CRISYS

Electronic Health Records

USER'S MANUAL

Contents

GENERAL INFORMATION

System Overview

The transition from paper-based health records to electronic health records (EHR) is underway. There are many systems marketed to medical providers, and some systems oriented towards consumers, such as Google Health (www.google.com/health) and Microsoft HealthVault (www.healthvault.com).

A comprehensive EHR system would provide interfaces for many kinds of organizations (doctor's offices, hospitals, pharmacies, insurance companies, auditors, regulatory agencies, etc.) and many categories of users within each organization. In this project, we limit the scope to patients and their agents (e.g., spouse or parents) and clinicians (e.g., doctors and nurses). Also, the information maintained by the system is limited primarily to EHRs and information needed to control access to EHRs. Work schedules, appointments, billing, insurance, etc., are omitted.

System Requirements

- PC with Pentium processor or compatible
- Any operating system with a web browser
- 256 MB RAM
- Internet connection

SYSTEM SUMMARY

System Configuration

Users will access the system through a web interface. The system will manipulate the database through the database connector. At the same time, the database will control what information is passed to the user interface.

User Access Level

There will be different roles in the system:

- Administrator: will be responsible for maintaining user accounts
- Clinician: duties involve updating patient information
- Patient: the role with default permission level in the system; the data present will be centered on this user
- Agent: will have a role supplementary to the patient, on the condition that the patient does not have the ability to manage his/her account

GETTING STARTED

Server Side

Installation

- **Requirements**
  CodeIgniter requires PHP and a supported database for the system to work. Supported databases include: MySQL, MS SQL, Postgres, Oracle, SQLite, and ODBC. Crisys uses MySQL. See the FAQ for more detailed instructions.
- **CodeIgniter**
  Download the latest version of the CodeIgniter application developer framework from *http://codeigniter.com*. The contents of the archive should be extracted to the web server.

Configuration

- **Setting up CodeIgniter in the web root**
  1. Extract the compressed files to the web root directory.
  2. Normally, the index.php file will be at the root.
  3. The system folder can be renamed for more security. If this is done, the mapping must be updated in the main index.php file's $system_folder variable at the top of the page.

- **Configuring CodeIgniter**
  1. Open the application/config/config.php file with a text editor.
  2. Set the base URL variable.
  3. If you intend to use encryption or sessions, set your encryption key.

- **Configuring the database connection**
  1. Open the application/config/database.php file with a text editor.
  2. If a database will be used, the proper variables need to be set. These include the hostname, username, password, database, and dbdriver.

Starting the system

Because this is a live web implementation, the system will run on a dedicated host machine. After configuring the server side, there will be no need to start the system, as it will always be in a running state.

Client Side

The user will interface with the system through a website. Therefore, the client side of the system will only require a web browser. As of the current implementation, technologies such as Flash and Silverlight are not required.

To gain access to the system, the user will visit the website and request an account. This is as simple as sending out an email.

Thereafter, the user will have a login and password. Logging in to the system will entail entering this information at the index page. After logging in, the user will have access to the system's resources with the intended permissions.

USING THE SYSTEM

As a Patient

The system revolves around the patient as a user. Its data and functionality centers on the patient. The system will maintain records on your health records. As a patient, you have access to the following permissions:

Browse EHR Items

Select “Manage EHR" from the Patient drop-down menu. There will be a table of the items in your EHR. An EHR item can be viewed by clicking the corresponding “Details” button.

Search EHR Items

Select “Manage EHR" from the Patient drop-down menu. Input the keyword to search the database for. Select the field to search for matching phrases in. Upon clicking the “Search My EHR" button, a page with the resulting EHR items will be generated.

Add Comment Item

To add a standalone comment to your EHR, select “Manage EHR" from the Patient drop-down menu. On the left, select the “Add Item” button under the Functions menu. The data for the comment can then be inputted and added to the system.

To add a comment to an existing item, navigate to an item first. Then fill in the comment text box at the bottom of the item’s page. The comment will be submitted on clicking “Add Comment”.

Appoint Agent

Select “Manage Agents" from the Patient drop-down menu. Either search for a user in the system or select “Browse Users”, which will output a list of the current users of the system. Select a user to appoint as your agent, as well as an access level. Select “Add Agent” to appoint the user.

Revoke Agent

Select “Manage Agents" from the Patient drop-down menu. There will be a list of your current agents and their information. Select “Remove Agent” to revoke their agent status.

Appoint Primary Doctor

Select “Manage Clinicians" from the Patient drop-down menu. If you do not have a clinician with primary status, select one from the list of treating clinicians. Click the button to appoint them as your primary. Otherwise, you will not be able to appoint another primary.

Revoke Primary Doctor

Select “Manage Clinicians" from the Patient drop-down menu. If you already have a clinician with primary status, select the radio button to confirm that you want to revoke their status. Click “Remove Primary Clinician” to revoke their status.

Grant Consent to Treatment by Clinician

Select “Manage Clinicians" from the Patient drop-down menu. Near the bottom of the page, select a clinician under the “Grant Consent to Treatment” section. Click the button to grant consent to that user.

Withdraw Consent to Treatment by Clinician

Select “Manage Clinicians" from the Patient drop-down menu. Under the “Other Treating Clinicians” section, click the button corresponding to the clinician you wish to withdraw consent to treatment from.

Conceal an Item

Select “Manage EHR" from the Patient drop-down menu. Navigate to the EHR items (either by searching or browsing). Click the “Conceal” button next to the item you wish to conceal, and then select the user(s) you wish to hide the item from. You cannot hide it from the author.

Cancel Concealment of an Item

Select “Manage Concealments" from the Patient drop-down menu. Click the button corresponding to the concealment you wish to cancel to reveal the EHR item.

Cancel Referral

Select “Manage Referrals" from the Patient drop-down menu. Click the button corresponding to the target referral to cancel it.

As an Agent – Read Only

As a read-only agent, you will be able to view your sponsored patient’s EHR. You will be limited from making any changes to it, however.

Browse Sponsored Patient’s EHR

Select “Sponsored Patients” from the Agent drop-down menu. Click the “View Patient” button corresponding to the patient whose information you wish to view. This will display the patient’s EHR.

As an Agent – Read and Comment

As a read-and-comment agent, you have the ability to view your sponsored patient’s EHR, as well as add comments to it. Please reference the “As an Agent – Read Only” section of this manual for more information on viewing the EHR.

Add Comment to Sponsored Patient’s EHR

To add a standalone comment to the patient’s EHR, navigate to the sponsored patient from the Agent drop-down menu. On the left, select the “Add Item” button under the Functions menu. The data for the comment can then be inputted and added to the system.

To add a comment to an existing item, navigate to an item first. Then fill in the comment text box at the bottom of the item’s page. The comment will be submitted on clicking “Add Comment”.

As an Agent – Full Permission

As a full permission agent, you will be acting on behalf of your sponsored patient. Therefore, your permissions in the system will be equivalent to that of a regular patient. To access this functionality, navigate to the sponsored patient’s EHR through the Agent drop-down menu. Please reference the “As a Patient” section of this manual to learn more about the Patient’s permissions.

As a Clinician

As a clinician in the system, your role will be to document and maintain the information on the patients. The system will allow you to take care of your patients, as well as communicate with other users to ensure their quality of care.

Browse EHR Items

To browse your patient’s EHR, select “Manage Patients” from the Clinician drop-down menu. Click the “View EHR" button corresponding to the EHR you wish to see. The system will output the items belonging to that EHR.

Search EHR Items

To search your patient’s EHR, navigate to the EHR you wish to search through. On the left, select the “Search” item under the Functions menu. In the resulting pop-up, input the string to search for, and the field to look in. Click the button to search through the EHR, or close the window.

Add Comment Item

To add a standalone comment to the patient’s EHR, navigate to the sponsored patient from the Clinician drop-down menu. On the left, select the “Add Item” button under the Functions menu. The data for the comment can then be inputted and added to the system.

To add a comment to an existing item, navigate to an item first. Then fill in the comment text box at the bottom of the item’s page. The comment will be submitted on clicking “Add Comment”.

Add Quantitative Observation, Qualitative Observation, Diagnosis, or Treatment Item

Navigate to the sponsored patient from the Clinician drop-down menu. On the left, select the “Add Item” button under the Functions menu. Select the type of the item to be added to the EHR. The data for the item can then be inputted and added to the system.

Appoint Agent

To appoint an agent for a patient who has appointed you his/her primary clinician, select “Manage Agents” from the Clinician drop-down menu. Select the patient you wish to appoint an agent for, and click “Manage Agents”. You will be brought to a page where you can view the patient’s current agents. You can either browse the users of the system, or search through it for a user to appoint as an agent. After selecting one, choose a permission level, and click “Add Agent” to appoint him/her.

Revoke Agent

To revoke an agent for a patient who has appointed you his/her primary clinician, Select “Manage Agents" from the Clinician drop-down menu. Select the patient you wish to revoke an agent for, and click “Manage Agents”. There will be a list of his/her current agents and their information. Select “Remove Agent” to revoke their agent status.

Create Referral

To refer a patient to another clinician, select “Create A Referral” from the Clinician drop-down menu. Select the patient you wish to create a referral for, and a medical area that the referred clinician specializes in. You will see a list of doctors who have listed that area as their specialty, if there are any. Select the radio button next to his/her name, and click “Create Referral” to refer the patient.

Cancel Referral

To cancel a referral that you have created, select “Manage Referrals” from the Clinician drop-down menu. You will see a list of the referrals that you have created. Click the “Cancel Referral” button next to the referral you wish to delete to remove it from the system.

As an Administrator

The administrator’s role is to maintain the data in the system. He/she will be responsible for adding new users, as well as keeping logs of the transactions.

Access Control Modification

On the database level, there will be a table that contains the associations between roles and their permissions. The rows will represent actors, and the columns will represent actions. The table entry will be one of two values. This will describe whether or not a user of a particular role can perform a certain action. On displaying of the user interface, the system will look through the database for the allowed actions of a particular role. The results of this query will be used to populate the user’s menu, thus controlling the actions that they are allowed to take. During the processing of transactions, the system will also check for the user’s role, adding another level of security to the process.

The access control policy can be modified so that a specified role will gain or lose the ability to perform a particular action in the system. Administrators of the system will be able to change the policy through a web interface. On the user interface level, there will be a control page which will allow a user to change the control policies of the system. This will include a drop-down menu of the actors and actions of the system.

Modifications to the access control policy will involve manipulation of the database. The policy is implemented as a binary matrix. Therefore, modifying a permission will involve setting an element to either zero or one. Adding a new role to the system will be performed by adding a new row to the database table. Likewise, adding a new function to the system will be represented by adding a column to the table.

Therefore, the access control policy will be straightforward to implement, and simple to modify.