Radiology Information System

1. Installation Guideline

To install the system, you need to do the following steps:

1.1 Download the source files

- Download the `tar` file.
- Extract source code into the `proj1` directory within your `catalina/webapps`.
- Compile the `GetOnePic.java` into `catalina/webapps/WEB-INF/classes` directory.
- Move `web.xml` file into `catalina/webapps/WEB-INF` directory
- Move the `commons-fileupload-1.0.jar` file into `catalina/webapps/WEB-INF/lib` directory.

1.2 Run Tomcat

- Open a terminal, and run `starttomcat`

1.3 Set up the initial database

- Start `sqlplus` in a termial and login.
- Set up and populate the initial database using script files (e.g. `setup.sql`) by running the following commands: `@setup.sql`

1.4 Connect to Oracle DB

- You need to connect to Oracle DB at `http://HostName:PORT/proj/Connector.html` where `HostName` is the machine name of the server the system installed on and `PORT` is the port number that tomcat is running on.
- Enter the **Oracle ID** and **Password**, and click "**CONNECT**" button

2. Login Module

This module will be used by all users to login to the system with proper privileges, and to modify their personal information and/or the password.

2.1 Login Module

Enter the **User Name** and **Password**, and click "**LOGIN**" button to login the system.

2.2 Changing Personal Information and Password

To change personal information and/or password, click the your **UserName** at the top of the page after you successfully login.

You can change any of the following fields:

- First Name
- Last Name
- Address
- Email*
- Phone
- Password

```
* Note that your Email should be unique, which means
that you cannot have the same Email with any other
person in our database.
```

Click the "**UPDATE**" button at the bottom to save the changes.

3. User Management Module

This module allows a system administrator to manage (to enter or update) the user information.

3.1 Register New User

System administrators can register new users for the radiology information system.

Clicking the "**+User Account**" hyperlink will directe system administrators to the New User Register page.

You need to provide the following information:

- User Name
- Password
- User Class*
- Choose Person**

```
* Choose one from "Administrator", "Doctor",
"Radiologist" and "Patient".
** Choose a Person from the database. See 3.3 Register
New Person and 3.4 Update Personal Information for
more information.
```

Click the "**Add**" button to register. Click the "**cancel**" button to cancel the registration.

3.2 Update User Information

System administrators can update user information in the radiology information system.

Enter the user name and click the "**GO**" button. System administrators will be able to manage user's account.

You can only change:

- Password

Click the "**OK**" button to save the changes.

3.3 Register New Person

System administrators can register new person for the radiology information system.

Clicking the "**+Person**" hyperlink will directe system administrators to the New Person Register page.

You need to provide the following information:

- First Name
- Last Name

- Address
- Email*
- Phone
- Password

* Note that the Email should be unique, which means that a person cannot have the same Email with any other perseon in our database.

Click the "**Add**" button to register. Click the "**cancel**" button to cancel the registration.

3.4 Update Personal Information

System administrators can update a person's personal information in the radiology information system.

Select a person and click the "**GO**" button. System administrators will be able to manage personal information of this person.

You can change any of the following fields:

- First Name
- Last Name
- Address
- Email*
- Phone
- Password

* Note that the Email should be unique, which means that a person cannot have the same Email with any other perseon in our database.

Click the "**UPDATE**" button to save the changes.

3.5 Update Patient's Family Doctor

System administrators can add a family doctor to a patient, or remove a family doctor from a patient.

3.5.1 Add a Family Doctor to a Patient

- Select a **Patient** and **Add** option from the drop down lists, and click the "**GO**" button.
- System administrators will be directed to a page to add a family doctor to this patient.
- Select a **Family Doctor** from the drop down list, and click "**Add**" button to add the selected family doctor to the patient.*

* Note: when all of the family doctors are already assigned to the patient, the drop down list will be empty.

3.5.2 Remove a Family Doctor from a Patient

- Select a **Patient** and **Remove** option from the drop down lists, and click the "**GO**" button.
- System administrators will be directed to a page to remove a family doctor from this patient.
- Select a Family Doctor from the drop down list, and click "**Remove**" button to remove the selected family doctor from the patient.**

** Note: when there is no family doctor assigned to the patient, the drop down list will be empty.

4. Report Generating Module

This module will be used by a system administrator to get the list of all patients with a specified diagnosis for a given time period. For example, a system administrator shall be able to use this tool to generate the list of all patients who have been diagnosed having breast cancer in 2013.

4.1 Generate Report

Clicking the "**Report Generating**" hyperlink will directe the system administrator to the report generating page.

Enter a **Diagnosis**, and specify a **Time Period** by selecting **From** date and **To** date.

Click the "**Generate**" button to generate the report after a diagnosis and time period is specified. Click the "**cancel**" button to cancel the operation and go back.

The report contains the list of all patients with the specified diagnosis for the given time period. For each patient, the list contains the **Patient Name**, **Address**, **Phone Number** of the patient, and **Test Date** of the first radiology record that contains the specified diagnosis.

5. Uploading Module

This module will be used by radiologists to enter a radiology record, and then upload medical images into the radiology record.

5.1 Enter a Radiology Record

Clicking the "**Upload Records**" hyperlink will directe the radiologists to the record uploading page.

First, choose the **Patient** who did the test and the **Doctor** who prescribes the test.

Then, enter the following information:

- **Test type**
- **Prescribing date**
- **Test date**
- **Diagnosis**
- **Description**

Click the "**UPLOAD**" button to upload the record, and the radiologist will be directed to medical images uploading page.

5.2 Upload Medical Images

In the medical images uploading page, click the "**Browse**" button to choose one or more medical images stored in the radiologist's local file system.

After medicals images are chosen, click the "**UploadPic**" button to upload the images to the system database.

6. Search Module

This module will be used by all the registered users to search the database for a list of relevant radiology records and to view medical images with the zoom-in facility.

6.1 Search Condition

Clicking the "**Search for radiology records**" hyperlink will directe the user to the search page.

Enter the **Search keys** for the search. Search keys cannot be blank. If you have multiple search keys, use comma to separate them.

User can optionally specify a **Time period** for the search.

Radiology records are defaultly ranked based on the following function with the largest first:

```
Rank(record_id) = 6*frequency(patient_name) +
3*frequency(diagnosis) + frequency(description)
```

where the term frequency(column_name) represents the value returned by the SCORE function of the corresponding CONTAINS function.Note that the value returned by SCORE(n) is propositional to, but not exactly, the number of occurrences of the key word(s) in the respective column.

However, user can also indicate that the ranking to be based on timing, i.e., most-recent-first or most-recent-last, then the ranking shall be done accordingly.

Click the "**Search**" button to search under the specified condition.

6.2 Search Result

The search module, upon receiving the search condition, will display a list of all radiology records that satisfy the search condition, and are accessible to the user by the security module.

The search results are printed in a table. Each record displayed shall contain all the information, including the list of thumbnails of medical images, of the

record. The specified medical image will be displayed in the browser upon an image thumbnail is clicked.

The security module of the system guarantees proper accesses to radiology records. That is, a patient can only view his/her own records; a doctor can only view records of their patients; a radiologist can only review records conducted by oneself; and an administrator can view any records.

User can modify the search condition and click the "**Search**" button to perform another search.

7. Data Analysis Module

This module will be used by the system administrator to generate and display an OLAP report for data analysis.

7.1 Data Analysis

Clicking the "**Data Analysis**" hyperlink will directe the system administrator to generate and display an OLAP report for data analysis.

The system administrator may choose to display the number of images for each **Patient**, **Test Type**, and/or **Time Period**. They system administrator can specify one or more of those three attributes. A data cube information of the number of the records can be generated for all possible combitions of those three attributes.

The system administrator can check the "**Group by this attribute**" boxes to have the results grouped by **Patient** and/or **Test Type**. The system administrator can also drill down and rollup on different levels of time hierarchies for weekly, monthly and yearly, by selecting any of them for "**Group by range**".

Click the "**GO!**" button to start generating the OLAP report for data analysis.