of all the activities of students on day to day basis. This information is extremely useful at time like Parent Teacher Meeting (PTM) etc. We can have a standalone system or a multiuser system that can be accessed by many users at the same time. In other words we can say that our application is a supporting tool which can be accessed in one of the many ways like –

- Standalone
- Local Area Network (LAN)
- Wide Area Network (WAN)
- Web

This paper deals with the development and deployment of such Information Technology (IT) based Management Information System at Cihan University, Erbil.

Figure 2 - Screenshot of the main screen of SmartCMIS

2. MOTIVATION

Usually any Class Management System allows its users to store most all of their Class's information digitally. The purpose of implementing classroom management strategies is to enhance prosocial behavior and increase student academic engagement (Emmer & Sabornie, 2015; Everston & Weinstein, 2006). Effective classroom management principles work across almost all subject areas and grade levels (Brophy, 2006; Lewis, et al., 2006) [2]. Further, this processed information can be conveniently accessed & shared with the authorized users at any point of time. This type of user access control program has been projected for a future release. Everything becomes so easy to process & prepare the flexible management information system reports in a fraction of second with the press of a button.

Actually Cihan University is working on an action plan which aims at a maximum usage of Information & Communication Technology (ICT) in almost all the operations at all the levels. Therefore, their needs moved towards Class Management Systems (CMS) as a best fit solution for managing any data related to students, employees, teaching processes etc. Such an automated system can make life peaceful and easier for any end user. Using PerfectC^{2}MIS, finding student's information is fast and fluid which otherwise could have taken a much longer duration. At the end of each semester, printing students' overall performance statement including attendance, grades, notes becomes just a few seconds job which otherwise could have taken a much longer time without using our application.

With the initiative of the management of the Cihan Educational Group and the whole hearted support of the concerned departments a project team was formed for the design and implementation of the automated system. Cihan University is a private English-speaking institution, one of the first and finest universities established in Erbil, Kurdistan, Iraq. It was approved by the Kurdish Ministry of Higher Education and Scientific Research in 2006 and operated for the first time in 2007 [6].The primary objective of our project was to develop an automated computer based system for Cihan University to computerize all the teaching procedures & practices being followed in the management of the classes conducted at Cihan University.

3. SYSTEM DEVELOPMENT

SmartCMIS is being used at a standalone system at the present time. Later on we would migrate our application to Client-Server environment. At the present time we can execute our application on a standalone module although the same application has been tested to work on Local Area Network (LAN) as well. In this scenario we have just one drawback that our database cannot be centralized. All the users are unable to share the information between them. Later on with the purchase of server edition of FileMaker we would be able to map it to the server edition as well. Further we have very efficient & fast file servers at the backend to manage the show. Our application should be hardware and software independent as well.

3.1 Analysis and Definition

A detailed session of discussions and meetings was carried out with the potential users of the system as well as concerned staff. Based on these inputs a detailed SRS (System Requirement Specifications) document was prepared. This consisted of existing hardcopies of forms and reports served as a good reference for the best possible solution of the final SRS. Paper documentation serves as a rich input to understand the existing procedures/activities performed within the department. Failure projects are those ones that do not meet the original time, cost and quality requirements criteria. The common cause of software project failure: absence of well-defined requirements. This document defines the normative content of the software requirements specification (SRS). Organization of the information items in the document such as the order and section structure may be selected in accordance with the project's documentation policies [3].
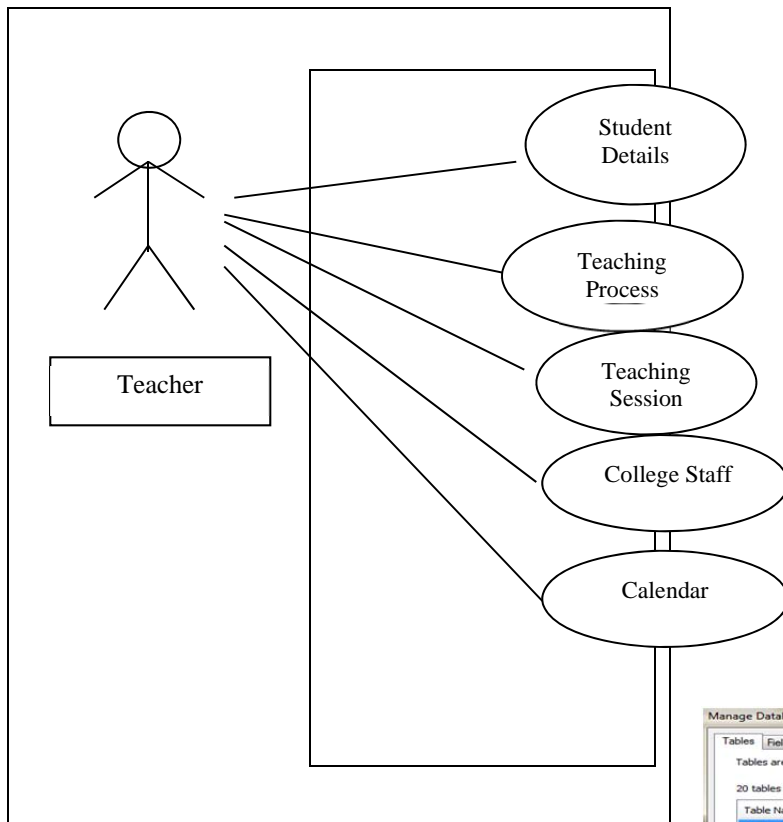
project lies in the quality of software design. It consists of understanding user requirements completely & correctly. Completing the paperwork like SRS, DFD's, and ERD's. Making a complete sketch of Data tables & their fields is again a very important part of software design.

3.2.1 Data Model

The first step in the data modeling module is defining a good consistent structured database. This model of our project is represented by the data model which consists of various entities as shown in figures below:-
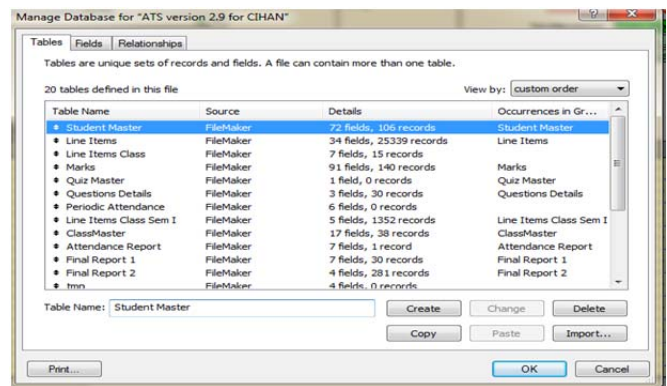

Figure 3: User-case Diagram

With some hardships we were able to understand the required system from the end user as well as the cooperation from the administrative staff. All the inputs were collected with just point in the mind that was to streamline the system to the maximum. Figure 3 above shows the User-case Diagram for one user i.e. the teacher. Later on we would work on to release updated modules for:

- ✓ Head of the Department
- ✓ Secretary
- ✓ Students

It has been found that the end users are not fully versed with the complete requirements of the system. Henceforth it becomes very important for the analyst to understand the complete System Requirement Specifications (SRS) with the designated in charge. Initially we face a some resistance from the end users in using the system but later on they would be able to accept it. Further we also need to note that if our application does not help and facilitate the user's work they will be reluctant to use it. We need handle such situations tactfully.

3.2 Software Design

As we all know that software design is the most critical element of any project. The success of any

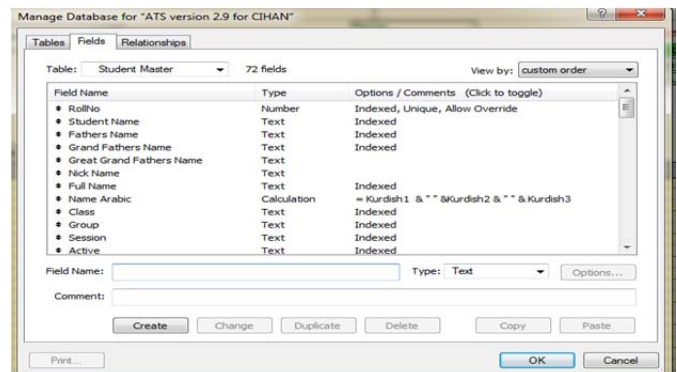**Figure 4: The database structure**

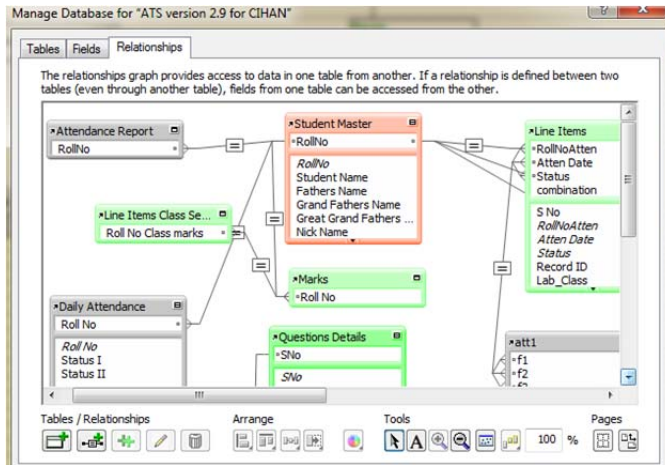**Figure 5: A typical FileMaker Table structure**

Figure 6: A typical Entity-Relationship diagram in FileMaker

When we design the database, we need to make right decisions to make the best use of an effective and efficient system. A well worked on database takes less time and efforts to process and produce end results. For the reason a lot of the success of the project depends on the designing of the data model. It should be scalable with the options to modify as and when required. It should be easy to understand & user-friendly. We need to take care of data redundancy. Further our application should be flexible so that it can be used anywhere with no hardware or software limitations and should work perfectly well with changing requirements with minimum efforts.

We show a sample database structure for the application in figure 4 above. Like this we have other database structures as well. We just need to link them together as per our requirement.

In figure 6 we show the most important entities of the model and their relationships as defined & used in a typical class/session in our Cihan University. Our whole project is usually based on this ER diagram (Entity-relationship) diagrams. An Entity Relationship Diagram (ERD) is a data model describing how entities (or concepts or things) relate to one another. When created by business analysts, ERDs can be used to understand the business domain, clarify business terminology, and connect business concepts to database structures [4].

In figure 5 we have shown the concerned fields in a particular table i.e. Student Master in this case. As we all know this is the basic building block of any database application. We need to sit down and workout the best possible database avoiding data redundancy at all stages. In this manner we workout all our possible tables. It is always better to work out the entire plan on a piece of paper before starting to do it on the machine.

We establish a relationship between the various fields associated with the tables. Tables as we all know are the basic building blocks of any RDBMS based application.

32.2. Implementation

The next step is the implementation of the application software which has been developed as a constructive effort of the entire team. The communication between the database and the software includes:

- Storing data/information in the database.
- Modifying data/information as and when required.
- Retrieving the required data/information as required.

Installation and configuration documents are useful for when developers need to set up new or additional application environments. If possible, the steps should be detailed and easy to follow and can include screenshots if necessary. Anyone should be able to follow the steps and successfully install an application. Having the steps identified will help the installer prevent problems because of missing parts of an application [5].

4. CONCLUSIONS

The need of managing the information electronically has been growing man folds in all areas of the Kurdistan region. As we all know that education is considered to be very essential for the development of any nation. Therefore, Class Management Systems like SmartCMIS have been suggested as the best option to manage information in the schools/colleges.

The SmartCMIS application software has been built based on actual procedures and practices being followed in Cihan University. Therefore, this system may be considered as a very critical step aimed towards implementing digitally based information management in Schools/Universities.

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