UNIVERSITÀ DEGLI STUDI DI PADOVA

DIPARTIMENTO DI INGEGNERIA DELL'INFORMAZIONE

Database Management Systems, A.Y. 2017/2018
Master Degree in Computer Engineering
Master Degree in Telecommunication Engineering

Homework 1 – Requirements Analysis

Deadline: March 16, 2018

LeoForFriendsDB	TreatIT	
Da Lio	Edoardo	1174591
Giovannini	Stefano	1178044
Kalakonda	Srikanth Reddy	1178232
Rossi	Gianmaria	1178526
Zhang	Guangzheng	1178043

Objectives of the System

A medical office needs a more efficient and automated system in order to manage their patients' information records, to be able to make this data easily accessible to all doctors working in the structure and eventually to make this data more easily shared (sometimes in an anonymous way) with other medical facilities like public local health companies.
Doctors should be able to manage prescriptions of medicines, patient history and personal data, received treatments and undertaken exams. Every doctor should be able to freely access his/her own patients' information and to share them with colleagues.

Interviews

The interview was conducted in two sessions with Dr. Augusto Rossi, who is a practicing doctor from Nove (VI) working in a medical studio alongside with other physicians. The interviewers were given a presentation of the current version of the system available to the doctor at the present moment, and also suggestions on what could be some possible improvements to it. The aforementioned improvements are listed and discussed in further details in the following sections of this document.

Users and Stakeholders of the System

The system is meant to be used by:
Doctors: physicians working for the organization. They are the main users of the system.
Employees of public health structures: doctors working for public health system should be able to access patients' information anonymously if in case of statistical data collection.

Natural Language Sentences

As already stated current systems present several lapses according to their final users, who are mainly the doctors of the structure. These lapses are concerning mainly on:

- Missing accurate description of disease offspring and development
- Need for more accurate descriptions of features like medical history or hospitalization by the addition of more detailed fields
- Lacking possibility to perform well-organized and detailed cross-searches about diseases, vaccinations and prescriptions between data of different patients

Thus, modern medical offices need efficient and redefined versions of their current ways to store individual information about their patients, in order to achieve higher levels of organization and have a safer and faster way to access to the whole data regarding a specific person.
More specifically, doctors need, for each patient, to be able to add information on personal data like: name, surname, fiscal Code, birthdate and place of birth, phone number, personal and official email addresses (possibly), Local Socio-Sanitary Unit (ULSS) of origin, date when he/she was taken into care. Same information should be stored for doctors, too, with the only exception of fiscal Code and personal mail. Each doctor shall be able to access only his/her own patient data, unless under authorization of another colleague working in the structure. Each doctor must be able to access the system with his/her own personal account by means of their personal password.
It is also needed by physicians to access and modify the medical history of a patient, which is a record of all symptoms and signs shown by the person and also some medical information about his/her relatives.
Moreover, it is necessary to store any experience or fact that may cause or have caused a certain disorder, like travels in foreign countries or traumatic events.
Medics must also store all results of the exams patients take and need to list them, together with hospitalization data. They also need to write down details regarding the environment in which the patient lives in order to have a clearer and more complete picture, leading thus to a more accurate diagnosis.
Records of past prescriptions (synonym for medical recipe) are to be made available in two different ways:

- List of all the prescriptions a single doctor wrote during his period of work in the office
- Collection of all the prescription a patient has been assigned.

A single prescription of a drug needs to report: the name of the medicine, the dosage, usage modalities.
Medical certificates have also to be kept in memory by the system, with a specific field exhibiting their type. Certificates can be regarding: absence from work, habilitation for sport practice, health insurance, firearm license, driving license, certificates for national social welfare institute (INPS), disability, school and others. Alongside with certificates, also exemptions need to be managed in their various forms: pathological, disability, income.
Medical exams should also record or allow to set the deadlines for periodic exams, like medical exams, also vaccinations (i.e. targeted immunizations to certain curable diseases, often to be repeated periodically) have to be recorded together with their deadlines.
Diagnosis of diseases must be stored with: name of the disease, first symptom appearance date, symptoms descriptions, pain scale (subjective, from 1 to 10).
Eventually also allergies (i.e. hypersensitivities to certain external agents like pollen, cat or dog fur, or similar) must have their field in the patient information records.
The final goal of this system should be to provide doctors an efficient way to access to this stored data by means of simple queries based on categories: this means that a doctor should be able to search, for example, all patients affected by a certain disease or that underwent a specific vaccination and, most importantly, to search for the name of a single patient and immediately access all of his/her related data.

Furthermore, some anonymized data collection regarding specific fields (i.e. number of vaccinations or incidence of a certain disease in a season) should be provided monthly to research institutes via spreadsheet files, to be created automatically.

Filtered Sentences

Patient: main entity of the system
- His/her information should be complete and exhaustive, including all personal and medical data: name, surname, fiscal Code, birthdate and place of birth, telephone number, emails, ULSS of origin, date of taking under care, vaccinations, allergies, diseases, hospitalizations, received prescriptions, prescription history, medical history, exemptions, certificates.
- They have no access to the system, but doctors should be able to deliver them their own personal data by accessing and collecting it in a single file.

Doctor: only user of the system
- Need to log in to the system with his/her personal account and password in order to use it
- Must be able to insert, modify, delete all the data regarding his/her patients
- Can access other physicians' patient information freely
- Must be able to query the system by means of insertion of keywords. These queries can be conducted by filtering various categories (e.g. vaccinations, exams, diseases, …).

Disease: Health problem suffered by a patient
- Its linked information concerns: name of the disease, first symptom appearance date, symptoms descriptions, pain scale (subjective, from 1 to 10).

Vaccination: Targeted immunization to a certain disease
- Information related to the deadline for its repetition needs to be available if necessary

Allergy: Hypersensitivity to external agents.

Medical History: List of symptoms and signs a patient exhibits, including information about past diseases and medical conditions of his/her closer relatives.

Prescription: Assignment of a drug to a patient
- It should be stored alongside with data on the kind of the assigned drug and its dosage.

Certificates: Documents attesting the medical fitness (or unfitness) of the patient to accomplish a given task, such as: working, practicing sport, getting health insurance, get the firearm license, get the driving license, access certain national social welfare institute (INPS) services, prove a condition of disability, going to school.

Exam: medical tests taken by patients
- An exam can be taken by a patient both according to an autonomous decision or after prescription of the doctor. In the latter case, the prescribing doctor should be able to keep track of which exams he/she assigned to which patient and their results.

Prescription History: record of all the past prescriptions
- It can be regarding both prescriptions received by a single patient or made by a single doctor.

Exemption: it certificates that the patient has not to pay for a given service because of proved motivations
- It can be approved by the doctor because of pathological, disability, income issues faced by the patient.

Hospitalization: medical cares received by the patient during his/her permanence to the hospital
- Its relative record should contain examination results and the drugs the patients has taken

Term Glossary

Term	Description	Synonyms	Connections
Patient	Someone under medical care	Person	Doctor, Disease, Allergy, Medical History, Prescription, Vaccination, Certificate, Exam, Prescription History, Exemption, Hospitalization
Doctor	Someone providing medical care	Physician, Medic	Patient, Prescription History, Prescription, Exam, Certificate, Exemption
Disease	Health problem affecting a patient,	Disorder	Patient
Allergy	Hypersensitivity of the patient's body to a certain substance	-	Patient
Medical History	Collection of data regarding past diseases and treatments related to the patient	-	Patient
Prescription	Medication suggested by the doctor	Medical recipe	Doctor, Patient, Disease, Prescription History
Vaccination	Preventive immunization to a certain disease	Immunization	Patient
Certificates	Documents written by the doctor to provide a promissory note regarding health conditions of the patient	-	Doctor, Patient

Exam	Series of tests targeted to check specific health conditions of the patient	Medical test	Patient, Doctor
Prescription History	Record of all prescription assigned by a doctor or received by a patient	-	Prescription
Exemption	Document attesting someone's authorization not to pay taxes for a certain medical performance	-	Doctor, Patient, Exam
Hospitalization	Period of time during which a patient is under the care of an Hospital	-	Patient, Exam, Disease

Functional Requirements

The system features should follow the subsequent points:

- Allow doctors to insert, modify, query and delete data about patients
- Guarantee access to doctors just after they log in the system upon insertion of a personal password
- Patient records should contain: name, surname, fiscal Code, birth date and place of birth, telephone number, emails, ULSS, date of taking under care, vaccinations, allergies, diseases, hospitalizations, received prescriptions, prescription history, medical history, exemptions, certificates
- Information on doctors should be stored with the fields: name, surname, birth date and place of birth, telephone number, email
- Number of results retrieved by queries should be available
- Manage submissions from different doctors on the same patient

Non Functional Requirements

Additional features of the system should be:

- Information about patients should be provided in an anonymized way to local research institutes
- System should be accessible from 1 up to 50 doctors
- Doctors should find the system very simple to use
- Help buttons should be available in every interface of the system

Constraints

The DBMS should satisfy the following constraints:

- Be implemented with PostgreSQL.
- Operating system: Windows (currently used by doctors)