

Electronic Medical Record System (EMRS)

Database Design Document

Details of Design Decisions and Considerations

Version 1.0

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PROJECT MEMBERS

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Introduction

The goal of the Electronic Medical Record System (EMRS) is to allow patients, healthcare providers, and healthcare administrators easier access to relevant information they may need in their day-to-day activities. The EMRS should allow its users to streamline the tasks that can often be tedious to complete in the healthcare industry.

1.1 - Summary of Previous Documents

The previous document, an analysis and specification for the EMRS, included a statement of need and feasibility, technical specifications, a list of requirements, and an appendix. The statement of need and feasibility addressed our client and their need for this system. The technical specifications gave a brief description of the technologies that would be used to implement the EMRS. The list of requirements laid out many of the requirements the EMRS would need to fulfill to ensure the users' needs are met by the system. Hospital administration, medical personnel, and patients' needs are addressed, as well as general system requirements. Finally, a use case diagram was included to demonstrate the various scenarios the system would be used for.

1.2 – Design Objectives

The objectives of the design for the EMRS arise from a necessity for the system to be reliable, efficient, and robust. In order to achieve this, tables in the database must be measurably good in their ability to accurately represent the data. Normalization will be performed on the tables in order to ensure minimal redundancy in data representation. The database schema must be comprehensive, so that information necessary to health care personnel, administration, and patients is present if/when needed.

Changes Made to Previous Documents

Changes have been made since the last submission to contribute to a more comprehensive, readable, organized, and professional document. These changes were made in order to better track the design process, and to maintain better organization for the system.

2.1 – Further Detail Provided

Further explanations given regarding system and user requirements, technical descriptions, and data design. This is to clarify and provide a complete picture of what is to be accomplished.

2.2 – Addition of Figure Numbers

All figures can now be referred to by numbers given in the table of contents. This change contributes to better readability, and all over organization.

2.3 – Addition of Diagrams

Various diagrams have been added to this document in an effort to more comprehensively describe the system. An entity relationship diagram giving a general view of how certain aspects of the system are relevant to each other, as well as a diagram detailing the database schema will be given.

In addition to diagrams detailing the structure of the database, a few prototypes of the user interface are presented as well. Please note these snapshots are prototypes and may not reflect the finished product.

Subsystem and Application Overview

Given the sensitive nature of the information stored in the EMRS, certain end users will only be able to accomplish certain functions. These functions will be laid out here.

3.1 – Application Description

Record Management System: This subsystem of the EMRS will track, create, archive, and delete records present in the system. It is through this system that health care providers will create, add to, remove from, and update patient records. Through this system patients will be able to view their current medical record, as well as progress on any ongoing treatments.

Financial Management System: This subsystem of the EMRS will track financial statuses of the hospital as a whole, as well as patients current bills. Through this system, hospital administrators will be able to view relevant information regarding patients' insurance, and their current bills.

Archival System: This subsystem will keep track of and remove from the system old medical records. Users will not have direct access to this subsystem, as the subsystem automatically archives records that are marked for archival, and automatically removes records that have met the proper requirement for removal.

3.2 – User Interface Prototypes

Given these descriptions of subsystems, it is pertinent to demonstrate what the end users may see when working with the EMRS. It is again important to note that these are simply prototypes and may not wholly reflect the finished product.

3.2.1 – User Login

Shown is the login interface for the EMRS. This login screen will be presented to all end users. Different accounts will be identified in the database itself, and that will determine which interface will be displayed to the user. For instance, when a doctor logs in to the system, the database entry of the doctor's account will be marked as a doctor, while a hospital administrator's account will be marked as an administrator.

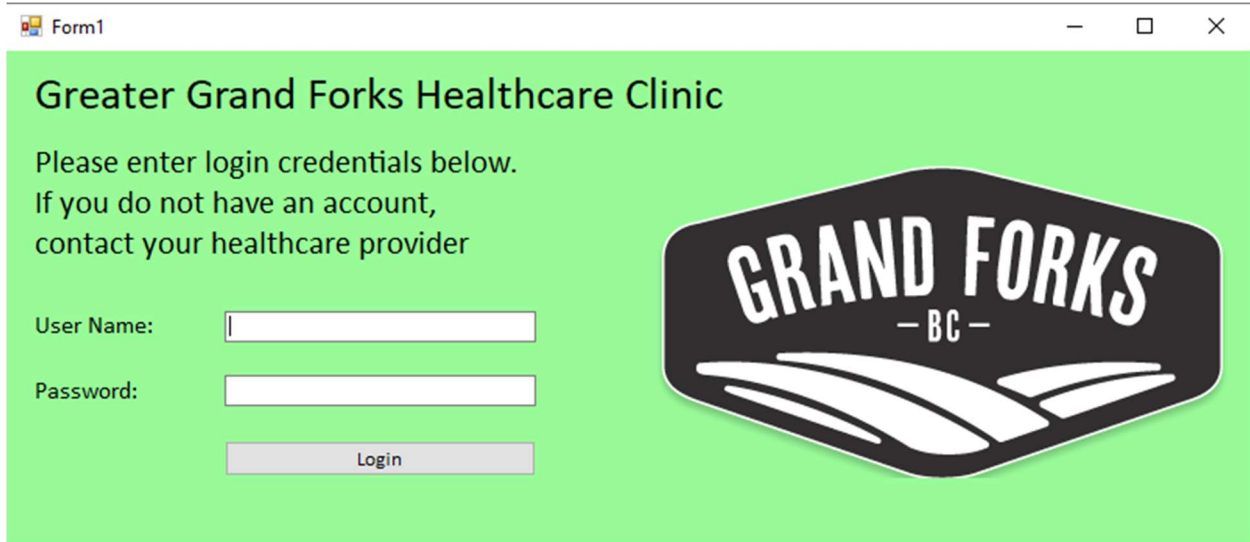
The image shows a screenshot of a web application window titled "Form1". The background is a solid light green. At the top left, the text "Greater Grand Forks Healthcare Clinic" is displayed in a bold, black, sans-serif font. Below this, a message in a smaller black font reads: "Please enter login credentials below. If you do not have an account, contact your healthcare provider". To the right of the text is a large, dark blue shield-shaped logo with a white border. The logo contains the text "GRAND FORKS" in a large, white, serif font, with "- BC -" in a smaller white font below it. Below the text are three white, curved lines representing a stylized landscape or waves. On the left side of the login form, there are two white input fields. The first is labeled "User Name:" and the second is labeled "Password:". Below the password field is a grey button with the word "Login" in a small, black, sans-serif font.

Fig. 3.2.1 – Login Interface

3.2.2 – Medical Personnel Interface

The healthcare personnel interface will allow doctors to accomplish various tasks relevant to treating a patient, such as: viewing a patient's current symptoms, viewing previous diagnoses, viewing previous prescriptions, issuing new prescriptions, editing current prescriptions, and marking the record to be archived. As was previously mentioned, the record archival subsystem is not directly accessible, however, a member of healthcare personnel can have the ability to manually mark an old record for archival.

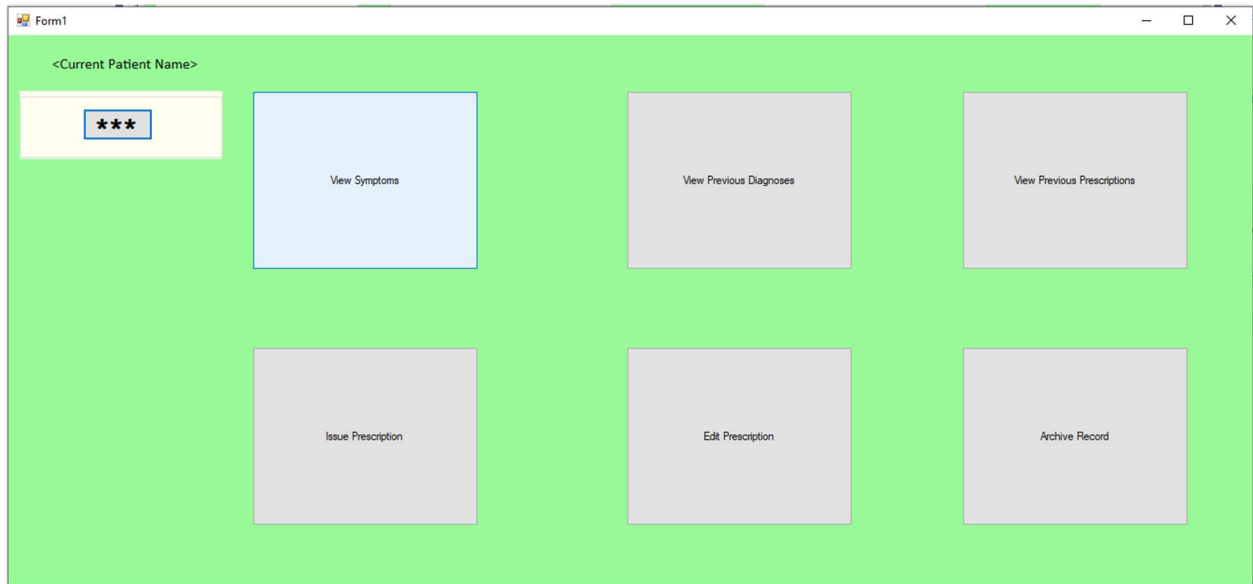


Fig. 3.2.2 – Healthcare Personnel Interface

3.2.3 – Patient Interface

The patient interface will allow patients to accomplish various tasks relevant to their care, such as: viewing symptoms they are experiencing, viewing previous diagnoses, viewing current prescriptions, and paying current hospital bills.

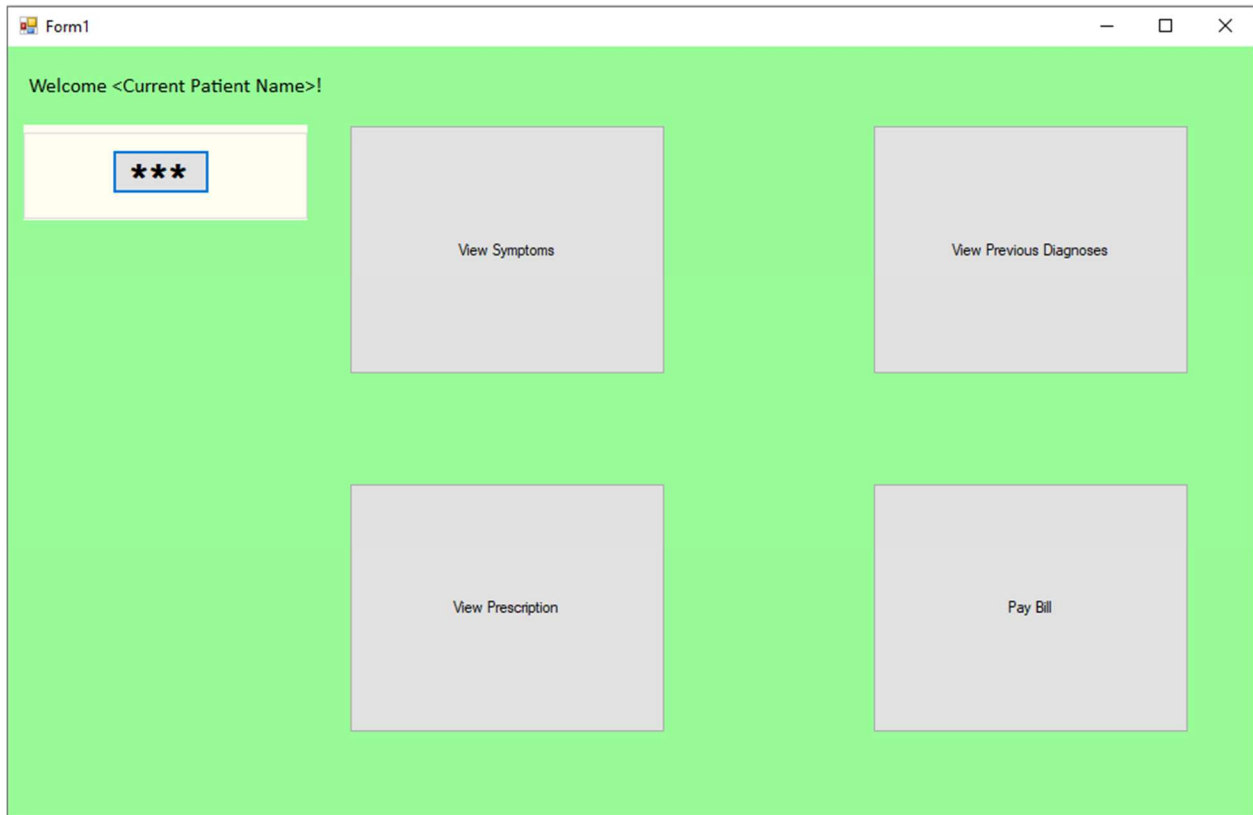


Fig. 3.2.3 – Patient Interface

SQL Statement Examples

4.1 – Create Patient

INSERT into PATIENT table VALUES for new patient

4.2 – Create Treatment

INSERT into MEDICAL_RECORD table VALUES for treatment

IF USER_ID=HEALTHCARE_PROVIDER_ID

4.3 – Edit Treatment

UPDATE MEDICAL_RECORD SET treatment information WHERE PATIENT_ID

IF USER_ID=HEALTHCARE_PROVIDER_ID

4.4 – View and Pay Bills

SELECT Bills FROM MEDICAL_RECORD

4.5 – Edit Personal Information

UPDATE PATIENT SET personal information WHERE PATIENT_ID

IF USER_ID=PATIENT_ID

Data Access Requirements

As the nature of the information contained within the database will be of a sensitive nature, it is necessary to establish certain security rights in order to view certain information. This allows access to the data to only be allowed by the appropriate parties.

5.1 – Database Administrators

Database administrators will be tasked with the maintenance of the database, installing any necessary software, updating the RDBMS system as needed, performing information backups, and ensuring access to the database is secure. Given the nature of the database administrator's job, this position must have access to the entirety of the database. As such, the database administrator must be able to demonstrate trustworthiness with respect to handling the data.

5.2 – Hospital Administrators

Hospital administrators will need to have access to personal information of patients, such as: names, phone numbers, addresses, insurance information. However, hospital administrators do not necessarily need to know the current condition of the patients, like their symptoms or their prescriptions. Hospital administrators will also have access to the names, phone numbers, addresses, and work positions of the healthcare personnel employed at the hospital.

5.3 – Medical Personnel

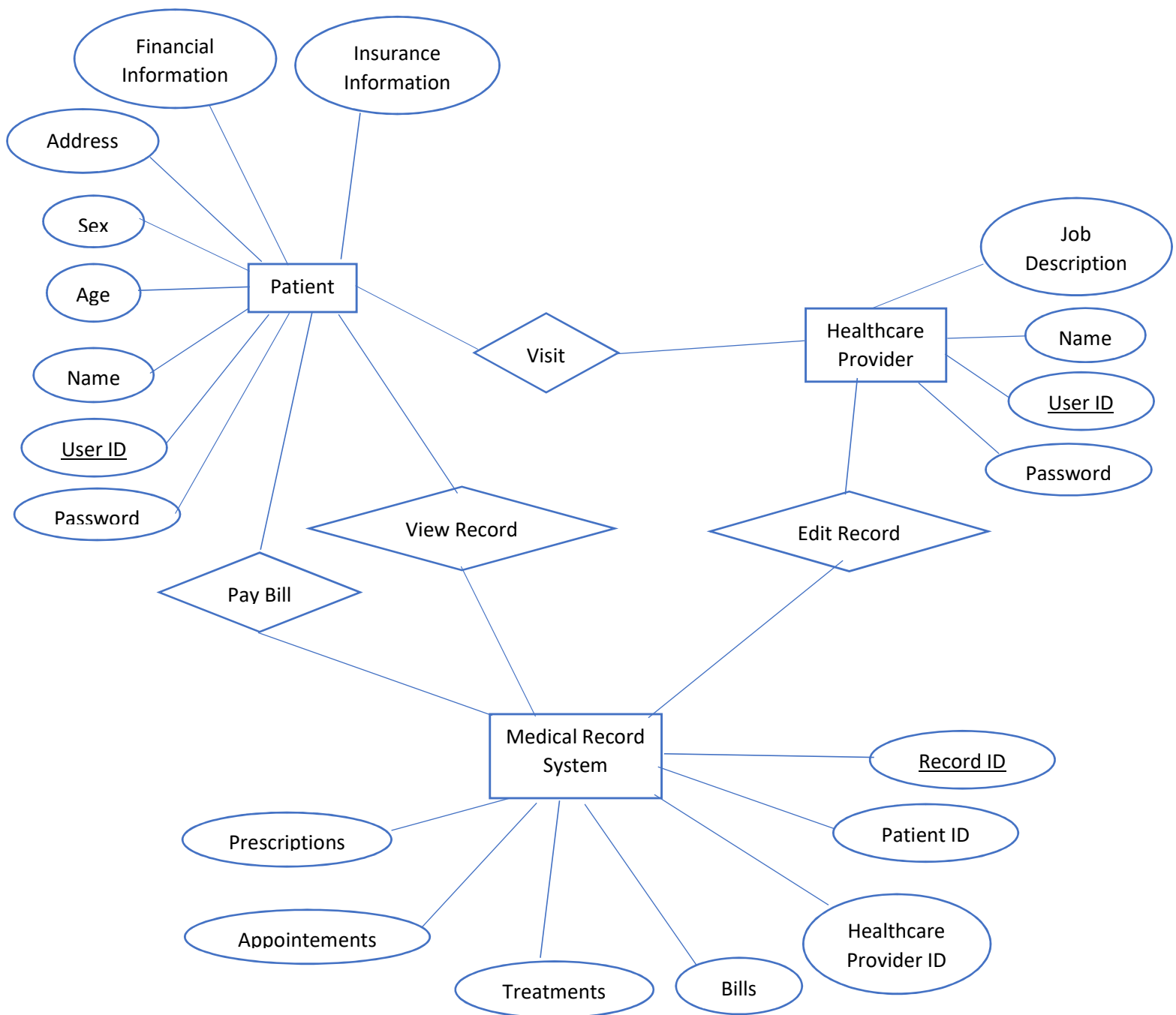
Medical personnel will need access to most patient information. They will need patients' names, phone numbers, addresses, medical records, and prescription information. They will not need, however, a patient's insurance information.

5.4 – Patients

Patients will need full access to their information, such as medical records, prescription information, and insurance information. They will also need the information of their primary care providers, such as: names and phone numbers. They will not be allowed access to other patients' records, or other patients' primary care providers. Patients can be allowed access to a directory of staff, in case they would like to contact another doctor for a second opinion.

Appendix

6.1 – Entity Relationship Diagram



6.2 – Relational Schema Diagram

Patient:

<u>User_ID</u>	Password	Name	Age	Sex	Address	Financial Information	Insurance Information
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Healthcare Provider:

<u>User_ID</u>	Password	Name	Job Description
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Medical Record:

<u>Record_ID</u>	Patient_ID	Healthcare_Provider_ID	Treatment	Prescription	Appointement	Bill
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6.3 – Use Case Diagram

