RADIOLOGY SUPPORT DATA ACCESS INTERFACE

DOCUMENTATION

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INTRODUCTION

Introduction

The primary function of the Radiology Support Data Access Interface application is to allow the user to search within an Apache Solr database and compare different search results together without the need of multiple windows or applications to be opened. Our primary goal is to maximize user convenience as much as possible and streamline the user experience when interacting with Apache Solr.

While this documentation takes a neutral use case perspective, this application is targeted towards the medical field, particularly radiology case documents.

We hope that you find this application to be very useful and simple to use.

- The development team

Setup & Installation

Requirements

The following software packages must be installed and configured before using this application:

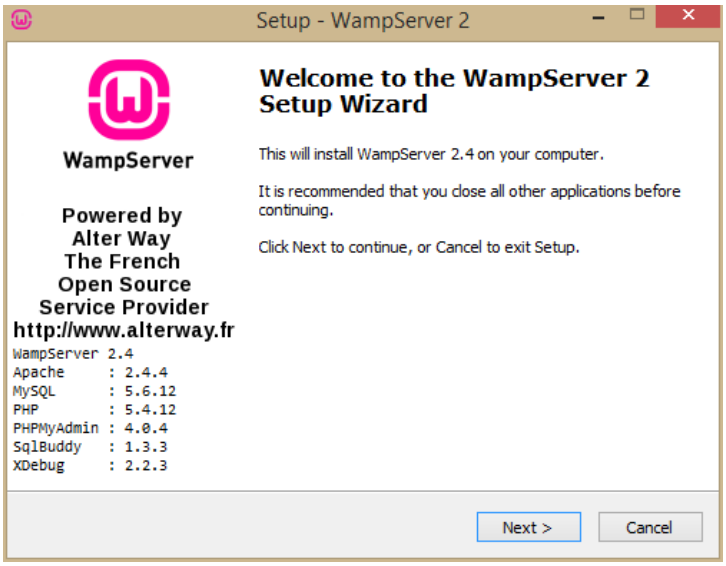
- Apache web server
- PHP 5+
- MySQL 5+ database
- Apache Solr 4+

While it is possible to install and configure these packages separately, using a web application stack such as WAMP will simplify the setup process. This guide will use WAMP to demonstrate the setup process for any one of the following configurations:

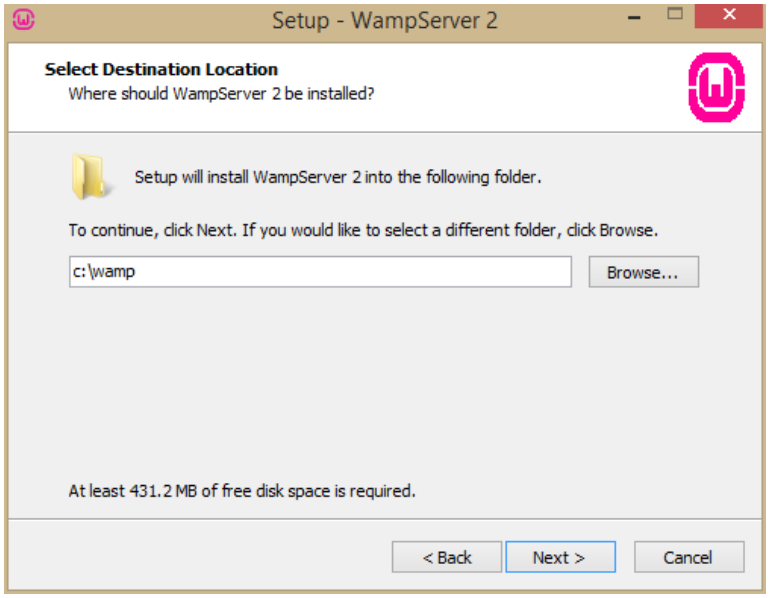
- **Windows platform: WAMP (Windows/Apache/MySQL/PHP)**
- **Mac OS platform: MAMP (Mac/Apache/MySQL/PHP)**
- **Linux platform: LAMP (Linux/Apache/MySQL/PHP)**

Installing and Configuring WAMP

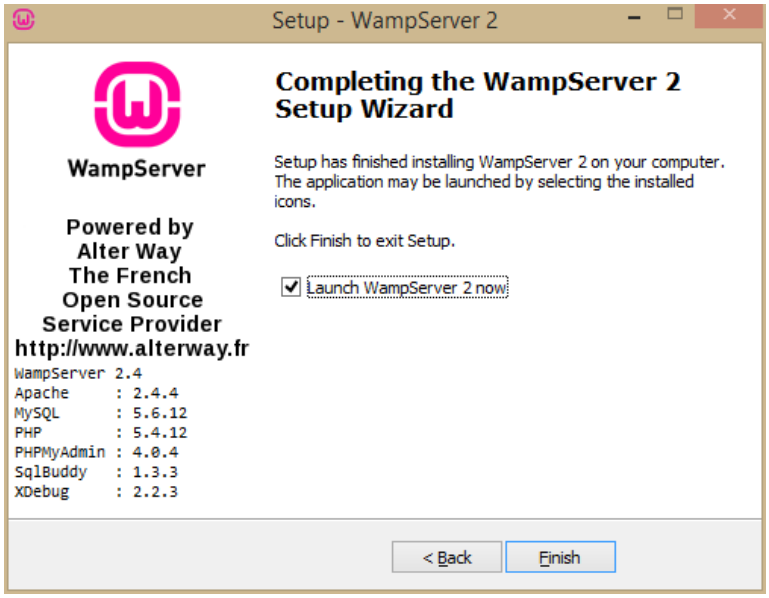
1. To download the latest version of WAMP, visit the official WAMP site http://www.wampserver.com/en/ for more information. WAMP downloads are also available on the SourceForge website. Choose the appropriate version for your system (32-bit or 64-bit) before continuing the installation process.
2. Once WampServer has downloaded, double-click on the file to launch the installer. Note the application versions listed on the bottom left column of the installer. Click Next to continue.



3. Upon agreement of the WAMP license terms and conditions, choose “I accept” and click Next.
4. The setup will prompt for a location to install WAMP. The default directory should already be entered into the textbox. This location may be edited; however, this guide will assume that the default directory is used. Note: approximately 500 MB of disk space will be required. Click Next to complete the installation.



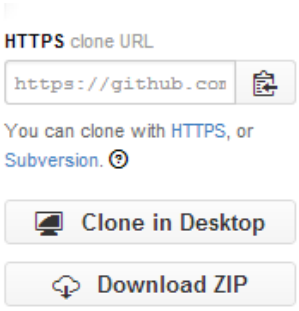
5. Check the “Launch WampServer 2 now” box and click Finish to run WAMP.



SETUP & INSTALLATION

Downloading the Radiology Support Data Access Application

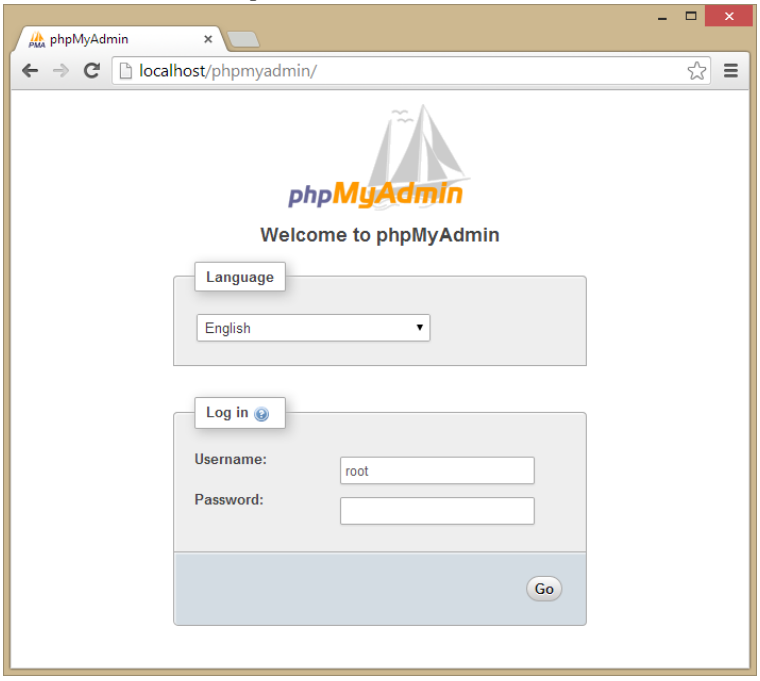
1. The application is hosted on the open-source repository website, GitHub. Visit https://github.com/JCU-CS-470-51-201330/Radiology-Support-Data-Access-Interface/ to download a ZIP archive containing the latest version of the application.
2. Click on the "Download ZIP" button located at the right sidebar of the website.



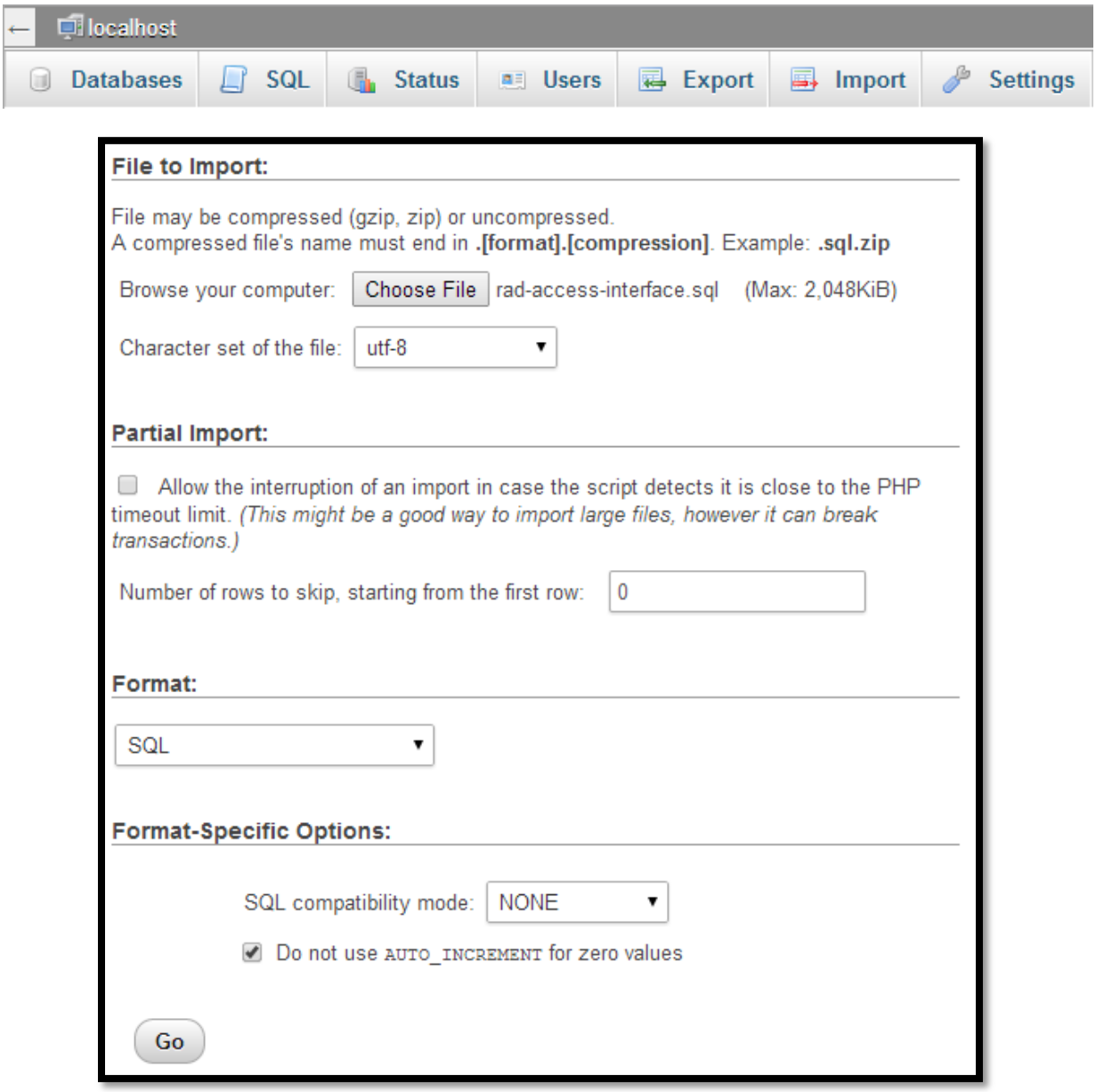
3. Once the ZIP archive has downloaded, extract its contents to the www directory created by the WAMP server installer. The default location is C:\wamp\www\ on the Windows platform.

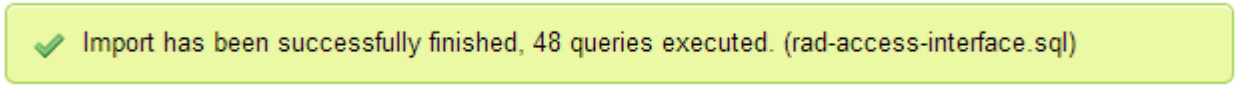
Preparing the MySQL Database

1. WAMP provides a MySQL interface tool called "phpMyAdmin". This web tool will be used to import the SQL schema provided with the application. The file (rad-access-interface.sql) is located in the \Radiology-Support-Data-Access-Interface\mysql-config folder.
2. Visit http://localhost/phpmyadmin from any web browser. At the login prompt, enter the default username "root" and leave the password field blank.



3. Click on the "Import" tab to load an SQL file into the MySQL database. Next, browse to C:\wamp\www\Radiology-Support-Data-Access-Interface\mysql-config\ and select the (rad-access-interface.sql) file. Leave all of the default settings on the import page as is. Click "Go" to run the SQL script.

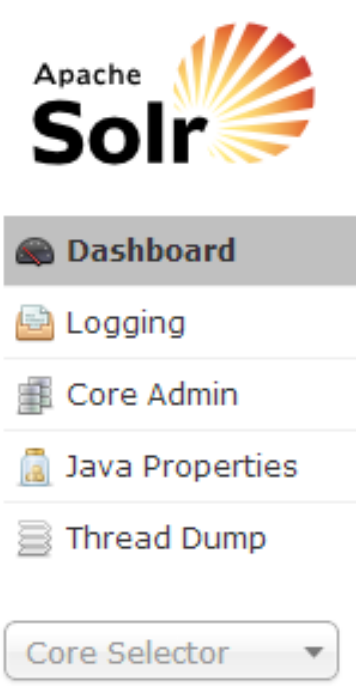


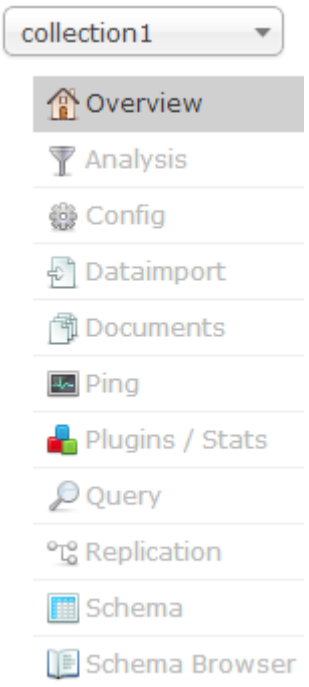


SETUP & INSTALLATION

Downloading and Installing Apache Solr

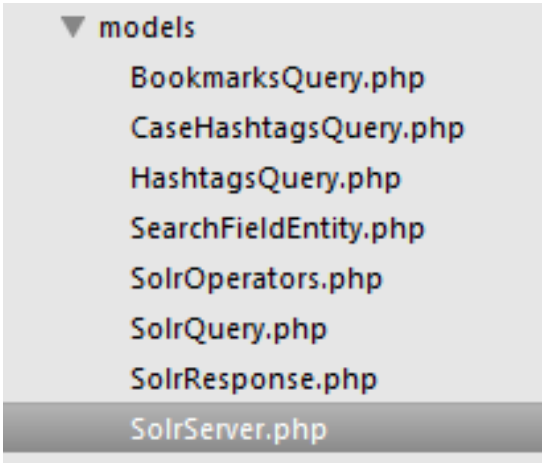
1. Visit http://lucene.apache.org/solr/ to download the latest version of Apache Solr.
2. Once the latest version has been downloaded, extract the ZIP archive to C:\Apache\Solr or any other directory.
3. To launch Solr, open a command prompt and navigate to the directory where Solr was extracted. Run the command **java –jar start.jar** to launch Solr. Note: Java 6+ will need to be installed and configured in order to use Apache Solr.
4. Open a web browser and visit http://localhost:8983/solr/ to access Solr Admin to create new cores, and load the application's Solr schema XML file. Alternatively, the "schema.xml" and "solrconfig.xml" files may be copied and pasted into the default Solr directory.





Configure the Application with Your Solr Server

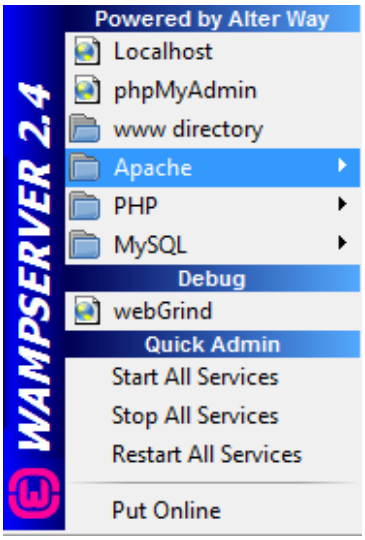
To configure the host, port, and path of the Solr installation, browse to the Models folder of the application and locate SolrServer.php.

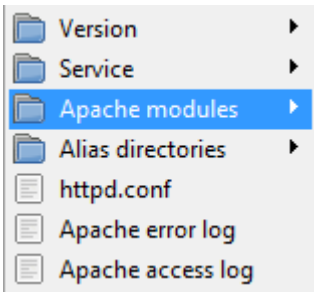


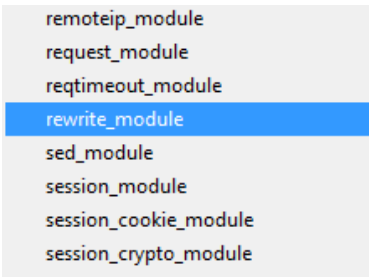
Final Configuration Steps

Before the Radiology Support Data Access Interface application can run, a few WampServer extensions must be enabled manually.

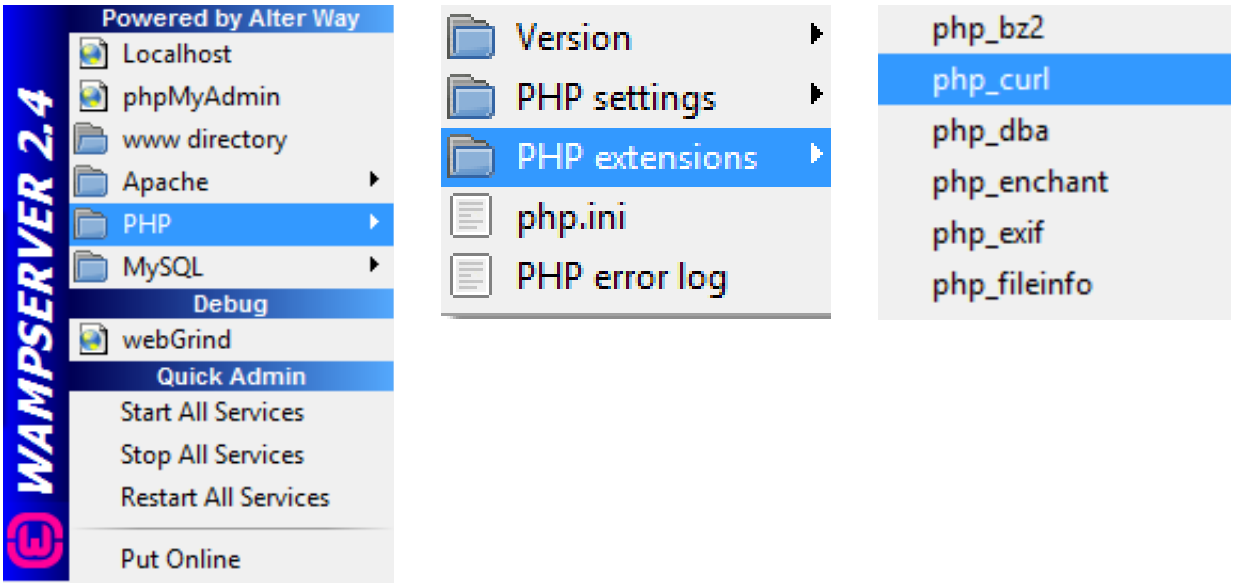
1. Click on the WAMP dock icon and browse to the Apache menu option. Under "Apache modules" be sure **rewrite_module** is checked.







2. Click on the WAMP dock icon and browse to the PHP menu option. Under “PHP extensions” be sure **php_curl** is checked.



Application Structure

The Radiology Support Data Access Interface was built using open-source tools and frameworks, including jQuery, Laravel 4 PHP framework, Apache Solr, Solarium, and MySQL. The application follows the Model-View-Controller (MVC) design pattern, which allows simple and easy configuration of multiple data sources running within various environments.

Core Application Structure

The following describes the overall structure of the application, in terms of code organization and configuration file locations.

Solr Config

schema.xml: The default schema file provided with the application. Copy this file into the installed Solr directory.

solr-test-data.txt: Sample documents that can be loaded into Solr for testing purposes.

solrconfig.xml: The default Solr configuration file provided with the application. Can overwrite the current Solr configuration file, but it is not required.

MySQL Config

rad-access-interface.sql: Import this SQL file into the running MySQL instance. This file builds the required database and tables used by the application. Bookmarks and hashtags are stored within this schema.

Public

The public directory should be placed in the root of the default public web folder. Typically, this folder will be placed within the public_html or www directory. The default web folder may vary depending on the server platform and application stack (WAMP/MAMP/LAMP).

App/Controllers

The controllers directory contains code that handles requests and responses. The file SolrController.php may be used to change the default localhost (127.0.0.1) or port (8983) that will be run on Solr.

App/Models

The models directory is the data access layer of the application. The code within this directory handles both Solr and MySQL queries.

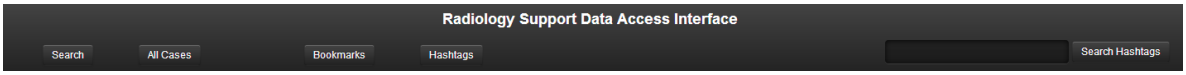
App/Views

The views directory contains HTML and jQuery code for displaying the application in a web browser.

Using the Application

Header Bar

The header menu is the primary hub of the application, allowing the user to navigate across the entire program no matter the current page.



Case search

This is the main page of the program, where users will be able to search for particular cases. There are two primary ways to search Solr: by keywords or by individual case IDs.

All Cases

This is where the user can interact with the actual cases that are stored within Solr.

Bookmarks

The bookmarks page allows the user to view saved searches and quickly re-run the search query.

Hashtags

The hashtags page allows the user to view saved and quickly accessed saved cases.

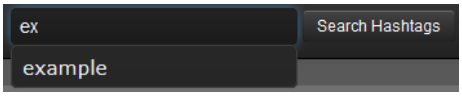
Search by Hashtags

How to use

1. Go to "Search Hashtags" section of the header menu.
2. Input the hashtag.
3. Press the "Search Hashtags" button or hit the "Enter/Return" button to run a search.
   *Note: Cursor must be within the appropriate input box.

Possible Query Auto-Complete

Keywords will appear below the text box that matches the typed hashtag string.



Footer Bar

The footer menu contains a link to download a PDF version of the application user manual and programmer's guide.

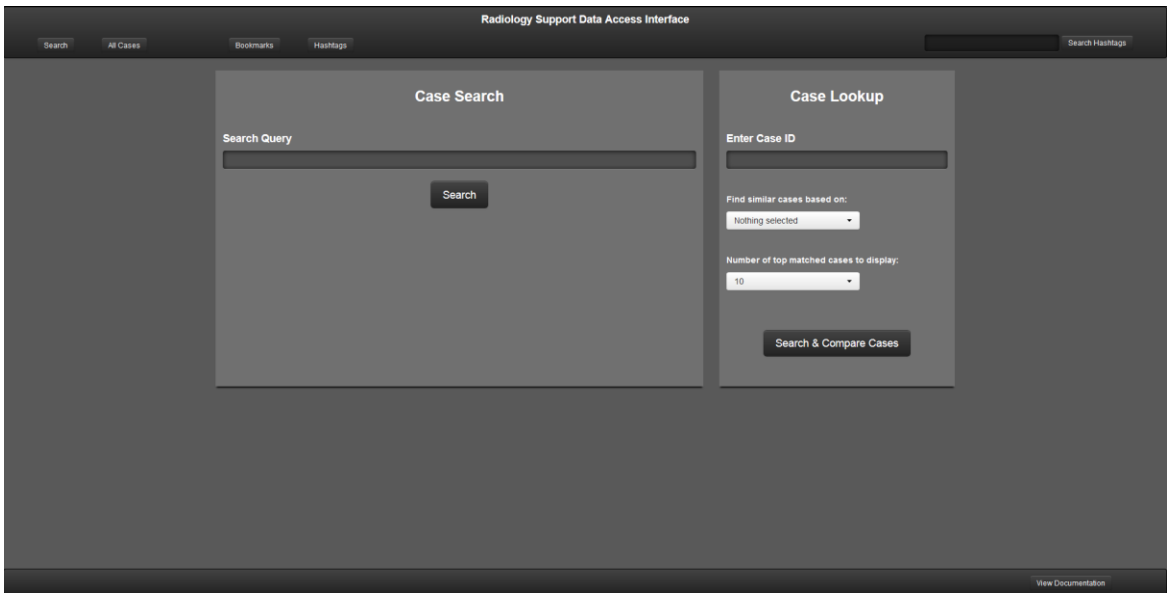
View Documentation

Stores a PDF version of the user's and programmers guides.

USING THE APPLICATION

Case Search Page

The main application page where the user will be able to search and query Solr by one of two ways: by keywords or by a specific case ID along with specific search fields.



Search by Keywords

Functioning much like a search engine, this form of searching accepts a raw Solr query or keywords to pull and display cases that fit the given search criteria. For example, the query "fracture AND tibia" will return a results page listing all cases that contain information regarding fracture and tibia.

How to use

1. Go to "Case Search" section of the search page.
2. Input keyword(s) or a Solr query.
   *Note: "AND", "OR", and "NOT" are acceptable operators.
3. Press the "Search" button or hit the "Enter/Return" button to run a search.
   *Note: Cursor must be within the appropriate input box.

USING THE APPLICATION

Search Using Case ID

Sometimes it is necessary to search multiple cases that are related to a particular case. Using the option to search using a case ID will allow the user to not only access the information of a particular case, but also display any related case that could prove to be helpful.

How to use

1. Go to "Case Lookup" section of the search page.
2. Input the Case ID of the primary case.
3. Use dropdown menu to select related field(s) that will relate to the primary case.
   *Note: Searching without related field(s) will only display the primary case.
4. Press the "Search & Compare Cases" button or hit the "Enter/Return" button to run a search.
   *Note: Cursor must be within the appropriate input box.

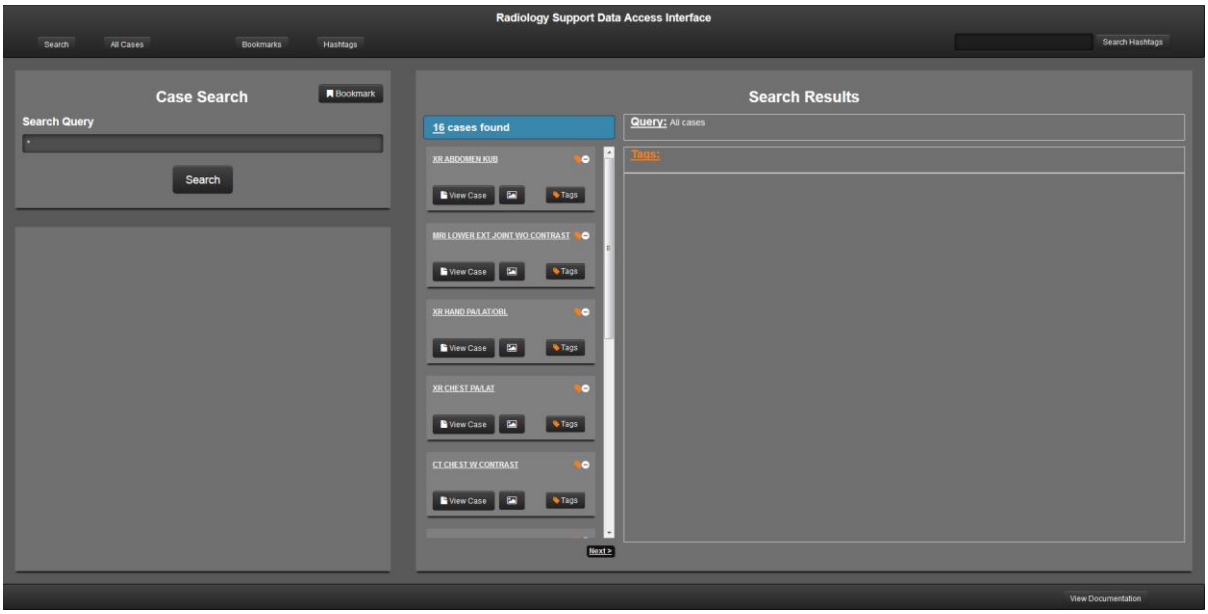
Filtering Top Matches Returned

How to use

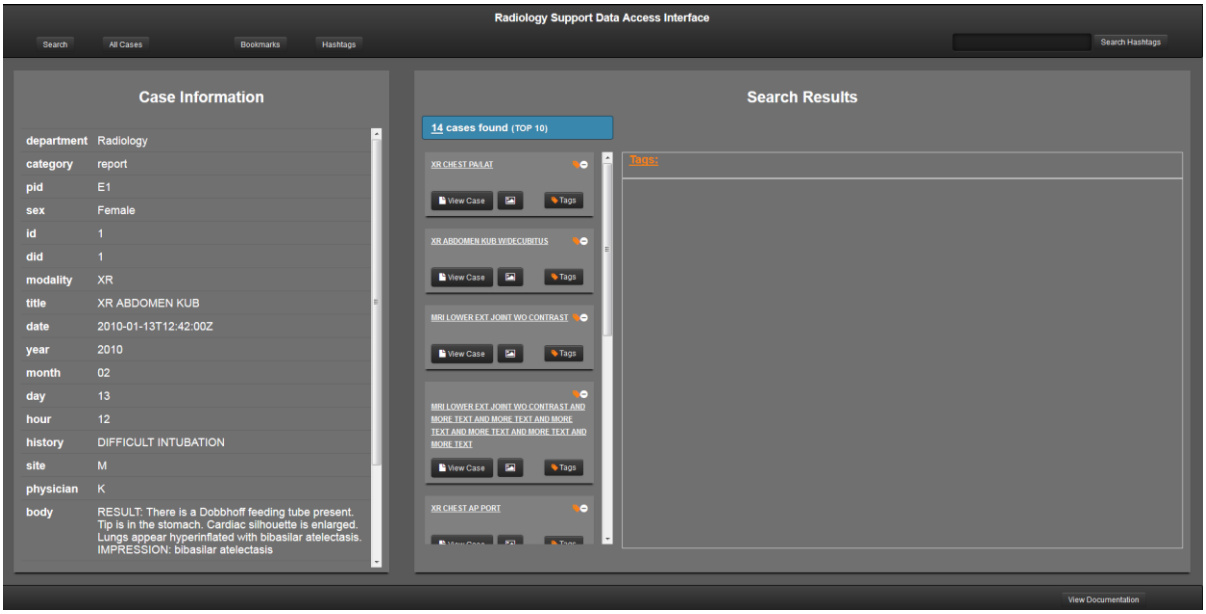
1. Go to "Case Lookup" section of the search page.
2. Select the number of top searches to display from the dropdown menu.
   *Note: Default filter will be at 10
3. Press the "Search & Compare Cases" button or hit the "Enter/Return" button to run a search.
   *Note: Cursor must be within the appropriate input box.

Search Results Page

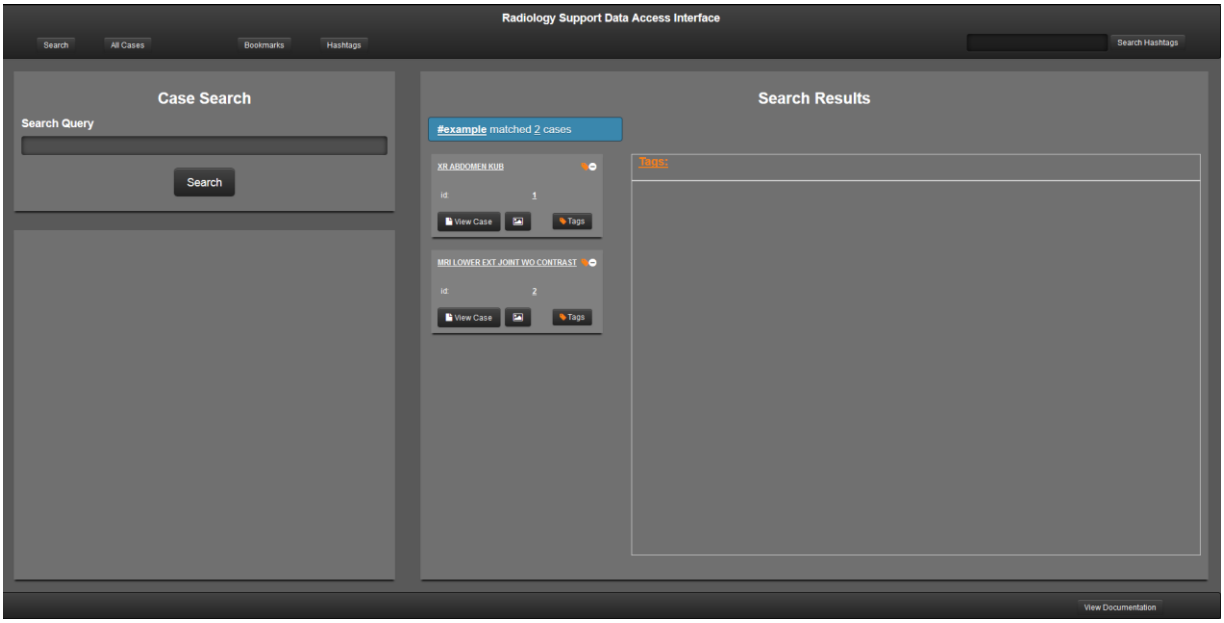
This is where all the search results are displayed to the user. There are two alternate versions of the results page. Below is an image of a keyword search results page (In this case using the "All Cases" option from the header menu).



There is also a separate case result page should the user initiate a search using an case ID and any desired search fields.



There is also a modification of the keyword results page if the user searches for any cases with a particular hashtag from the header menu.



Reading Cases

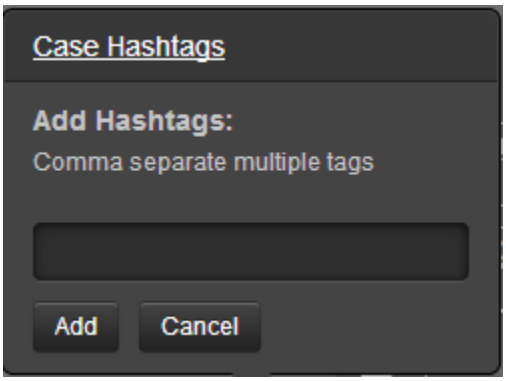
All versions of the results page will allow users to access any stored cases within Solr regardless of the search type. To optimize searching, the documents will be loaded asynchronously upon clicking the "View Case" button.

How to use

1. Go to "Search Results" section of the search page.
2. Go to the desired case.
3. Press the "View Case" button.

Tagging Cases

There might be times that a user will want to remember a particular case. It is possible to hashtag a specific case in order to group cases quickly and easily.



How to use

1. Go to "Search Results" section of the search page.
2. Select a document to hashtag.
3. Click the " Tags" button.
4. Input hashtag(s), when inputting multiple hashtags separate each hashtag by a comma – no spaces necessary.
5. Click the "Add" button to add the hashtag(s) to the particular case.

Delete Hashtags

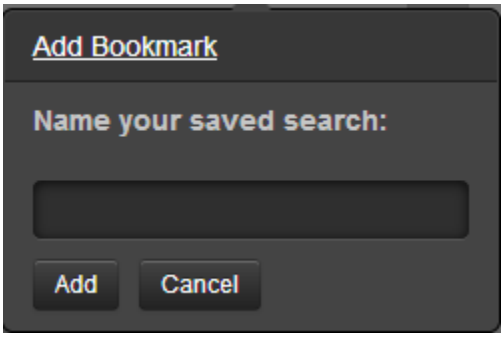
How to use

1. Go to "Search Results" section of the search page.
2. Click " " button on the selected case.
3. Click the "X" button to remove the hashtag.

Bookmarking Searches

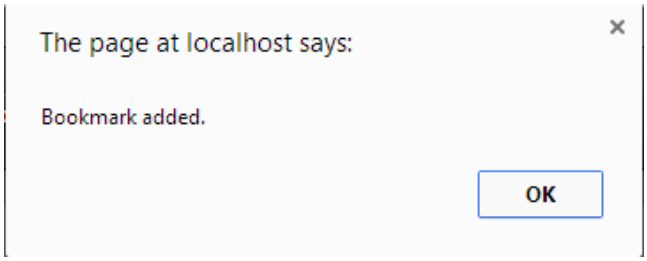
Much like the hash-tagging function, bookmarking will allow a user to save a particular search query without having to remember the query itself.

*Note: It is only possible to only bookmark searches on the hashtag and non-case ID search results page.



How to use

1. Go to "Case Search" section of the search page.
2. Click the "Bookmark" button.
3. Input a title for the query to save.
4. Click the "Add" button to save the search.
5. Once complete, pop up will appear.



Agfa Image Component

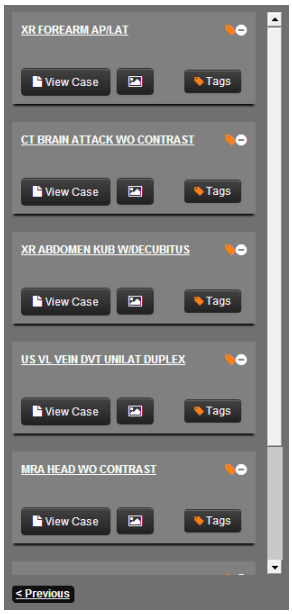
Associated with a case's information are digital images. The Agfa image component allows the user to view and manipulate case images.

How to use

1. Go to "Search Results" section of the search page.
2. Select the desired case.
3. Click the "" button.
4. The Agfa image(s) will display in a separate tab window.

Advancing between case results listings

Cases will appear 10 results at a time in order to improve optimization and load times when accessing Solr.

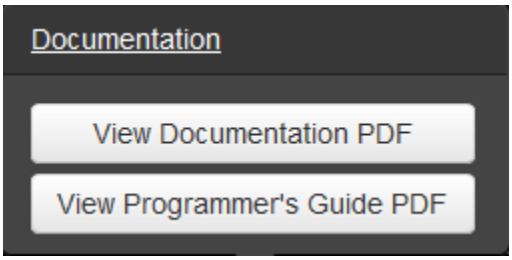


How to use

1. Go to “Search Results” section of the search page.
2. Click the “Next” or “Previous” to advance between case listings.

Downloads Pop-Up

This contains a link to the PDF versions of both the user manual and the programmer’s guide.

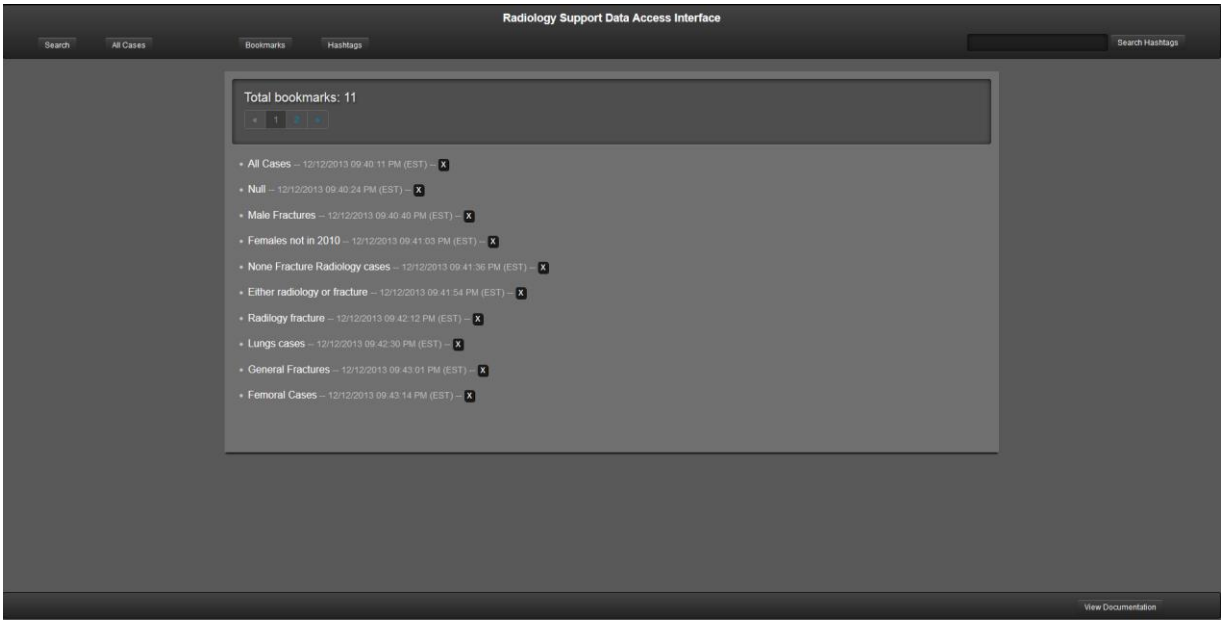


How to use

3. Go to “View Documentation” section of the footer bar.
4. Click on either “View Documentation PDF” or “View Programmer’s Guide PDF” option.

Bookmarks Page

This page contains saved Solr queries as bookmarks. Users can save search queries to quickly refer back to at a later time.



Viewing Saved Searches

Just as the results page displayed all cases that relate to specific keywords or criteria that are related to a specific case, this page displays all the bookmarked searches.

How to use

1. Navigate to the Bookmarks Page.
2. Click the bookmark to return to the search results page with the saved search query.

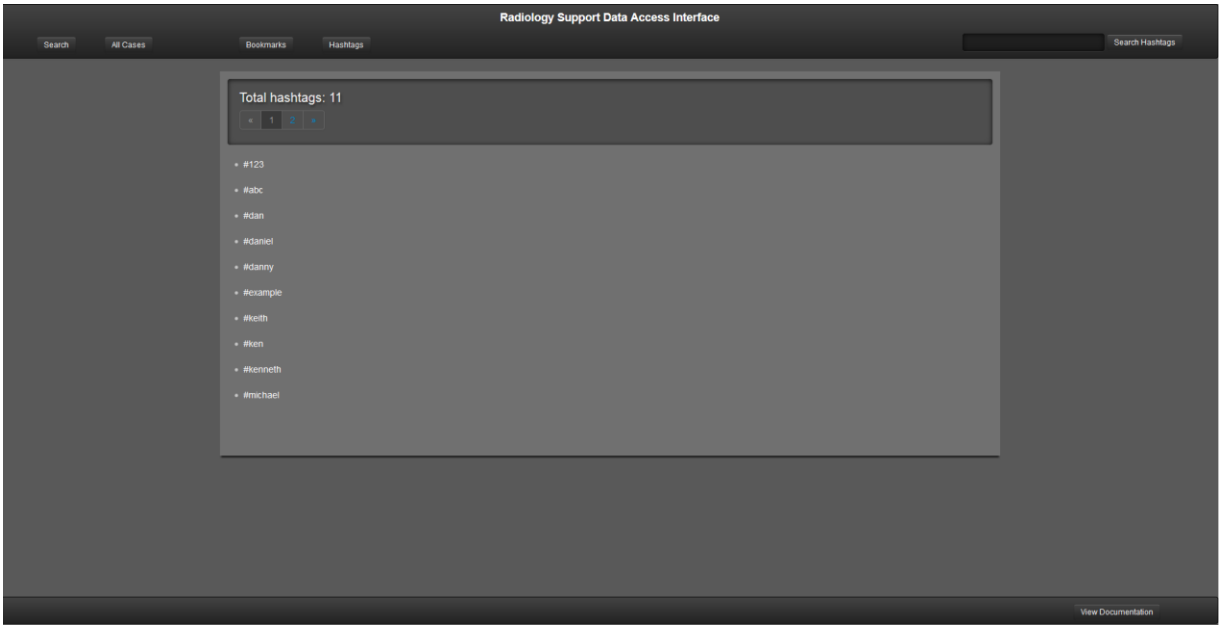
Delete Saved Searches

How to use

1. Navigate to the Bookmarks Page.
2. Click the “X” button to remove the bookmark.

Hashtags Page

This page contains saved cases as hashtags. Users can save specific cases to quickly refer back to at a later time.



Viewing Hashtags

Just as the bookmarks page, this page displays all hashtags.

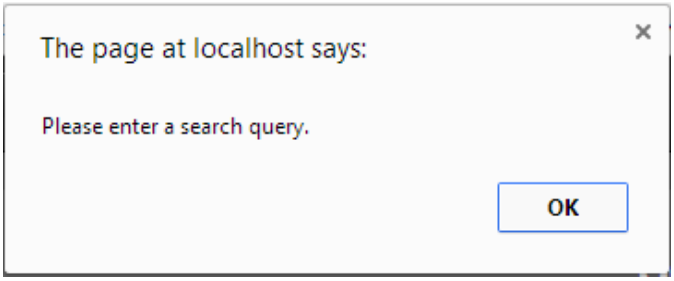
How to use

1. Navigate to the Hashtags Page
2. Click the hashtag to access all cases associated with that particular hashtag.

Troubleshooting Guide

Not Providing a Query

Appears if the user performs a search without a Solr search query.

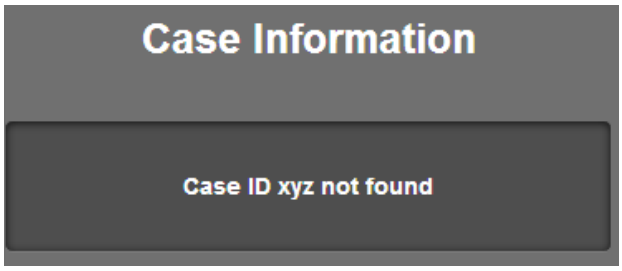


No Search Results Found

Appears if there is no information within Solr that match the search query's criteria.

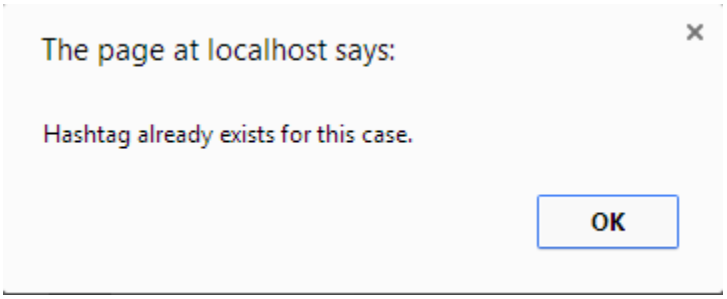
No Cases with a Particular Case ID Found

Appears if there are no cases within Solr that contain a particular case ID.



Duplicate Hashtags

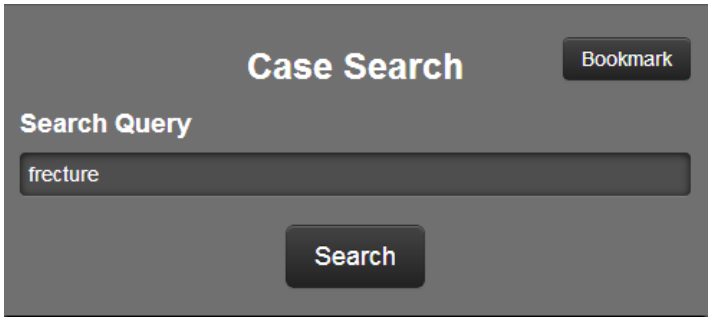
Appears if user inputs the same hashtag multiple times within the same case.

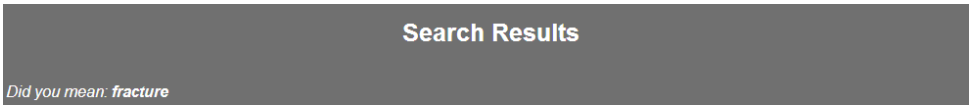


Appendix – User Interface Messages

Spelling Corrections

Should the user input a spelling mistake within the Solr search query; a correction will be displayed within any of the regular search result page.





Possible Query Auto-complete

Keywords will appear below the text box that matches the typed query string.