THE DESCRIPTION OF A NEW MEDICAL SOFTWARE TOOL FOR HOSPITALS MANAGEMENT AND FINANCE

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Abstract: In this paper we present an efficient and flexible software system as an alternative for the DRG-National application, used by the Romanian Government to finance the hospitals. This alternative software system is in fact an on-line application based on JSP technology and a MySQL database in order to replace the old application realized in MS Access 2000. This application will help the DRG National Bureau to analyze, at any time, real-time data, and even send it to the international organizations. The users can easily get accustom to this new application, because it keeps the structure and many menus from the old application.

Keywords: medical applications, management systems

1. INTRODUCTION

The software system used for the management and finance of the Romanian hospitals permits to classify the patients based on the diagnosis, the procedures and other information (the complexity of each case) and to link this type of patients that each hospital treats to the expenses needed (DRG, 2005).

The necessary data for the patient classification on the basis of the diagnosis and the procedures in these system categories are: age, sex, hospitalization period, principal diagnosis, secondary diagnosis, procedures, health condition when leaving hospital, the birth weight (in the new-born child case). Through the system of the diagnosis group the characteristics of each patient who left the hospital are analyzed, and in accordance with these, the patients are classified in a different category. This way, this system makes an ,,image" to the hospital results, trying to standardize the results of this activity.

The diagnosis groups have two essential characteristics:

1) The clinical homogeneity, meaning that in a certain DRG the cases (the patients) are similar from the clinical point of view, but not identical
2) The costs homogeneity, meaning that each DRG has cases that need similar usage of resources.

To be able to classify each patient that left the hospital in a diagnosis group there have to be run four phases:

1. the disponibility of the clinical data for the patients that left the hospital
2. the codification of the necessary data for the diagnosis and the procedures in order to have a standardized language for these variables and to be able to use them easily
3. gathering these data in an electronic manner
4. the automatic classification of each patient in a diagnosis group

Nowadays, to gather the information for the patients it is used the v4.0 application that is delivered through the district agencies (DRG, 2005). This application must be installed on every computer used for gathering data about the patients. The electronically registration for a patient, one for the whole period the patient stays in hospital, is in concordance with the new clinical observation form

introduced by the Romanian Health and Family Ministry. Once collected, the data are added to a database, which has to be sent monthly to the DRG department from the National Health Institute for Research and Development, Bucharest. This is a Runtime application implemented in Microsoft Access 2000 that collects information about the patients at the department level, encrypt them and after that send them to the DRG National Bureau using the e-mail. The data centralization from all departments on a single computer is also possible, where the application also has to be installed, and send them in this centralized manner to the DRG National Bureau.

The application has minimal requirements at the hardware level and at the level of the Internet connection.

2. THE PRESENTATION OF THE NEW ALTERNATIVE FOR THE DRG SOFTWARE SYSTEM

2.1 Brief comparison of the two applications

Because of the difficulties presented by the DRG-National application, we propose a new software system.

The desavantages of MS Access 2000 are: it is an administration system for desktop databases and administrates with efficiency a slightly reduced number of recordings: around 20000-30000 records, generally used in activity management in small companies. That is why, instead of using MS Access 2000 it is proposed a much stronger system of database administration, named MySQL (Welling , 2003).

The proposed on-line application offers more advantages:

- With this solution, the encrypt phase of data and the transmission through the e-mail are eliminated, because it can bring a lot of problems; the data received by e-mail at the DRG National Bureau must be saved in a certain format, eventually a database, in order to be consulted either with visualization, or with the elaboration of some reports, statistics or graphics; when adding in the same database information resulted from different sources there might be a lot of data inconsistencies.
- The data that DRG National Bureau sees are always up to date; it is not necessary to wait for the end of a certain period of time to receive those data.
- The application and the database server must be installed on a single computer (server); it will be accessible for any user in the range of his rights from his own computer, using a browser; in this manner it is not needed to install the application on each client's computer; of course, the server's performances must be very high.

The application described below is a client/server application implemented using Java technologies (Goodwill,2000) and represents the ideal solution to implement a competitive database with minimum costs (software costs are zero). It is based on a MySQL database server.

2.2 The database description

As we said above, the database used for implementation is a MySQL database server. The database structure is the following:

1. Table **tblStatus** allows encoding of the patient status by means of two fields status_id (primary key) and status name.
2. For encoding the diagnoses there are three tables **tblClass**, **tblSubclass** and tblDiagnoses connected by a 1:m relationship because in one class there are several subclasses, and in one subclass there are several diagnoses.
3. For encoding the XR investigations and the functional explorations there is table **tblXr,** respectively **tblInvestFunct**
4. There is also a table which allows the encoding of the surgical procedures, **tblSurgical**
5. The table **tblInt** allows encoding of the different types of hospital registration

Some other tables in the database are:

6. In the table **tblHospital** there are data about the hospital from the DRG network: hospital_id (primary key), hospital name, county, city, number of beds.
7. In the table **tblDepart** there are data about the departments from each hospital: department_id (primary key), department name, hospital_id (foreign key) used to implement the relationship 1:m between the tables tblHospital and tblDepart.
8. In every department works a number of doctors about whom there are data in the table **tblDoctor**: doctor_id (primary key), name, specialty, department_id (foreign key) used to implement the relationship 1:m between the tables **tblDepart** and **tblDoctor**.
9. For a certain department and a certain doctor are registered the patients who have a new sheet at every hospital record. For their data a new table **tblPatient** was created having the following structure: sheet_id (primary key), personal_id, first name, last name, sex, birth weight in the new-born child case, data of registration, data of release from the hospital, doctor_id (foreign key) in order to know the doctor who attended the patient, the code of the first principal diagnosis, the code of the

second principal diagnosis, the code of the secondary diagnosis, the code of the hospitalization type, the code of the patient status.

The database also contains a series of tables as the result of the implementation of some m:m relationships between the above tables.

10. The table **tblPatient_XR** stores for every observation sheet identified by sheet_id the codes of the effectuated XR investigations
11. The table **tblPatient_FuncExpl** stores for every observation sheet identified by sheet_id the codes of the effectuated functional explorations
12. The table **tblPatient_Surgical** stores for every observation sheet identified by sheet_id the codes of the surgical procedures made during the hospitalization time

2.3 The levels of security and user rights

For the application security some levels of security are created.

The higher level is the zero degree, which is the database administrator and he has all the rights.

For identification a username and a password are used. One of its roles is to introduce in the **tblHospital** table a record for each hospital added in the DRG system.

For each hospital a new administrator is created, who has all the rights over his hospital information. This is the first level.

The administrator from first level has the possibility to view all the user data(diagnosis and investigation tables). Also the hospital administrator from first level can add a departement record in the table **tblDepart** and one or more users for each department.

Aloso he modify the department records. The is the second level. A user from the second level will have access only to the information from the its department.

2.4 Graphical User Interface

At the start of the application the user has to introduce the username and the password for having access to the application menu.

The interface functions are presented in this paper.

The main application window is presented in the following figure:

Fig. 1. The user authentication window

Depending on the security level , the user will have access to different application modules

Fig. 2. One of application modules depending on the logged user

When the user from zero level have to add a hospital administrator, the following window will be opened as in the bellow figure:

Fig. 3. The form by which an adminstrator of zero degree adds a hospital administrator

The roles of the hospital administator are: creation of a new department in the hospital which he administrates , the creation of a department user, the creation of the doctors lists of the department.

Fig. 4. A form which permits to a hospital administator to add a department user and the doctors' list

The user from the second level (the department user) has no access to the operations of the user and department creation. The department user has an option for creating the patient sheet(PatientSheet), in which he can introduce information of the patients from his department.

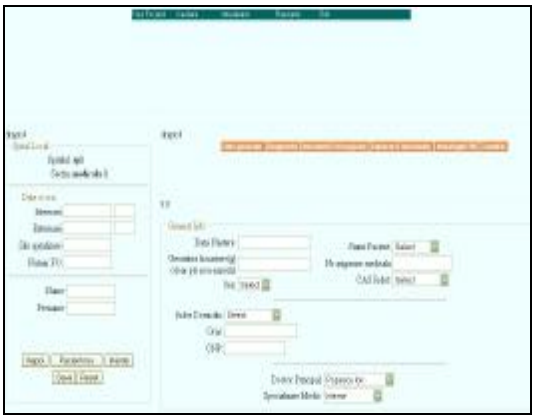

Fig. 5. The form which allows the department user to add patients

The department user can introduce specific data of the patient: from general data to diagnosis and procedures.
Also the application allows the visualization of the data, depending to the logged user. So the user can visualize the patients, the diagnosis, the surgical procedures and the functional explorations.

Fig. 6. The visualisation of the data from the department or hospital level

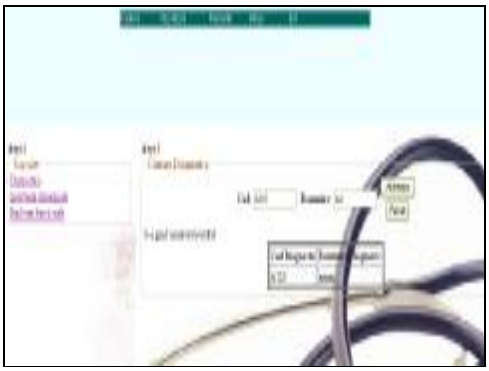

Fig. 7. The form which permits the diverse reports creation at the department, hospital or global level

The *Report* option permits the edit of diverse reports, either at the level of department or hospital or at global level. The access to these reports is determined by level of security, so that a user from the second level has access only to his department reports.

Fig. 7. The Report window

The *Search* option permits the searching of the diagnosis, surgical procedures or functional explorations in the database. The searching form is the same for all the users.

Fig. 8. The searching window

CONCLUSIONS

The application described below is a client/server application and represents the ideal solution to implement a competitive database with minimum costs (software costs are zero). It is based on a MySQL database server.

This application is an alternative to the DRG – National application, which have a lot of desavantages.

This paper has presented not only the drawbacks and the inconvenients of the used application, but also a new solution.

The new solution is not expensive and offers a series of advantages:

- The MySQL database has performances superior to those offered by MS Access
- The data viewed by the DRG National Bureau are every moment the up-to date ones, without having to wait for the end of the month
- The application and the database are installed on a single computer, from where is accessed by everyone who has the rights
- The administration and the security of the database have been realized by means of some security levels and of some views on the database defined for each type of user

In the end, it has to be mentioned that the application is in the developing stage.

REFERENCES

Goodwill J. (2000). Pure JSP, Java Server Pages: A Code-Intensive Premium Reference, Smas

DRG Romanian Oficial Page(2005) http://www.d rg.ro

Welling L, Thomson L. MySQL Tutorial, MySQL Press, 2003