Database Management Systems: A Case Study of Faculty of Open Education

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1. INTRODUCTION

We live in the information and the microelectronic age, where technological advancements become a major determinant of our lifestyle. Such advances in technology cannot possibly be made or sustained without concurrent advancement in management systems (5).

The impact of computer technology on organizations and society is increasing as new technologies evolve and existing technologies expand (5). Because of the influences of the innovations in the computer technology, people can also build their own computerized systems with easy-to-use construction tools.

Management is a process by which certain goals are achieved trough the use of resources like materials, people, money, time. These resources are considered to be inputs, and the attainment of the goals is viewed as the output of the process. Database systems continue to be a key aspect of Computer Science & Engineering today. Representing knowledge within a computer is one of the central challenges of the field. Database research has focused primarily on this fundamental issue (6).

This paper presents a database management system developed for AOF (Faculty of Open Education) course books. Its rationale is based on the development of a database application that share data and operations through a database. It supports organization's manipulation and retrieval of data. In order to organize large amounts of data (book's names, ISBN numbers, number printed; authors' names, and addresses, etc.) similar user interfaces are developed for different types of users. In addition, they can create special reports. It also encourages users who have no previous programming experience. The detail of the study is presented in the third part of the paper. In the second part of the paper, some knowledge about management information systems and database management systems are given.

2. MANAGEMENT INFORMATION SYSTEMS

Management information systems (MIS) consists of a collection of interrelated data and information structure that organized in such a way that it corresponds to the needs and structure of an organization and can be used by more than one person for more than one application. A (MIS) is a formal, computer-based system, intended to retrieve, extract, and integrate data from various sources in order to provide timely information for routine, structured, and anticipated types of decisions. In addition, it has been successful in acquiring and storing large quantities of detailed data concerning transaction processing (5). MIS has the following characteristics:

1. It supports recording keeping and data processing functions.
2. Same databases can be shared for all functions of the organization
3. Every manager, from the diffrent levels of the organization can reach easily to the data.
4. All data and information can be used only by authorized personnel. Thus, system's security is provided.

Organizations require MIS because of some specific causes. These causes are; (3)

1. Complexity of data transfer and communication problems because of this complexity.
2. Work and force repetitions, creation of same data, and storing them in many different places.
3. Applying many kinds of operations and information flows when obtaining same data.
4. Impossibility of working with data. It's hard to get useful and necessary information because their form and positions aren' t proper.
5. Insufficient data source.
6. Limited information support.

2.1. Database Approach

Misplacing information is a problem. Having the right information is not enough; we also have it logically and physically organized so that you can easily access it and make the sense of it. Having the right information and being able to get it quickly will increase productivity .Once getting the information, it must be stored so that people can get it easily and make changes as needed. There are two views of information, physical and logical. The physical view deals with how information is stored on storage devices, while the logical view deals with how you arrange information while you' re working with it (1).

Everyone has his or her own files of information. And the software that each person uses to maintain the information in the file is called a *file management system*. There are some basic problems with using files and file management systems (1). First, the same information may be stored in many different places. This problem is known as **data redundancy**. For example, a course book's chapter names appear in two different places. Second, because the same information exists in several places, there is the issue of **data integrity**. Data integrity deals with the correctness of the information. Although the author's title is correct in the chapters file, it isn't correct in the addresses file; this is the loss of data integrity.

Because of these problems, all the organization' s information stored in one place and a software is proved that anyone can use to access any of the information. These concepts are called *database* and *database management system* (DBMS). A database is a group of *related files*, and a DBMS is the software designed to create, store, and manipulate a database.

One facet of a database management system is processing inserts, updates, and deletes. This all has to do with putting information into the database. Changes in data representation will often be needed as a result of changes in query, update, and report traffic and natural growth in the types of stored information. A relational database is a big spreadsheet that several people can update simultaneously.

The relationships between the many individual records stored in a database can be expressed by several logical structures. DBMS are designed to use these structures to execute their functions (5). One of these structure is relational. Relational database allows the user to think in the form of two-dimensional tables, which is the way many people see data reports. This structure is most popular for DSS databases.

The database approach offers a number of important and practical advantages to an organization. Reducing redundancy improves the consistency of data while reducing the waste in storage space. Sharing data often permits new data processing applications to be developed without having to create new data files. In general, less redundancy and greater sharing lead to less confusion between organizational units and less time spent resolving errors and inconsistencies reports. The database approach also permits centralized control over data standards, security restrictions, and integrity controls. This facilitates the natural evolution and change of information systems and organizations. Databases are very commonly used in everyday life. The relational model of databases provides a very simple way of looking at data structured into tables (7).

3. PROCESSING OF THE COURSE BOOK DATABASE

The course books database is user-friendly software designed to store and retrieve in an efficient and systematic way the large amounts data collected in different departments related with these books. Having the entire course books information printed for AOF, in one place means that all people, regardless of the department they are in or what their jobs are, can gain access to the information they need.

The need for this study is appeared because of the problems defined in the second section. There are still 278 kinds of books are being used by students. Nearly every book has at least two printings. And also there are 735 authors and editors. This means that, there are at least 735 different address data are stored. Like these, the system has been using different types of data about course books. The people studying with these data, have problems like storing the same files with different names, storing them with same name but with different changes.

The DBMS developed for AOF is composed of four subsystems: data definition, data manipulation, data administration, and application generation (4).

3.1 The Data Definition Subsystem

The data definition subsystem helps defining the structure of the files in the database.
Data tables are designed on relational data tables. There are eighteen data tables provided by the relational database in this study (Table-1). In the relational data table, attributes represent necessary data summarized by the course book's printing, and royalty departments. The structure of the relational database in this paper is described in Figure 1.

3.2 The Data Manipulation Subsystem

The data manipulation subsystem lets us add and delete records, change field contents, and view the database. The information in a database can be viewed by using queries.

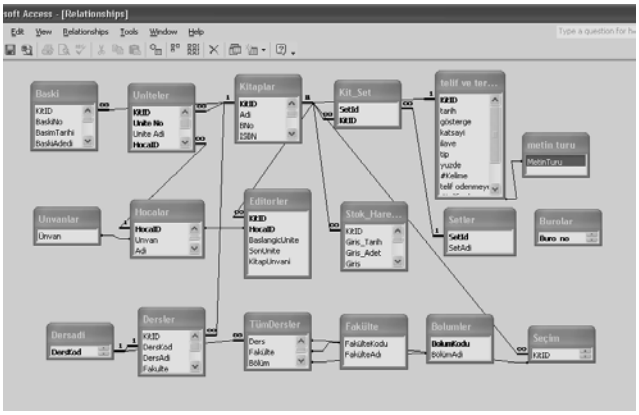

Figure.1 Relationships Table

Table-1: Data Tables

	DATA TABLES	
1.	Books	BookID, Name, Barcode Number, ISBN, publication numbers
2.	Printing	BookID, Printing number, date, number of pages
3.	Chapters	BookID, Chapter number and names, Author's ID
4.	Authors	AuthorID, title, name, surname, address, phone number
5.	Publishers	BookID, AuthorID, beginning and last chapters
6.	Titles	Title
7.	Royalty	BookID, date, pointer, coefficient, addition, text type
8.	Text type	Text type
9.	Stock	BookID, entrance and exit date, unit, explanation
10.	Book-Sets	SetID, BookID
11.	Sets	SetID, Set names
12.	Offices	OfficeID, Office name
13.	Course Names	CourseID, Course
14.	Faculties	FacultyID, Faculty name
15.	Departments	DepartmentId, Department name
16.	Courses	BookId, CourseID, Course name, Faculty, department and class
17.	Addition royalty	BookID, page number, number of words
18.	Selection	BookID, Course

The database is opening with the following start-up menu. The user has the following six main options: creation of necessary records of book's characteristics; control of book storage; preparing royalties and storing personal (authors and publishers) information, and preparing any kind of reports to see information about books. User can quit the database by clicking "Programdan Çıkış" command button (Figure 2).

Figure.2 Main Menu

User can add, edit, and delete records by using the following forms (Table 2):

Table-2: Database Forms

1.	New Course Book Definition
2.	Printing
3.	Courses
4.	New Course Definition / Modification of Courses
5.	Chapters
6.	Authors & Publishers Addresses
7.	Modification of Authors & Publishers
8.	Royalty
9.	Course Book's Sets Definition
10.	Stock Inputs & Outputs

For example, "Printing" form includes all the fields necessary to define course books printing information. It is used to enter new printing data into the database. An
example of an input data screen is shown in Figure 3. User selects the book's name and fills out necessary fields. The user can add new course book to the database by clicking "yeni kitap Ekle" command button. He can also make modifications of existing data. The edit and delete operations are identical to the input data operations and work in the same way. In this form, there're also links for reports of printing data.

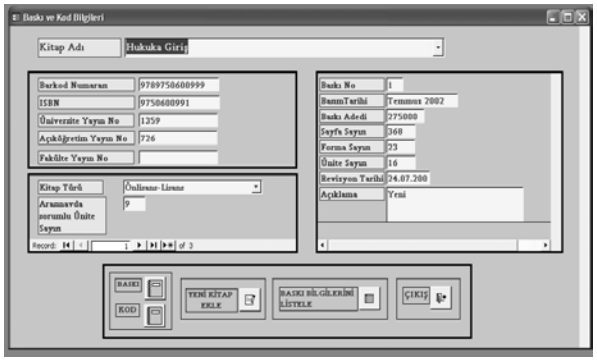

Figure. 3 Printing Form

User can also view the information in the database by using special reports. A form is used for preparing reports (Figure. 4).

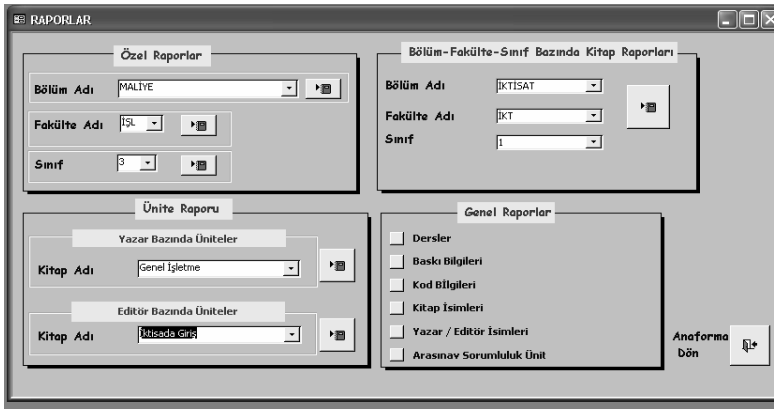

Figure. 4 Reports Form

3.3. The Database Administration Subsystem

Storing all of the course book's information in a database has created the need for managing the database. In the relational database, data integrity and security are maintained by those who are authorized to use, update, and delete. The database administration subsystem lets us establish users of the database, specify who can update

which information, and develop methods for backing up the database and recovering the database in the event of a failure. For example, one form printing department could look at, but not change, information relating to the price of royalties.

3.4 Application Generation Subsystem

Application generation subsystem contains tools that help us create and update other features such as menus, data entry screen forms, reports, and application software. This study needs more time to examine further development of system implementation. For example, new orders can be taken from users, like new reports, and data entry forms.

4. Conclusion

Until now, there is no problem with the database. Users can use it easily without any problem. Everyone related with these data are now uses only one database, and can reach easily. By this study, the data redundancy and integrity problems have been solved.
Finally, in the future studies, according to this relational database management system, a web-based system will be constructed. By then, everyone besides the related people can reach general information about course book data from anywhere.

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