

# Web based Radiology Viewer

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## ABSTRACT

The 'Web Based Radiology Viewer' is a viewer for CT/MRI/X-ray images. The problem with the available viewers which are compatible with modalities like CT, MR, US, CR, etc. is that the images can be viewed inside the hospital only where the software is installed and the hardware required for installing these softwares is humongous and expensive. This problem may be overcome by Web based radiology viewer which is 'INTERNET' based. There will be no constraints on the geographical location nor on the device with which the physician will be viewing the radiological images. It doesn't require any hardware for its installation, so the only sector in which the cost is involved will be its deployment over the Internet. The software uses HTML 5, JavaScript, CSS and PHP. Physician can perform many operations on images such as zooming, panning, distance measurement etc which will provide intricate details and can help in diagnosis. Especially designed to bring all the capabilities of a commercial DICOM Workstation to the physician's personal computer, whether it is used by a radiologist, a radiology student or a medical imaging researcher, this viewer aims at meeting their needs. Web Based Radiology Viewer overcomes all the problems associated with the available viewers and gives a number of additional features. It also aims at providing the users with the feature of simultaneously loading and comparing two sets of images. This application can be considered as a part under tele-radiology and communications.

## Keywords

DICOM, INTRANET, INTERNET.

## 1. INTRODUCTION

DICOM is an essential part of medical imaging field that not only encompasses image type extension '.dcm' but also is a set of all those standards that make up the whole image that is interpreted by the radiologist. Thus DICOM comprises of image and related information that convey complete patient medical information to the image interpreter. It includes a file format definition and a network communications protocol. The communication protocol is an application protocol that uses TCP/IP to communicate between systems. DICOM files can be exchanged between two entities that are capable of receiving image and patient data in DICOM format.[5],[6] It has been observed that if a physician has to view a radiological image (CT, X-ray, MRI, etc.) he/she needs a radiology viewer software to do the same. The hospital has to purchase these expensive softwares and the hardware

required for installing this software is humongous and expensive, which makes it even more complex. [1],[2] This software works only on intra-net i.e. the patient's data of that particular hospital can be accessed only in that hospital and not from anywhere else.[3] Web Based Radiology Viewer is basically a software platform used to open, view DICOM images. Through this viewer, after opening the image one can perform many operations on the image.

There are viewers of various companies available in the market, which provide the basic features. Viewers like DICOM Viewer-Radiant, 3D Slicer, GDCM, OsiriX-DICOM Viewer, Santesoft-Sante DICOM Viewer, i-pad radiological viewer, Universal viewer, etc are available.[7] All these viewers have the following basic features and benefits: Compatibility with all modalities (CT, MR, US, CR etc.), On-line, case sensitive help, Synchronized frame view between the series, Synchronized level-window between the series, Synchronized field of view between the series, Measurement Tools (distance, angle), Overlay layer support, Annotation texts and arrows, Interpolated (smooth) zoom and advanced zoom tools (e.g. dynamic zoom, zoom window), Zoom policy (enlarge to fit, shrink to fit, fit always), Image orientation (flip, rotate).[8] The main drawbacks of the available viewers are that they are 'Intranet' based, there is constraint on the geographical location of the physician and on the device which is used for viewing images, no cross platform availability, requirement of additional software and expensive hardware.[9],[10]

## 2. PROPOSED PLAN

Web based radiology viewer proposes to overcome above mentioned problems which shall be deployed over the internet. Project aims at developing such software in which doctors and consulting radiologist can register, login and can view any medical image. The software will also offer operations which can be performed on the medical image for better viewing such as zooming, panning, rotation etc. Hence, by accessing this website, it would be possible to view scanned images almost immediately, anywhere and help server for better treatment.

## 2.1 Block Diagram

The block diagram depicts the front end of the website elaborating the flow. The user needs to register with the website by providing a few details and has to log in into the portal. The home page now shows the user two directions. One the user can either instantly upload and view the image immediately. Second, the user can upload a complete study which would be archived into the PACS. After this the user needs to log into the inbox where the administration sends a URL to access these studies, which when clicked opens the images in the viewer.

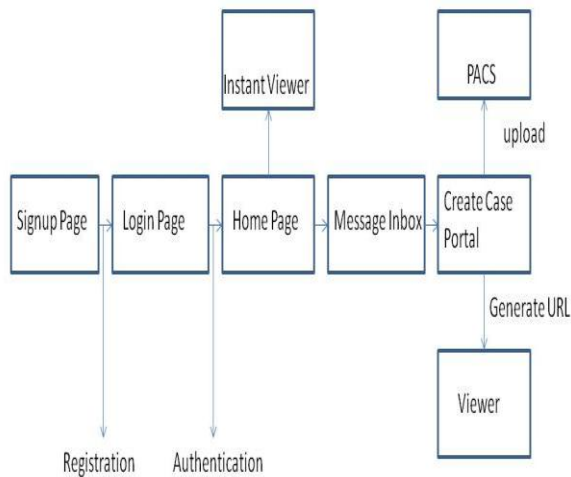


Fig 1: Block Diagram

## 2.2 Basic Workflow

### 2.2.1 Sign up page

As the user types the URL in the address bar of the browser, the sign up page will open by default. If the user is new, then he/she may register with our website by filling in a few details and creating a new account. At the registration page, the user needs to fill in the personal details like the user name, password, doctorate qualification, hospitals affiliated to, email id and create email id for internal messaging system. After successful registration, the user will be automatically redirected to the login page. Else the user may also navigate to the login page, if he/she has an account, by clicking on the login button on top right corner.

### 2.2.2 Log in Page

At the login page where the user can fill the username and password to enter the website. The page will refresh under two circumstances. One is if the username or password is wrong. Secondly if either of the fields are left empty (null) which indicates that there is failure of authentication.

After the fields are filled with information, the data is stored at temporary location and also the database copy of the database entries is made. The username is searched corresponding to the one which is entered and the comparison of username and passwords is done. It checks and matches the username and password and if they match, it redirects the user to home page. The passwords stored in the database are in the encrypted form. This is to maintain the privacy of the user. The encryption is done through md5 algorithm. When the user logs in, a user id also provided for uploading the files.

### 2.2.3 Home Page

This page contains all the basic information of the website. The other features of the website, like consult a doctor, mail inbox etc are given in the navigation bar. At the bottom of the page are two options. One button is to access instant image viewer. Here the user can upload the image and view it immediately. Second button is to upload the study and archive it onto the PACS.

Personalia:

USERNAME :

PASSWORD :

DOCTARATE QUALIFICATIONS :

HOSPITALS AFFILIATED\* :

EMAIL ID :

WEB VIEWER EMAIL ID :

(for example: xyz@webviewer.com)

\*Please do not enter the qualification as M.D.(Neurologist). Write only Neurologist instead

Thank you for your details. Enjoy using the web based radiology viewer. !!!

Fig 2: Sign Up page

USERNAME :

PASSWORD :

[Not yet signed in !! click here to sign up](#)

Fig 3: Login page

### 2.2.4 Update Profile

The user can go to this page to update the account details at any point of time by clicking on the navigation of update Profile on the home page. The user can reset or change old fields of registration. After the process, the user will be shown a message and the page will automatically navigate back to the home page.

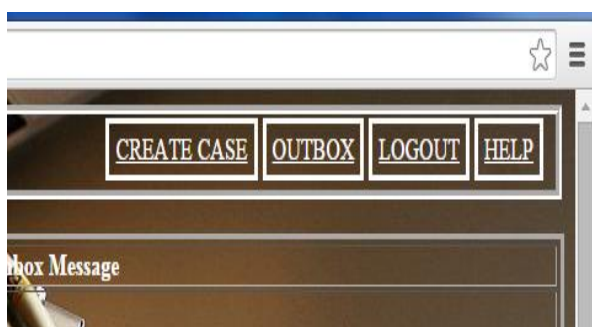
### 2.2.5 Admin Profile Page

This page is yet another layer of the html in the block diagram. This page can be accessed only through the home page through navigation bar on the top. Since this is not in the flow of the web pages, that is, this page is not an essential part of the page flow; it is not depicted in the block diagram. For this stage of the project, only the name and little information about the four coders are given.

### 2.2.6 Messaging Portal and Create Case Portal

With the internal messaging system, which we are providing as a feature, there is a login page for the same. The password for entering the website and the inbox shall remain the same. In the messaging portal, the user will see two columns, on the left is the space for drafting a message and on the right is the inbox or received messages. The outbox and logout buttons are provided in the navigation bar at the top.

The important navigation here is the Create Case Portal. This is actually the page where the user can upload studies to be stored onto the PACS. The radiologist will find a upload button on the page. The radiologist can upload a zip file of the images. Below this is a space provided to drag and drop the dcm image or dir file. By doing this, the file will get parsed (JavaScript parser) and the URL will be generated using the UID. The radiologist can either copy, paste this URL on a new tab in the browser and the studies corresponding to this UID shall be opened in the viewer or may share it with other users by simply copying and pasting it in the draft message section and clicking the send button. Out of all the huge series of images that the radiologist uploads, he/she may parse just any one image since all images under one study have same UID.



**Fig 4: Create Case Portal Navigation Button**

File Upload: Select a file to upload:  
 No file chosen

Status: Ready (no file loaded)

Patient Information

Patient Name:  
Patient Birth Date:

Study Information

Study Description:

**Fig 5: Create Case Portal**

#### UIDS

Study UID: [localhost:8080/oviyam/oviyam?studyUID=2.16.840.1.113669.632.20.1211.10000329900](http://localhost:8080/oviyam/oviyam?studyUID=2.16.840.1.113669.632.20.1211.10000329900)  
 Series UID: 1.3.12.2.1107.5.1.4.54693.30000006102508593206200000001  
 Instance UID: 1.3.12.2.1107.5.1.4.54693.30000006101906583670300011284  
 SOP Class UID: 1.2.840.10008.5.1.4.1.1.2

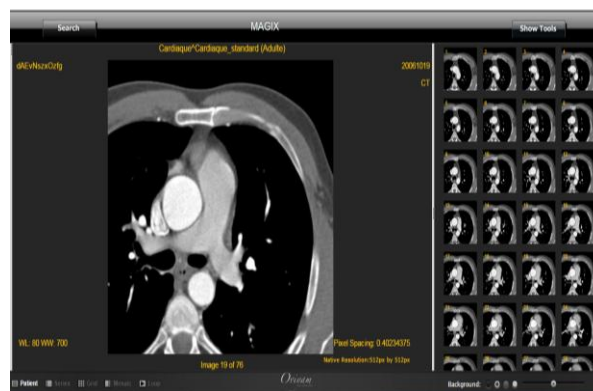
**Fig 6: Generated URL (sample)**

This website shall be used by a consulting radiologist, who generally reads the images and reports to the doctor. Hence

through the aid of this internal messaging system, even reporting can be done by the radiologist to the consulting doctor. Therefore, for the radiologist, uploading to PACS, generation of URL for retrieval and reporting are all under one roof.

### 2.3 Features

- (i) The software being Internet based eliminates the need of installation of expensive hardware and has no geographical constraints.
- (ii) It is Compatible with all modalities like CT, MR, and Ultrasound, X-Ray etc. which can be uploaded and studied using the viewer.
- (iii) Reduce direct and indirect costs associated with traditional methods of image exchange like Inbound and outbound CD management costs (media creation, mailing, rework, manual ingestion etc)
- (iv) Provision of measurement tools and drawing tools. (Distance, angle). Measurements can be taken to detect abnormalities. Interpolated zoom and advanced zoom tools. Zoom tools which makes zooming mechanism smooth. It also defines the zooming window and allows dynamic zoom tools.
- (v) Doctor Search through hospital name and designation is yet another feature of the website.
- (vi) Through Internal messaging system users can share their queries with subordinate doctors and doctors from other hospitals using internal messaging system.
- (vii) Generation of URL by parsing file for retrieval and sharing of studies.
- (viii) Reporting to doctor by using the messaging system.



**Fig 7: Images in viewer using URL**

### 3. CONCLUSION

Therefore the project idea is to overcome general trend of study transfer, storage of hardcopy reports and ease the workflow and effort of consulting radiologist. Also, being internet based in accessible around the globe, 24 \* 7 and on any device and OS. Thus, Web based radiology viewer is a fast internet based solution, which ease the process of viewing and aims at replacing the conventional practice. The future plan includes modification of website, deployment over the internet, getting reviews from hospitals and feedback from radiologists and physicians and integration with other radiology and hospital workflows. After a general survey, it has also come to light and in turn makes place in our future plans is security of the medical images. Security of the images is at most important according to medical standards. Therefore acquiring appropriate certificates from institutions like HIPPA

etc is also an essential. Furthermore, LAN testing is also one of the items on future plan.

The future scope of this project is broad and will be applicable to the multi-specialty hospitals which have numerous branches as per current trend. It can even bring two different institutions closer, it can help to reduce production of numerous soft and hard copies of the same scan of same patient and contribute to overall software, hardware and storage efficiency.

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