

Opal-RAD User Manual

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Viztek, Inc.
6491 Powers Avenue
Jacksonville, FL 32217

904-730-0446
800-366-5343

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Author: Kristen Tabone and Douglas Bretton

Chapter One

Welcome to Opal-RAD

This chapter officially welcomes you to Opal-RAD Client Worklist and Web Worklist. The chapter covers mouse button fundamentals, introduces the two main screens, the Study List and the Image Viewer, and offers a brief look at what else is available in this and other applications in the Opal-RAD suite of medical imaging tools. We will also detail the minimum hardware and software requirements to run Opal-RAD, as well as, security considerations.

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Welcome to Opal-RAD

The Opal-RAD suite of PACS applications was developed specifically to handle the DICOM protocol, for both transmitting and viewing DICOM images and data elements. The applications were developed so that access to the PACS can occur from any Microsoft Windows computer with Internet capabilities, and offer an interface that users find to be quite intuitive after some initial learning.

The Opal-RAD applications deal with all manner of DICOM images and modalities, including MR, CT, CR, US, and many others. These images can be viewed, manipulated, annotated, transmitted to other facilities, printed, animated and stored using the Opal-RAD suite.

This manual is concerned primarily with the Opal-RAD Client Worklist, Web Worklist, and Image Viewer applications. The basic functionality of the Client Worklist and Web Worklist alternates between finding a study and viewing the images it contains. Thus, the Client and Web Worklists have been divided into two different screens.

The first is the Study List, which is used for searching and managing your studies. The second screen is the Image Viewer, which is used for viewing and manipulating the images contained in the study.

Features of the Client and Web Worklists

Opal-RAD Client Worklist and Web Worklist are highly configurable and modular, but there are some functional differences between them. The Web Worklist includes most of the advanced Study List features and the entire Image Viewing features, but cannot create Patient CDs or importing images and scanned documents. The Client Worklist includes all of the advanced Study List and Image Viewing features mentioned above. Available modules in the Client Worklist add to this functionality by providing:

- Sending and Receiving images over phone line, local area networks, and the Internet. The Opal-RAD suite features truly impressive teleradiology capabilities, including DICOM transmission/receive, and a proprietary format for transmissions between two Opal-RAD machines utilizing compression, encryption, and auto-resume functions.
- Acquisition of images. Client Worklist can be configured as a QC (quality control) Acquire station and connected to one of several compatible scanners, such as the Orex PcCR line of CR scanners, the VIDAR Diagnostic Pro film digitizer, Lumisys Film digitizers, frame-capture devices, and any acquisition device that uses DICOM.
- Film printing. For those instances where film is essential, Client Worklist provides advanced capabilities and control over the final appearance of the printed film, and is compatible with virtually all film cameras.

Feature	Client	Web
Acquiring Images	X	
Printing to Film	X	
CD Burning	X	
Deleting Studies	X	
Merging Studies	X	
Importing JPEGs	X	
Importing Scanned Documents	X	
Importing Images CD	X	
Edit Study and Patient Data	X	
Custom Study List Filters	X	X
Comparing Exams	X	X
Sending Studies	X	X
Adding Study Notes	X	X
Transcription		X
User/Group Administration		X
DICOM Printer Creation		X
DICOM Print Queue		X
DICOM Send Queue		X

Product Comparison

The Study List

As stated earlier, Opal-RAD Client Worklist and Web Worklist consist of two interfaces (screens), each with a separate function. The first interface you will see after logging on to Client Worklist or the Web Worklist will be the Study List screen. This interface is used for searching and selecting patient studies and sending studies to other users.

The study list itself is divided into many columns including Status, Modality, Patient Name, Study Date, Study Description, etc. Studies can be sorted by any of these columns and the column headers actually double as search fields. All of these listing options enable you to quickly find your desired study among the thousands of exams in your database.

Next to each exam/study in the study list are buttons, which provide the user access to some of the advanced features of the Worklist, including:

- Patient Exam History Notification
- View Key Images
- Listen to Dictation and/or Transcribe (optional feature)
- View Report (optional feature)

Below the study list is the Patient Studies window, which is used to view all of a patient's prior exams. At the bottom of the screen is a toolbar, which is used to open or compare exams, filter the study list, and navigate through your studies.

To view your study, you simply double-click it. This will open the exam in the Image Viewer screen. This will be explored in more detail in the next topic, but for now lets look at just a few of the differences between the Client Study List and the Web Study List.

Client Worklist

At the top of this screen, are tabs separating the Study List from the Study Manipulation and Study Merge and Delete tabs. The Study List screen also gives you access to other features of Client Worklist, such as sending images to other doctors, creating Patient CDs, and acquiring images from film and plate scanners (not included in the Web Worklist.)

Web Worklist

At the top of this screen, are tabs separating the Study List from the Settings and Administration sections and a main window. With the Settings tab, users can modify their Study List's display settings. With the Administration tab, your administrator can add, edit, and delete user and group accounts. They can also create DICOM printers and send destinations, and manage the print queue.

☼ The specifics of all of the features described above will be covered in greater detail in the chapters that follow.

The Image Viewer

The second component of the Opal-RAD suite is the Image Viewer screen. Unlike the Study List component, there is no functional difference between the Image Viewer of the Client Worklist and the Image Viewer of the Web Worklist.

The Image Viewer offers a vast array of powerful tools and functions for viewing and diagnosing medical images. Images can be window/leveled manually or automatically, sharpened, flipped, rotated, zoomed, panned, and inverted. You can view “cut-lines” (image intersections), Hounsfield Units (for CT), and DICOM elements (“tags”). Images can also be printed or combined with other images to create Pre-Op Studies.

The Image Viewer screen also has a large number of image marking tools to assist in your diagnosis. Various annotation tools are available, ranging from simple arrows and text boxes to angle and distance measurements.

Please see the appropriate sections of this manual for more discussion of the features. You will find that most of the features can be accessed quickly through a toolbar button or the dropdown menus.



The Image Viewer screen

With the Image Viewer, as with most software applications, development is an ongoing process. The Opal-RAD Image Viewer (sometimes called Opal Viewer) is constantly being enhanced to include additional functionality or simplify complex tasks.

New releases of the software can be downloaded and installed via a link on the Web Worklist's Study List screen. For instructions on how to upgrade your Image Viewer, please see "Chapter Two: Installing and Updating the Image Viewer".

Easy To Use

Opal-RAD is designed to combine a multitude of powerful tools with an intuitive and configurable interface.

With any software package, there is an initial learning curve that must be surmounted. Trial and error will lead to familiarization and efficiency. First-time users of Microsoft Windows often become accustomed to it within a week or two of regular use.

Opal-RAD builds on this by using menus, shortcuts, and operations that are similar to most other Windows programs, thus decreasing the learning curve and familiarization period. The Opal-RAD applications make extensive use of toolbars, context menus, drag-and-drop functionality, menus, and shortcut keys to provide even more efficiency to your busy schedule.

The computer's mouse has two buttons (some newer models also have a third, the "middle" button, and/or a scroll-wheel in the center.) The behavior of these two buttons, referred to as the "left" and "right" buttons, respectively, is consistent throughout Opal-RAD software.

Left Mouse Button

Almost all tasks are performed with this button. A single click is used extensively throughout the software to select an item (e.g., select a study in the Study List, select an image in the Image Viewer, select a recipient on the "Send To" dialog, etc.) or activate a feature (e.g., clicking the appropriate

toolbar button to activate the Zoom tool, clicking the “OK” button on a dialog in response to a question, etc).

Right Mouse Button

A single click with this button reveals a pop-up menu containing functions and options pertinent to the area of the software you are currently using. “Dragging” (hold the button down and move the mouse) this button is used primarily for functions like windowing an image while you view it.

These behaviors described above are consistent with most other software packages designed to run on the Microsoft Windows platform, so you will find that you use the same mouse skills across multiple software products, and you will very quickly become accustomed to using the mouse.

 Please see Chapter 12: Windows Primer if you are new to the Windows operating system.

How to Use This Manual

The next chapter offers a walkthrough for typical usage of the Client Worklist and Web Worklist, which includes, logging on, locating a study in the Study List screen, viewing and basic manipulation of the study's images in the Image Viewer screen, and returning to the Study List.

The rest of the chapters explore individual sections of the Client Worklist and Web Worklist in greater detail, including the Study List and Image Viewer screens. The following features are available for the Client Worklist: advanced image viewing and manipulation tools / operations, printing to paper and film, creating Patient CDs ("CD burning"), sending and receiving exams, and acquiring exams from a supported acquisition device.

Minimum Requirements

Opal-RAD PACS Viewer Minimum Requirements:

- Window's XP Operating System
- 1 Gigabyte RAM
- 20 Gigabytes of free space on hard drive

Security Statements

Opal-RAD will be accessible from any computer with internet access. In order to keep the Opal-RAD database secure, there are several steps you should take to ensure the security of your data, and the confidentiality of your records.

Since all Internet communication is subject to malicious attacks from outside sources, it is highly recommended that your organization purchase a 128-bit SSL Certificate from a trusted authority, such as Verisign or Thawte, and install it on your web server. By using a SSL Certificate you can ensure that all Internet access to your server is encrypted and protected from outside sources.

Each user will have a personal user name and password with which to access the Opal-RAD Worklist. Your Opal-RAD administrator will be responsible for determining those user's rights and defining security protocols, such as user the time-out duration, password length, and permissions.

Chapter Two

Basic Workflow of Opal-RAD

This chapter offers a walkthrough for typical usage of the Client Worklist and Web Worklist. The walkthrough includes locating a study in the Study List screen, viewing and basic manipulation of the study's images in the Image Viewer screen, and returning to the Study List.

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Introduction

Opal-RAD Viewer (a.k.a. “Viewer” for brevity) is an application that allows users to view and manipulate vast amounts of DICOM and patient information.

There are two basic functions in the viewer: selecting a patient and viewing that patient’s images. As such, the program is divided into two interfaces: the Study List screen for selecting patient studies, and the Diagnostic-Quality Image Viewer screen for viewing and manipulating the images. As you use the viewer, you will find that you alternate between these two screens quite frequently.

In this chapter we will look at a sample user session of the Viewer. This session includes the following steps:

- Logging In
- Study List screen
- Sorting and Searching the Study List
- Installing the Image Viewer software
- Opening a study in the Image Viewer
- Image Viewing screen
- Closing a study

Step 1: Logging In

In order to begin using either the Client Worklist or Web Worklist applications you must first log in to the system. Logging in will allow you access to the list of patient studies. The Log-In Screen contains of two fields that must be filled in prior to logging on: User Name and Password.

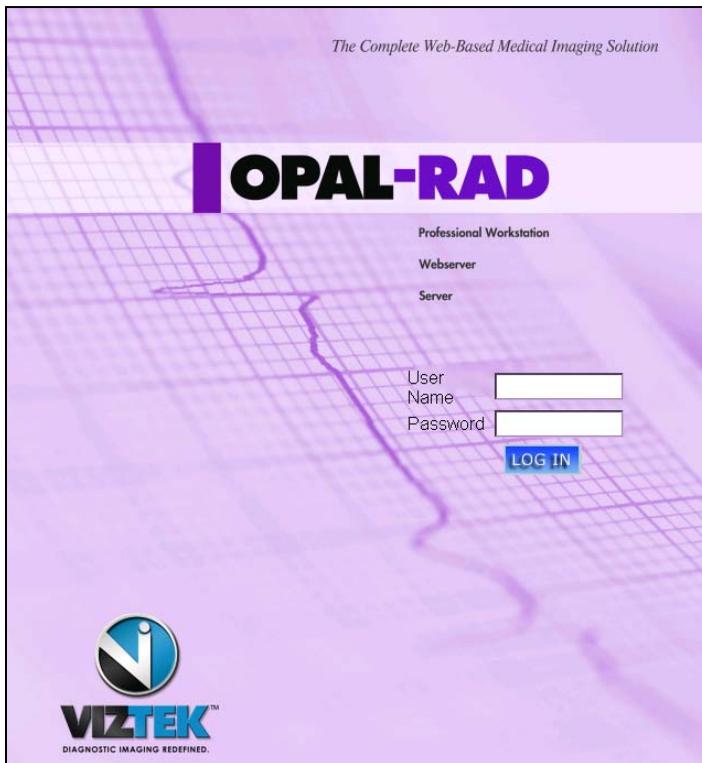
► To login to the Client Worklist

1. Double-Click on the “Opal-RAD Client Worklist” icon on your desktop.
2. Enter your User Name and Password, and then click **LOG IN**.

► To login to the Web Worklist

1. Open Internet Explorer or your Internet service provider.
2. Type the web address to the Opal-RAD web server into the address bar and press ENTER.
3. Enter your User Name and Password, and then click **LOG IN**.

 The User Name and Password are both case sensitive.

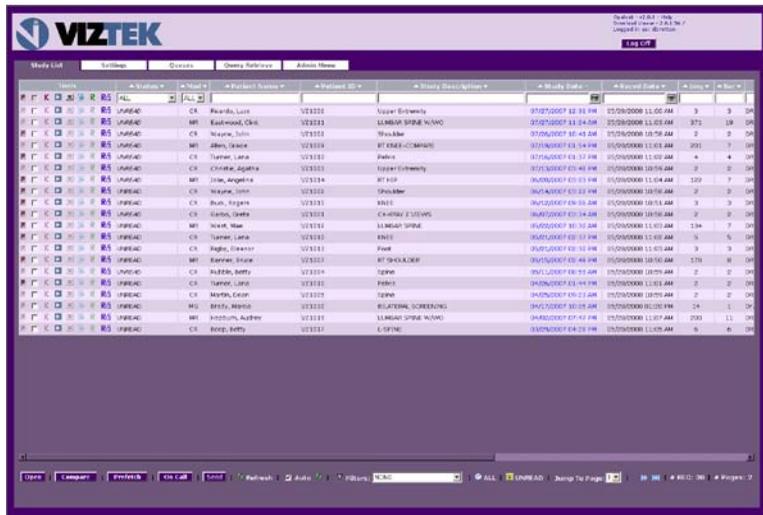


The Log-In Screen

Please consult your PACS administrator, or similar authority, to receive your username and password. Requiring a valid username and password is an effective security measure for protecting the records of your patients.

Step 2: The Study List screen

The first interface you will see after logging on will be the Study List screen (Web Worklist pictured). This interface is used for searching and selecting patient studies and sending studies to other users.



Above the study list, are tabs separating the study list from the settings and admin sections. Below the list you will find your toolbar and page navigation controls.

Step 3: Sorting and Searching Your Studies

The Study List window is divided into columns such as Status, Modality, Patient Name, etc. The data contained under these columns can be both sorted and searched.

► To sort the study list

1. Left-Click on either the up or down arrows next to the column name.

The listing will now be sorted by whichever column you chose, but this may not be sufficient for finding a particular study if the list is very large. Our next step is to filter the list by performing a quick search.

► To search (filter) the study list

1. Type in the white space directly below the column heading. For example, you might enter “Smith” under the column header labeled **Patient Name**.
2. Press ENTER to apply the search filter.

The Patient listing is updated to display only the patients that match the search criteria. From this reduced listing we can see our desired patient.

Step 4: Installing and Updating the Image Viewer

This step is optional. Only update your image viewer if you do not have the latest version. Only users with administrative rights on the computer being used will be able to install the viewer.

► To Install or Update your Image Viewer

1. Left-Click on the **Download Viewer** link in the top right-hand corner of the screen.
2. Click the **Open** button on the dialog box that appears to begin the Image Viewer installer (see below).
3. When it's completed, simply click the **OK** to return to the Study List

Step 5: Opening a Study in the Image Viewer

Once we have located the study (Exam) that we would like to view we can open it in the Image Viewer.

► To open a study in the Image Viewer

1. Double-Click on a study in the study list.

Step 6: The Image Viewer screen

After opening the selected study you will be taken to the Image Viewer screen. On the left side of the screen is the Series Window, which displays thumbnails for each series in the study. The largest window in the workspace is the viewing window, where the image(s) are displayed.

To display an image in the viewing window, double click on the thumbnail or drag and drop a thumbnail to the viewing window. After the image has been opened, you will then have access to an array tools for modifying or annotating your image.

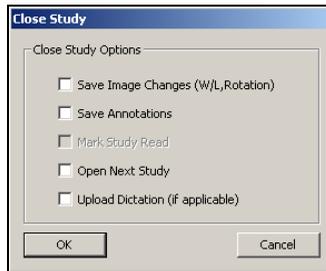


Step 7: Closing a Study

When you are finished viewing the study, there are two methods of closing the study to return to the Study List screen.

► To close a study

1. On the **File** menu, Left-Click on **Exit**, or Left-Click on the “X” in the upper right corner of the Image Viewer.
2. A **Close Study** dialog box will appear. Select the appropriate options and Left-Click the **OK** button.



If you are not prompted, or if you wish to have your changes automatically saved, please consult the topic Auto-Save Options in Image Viewer Settings Chapter for more details.

Upon returning to the Study List, you will notice that your previous sort and search filter are still in place. To bring back the entire patient list, delete everything from the search fields and press ENTER, or Left-Click the **ALL** button.

Going Further

This completes our sample session using Opal-RAD Client Worklist / Web Worklist. We have only looked at the most basic functionality of the software: selecting and viewing a study.

The both the Study List and Image Viewer contain many useful and specialized functions designed to increase efficiency and the quality of reading patient studies. Please consult the more advanced sections of this manual to familiarize yourself with those features.

Chapter Three

The Study List Screen

This chapter explores in detail the first of two screens you will alternate between while using the Client Worklist or the Web Worklist. This screen lists all of the exams in the database(s) you are connected to, allowing you to filter and sort the listing as you navigate the list. From this screen you can also change a study's status, send it to another site, create Patient CDs, and view study histories.

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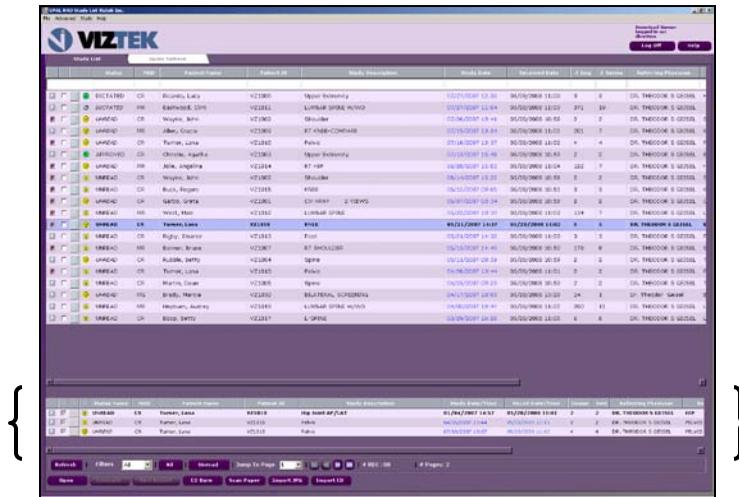
An Overview of the Study List Screen

Let's start by identifying this screen's distinct parts.

The **Study List** is the largest and most important part of this screen, holding the actual listing of studies in your database. The list is divided into several columns to organize all of the information available – like patient name, sex, and birthdate, the study's status, number of series and number of images, etc.

The **Patient's Studies** window works in conjunction with the study list to quickly show you all of the studies associated with the selected patient. When a study in the Study List is selected (highlighted) the Patient Studies window will show that patient's previous exams in the region just below the Study List.

The **Toolbar** sits below the Patient Studies window. On this toolbar you will find the controls necessary for opening and comparing studies, printing studies, burning CDs, importing JPEG images and scan documents, and record navigation.



Patient Studies Window

When you single-click on a study in the study list it becomes the selected study. The Client Worklist will quickly search through the study list to find every other study for this selected patient and after a moment displays these studies in the Patient's Studies window. To perform this same search using the Web Worklist, Left-Click on the “P” icon located to the left the study entry.

This search is based on the patient's ID. This enables you to quickly see all studies for the patient you are interested in. You can also select the study to view from this window just as you do from the Study List window. The “P” located to the left of a Study List entry is another indication that the patient has other exams in PACS.

Study List Buttons

The Study List buttons appear at the bottom of the Study List screen and to the left of the Study entries. The buttons will change depending on which version of the Opal-RAD software you are using (Client Worklist or Web Worklist).



Client Worklist buttons



Web Worklist buttons



Study List buttons

- **P Patient Exam History Notification:** When highlighted, this icon will indicate that the patient has multiple exams in the system.
- **Select Study Check Box:** Check this box to compare or open multiple studies.
- **K Key Image:** When highlighted, this icon will indicate that key images exist for the study.
- **▶ Transcription:** Opens a window for adding a transcription to the study.
- **X XMLData:** Displays a study's DICOM data in XML format.
- **📄 Add Note:** This is used to add notes to a study.

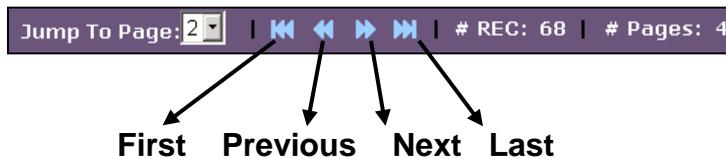
- **R View Report:** This displays a study's completed exam report.
- **RiS RIS Docs:** This will open a list of any documents scanned in using your integrated Opal-RIS package.
- **Open:** This feature will allow you to consecutively load up to five studies.
- **Compare:** This feature allows loading of two studies for comparison.
- **Prefetch:** This allows users to download studies to their local hard disk.
- **On Call:** This uses a pre-defined search filter in conjunction with Prefetch feature to download studies
- **View Report:** Opens a PDF version of the radiology report.
- **CD Burn:** This feature allows the user to burn patient studies to a CD.
- **Send:** This is used to DICOM send a study to another PACS.
- **DICOM Print:** This is used to print a study to film.
- **Scan Paper:** This allows the user to attach a scanned document to the selected study.
- **Import JPG:** This allows the user to attach a JPG image to the selected study.
- **Import CD:** This feature allows the user to import DICOM images from a CD.
- **Refresh:** This button performs a manual refresh of the study list.

☀ CD Burn, Import JPG, Delete Study, Purge Study, and Scan Paper are only available from the Client Worklist.

Study List Navigation

As the number of studies, or records, in your database grows it will be necessary to use the Study List's record navigation toolbar to browse through the entire list. This toolbar (shown below) can be found at the bottom of the Study List screen.

The number of records, number of pages, jump to page, and page forward/backward buttons are available from the bottom left corner of the screen.



► To move through your records

1. Left-Click on the **First** or **Previous** button to move backwards through your records.
2. Left-Click on the **Next** or **Last** button to move forwards through your records.

► To go to a specific page

1. Left-Click on the **Jump To Page** dropdown list.
2. Select a page number from the list.

Opening a Study in the Image Viewer

When you have located your desired study, you may open it for viewing one of two ways.

► To open a study in the Image Viewer

1. Double-Click on the study in the Study List window.

-or-

1. Left-Click on the check box to the left of the study in the Study List window.
2. Left-Click on the **Open** button.

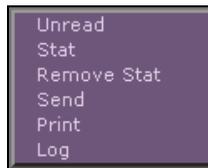


Open

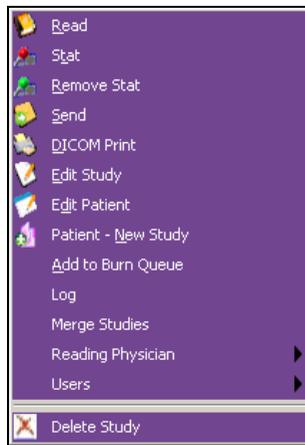
☀ You may open up to five studies at a time by using the Open button method. Simply select all five studies prior to clicking the Open button. The studies will open one at a time. As each study is closed the next in line will open.

Study List Context Menus

Both the Client and Web Worklists have a Right-Click context menu, which can be accessed by Right-Clicking on a study in the Study List. The contents of the context menu will depend on whether you are using Client Worklist or Web Worklist. For example, if you Right-Click on a study while using the Web Worklist, the following menu will appear:



If you Right-Click on a study while using the Client Worklist, the following menu will appear:



☀ We will examine each of these menu options in the pages and chapters that follow.

Changing the Status of a Study

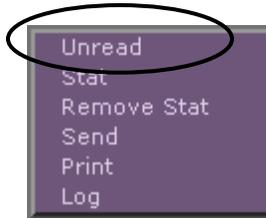
Each study in the system is assigned a “status.” The status acts as a marker to indicate at what point a study is at in its life-cycle. The valid status types are as follows:

- **Incomplete:** Studies are considered “incomplete” when either (a) the images are still coming into the system from the modality or another sender, or (b) the technologist has not yet validated this study. Studies of this type can be changed to Unread in a process known as “validating”. Once a study has been validated it cannot be changed back.
- **Unread:** Unread studies have been validated by a technologist and are awaiting diagnosis by the Physician/Radiologist. Images can no longer be added to the study. Studies of this type can be changed to Read.
- **Read:** Studies of this type have been already been diagnosed, or “read.” Studies of this type can be changed back to Unread.
- **Deleted:** Studies of this type have been marked for deletion from the PACS server. This feature is only available from the Client Worklist and should rarely be used. Studies of this type can be changed back to Read or Unread.
- **STAT:** Marking a study STAT will highlight the study and move it to the top of the study list. A study that has been marked STAT implies that it is of great importance, and should be attended to first.

Unlike the other statuses mentioned the STAT status is independent of the other types. So, for example, you could have a study marked both Unread and STAT simultaneously.

► **To change the status of a study**

1. Right-Click on the study to be changed.
2. Select the appropriate status, such as Unread or STAT, from the context menu that appears (below).



Web Worklist context menu

The statuses that are displayed in the context menu will change depending on the current status of the study being changed. For example, if a study has been marked as **Read**, then the **Unread** option will appear in the context menu.

☀ **Marking a study as Deleted is only available from the Client Worklist.** Please see the Chapter 8: Patient/Study Administration for more details on deleting studies.

Add Notes to a Study

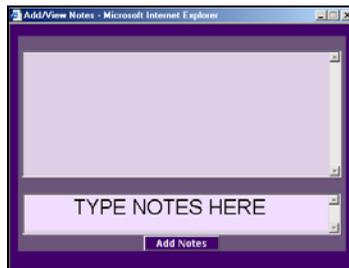


Add/View Note button

If a note exists, the Add/View Note button will be highlighted. The typed notes will appear when the Add/View Note button is pressed. You can attach as many notes as necessary to a study, with the last note being the most recent. Once created, these notes cannot be removed.

► To add notes to a study

1. Left-Click on the **Add/View Note** button to the left of the Study Entry.
2. Type the note in the bottom portion of the Note window.
3. Left-Click on the **Add Notes** button to save the note, or Left-Click the “X” in the upper right-hand corner of the window to cancel.



☀ To view notes from the Image Viewer, Right-Click on the Series/Stack Header and select View Notes.

Columns in the Study List

The data that comprises your studies are displayed in a columnar format. To facilitate the the finding of studies, most of these columns can be sorted, searched, rearranged, and removed.

The columns available in the Study List are:

- Status
- Modality
- Series Count
- Image Count
- Patient Name
- Patient ID
- Description
- Body Part
- Study Date
- Referring Physician
- Gender
- Date of Birth
- Age
- Accession Number
- Institution Name
- Reading Physician
- Received Date
- Department
- Station
- Fax Number
- Approved Date

Sorting the Study List

Most of the columns in both the Client and Web Worklists can be sorted to make finding data in a large study list easier.

► To sort a column in Client Worklist

1. Double-Click the column to be sorted.
2. The direction of the arrow that appears on the column will indicate the direction of the sort.
3. Double-Click the column again to change the sort.



► To sort a column in Web Worklist

1. Left-Click on either the Up-Arrow or Down-Arrow printed on the column header.



Alphanumeric fields will be sorted as follows:

- Ascending will sort from A to Z.
- Descending will sort from Z to A.

Date/Time fields will be sorted as follows:

- Ascending will sort from oldest to newest.
- Descending will sort from newest to oldest.

The Study List Filter (Searching)

Sorting the study list by any column is handy enough, but once you begin to accumulate hundreds of studies, the list becomes quite long and more time-consuming to navigate by scrolling through it.

Filtering what is displayed in the list becomes essential. Once a filter is applied the list will be updated to display only the studies that match the search criteria, making it easier to find your desired studies. There are a number of techniques for filtering, or searching, your studies:

► To filter the study list with a search phrase

1. Enter a search phrase in the textbox below the column header. For example, enter “*Smith*” under the column header labeled **Patient Name**. You may also enter a partial search phrase, such as “*Sm.*”
2. Press ENTER to apply the search filter.



A screenshot of a search filter interface. At the top, there is a grey header bar with the text "▲ Patient Name ▼" in white. Below this header is a white text input box with a thin black border. The input box contains the text "Smith" and has a vertical cursor at the end of the text.

☼ Some columns in the Study List window are pre-populated dropdown lists. To search by one of these fields, simply select a value from the dropdown list. To remove this value, just select the blank entry, or the **ALL** option, at the top of the list.

► **To remove a filter from your study list**

1. Erase the search phrase from the search field and press ENTER.

► **To remove all filters from your study list**

1. Left-Click on the **All** button on your toolbar.

► **To display only Unread studies**

1. Left-Click on the **Unread** button on your toolbar.



► **To use a Saved Search Filter**

1. Select a filter from the **Filters** dropdown menu.



☼ In order to use Saved Filters you must create them through the Web Worklist Settings window. Please see Chapter 10: Web Worklist Settings for more details.

Refreshing the Study List

Depending on his/her permissions, a user from one workstation could potentially add, remove, or modify a study on the study list. If there are other users operating from other workstations, they may not see these changes immediately.

To ensure that your study list is showing the most current and up-to-date data, you may refresh the list.

► To refresh the study list

1. Left-Click on the **Refresh** button on your toolbar.



Through the Web Worklist you may automatically refresh your study list based on a predefined interval.

► To automatically refresh the study list

2. Left-Click on the **Auto** checkbox on your toolbar.



☀ The study list's auto refresh interval can be modified using the "OPAL-RAD Local System Configuration" program from your Opal-RAD folder on the Start Menu.

Chapter Four

Study List Settings

This chapter will explain how to modify your user account's Worklist settings. These settings include adjusting the column order and visibility, number of displayed rows, default sort column. Additionally, through the Settings tab we can also change the user's password.

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Introduction

The Web Worklist Setting Tab (pictured below) is where users of all types (not just administrators) can adjust their display settings and passwords. It is important to understand that all changes to a user's display settings and password will apply to both the Client Worklist and Web Worklist.



The Settings tab includes the following sections:

- **Column Order:** This will allow you to enable, disable, and sort the columns on your study list.
- **Rows to Display:** This is the number of records that will be displayed per page on your study list.
- **Change Password:** This is where the user may change his or her password.
- **Default Sort Column:** This is the column that will be used to sort the study list.
- **Audio Player Lag Time:** Used to adjust the automatic rewind feature of the dictation control.
- **Auto Open Priors:** Activates the auto open feature.
- **Filter Menu:** This control panel will allow the user to create, edit, and delete pre-saved study list filters.

☀ After any of these options have been changed, it is important to remember to Left-Click on the Save button.

Add/Remove Study List Columns

You may find that you prefer to have certain columns listed in the Study List. This may be because the information is unnecessary or not available (e.g., many institutions do not use an Accession Number.)

► To add Study List columns

1. Left-Click on the **Settings** tab.
2. Left-Click on the **Column Order** node to expand the column settings.
3. Left-Click on a column in the **Unselected** list.
4. Left-Click on the **Add** button to move the column to the **Selected** list.
5. When you are done adding columns, Left-Click on the **Save** button to save your changes and return to the Study List.

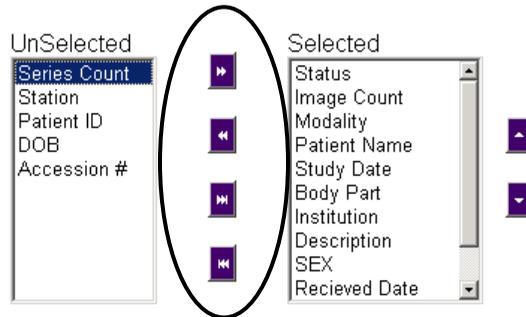
When a column is added to the Selected list box, it will automatically appear at the bottom of the list. For instructions on moving the column on the list, please see the next topic, “Rearrange Study List Columns.”

► To remove Study List columns

1. Left-Click on the **Settings** tab.
2. Left-Click on the **Column Order** node to expand the column settings.
3. Left-Click on a column in the **Selected** list.
4. Left-Click on the **Remove** button to move the column to the **Unselected** list.

5. When you are done removing columns, Left-Click on the **Save** button to save your changes and return to the Study List.

You may add or remove all columns at once by clicking the **Add All** or **Remove All** buttons (these are the bottom two buttons circled below).



-  Add Selected
-  Remove Selected
-  Add All
-  Remove All

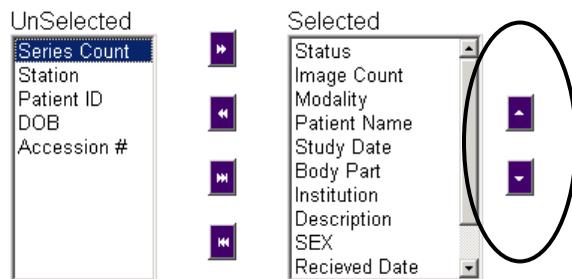
☼ It is not necessary to select a column from either list box when using the Add All or Remove All feature.

Rearrange Study List Columns

The columns that appear on the study list may be rearranged in any order desired. The order in which they appear in the “Selected” list (from top to bottom) will be the order in which they appear on the Study List (from left to right). For example, if the “Status” column is the first on the list, it will be the first column on your Study List.

► To rearrange the Study List columns

1. Left-Click on the **Settings** tab.
2. Left-Click on the **Column Order** node to expand the column settings.
3. Left-Click on the column to be moved in the **Selected** list.
4. Left-Click on either the **Up** or the **Down** arrow (circled below).
5. When you are done sorting columns, Left-Click on the **Save** button to save your changes and return to the Study List.



Study List Rows

By default, when the Study List contains more records than will fit on the screen you will need to use the record navigation toolbar to page through all of the records (see the section on Record Navigation for more information).

However, you can adjust the number of records, which appears on each page of your Study List.

► To adjust the number of rows/records to display

1. Left-Click on the **Settings** tab.
2. Left-Click on the **Rows to Display** node to expand the row settings.
3. Left-Click on the dropdown list box and select a value (10, 20, 30, 40, or 50).
4. Left-Click on the **Save** button to save your changes and return to the Study List.



Changing Your Password

In order to log in to the Opal-RAD PACs server, you need to pass the system a username and password (see “Logging On” in Chapter 2: Basic Workflow of Opal-RAD for more information). If you would like to modify the password you can do so through the Web Worklist Settings Tab.

► To change the user’s password

1. Left-Click on the **Settings** tab.
2. Left-Click on the **Change Password** node to expand the password settings.
3. Enter your new password in the textbox.
4. Left-Click on the **Save** button to save your changes and return to the Study List.



Default Sort Column

By default, The Study List is sorted on the “Study Received Date” column. If you would like to modify this default behavior, you can do so through the Web Worklist Settings Tab.

► To modify the default sort column

1. Left-Click on the **Settings** tab.
2. Left-Click on the **Default Sort Column** node to expand the Study List column sort settings.
3. Select a column from the **Default Sort Column** dropdown list box.
4. Select a sort order (Ascending or Descending) from the sort type dropdown list box.
5. Left-Click on the **Save** button to save your changes and return to the Study List.



☀ See Chapter 3: The Study List Screen for more information on manually sorting columns in the Study List.

Audio Player Lag Time

The Dictation Audio Control will automatically rewind a predefined amount of time every time the Play Foot Pedal is released and re-depressed. Your “Transcriptionist” User Group might benefit by adjusting the amount of time the audio file automatically rewinds. This can be done through the Web Worklist Settings Tab.

► To modify the default sort column

1. Left-Click on the **Settings** tab.
2. Left-Click on the **Audio Player Lag Time** node to expand the Audio Player Lag Time settings.
3. Select a value from the dropdown list box.
4. Left-Click on the **Save** button to save your changes and return to the Study List.



Auto Open Priors

All users with permission to view studies have the ability to manually open a patient's prior studies through the Image Viewer interface. If you would like to have a patient's prior study automatically opened when the viewer launches, you simply need to enable the Auto Open Priors feature.

Which study opens automatically will depend on the Auto Open settings which can be found in your Image Viewer Settings control panel. For example, we can have the last study from the same modality opened, or the last study of the same body part.

► To enable the auto open priors feature

1. Left-Click on the **Settings** tab.
2. Left-Click on the **Auto Open Priors** node to expand the Auto Open Priors settings.
3. Select "On" dropdown list box.
4. Left-Click on the **Save** button to save your changes and return to the Study List.

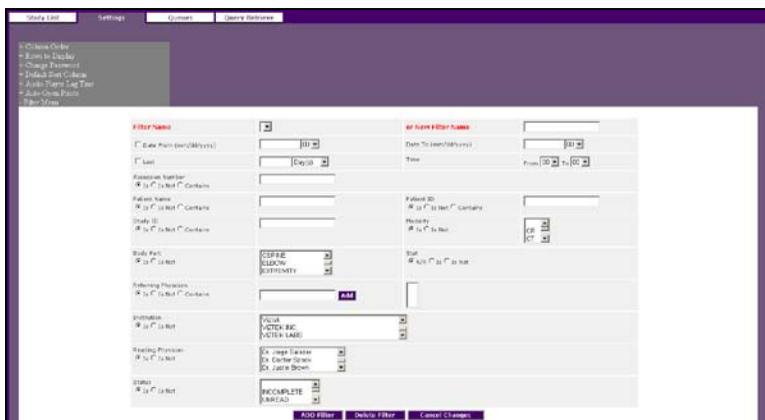


☼ See Chapter 11: Image Viewer Settings for more information on configuring your Auto Open Priors settings.

Filters Menu

Through this interface, the user can create, modify, and delete search filters. Users will typically apply their filters (search criteria) to the study list, one at a time. This can become cumbersome if the user is constantly filtering the list for multiple criteria, such as date, modality, and referring physician.

Client Worklist and Web Worklist have a saved search filters feature. These saved search filters make it easy for the user to apply a complex set of search criteria to the study list with the click of a button. See Chapter 3: The Study List Screen for details on applying your saved search filters.



☀ In order to create saved search filters, you must be logged into the Web Worklist application.

► **To add/create a study list filter**

1. Left-Click on the **Settings** tab.
2. Left-Click on the **Filter Menu** node to expand the filter menu settings.
3. Enter a name for your filter in the **New Filter Name** textbox.
4. Enter criteria in the remaining fields as needed.
5. Select a user name in the **Save For User** dropdown list (only the Admin users will have this option).
6. Left-Click on the **Add Filter** button.

► **To edit a study list filter**

1. Left-Click on the **Settings** tab.
2. Left-Click on the **Filter Menu** node to expand the filter menu settings.
3. Select a filter in the **Filter Name** dropdown list.
4. Modify your fields as necessary. If you make a mistake and would like to cancel you changes, Left-Click on the **Cancel Changes** button.
5. Left-Click on the **Update Filter** button.

► **To delete a study list filter**

1. Left-Click on the **Settings** tab.
2. Left-Click on the **Filter Menu** node to expand the filter menu settings.
3. Select a filter in the **Filter Name** dropdown list.
4. Left-Click on the **Delete Filter** button.

Notes on adding and editing filters:

- Only the “Admin” Group will be able to save filters for other users. All other groups can only create filters for themselves.
- Hold down the CTRL key to make multiple selections in any of the list boxes (i.e. Body Parts, Modalities).
- To deselect an item from your list, simply hold down the CTRL key and Left-Click on the item.
- If you would like to deselect all items in your list, Left-Click on the first entry in the list. This entry will appear as a blank space.

Chapter Five

Dictation and Transcription

This chapter explores Opal-RAD's built-in Dictation and Transcription module. We will examine in detail the process of created radiology/exam reports for the studies loaded on the PACS.

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Introduction

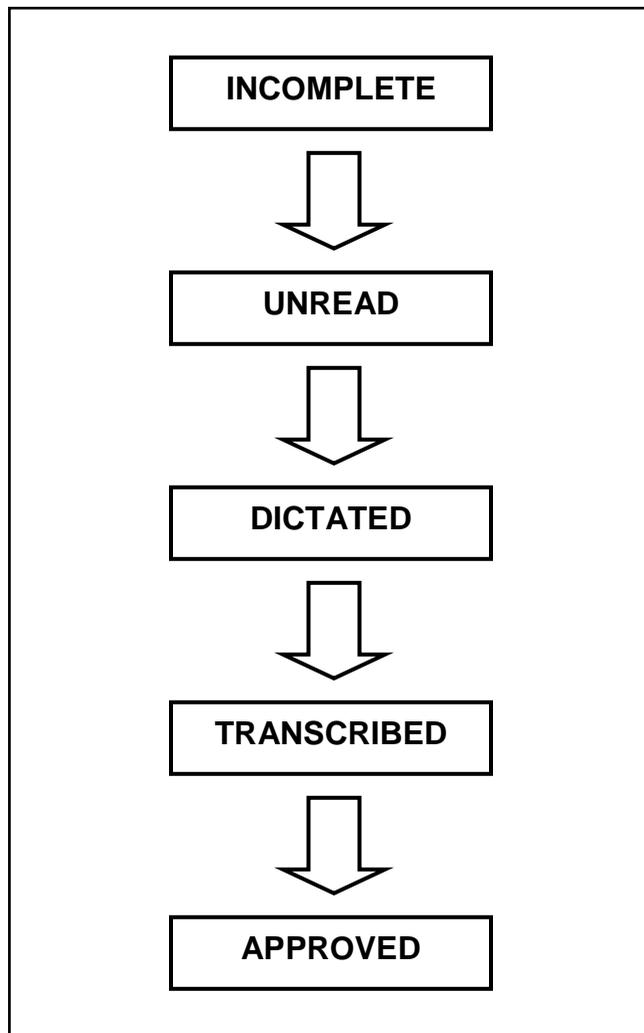
The Dictation/Transcription Module of Opal-RAD allows the Reading Physician and Transcriptionist to work in unison to create and approve radiology/exam reports for study's loaded on the PACS.

As mentioned earlier in **Changing the Status of a Study**, each study loaded on the PACS is initially assigned a status of "Incomplete." For those users who do not use the built-in Dictation/Transcription module, the incomplete studies will be validated to "Unread," and then eventually marked as "Read" by the reading physician.

But when the Dictation/Transcription module is used, the study's life-cycle does not end after the study has been read. Rather, it ends after a study's exam report has been approved and electronically signed by the physician. It is through the Dictation/Transcription module that we will reach that goal.

We start by recording a dictation file and saving it with the exam. Then a transcriptionist will listen to the saved file, transcribe it, and send it back to the physician for approval. The physician will then determine the accuracy of the transcribed report and choose to approve or not approve it.

In the following pages we will explain how this multi-stage process works. But first please refer to the diagram on the next page, as it illustrates the workflow process defined above.



Opal-RAD Workflow

Dictating a Study

Dictation may be created from both the Image Viewer and the Transcription module. The dictation toolbar has a play, pause, stop, and record button for creating and listening to your dictations. There is also a status window and counter for providing feedback to the user.

The Dictation control works seamlessly with the Philips Speechmike handheld recorder. The play, pause, stop, record, fast-forward, and rewind functions can all be accessed through the Speechmike control.



► To record dictation

1. Open your study in the Image Viewer, or Left-Click on the study's Transcription button from the Web Worklist.
2. Left-Click on the **Record** button (circle).
3. Speak clearly into the microphone. To pause the recording, Left-Click **Record** again.
4. When you have finished dictating, Left-Click on the **Stop** button (square).

► To listen to your recorded dictation

1. Open your study in the Image Viewer, or Left-Click on the study's Transcription button from the Web Worklist.
2. Left-Click on the **Play** button (triangle).
3. Any recorded audio will begin to play.

4. When you have finished listening, Left-Click on the **Stop** button (square).

After dictation has been created, it is important that it be uploaded back to the PACS server. If you have recorded your dictation using the Transcription module, you simply need to Left-Click on the **Save Dictation** button to save the current audio file and upload to the PACS.

If you have used the Image Viewer to create the dictation, you simply need to close the Image Viewer to save and upload the dictation.

Please note that if the user has disabled the **Ask on Close** feature, then they will be prompted to upload the dictation. To do so, simply select **Yes** in the dialog box. The “uploaded” dictation will be sent back to the PACS server where it will be saved.

If you chose **No** in the previous step, you will then be given a second chance to save the dictation. Rather than saving the dictation on the PACS server, your file will be saved on the local hard drive.

If the study is then reopened on the computer with the saved dictation, the user will be prompted to load the dictation into memory.

► **To start a new dictation**

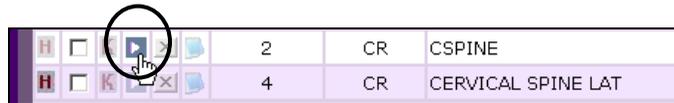
1. Open your study in the Image Viewer, or Left-Click on the study's Transcription button from the Web Worklist.
2. Left-Click on the **New Dictation** button (down arrow) and select New Dictation from the menu.
3. Left-Click on the **Record** button (circle).
4. Speak clearly into the microphone. To pause the recording, Left-Click **Record** again.
5. When you have finished dictating, Left-Click on the **Stop** button (square).

⚠ If you start a **New Dictation**, any previously unsaved dictation will be erased. Please see previous topic for more information on closing and saving dictation.

Transcribing Dictation

After dictation has been added to a study, you can transcribe it using the Transcription module. Although Dictation can be accessed from both the Web and Client Worklists, the Transcription module is only accessible through the Web.

The Transcription module contains both a text editor and the Dictation control (see previous section for usage). The text editor, is similar in design to many word processing applications, such as Microsoft Word. There are controls for aligning, resizing, and reformatting your text.



► To transcribe your dictations

1. Left-Click the Transcription icon (above) next to the study to open the Transcription window.
2. Use the Dictation toolbar to listen to your dictation (see previous section for instructions), and enter your transcription into the text editor.
3. Left-Click on the **Submit** button to save.

☼ Only users who are members of the Transcriptionist Group will have access to the **Submit for Approval** and **Save Transcription** functions.

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http://199.227.180.244/opalweb/(S(ba04j55Savr0zp45gu1qkr5S))/Trans.aspx?SID=4E6A67334E773D3D&GR - Microsoft Internet Explorer

Paragraph Font Size Font Color Background Auto Correct

Referring Physician: [dropdown] Dicom Name: DR. THEODOR S GEISEL
Address: Phone: Fax: 904-555-9999
Specialist: [dropdown]

First: John Last: Wayne MI: Sex: M
DOB: 1/1/1903 12:00:00 AM SSN: Desc: Shoulder MODIFY
PDICOMID: VZ1002 Body Part: SHOULDER Modality: CR

Facility: Transcription Templates: NONE [] ALL [] APPROVE NOW

Observation:

Impression:

Submit for Review Submit for Review & Next Save Transcription

DICTATION

Transcription window (Transcription user)

Approving Transcribed Reports

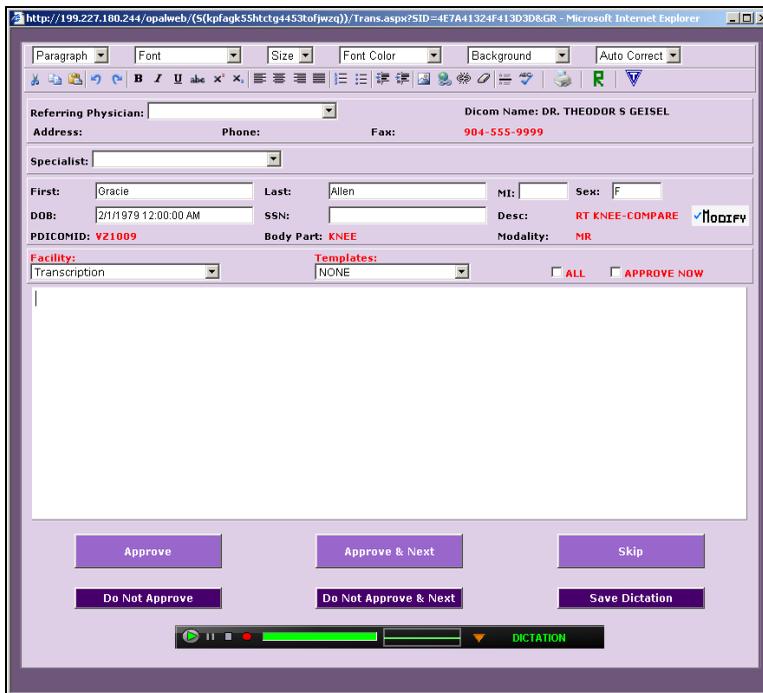
Once the reports have been transcribed, it is then up to the physician to approve the reports. Approving the report is then simply a matter of opening the Transcription module, reading the report, and selecting the **Approve** button.

► To approve a report

1. Left-Click the Transcription icon next to the Transcribed study to open the Transcription window.
2. Make any changes to the text as needed.
3. Left-Click on the **Approve** button to approve the report and close the Transcription window.
4. Optionally, you may select the **Approve & Next** button to approve the current report, and open the next Transcribed study in the Transcription window.

Once approved, the report will be electronically signed with the approving physician's signature, and the study's status will be changed to "Approved."

 If Auto-Fax feature is enabled, a copy of the report will be faxed to the referring physician's fax number.



Transcription window (Radiologist user)

Addendums

Even after approval, the physicians and transcriptionist have the ability to go back to the report and create addendums. Addendums are used to either correct a mistake that may have been overlooked in the approval process, or to insert information that may have been unavailable at the time the report was initially constructed.

► To add a dictation addendum

1. Left-Click the Transcription icon next to the Approved study to open the Transcription window.
2. Use the Dictation toolbar to create to your dictation (see previous section for instructions).
3. Left-Click on the **Save Dictation** button to save.

► To add a transcription addendum

1. Left-Click the Transcription icon next to the Approved study to open the Transcription window.
2. Left-Click on the **Add Transcription Addendum** button.
3. Enter your transcription into the text editor.
4. Left-Click on the **Addendum Submit For Review** button to save the transcription and close the window.

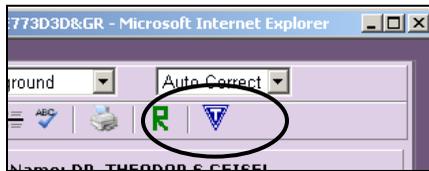
Once a dictation addendum is saved, the study will revert back to the Dictated status. Once a transcription addendum is submitted, the study will revert back to the Transcribed status.

Transcription Templates

To make the job of entering long or repetitive sections of transcription easier, users can utilize the templating feature of the Transcription module. Templates are especially useful when dealing with what are referred to as “normal” reports.

► To create a template

1. Left-Click the Transcription icon next to any study that is of the same modality as the type of template you would like to create (i.e. CR, CT).
2. Enter your transcription into the text editor.
3. Left-Click on the **Save Template** button (circled). The Manage Template window will appear.
4. Enter a name for your template in the textbox and Left-Click the **Save** button.



☀ The saved template will be associated with whichever modality was used to create it.

► **To load a saved template**

1. Left-Click the Transcription icon next to the study you are creating transcription for on the Study List to open the Transcription window.
2. Left-Click on the **Templates** dropdown list, and select a template. The text of the template will automatically load into your text editor.
3. If you do not see your named template in the list, place a check in the box labeled **All**, and then repeat Step 2.

► **To delete a saved template**

1. Left-Click the Transcription icon next to any study on the Study List to open the Transcription window.
2. Left-Click on the **Save Template** button.
3. Left-Click on the **Delete** tab.
4. Select the template from the dropdown list box.
5. Left-Click on the **Delete** button.

► **To update a saved template**

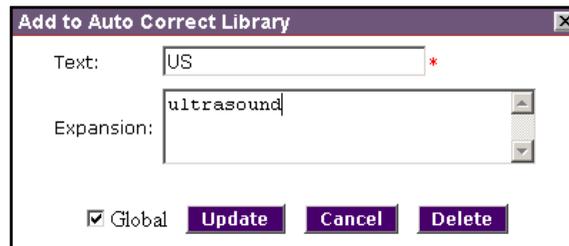
1. Left-Click the Transcription icon next to any study on the Study List to open the Transcription window.
2. Enter your transcription into the text editor.
3. Left-Click on the **Save Template** button.
4. Left-Click on the **Update** tab.
5. Select the template you wish to have updated with the current transcription text from the dropdown list box.
6. Left-Click on the **Update** button.

Auto Correct

When active, the Auto-Correct feature of the Transcription window will automatically replaced one word or phrase with another pre-defined word or phrase. For example, you can have the word “USA,” replace with the phrase “United States of America.”

► To create an auto-correct entry

1. Open a Transcription window.
2. Enter the word(s) you wish to use as your auto-correct phrase into the Transcription window’s text editor.
3. Using the mouse, highlight the entire auto-correct phrase.
4. While holding the CTRL key, press the E key. The Auto-Correct window will appear.
5. Enter your replacement text in the Expansion textbox.
6. Left-Click the **Update** button to save your entry and close the window.



► **To remove an auto-correct entry**

1. Open a Transcription window.
2. Enter the word(s) you wish to use as your auto-correct phrase into the Transcription window's text editor.
3. Using the mouse, highlight the entire auto-correct phrase.
4. While holding the CTRL key, press the E key. The Auto-Correct window will appear.
5. Delete the replacement text from the Expansion textbox.
6. Left-Click the **Update** button to save your entry and close the window.

☼ By default, all auto-correct entries are available to all transcription users. If, however, you wish to create an entry for only yourself, uncheck the **Global** checkbox before clicking **Update**.

Chapter Six

Advanced Tools

This chapter explores some of the more advanced viewing features found in the Opal-RAD Client Worklist. Some features are in the Web Worklist.

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Creating a Patient Disc (CD Burning)

► To burn a patient study to a CD

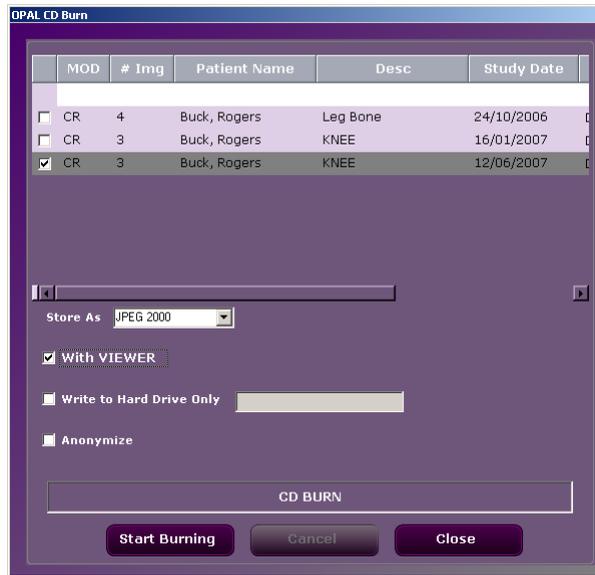
1. Launch the Client Worklist Study List screen.
2. Highlight the Study you intend to burn to a CD by Left-Clicking on the record.
3. Left-Click on the **CD Burn** button, which appears at the bottom of the Study List screen.



4. The **Opal CD Burn** window (see the following page) will then appear. In this window, select the study you wish to burn by Left-Clicking on the check box in the left-most column.
5. Left-Click on the **Start Burning** button to commence the burning process

Please note that CD burning is a system-intensive process and requires the entire computer's processing to achieve. It is therefore necessary to wait while until the CD is complete before continuing to use the Client Worklist. With current recording technology and speeds, most discs are complete within three minutes. Particularly large exams may take more time to complete.

Also note that Patient CDs can only be created one at a time in the Client Worklist.



If this is not sufficient for your institution's needs (perhaps you need to create large numbers of CDs, or cannot have your reading interrupted by the CD burning process), please consider either purchasing a separate workstation devoted to creating CDs, or purchasing an Opal-RAD CDR Server to automate the process. (For more information please contact Viztek, Inc.)

☀ Burning a CD is only available through the Client Worklist and requires that the workstation have a CD-Recordable drive installed and configured. Please contact your Viztek support staff for any questions.

Importing Studies

There are three options for importing studies/images into your PACS server. You can import a folder, individual files, or a DICOM directory structure. To access any of these import options you must first click on the **Import CD** button to open the **Opal Import** dialog (pictured below).



► To import a folder containing DICOM images

1. Left-Click on the **Select Folder to Import** button.
2. Locate the folder you wish to import in the **Browse for Folder** dialog and select **OK**.

► To import individual DICOM images

1. Left-Click on the **Select Files to Import** button.
2. Locate and then highlight the DICOM files you wish to import in the dialog and select **Open**.

► **To import a DICOM directory structure**

1. Left-Click on the **Open DICOMDir** button.
2. Left-Click the **Open DICOMDir** button in the dialog that appears (pictured below).
3. Locate and then highlight the DICOMDIR file in the dialog and select **Open**. The Open dialog will close.
4. Highlight the Patient, Study, Series, or Image node in the text box and click the **Add To List** button.
5. Repeat steps 2, 3, and 4 for each DICOM structure you wish to import, and then click **OK** when you are finished.

The DICOMDIR file contains the directory structure for your DICOM data. This includes Patient, Study, Series, and Image data. Be aware that when selecting a node (Step 4), only those nodes and their child nodes will be added to your import list



Importing Scanned Documents

The Client Worklist has a feature which will allow you to import a scanned document into a study on your PACS server. This is useful for attaching exam reports, or other medical documents, to their corresponding exams.

All that is required for the scanning feature is for a document scanner to be connected to and installed on the machine running the Client Worklist application.

► To import a scanned document

1. Highlight the Study you attach the document to by Left-Clicking on the record.
2. Left-Click on the **Scan Paper** button (*Fig. 1*).
3. Load your document into the scanner, and Left-Click on the **Scan** button.
4. When you are finished scanning documents, Left-Click on the **Finished** button.

If the Client Worklist detects that you have more than one scanner installed on the computer, you will be prompted to select the correct scanner from the **Select Source** dialog (*Fig. 2*).

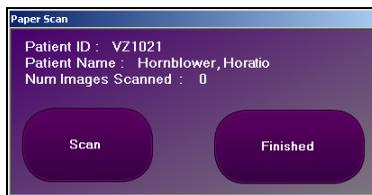


Fig. 1

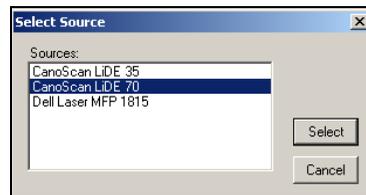


Fig. 2

Importing JPG Files

In some cases, a patient may bring in a CD which contains medical images that are not in the DICOM format. The Client Worklist has the ability to import saved JPEG images into a study on your PACS. The only prerequisite for importing the image is that they are saved in a JPEG format.

► To import a JPG image

1. Highlight the Study you will be adding the images to by Left-Clicking on the record.
2. Left-Click on the **Import JPG** button.
3. Select one or more images in the **Open Import Image** dialog, and Left-Click **Open** (*Fig. 1*).
4. Enter a Series Description in the text box (*Fig. 2*).
5. If you selected multiple images in Step 3, and would like all of the images in one series, place a check in the checkbox.
6. Left-Click on the **OK** button.



Fig. 1



Fig. 2

Send (“Push”) an Exam

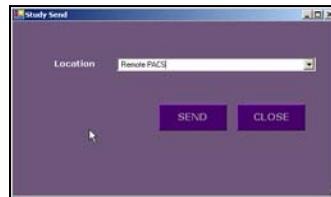
Sending a study to another PACS server is very simple to do once you have configured your recipients.

► To send a study to another server

1. Left-Click on the study to highlight it.
2. Left-Click on the **Send** button at the bottom of the screen (Client only), or right click on the image and choose **Print**.
3. Left-Click on the button that corresponds to the destination (Web Worklist), or select a location in the **Locations** dropdown (Client Worklist) and click the **Send** button.



Web Worklist



Client Worklist

After selecting the appropriate recipient, the screen disappears and the transfer of the exam is initiated in the background. No further user interaction is needed to complete the transfer, and it is not necessary to wait for one transfer to finish before initiating another.

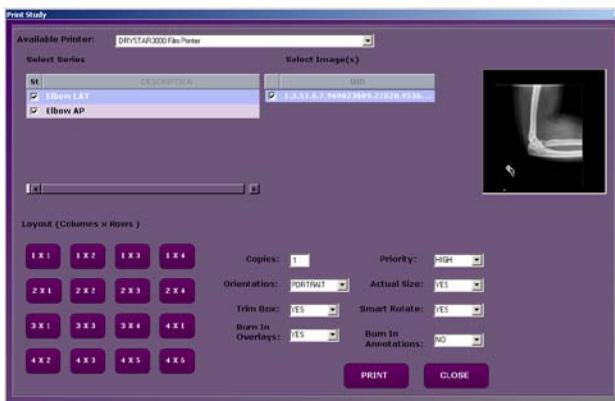
☀ Please see Chapter 11: Web Worklist Administration for details on creating your send destinations.

Print to Film

Printing to film is available through both the Client and Web Study Lists. When printing from the Client, the user has the ability to select which images will be sent to the printer, and which will not. When printing through the Web, the entire study will be sent to the printer.

► To print images to film

1. From the Study List screen, Right-Click on the study and choose **Print**.
2. Select a DICOM printer from the **Available Printers** list box at the top of the dialog.
3. Place a Left-Click the checkboxes next to any series and/or images you wish to print (Client Study List only).
4. Configure any other options as desired (see next page for available options).
5. Left-Click on the **Print** button.



Client Study List DICOM Print Window

The Print to Film window offers many options for defining the layout of the printed images.

Print to Film Options:

- **Layout:** Choose a layout for the printed images by clicking any one of the layout buttons. The supported layouts include common configurations such as “2 X 4”, indicating 2 columns by 4 rows.
- **Copies:** The number of copies of the film.
- **Priority:** Change the priority of the print job. A higher priority job will be completed first.
- **Orientation:** Print in portrait or landscape.
- **Actual Size:** Prints image in actual size, rather than taking up the entire piece of film.
- **Trim Box:** Border around image. This is a printer specific feature.
- **Smart Rotate:** When this option is selected, a landscape image will always print landscape. A portrait image will always print portrait.
- **Burn in Overlays:** Select this option to “burn in” the overlay information into the images so that they print to film.
- **Burn in annotations:** Select this option to “burn in” any annotations you’ve made so that they print to film. This includes markers, text, and measurements.

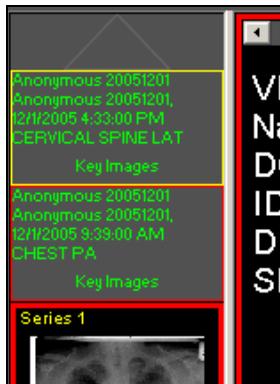
 Please note that the Web Worklist DICOM Print window does not contain an image preview feature.

Comparing Studies

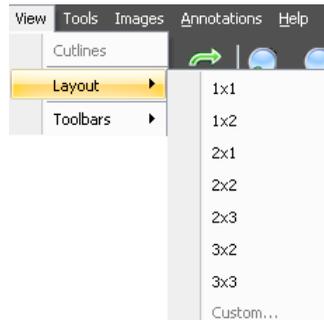
By using the Client or Web Worklist you have the ability to compare one study with a previous study from that same patient. This will require that you select two studies, one from the Study List and one from the Patient Studies Window.

► To compare two exams

1. Left-Click on a study in the Study List. The study will appear highlighted, and any previous exams for this patient will appear in the Patient Studies Window.
2. Left-Click on a study in Patient Studies Window.
3. Left-Click on the **Compare** button. This will bring up the Viewing Window.
4. On single monitor systems you will see two groups of thumbnail images in the Series/Stacks window. Each group will have its own study header as in the example below. On dual monitor systems, each of your studies will open on its own monitor.



5. Choose the vertical or horizontal split view, which is in the top right corner of the screen or the View menu.



6. Double-click or drag-and-drop the first image or series into the first pane.
7. Left-Click on the header information of the second study to bring up the second studies images.
8. Double-click or drag-and-drop the second image or series that you want to view in the second pane. Now both images can be manipulated.
9. To return to the Worklist screen, Left-Click on the “X” in the upper right corner of the screen.

Chapter Six

Patient/Study Administration

This chapter will explore the set of tools used by the administrator that will allow him or her to manage studies in the PACS. These tools and functions are only available from the Client Worklist, not the Web Worklist.

In order for the user to perform the functions described in this chapter, he/she must have the appropriate permissions. These permissions are created and assigned by the administrator through the Web Worklist Administration control panel.

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Edit Patient and Study Information

From time to time it may become necessary to edit the information contained within PACS to more accurately reflect contents of the data and or images contained within. This may require modifying a Patient's demographics (i.e. Name, DOB, or Gender), or a Study's details (i.e. Description, Referring Physician, or Body Part).

When a patient's demographics are modified, all of the patient's associated studies will be updated to reflect the new changes. If a study's details are modified, only that study will be updated.

► To edit the a patients demographics

1. Right-Click on any study for the patient to be modified on the Client Study List screen and then Left-Click on **Edit Patient** from the context menu.
2. Modify the information as needed and then Left-Click on the **Save** button when finished.

► To edit a study's details

1. Right-Click on the study to be modified on the Client Study List screen and then Left-Click on **Edit Study** from the context menu.
2. Modify the information as needed and then Left-Click on the **Save** button when finished.

The screenshot shows the 'Patient Editor' form within the 'Study Manipulation' window. The form is titled 'Patient Demographic' and contains the following fields and sections:

- Patient ID:** A text field containing 'V21015'.
- First Name, Mi, Last Name, Suffix:** Text fields containing 'Rogers', 'Buck', and an empty suffix field.
- Gender:** Radio buttons for 'Male', 'Female', and 'Unknown'.
- DOB:** A date field showing '01/01/1900'.
- Age, SSN:** Text fields for age and Social Security Number.
- Address 1, Address 2:** Text fields for the patient's address.
- City, State, Zip Code, Country:** Text fields for location information.
- Weight, Ethnic Group, Phone Number:** Text fields for physical and contact information.
- Patient Military Status:** A section with 'Branch of Service' and 'Rank' dropdown menus.
- Progress Bar:** A bar at the bottom showing '0%' completion.
- Buttons:** 'SAVE' and 'CLOSE' buttons at the bottom right.

Patient Editor

The screenshot shows the 'Study Editor' form within the 'Study Manipulation' window. The form is titled 'Study Detail' and contains the following fields and sections:

- Patient ID:** A text field containing 'V21015'.
- First Name, Mi, Last Name, Suffix:** Text fields containing 'Rogers', 'Buck', and an empty suffix field.
- Gender:** Radio buttons for 'Male', 'Female', and 'Unknown'.
- DOB:** A date field showing '01/01/1900'.
- Study UID:** A text field containing '1.2.040.114062.2.2007.6.12.0.05.25.1740079320.1430'.
- Accession #, Study ID, Study Completion Date and Time:** Text fields containing '30923', '62807061206', and '06/12/2007 09:00'.
- Progress Bar:** A bar at the bottom showing '0%' completion.
- Buttons:** 'SAVE' and 'CLOSE' buttons at the bottom left.
- Right Panel:** A vertical stack of sections, each with a dropdown menu and an 'ADD' button:
 - Reading Physician:** Dropdown menu with '<Select Reading Physician>'.
 - Referring Physician:** Includes a dropdown menu with '<Select Referring Physician>', a 'Dicom Name: DR. THEODOR S GEISEL', and a sub-section with 'Prefix', 'First Name', 'Mi', 'Last Name', and 'Suffix' fields.
 - Study Description:** Dropdown menu with 'KNEE'.
 - Institution Name:** Dropdown menu with 'Viztek'.
 - Body Part:** Dropdown menu with 'KNEE'.

Study Editor

► **To reassign a study to a new patient**

1. Right-Click on the study and then Left-Click on **Edit Study** from the context menu.
2. Enter the new Patient ID in the **Patient ID** textbox, and press the TAB key.
3. Enter values for the patient's Name, DOB, and Gender.
4. Modify any other information as needed and then Left-Click on the **Save** button when finished.

Notes on editing patient and study information:

- If while editing a study's details, you do not see your desired entry in the dropdown list boxes, you may click **Add** to activate the manual text entry feature. Any newly added entries will then be available the next time the Study Editor is opened.
- If you attempt to change a patient's ID, while using the Patient Editor, be aware that the ID must be unique. If the ID is in use by another patient, you will receive a warning dialog.

Merging Patient Studies

Each study in the study list is associated with a patient name. There may come a time when one of your patients has studies in the system under two different names, such as a maiden name and married name.

Ideally, you would want to consolidate, or merge, these studies under the one patient. By doing this, it would then be easier to locate a patient's previous exams using the Patient Studies Window. Merging studies is simply a matter of associating the correct Patient ID to your study.

► To merge studies under one patient

1. Right-Click on the study and then Left-Click on **Edit Study** from the context menu.
2. Enter the Patient ID for the patient you are assigning the study to in the **Patient ID** textbox.
3. Press the TAB key on your keyboard or Left-Click on any other field or object in the editor window. A dialog box will appear asking you to confirm your choice.
4. To confirm your choice, click **Yes** in the dialog box.
5. Left-Click the **Save** button to save your changes and close the study editor.

Creating a New Study

Periodically you may want to create a new, empty study in the PACS. With these empty studies, you can then import graphics, scanned documents, or acquire images from a CR scanner.

► To create a new study

1. On the **Study** menu, select **Create New Study**.
2. Enter values for all require fields (those marked with an asterisk).
3. Left-Click the **Save** button.

The screenshot shows a software window titled "Add New Study". It contains several input fields and buttons. At the top, there is a "Patient ID" field with the value "12345". Below this are fields for "First Name", "MI", "Last Name", and "Suffix". A "Gender" dropdown menu is set to "Male", with radio buttons for "Male", "Female", and "Unknown". A "DOB" field contains "01/13/87". Below these are fields for "Accession #", "Study ID", "Study Creation Date and Time", and "Modality", with the latter set to "LRX". The "Referred Physician" field contains "Gabor Pongracz Physicians". Below this is a table with columns "Profile", "First Name", "MI", "Last Name", and "Suffix", and an "Add" button. The "Study Description" field contains "Study 4 Study Description" and has an "Add" button. The "Institution Name" field contains "Gabor Institution Name" and has an "Add" button. The "Study Part" field contains "Gabor Study part" and has an "Add" button. At the bottom of the dialog are "SAVE" and "CANCEL" buttons.

If you would like to create a study for a preexisting patient, and do not wish to reenter the patient's demographics, simply Right-Click on a study for the patient, and then Left-Click on **Patient - New Study**.

Deleting and Purging Studies

In order to remove a study from your study list it must first be marked for deletion. This process is comparable to placing items in the Recycle Bin on a Windows-based system.

In order to permanently remove a study, it must be “purged.” In Windows parlance, this would be the equivalent of “emptying the Recycle Bin.”

► To mark a study for deletion

1. Right-Click on the study in your Study List.
2. Left-Click on **Delete Study** from the pop-up menu.

► To purge your deleted studies

1. On the **Study** menu, select **Purge**.
2. In the **Purge Study** window that appears select each study you wish to purge.
3. Left-Click on the **Purge Study** button.
4. To confirm your choice, click **Yes**.

We can distinguish “deleted” studies from other studies on the list by their status type (i.e. Unread, Read). We can un-mark a study for deletion by changing the status, just as we can “restore” items placed in the Recycle Bin.

► To un-mark a study for deletion

1. Right-Click on the study in your Study List.
2. Left-Click on **Unread** from the pop-up menu.

Deleting Study Images

Using the Client Study List, the end user can delete individual images or entire series of images from a study. To do this, you must first open the Delete Series or Image dialog utility (see following page for screenshot).

► To delete a series of images

1. Left-Click on the study in your Study List so that it is highlighted.
2. On the **Study** menu, select **Delete Study Image**. The Delete Series or Image Utility will open.
3. In the Series panel, Left-Click on the checkbox next to the series you wish to delete.
4. Left-Click on the **Delete Series** button.
5. To confirm your choice, click **Yes**.

► To delete individual images

1. Left-Click on the study in your Study List so that it is highlighted.
2. On the **Study** menu, select **Delete Study Image**.
3. In the Series panel, Left-Click on the series which contains the image(s) to be deleted. The series should now be highlighted.
4. In the Images panel, Left-Click on the checkbox next to the image you wish to delete.
5. Left-Click on the **Delete Image** button.
6. To confirm your choice, click **Yes**.



Delete Series or Image Utility

To preview an image, prior to deletion, Left-Click on the image in the Images panel. After a brief moment, the image will load inside the preview window (as shown above).

Merging Images: Overview

Every study which appears in your study list is assigned to a patient. These studies may contain one or more series, which in turn may contain one or more images each. This hierarchy of ownership is illustrated in the outline below.

- Patient
 - Study
 - ◆ Series
 - Image

The Client Worklist contains a utility that will allow the end user to quickly and easily move images from one study to another, thereby reassigning ownership of the images. This Merge Utility allows us to move Studies, Series, or Images.

We can individually move images into a study for the same patient, or for a new patient. We can also move an entire series of images into another study. At which point we can leave the series intact, or combine it with a pre-existing series.

The following chart displays the methods by which you may reassign images in the merge module:

<u>Object</u>	<u>Can Be Reassigned to:</u>
Study:	Studies, or Patients
Series:	Patients, Studies, or Series
Images:	Patients, Studies, or Series

To further illustrate the PACS object hierarchy we have included another sample outline for the fictitious John Doe patient. In this example, John Doe has two studies; one X-RAY and one CT.

These studies contain two series each. Both X-RAY series contain only one image each, while both CT series contain many images each.

- John Doe
 - ◆ Chest X-RAY
 - PA
 - ◆ Image 1
 - LAT
 - ◆ Image 1
 - ◆ Chest CT
 - Axial
 - ◆ Image 1
 - ◆ Image 2
 - ◆ Image 3
 - ◆ Image #
 - Coronal
 - ◆ Image 1
 - ◆ Image 2
 - ◆ Image 3
 - ◆ Image #

☀ If you move a study into a study, or a series into a series, the objects contained within will be combined.

Merging Images: Step-By-Step

To avoid confusion in the step-by-step instructions that follow, we will henceforth refer to the object to be moved as “Source,” and the object’s final resting place as “Destination.”

The merge process begins by selecting either one or two patients/studies from the client work list.

► To merge images

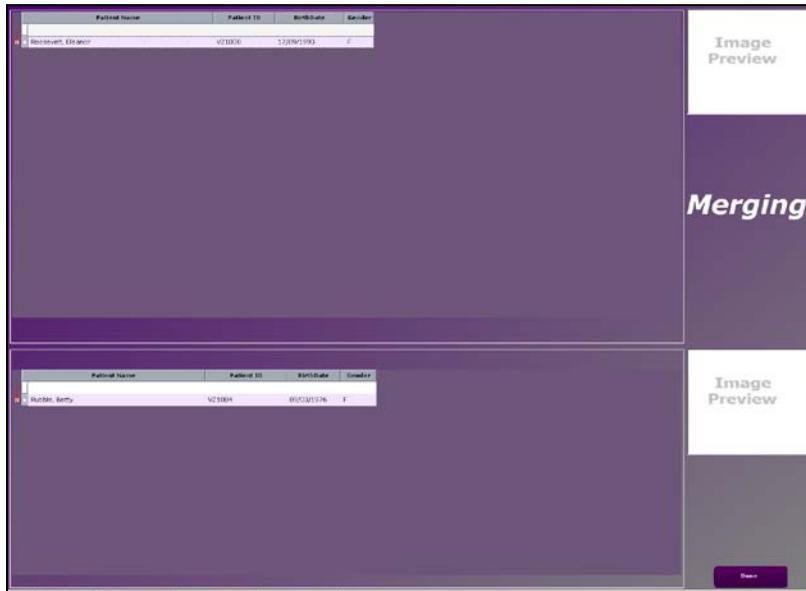
1. From the **Client Work List**, Left-Click on the patient who owns the Source object.
2. Hold down the **CTRL** key and Left-Click on the patient who will be receiving the Source object. (*optional*)

	Study	Study	Patient Name	Patient ID	Study Description	Study Date	Received Date	F Study	F Series	Referring Physician
	CR									
	DECLARED	CR	SARD, STEB	VZ001	CHE	02/13/2007 11:32	05/08/2008 10:58	2	2	DR. THEODORE S GENSEL
	LABELD	CR	GAOL, SUEA	VZ001	CR-DRAY 2 VIEW	04/07/2007 11:34	05/08/2008 10:58	2	2	DR. THEODORE S GENSEL
	LABELD	CR	WALSH, JOHN	VZ003	Shoulder	01/04/2007 11:41	05/08/2008 10:58	2	2	DR. THEODORE S GENSEL
	LABELD	CR	WALSH, JOHN	VZ003	Shoulder	01/14/2007 11:22	05/08/2008 10:58	2	2	DR. THEODORE S GENSEL
	APPROVED	CR	CHRIST, AGATHA	VZ003	Upper Extremity	07/18/2007 11:49	05/08/2008 10:59	2	2	DR. THEODORE S GENSEL
	APPROVED	CR	BALLO, BETE	VZ004	Spine	05/11/2007 09:39	05/11/2008 10:59	2	2	DR. THEODORE S GENSEL
	LABELD	CR	WALSH, JOHN	VZ003	Spine	04/20/2007 10:23	05/08/2008 10:59	2	2	DR. THEODORE S GENSEL
	DECLARED	CR	REICHER, LUCY	VZ008	Upper Extremity	09/27/2007 11:26	05/08/2008 11:00	2	2	DR. THEODORE S GENSEL
	APPROVED	CR	BANCOFF, THOMAS	VZ008	Spine	02/27/2008 11:04	05/17/2008 10:48	4	4	DR. THEODORE S GENSEL
	LABELD	CR	TURNER, LANA	VZ015	Hip Joint AS/LAT	01/04/2007 11:57	05/08/2008 11:01	2	2	DR. THEODORE S GENSEL
	LABELD	CR	TURNER, LANA	VZ015	pelvis	04/09/2007 11:44	05/08/2008 11:01	2	2	DR. THEODORE S GENSEL
	LABELD	CR	TURNER, LANA	VZ015	KNEE	05/21/2007 11:37	05/08/2008 11:02	3	3	DR. THEODORE S GENSEL
	APPROVED	CR	TURNER, LANA	VZ015	pelvis	07/10/2007 11:31	05/08/2008 11:02	4	4	DR. THEODORE S GENSEL
	LABELD	CR	WAGY, DIANE	VZ015	Foot	05/21/2007 11:34	05/08/2008 11:02	3	3	DR. THEODORE S GENSEL
	LABELD	CR	WAGY, DIANE	VZ015	Leg bone	05/24/2007 11:45	05/08/2008 10:58	4	4	DR. THEODORE S GENSEL
	LABELD	CR	WAGY, DIANE	VZ015	KNEE	04/18/2007 11:15	05/08/2008 10:51	3	3	DR. THEODORE S GENSEL
	LABELD	CR	WAGY, DIANE	VZ015	KNEE	04/10/2007 10:36	05/08/2008 10:51	3	3	DR. THEODORE S GENSEL
	LABELD	CR	WAGY, DIANE	VZ017	L-SPINE	04/09/2007 11:28	05/08/2008 11:05	6	6	DR. THEODORE S GENSEL

Client Worklist

3. Right-Click on a selected patient, and choose **Merge Studies** from the pop-up menu.

The Merge Studies window will appear. If you selected two studies in the previous step, then the first patient will appear in the top-most panel, and the second selected patient will appear in the bottom panel.



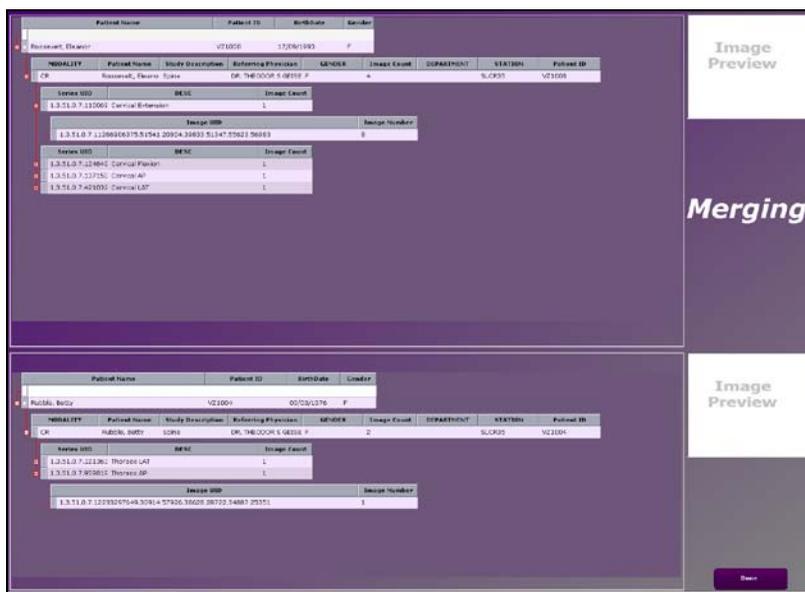
Merge Studies Window

If you only selected one patient prior to opening the merge window, then the bottom panel will not have a patient listed. In order to proceed with the merge process, you will first have to perform a patient search.

☀ For instructions on searching, please see the topic on searching for patients immediately following this topic.

To the left of each patient name will appear a “+” symbol. If you click on the “+” symbol a hidden list of that patient’s studies will appear directly below the patient. And next to these studies will also appear a “+” symbol, which, once clicked, will expose the list of series contained within the selected studies.

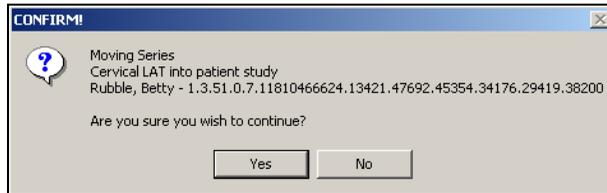
Once a node is expanded, the “+” symbol will be replaced with a “-“.



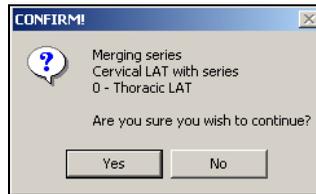
Merge Window (expanded)

4. Expand or collapsed the nodes as needed until you locate the Source object.
5. Left-Click on the Source object so that it is highlighted.

6. Left-Click again and drag the object. As you drag the object, your cursor will appear to be dragging a tiny rectangular box with it.
7. Drop the object on top of its destination.
8. A dialog box will appear, asking you to confirm your action. The Source and Destination types, will dictate the dialog box that appears. Below are two examples.



Series to Study



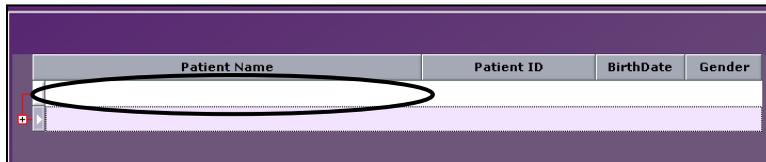
Series to Series

9. Left-Click on the **Yes** button to confirm your choice.
10. When you are done moving images, Left-Click on the **Done** button to close the Merge Studies window.

☀ Objects moved from the top panel can only be dropped into the bottom panel. Conversely, objects in the bottom panel can only be dropped into the top panel.

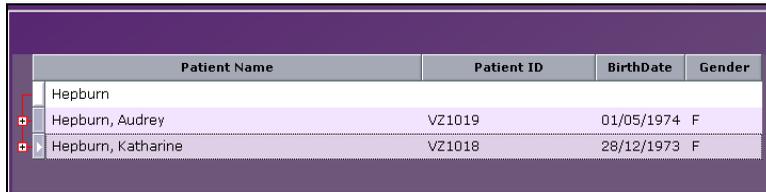
► **To search for a patient using the merge utility**

1. Left-Click inside the blank space below the column you wish to search by. For example, if you wish to search for the patient by name, then Left-Click below the **Patient Name** column.
2. Enter a value, and press Enter.



Patient Name	Patient ID	BirthDate	Gender

Before



Patient Name	Patient ID	BirthDate	Gender
Hepburn			
Hepburn, Audrey	VZ1019	01/05/1974	F
Hepburn, Katharine	VZ1018	28/12/1973	F

After

Chapter Seven

The Image Viewer Screen

The Opal-RAD Image Viewer is a Diagnostic Quality image viewer where you will perform all of your image viewing and manipulation. The Image Viewer has a wide range of tools at your disposal to aid in the reading and diagnosis of images. This chapter will explore in detail the viewer, its tools, and their usage.

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An Overview of the Image Viewer Screen

Let's start by identifying this screen's distinct parts.

The **Image Window** constitutes the largest portion of the Image Viewer. This section of the screen is reserved for displaying the images, and can be modified to display the images in a variety of columns / rows configurations. This is also the area where you will manipulate the properties of the images and create annotations.

The **Series/Stacks Window** is the smaller section on the leftmost side of the screen. The window displays a thumbnail image for every series (also referred to as a stack) in the study. These thumbnails also act as buttons (allowing you to quickly navigate between series.)

The **Toolbar** and **Menus** are located at the top of the Image Viewer screen and sets up the remainder of the screen to aid in diagnostic viewing. The functions accessible from the menus and toolbar are relevant to manipulating images.

 The individual toolbar functions will be discussed in greater detail in Chapter 5: Image Viewing Tools.



The images are displayed in rows and columns according to your selected layout, which can be changed by selecting one of the column layout buttons.

The viewer can be changed to display your open images in a variety of configurations, including: 1x1, 1x2, 2x1, 2x2, 2x3, 3x2, and 3x3. Please see the topic Image Viewer Layout in this chapter for more information.

The Image Window

The largest area of the Image Viewer, and your central workspace, is the image window. This is where image viewing and manipulation occurs.

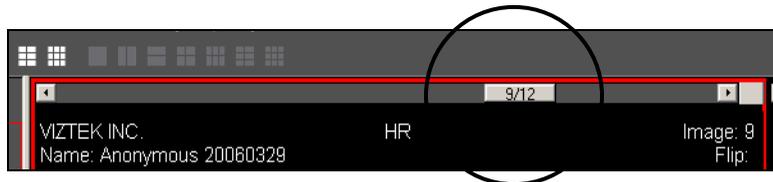
Note that only a limited number of images may be shown in viewing area at one time (only so many will fit), thus arrows above each series pointing left and right, will allow you scroll through the images in the series. The scroll wheel and Span button (discussed later) will also accomplish this.

Navigating through a series

You can navigate through the images in a study by any of these methods:

- Use the scroll bar at the top of the Image window
- Use the UP ARROW and DOWN ARROW keys
- Use the Span button on the toolbar

The horizontal scrollbar at the top of the image will display the location of the image that is being viewed in relation to the number of images in the series (i.e. 9/12).



The Series/Stacks Window

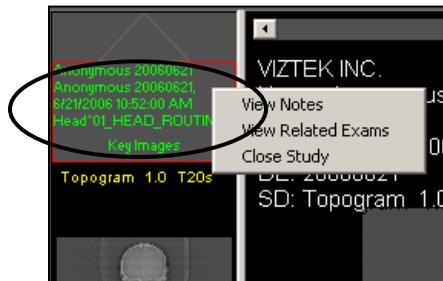
Leftmost on the screen is the Series/Stacks window. For each series (or “stack”) of images that is currently loaded there is a thumbnail picture of the first image in that stack.

A patient study may contain many series, all of which are loaded when the study is opened. To view a series, simply move the mouse cursors over the series thumbnail (in the Series window) you wish to view, and Double-Click on the thumbnail, or you may drag and drop images from the Series/Stack to the main Imaging Viewing window.

To move from one series to the next, you may use the Previous Series and Next Series buttons located at the bottom of the viewing screen.



The top of the Series/Stacks window contains study information. Right-Click on the information panel to view study notes, prior exams, or close the study.

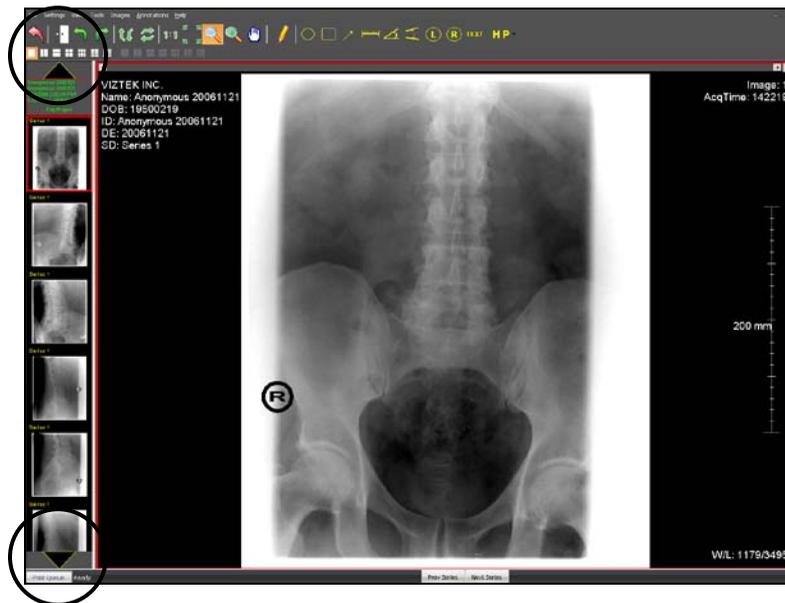


Note that only a limited number of thumbnail images may be shown in the series window at one time.

► **To scroll through the available series**

1. Left-Click on the up arrow (pictured) or down arrow provided above and below the thumbnails.

If the up arrow is gray in color, you have reached the top of the list. If the down arrow is gray in color, you have reached the bottom of the list. When the arrow is gray then they are not usable.



Opening Images in the Image Viewer

There are two methods for opening images/series in the Image Viewer.

► To open an image - Method 1

1. Double-Click on a thumbnail image on your series/stack window.

When you open an image or series in this manner it will open up in the first available window panel. If there are no panels available, then it will open in whichever panel currently has focus.

► To open an image - Method 2

1. Drag-and-Drop the thumbnail image from the series/stack window onto the image window.

The drag-and drop method will load your series in whichever pane you drop it into, whether there is already a series loaded or not.

If, after placing your images on your panes, you wish to view only one image at a time, simply Double-Click it. The rest of your panes will disappear temporarily. Double-Click the image again to bring back your original layout.

Image Viewer Layout

The **image layout** options allow you to specify the number of windowpanes that constitute your image window.

► **To modify your image layout**

1. Left-Click on one of the layout buttons on your toolbar.



-or-

2. On the **View** menu, choose **Layout**, and then select a layout (i.e. 2x2) from the pop-out menu.

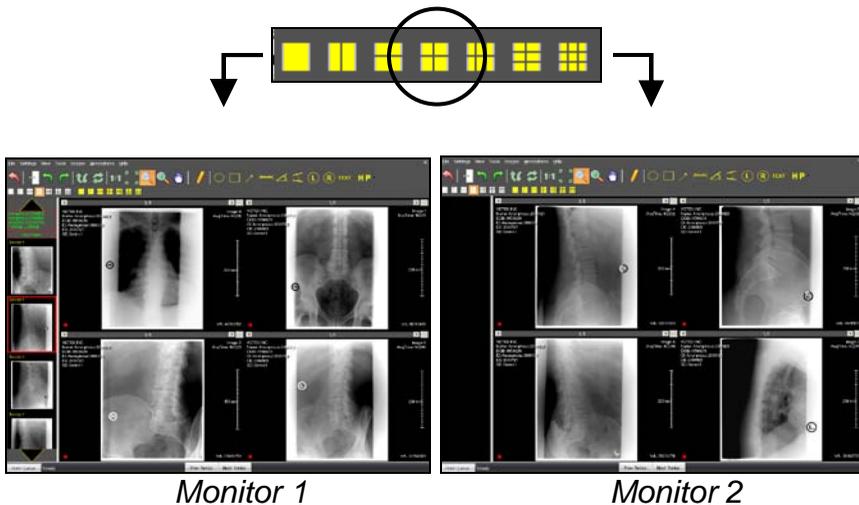


Example of a 2x2 image layout

On systems with **multiple monitors**, each image viewer window will have its own set of image layout buttons as described above, but there will also be a second set of layout buttons. This set of buttons (pictured below) will apply a selected layout to **ALL** monitors at once.

► **To modify your image layout of all monitors**

1. Left-Click on one of the layout buttons on your toolbar.

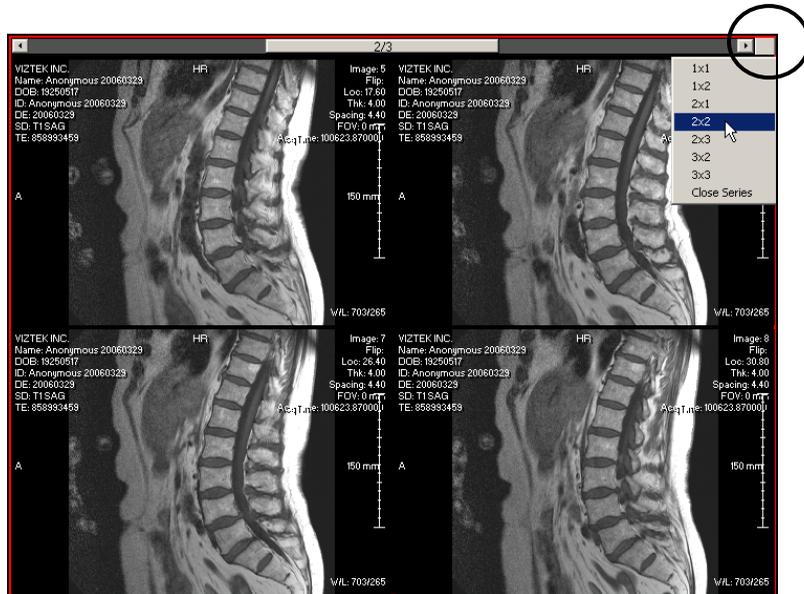


The example above shows a single study being opened across dual monitors. Note that the Series/Stack window for the second monitor is empty. Had we opened up two studies for comparison on a dual monitor system, the studies would have loaded on separate screens with their own Series/Stack windows.

The **series layout** options allow you to specify the number of rows and columns viewable within a series. Rather than splitting the window up into multiple panes for displaying multiple images/series, you are splitting up a pane so that you can display multiple slices from a given series.

► **To modify your series layout**

1. Right-Click on the series handle that is in the upper right-hand corner of the windowpane.
2. Select a layout (i.e. 2x2) from the pop-up menu.



Example of a 2x2 series layout

☀ Please see Chapter 9: Image Viewer Settings for instructions on setting your default image or series layout.

Moving Images Between Panels

The Series Handle may be dragged and dropped to move images. If a handle is dragged and dropped into another panel, the image will move from the original panel over to the new panel. If there is an image already loaded in that panel then this image will swap places with the one that was dropped, as in the example below.



☀ Images may also be dragged from a panel on one monitor to a panel on another.

Image Viewer Context Menus

Within the Image Viewer there are a number of areas for which there is a Right-Click context menu. The contents of the menu that appear upon Right-Clicking will depend on the item that was clicked. For example, if you Right-Click on an open image, you will see the following menu appear:



Image Right-Click Options:

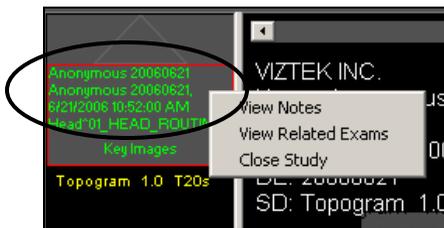
- **View FullScreen:** Hides the menus and toolbar controls to increase the viewable area of the viewer.
- **View Maximized:** Temporarily shows the selected image in a one-by-one window panel.
- **View DICOM Values:** Shows a list of DICOM tags and descriptions sent from the modality.
- **View History:** Shows clinical history saved in the DICOM header.

- **Add Image To Print Queue:** This adds the currently selected image to the paper print queue.
- **Add Series To DICOM Print Queue:** Adds the series for the currently selected image to the DICOM print queue.
- **Save Image As:** This allows you to save an image to a an external file.
- **Presets:** Applies a preset Window/Level to the current image.
- **Unsharp:** Applies an unsharp mask to the current image.
- **External Tools:** Sends the image to a pre-defined external application.
- **Set Key Image:** Creates a key image for the study
- **Add Image To New UNQ Study:** Adds current image to Pre-Op Study.
- **Delete Current Annotations:** Deletes the currently selected annotation.
- **Delete All Annotations:** Deletes all annotations on current image.
- **Delete All Annotations for Series:** Deletes all annotations that persist across multiple slices, such as the Spine Tool.
- **Link:** Links the selected series to any other series of the same view (i.e. Coronal, Axial).
- **Cine Tools:** Opens or closes the Cine Toolbar control
- **Close Study:** Closes the current study.

 The contents of this menu may change from image to image, depending on whether or not there are Annotations, Presets, installed External Tools, and so on.

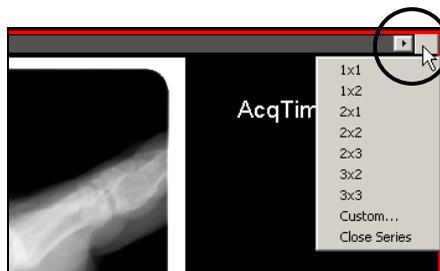
Series Right-Click Options:

- **View Notes:** Opens a window to show any notes that have been added to the study.
- **View Related Exams:** Shows a list of prior exams that can be selected for viewing.
- **Close Study:** Closes the current study.



Series Handle Right-Click Options:

- **Layouts:** Allows user to select a series layout view (i.e. 1x1 or 1x2, etc.).
- **Close Series:** Closes the selected series.



Chapter Eight

Image Viewing Tools

The Opal-RAD Image Viewer features a vast array of image manipulation tools to assist in diagnostic interpretation of medical images. Most of the tools described in this chapter have easy, one-click toolbar buttons to activate them. They are also available from Images or Tools menu.

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Reset Image State



Reset Image State tool

The Reset Image State is one of the most important tools because it allows the user to set the image back to its original state. The Reset Image State tool is on the toolbar and is also an option in the Image menu.

► To reset an image back to its saved state

1. Left-Click on the image or series.
2. Left-Click on the Reset Image State tool on the toolbar, or select **Reset** from the **Images** menu.

Resetting an image applies to all images in a series.

Invert Contrast



Invert toolbar button

Use this tool to invert the black and white pixel data, giving the image a “negative” appearance.

Activate the Invert Contrast tool from the toolbar or go to the Images menu and choose the Invert option.

► To perform invert contrast

1. Left-Click on the image.
2. Left-Click on the Invert Contrast tool on the toolbar, or select **Invert** from the **Images** menu.

► To reset the image back to normal contrast

1. Left-Click on either the Invert Contrast tool or the Reset Image Properties tool.

Invert contrast applies to all images in a series.

Change Orientation Tools



Rotate Images Left toolbar button



Rotate Images Right toolbar button



Flip Images Vertically toolbar button



Flip Images Horizontally toolbar button

These tools are available from both the toolbar and the Images menu.

These tools apply to all images in a series.

To undo one of these tools use the Restore Image State button.

True Size (1:1)



One To One View toolbar button

Use this tool to display the image in its true size, i.e., 1:1 ratio. When in 1:1 mode, you can view every pixel that makes up the image.

► To view an image in its true size

1. Left-Click on the image or series.
2. Left-Click on the 1:1 View tool on the toolbar, or select **One to One** from the **Images** menu.

Note that the image may be too large for the viewing window, especially if you are viewing in multiple columns. In this case, you may wish to change the number of columns, use the Zoom tool to shrink the size of the image within the window, or use the Fit To Window tool.

One To One applies to all images in a series.

☀ “True Size” refers to the actual size needed to display every physical pixel stored in the image data. MR images will typically “shrink”, while larger images like CT and CR will expand.

Fit To Window



Fit To Window toolbar button

Use this tool to expand or shrink an image so that it fits in the Image Viewing window.

This tool is of assistance when viewing large images in multiple columns as it shrinks images to fit in these smaller windows and allows you to view the whole image at once.

► To resize an image to fit in the viewable window

1. Left-Click on the image or series.
2. Left-Click on the Fit To Window tool on the toolbar, or select **Fit To Window** from the **Images** menu.

Fit applies to all images in a series.

☀ “Fit to Window” is the logical opposite of “True Size” (previous page.)

Magnify



Magnify toolbar button

Use this tool to magnify parts of an image. This is in contrast to the Zoom tool, which will magnify the whole image. The magnifying tool creates a temporary pop-up window that you can move over the image as you would a magnifying glass.

To activate the Magnify tool, click the Magnify button on the toolbar or click the Magnify option from the Tool menu. To turn Magnify off, click the None option or another tool from the Tool menu.

► To use the Magnify tool

1. Activate the Magnify tool.
2. Place the cursor over the image.
3. Hold down the left mouse button. Observe the pop-up magnifying window.
4. Move the mouse around over the image and the magnifying window will follow your movements.
5. Release the left mouse button and the magnifying window will disappear.

☼ By default, the popup window uses a 2x magnification. For more information on adjusting the magnification factor, or the window's size, please see the Chapter on Image Viewer Settings.

Zoom



Zoom toolbar button

This tool is used to zoom the entire image “in” (for closer inspection) or “out” (view the whole image at once). The mouse cursor will change to the Zoom tool cursor once holding the left mouse button down.

To use this tool, first activate the Zoom tool. This is accomplished by clicking the Zoom option on the toolbar or in the Tools menu.

► To perform the zoom

1. Activate the Zoom tool.
2. Place the cursor over the image.
3. Hold down the left mouse button.
4. Move the mouse up to zoom in, down to zoom out.
5. Release the left mouse button.

☼ As you zoom images in it may no longer be possible for the entire image to fit in the window, thus the Pan tool may be of some assistance in moving the image around.

Pan



Pan toolbar button

Use this tool to move an image around within its display window.

To activate the Pan tool choose the Pan entry from the Tools menu.

► To perform a pan

1. Activate the Pan tool.
2. Place the cursor over the image.
3. Hold down the left mouse button.
4. Move the mouse in any direction; the image will follow your movements.
5. When you are satisfied with the image's placement, release the left mouse button.

Pan applies to all images in a series.

Actual Size



Actual Size

Use this tool to display the image in its actual (anatomical) size. NOTE: The Actual Size tools will only work if the monitor has been calibrated.

► To view the actual size

1. Left-Click on the image or series.
2. Select **Actual Size** from the **Images** menu.

► To calibrate your monitor

1. On the **Settings** menu, select **Edit**.
2. Left-Click on the **Local** tab.
3. Enter your display's visible **Width** and **Height** (in millimeters) in the Monitor Calibration textboxes.
4. Left-Click on **Apply**, or Left-Click on the **OK** button to save your changes.

Actual Size applies to all images in a series.

☼ Please see the Image Viewer Settings chapter for more information on calibrating your monitor(s).

Window and Level (Width & Center)



Window & Level tool

This is the most basic and yet most important tool available, as it adjusts the window and level (also known as “width and center”, or simply brightness and contrast) of an image.

Adjusting the window and level of an image allows for viewing different “levels” of an image, e.g., moving from bone to soft tissue.

► To perform the Window & Level

1. Place the mouse cursor over the image.
2. Hold down the right mouse button.
3. Move the mouse horizontally and/or vertically; the image is adjusted as you do so.
4. When satisfied with the image, release the right mouse button.

Vertical movement of the mouse adjusts the “window” and horizontal movement adjusts the “level.”

Window & Level applies to all images in a series.

Span/Scroll Images



Span/Scroll Images tool

The Span/Scroll Images tool is useful when looking at a study that contains series with multiple images (CT, MR, US.) The tool allows the viewer to move through the images in a series.

The Span/Scroll Images tool can be found in the toolbar and also as an option in the Tools menu.

► **To use the Span tool**

1. Left-Click on the Span/Scroll tool on the toolbar, or select **Span/Scroll Images** from the **Tools** menu.
2. Move the mouse cursor on top of a series.
3. Hold the left mouse button down and move the mouse to the left to go up a series (towards the beginning), or to the right to go down a series (towards the end.)

Display Management



Display Management tool button

Many physicians prefer to display images a certain way each time they open a study. To expedite this process of displaying images you can use Display Management. The display settings, once defined, can be saved for the current study or for all studies of a certain type (i.e. MR, CT, US).

► To save your display settings for all studies

1. Left-Click on the Display Management tool and select **Save**.

► To save your display settings for a single study

1. Left-Click on the Display Management tool and select either **Save For Study** or **Save As**.
2. If you selected **Save As**, enter a name in the textbox and select **OK**.

► To apply your display settings to the current study

1. Left-Click on the Display Management tool and select your saved display setting from the list.

If the display setting was saved using the “Save For Study” option, select “Default” from the list. Any display setting using the “Save” option will be applied automatically the next time studies of this type are opened.

Mammography Layouts

In a typical mammography screening exam, four X-Rays of the breast are acquired. In conventional practice, two views are obtained for each breast. The first is the **Cranio-Caudal (CC)** view. The second view is called the **Medio-Lateral Oblique (MLO)** view.

When viewing these Mammography studies in the Image Viewer, you will have access to a special set of tools and features that are not available with other study types.

The tools include a custom toolbar (pictured below), which allows the user to quickly display various mammography images simply by selecting the corresponding layout button.



Mammography Layout Toolbar

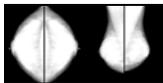
In the sample toolbar above, we are displaying a total of four layout buttons. They are as follows: Processed CC and MLO; Raw CC and MLO; Processed R/L MLO; and Processed R/R MLO (for comparison).

The layout buttons that are displayed are image dependent. For example if your study only contains the CC view of the breasts, then only CC specific layout buttons will appear.

Below is a list of additional Mammography Layouts. This list is not comprehensive, as it does not show all possible permutations of the views available.



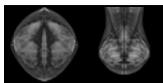
Processed R/L CC



Raw R/L CC and MLO



Processed R/L MLO



Processed R/L CC and MLO



Processed R CC

To conserve space on the Image Viewer Toolbar, the Mammography Layouts Toolbar will be limited in length. If more layouts exist than can be shown, the Left and Right Arrows will allow you to scroll through the list of buttons.

► To apply a mammography layout

1. Open a Mammography study, by Double-Clicking on the study's entry on the Study List.
2. After the images have loaded, Left-Click on the Mammography Layout Toolbar button that corresponds to the view you would like displayed.

☀ The currently selected layout's name will appear at the top-left corner of the toolbar control.

When viewing multi-image layouts, such as a **Processed Right and Left MLO**, on a single monitor system, both images will display inside the viewing pane in a 1 x 2 windows layout. When viewing multi-image layouts on a dual monitor system, each image will display in its own viewer.



Single Monitor with L/R MLO



Monitor 1



Monitor 2

Mammography Tools

When viewing a Mammography study, you will notice that the behavior of some of the tools you are already familiar with has changed slightly. The Tools affected include the Zoom, Pan, Window and Level, and Magnify tools.

The use of each of these tools on an open Mammography image results in a “mirror-like” effect which can be seen on its corresponding sister image. For example, if you adjust the Window and Level of the right breast in a CC view, the Left breast’s W/L will adjust as well.

The tools and their affected changes are as follows:

- **Window and Level:** The W/L of both images will be adjusted simultaneously as the tool is used.
- **Magnify Tool:** When this tool is used, a second magnifying window will appear over the same region on the adjacent image.
- **Magnify Annotation:** When this annotation is placed on an image, a second magnifying box will appear over the same region on the adjacent image.
- **Pan Tool:** Both images will pan in the same direction (i.e. anterior, posterior, left, right).
- **Zoom Tool:** Both images (left and right) will zoom to the same location on the breast.

 To learn more about the use of the tools listed above, please consult the appropriate topics within this chapter.

Image Overlays



Image Overlays tool

Certain types of studies, such as CT or Mammograms, can contain embedded overlays. These overlays are actually saved as part of the DICOM header of the image files. The overlays, once visible, will appear as text or annotation on the images they are saved into.

► To view embedded overlays

1. Left-Click on the image which contains the overlay.
2. Left-Click on the **Images Overlay** tool from the toolbar to turn on overlays.



The overlays have been enhanced to show detail

☀ The Overlays button will only be visible if overlays have been detected for the image being viewed.

Context Tool



Context tool

The Image Viewer's Context Tool allows the user to locate a slice in one or more series by selecting a point on another. For example, if you select a point on a coronal image/slice, the context tool will automatically scroll to that slice on a related axial series.

► To use the Context tool

1. Open at least two series in the image viewer.
2. On the **Tools** menu, select the **Context** tool.
3. Place your cursor over one of the images, then click and hold the left mouse button.
4. As you drag the mouse across the image, any related series will automatically scroll to the correct slice.



The context tool has been enhanced to show detail

Hounsfield/Pixel Value

Hu

Hounsfield Unit tool

The Hounsfield/Pixel Value tool will give the viewer a Hounsfield units reading if viewing a CT image and a pixel reading if viewing any other type of image. The tool activates a cross hair that will give you a temporary density reading at that precise point.

► To use the Hounsfield tool

1. On the **Tools** menu, select **Hounsfield/Pixel Value**.
2. Move your mouse over the area to be measured and Left-Click to display the Hounsfield/Pixel value.



3D Cursor



3D Cursor tool

The 3D Cursor is similar in functionality to the Context tool. When active, this will show you your relative position on one series with the series that currently has focus. This position is indicated by a small circular marker that will grow and shrink as we move the mouse across the images.

For example, assume we have both an axial and coronal series displayed. If you move the mouse cursor up and down over the coronal, the corresponding marker on the axial series will grow or shrink in size.

As your position on the coronal moves further away from the slice that is displayed in the axial window, the circular marker will increase in size. Conversely, the marker will shrink in size as you move closer to the displayed axial slice.

► To use the 3D Cursor tool

1. On the **Tools** menu, select **3D Cursor**.
2. Move your mouse over an image. As you do so, you will a circular marker appear over any other open, related series.

Unsharp Masking

Unsharp Masking is a technique, which processes an image into a clearer and more defined image. In general, sharp parts of an image are sharpened and less defined areas become clearer. It is a better technique than simply sharpening the image because the results are much less harsh. Unsharp Masking is most effective on large, CR images.

► To use the Unsharp Masking tool

1. Right-Click on the image, or Left-Click on the **Tools** menu.
2. Select an entry from **Unsharp** pop-out menu.
3. Wait a moment for the system to process the image.

To “undo” the effects of unsharp masking and return the image to its original state, select the Unsharp Masking tool again and choose “**Reset**” from the pop-out menu.

Unsharp Masking applies to all images in a series.

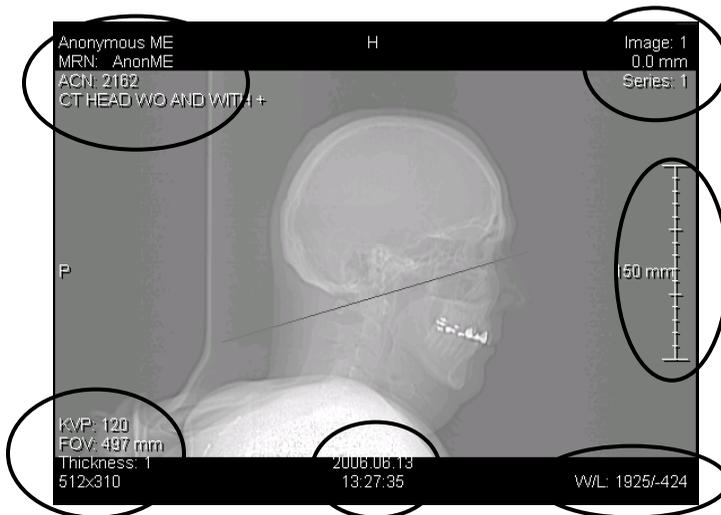
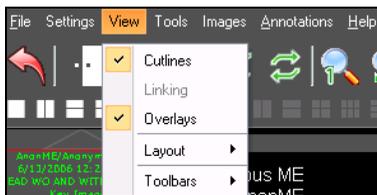
 Unsharp Masking is strictly a viewing tool; therefore images cannot be saved with the unsharp masking enhancement.

Show or Hide Study Overlays

Overlays are the patient, study, or image data that appears on the image. This is not to be confused with the Image Overlays, which are saved in the DICOM header of some image files.

► To show or hide overlays

1. On the **View** menu, select **Overlays**. A check indicates that they are enabled, or press the “O” key on the keyboard.



Chapter Nine

Annotations

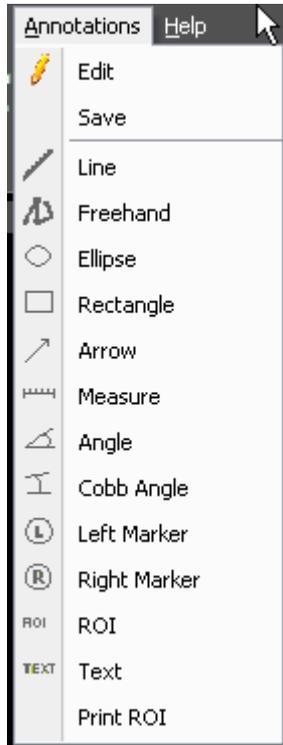
The Opal-RAD Image Viewer also features a large number of image annotation tools to further assist in the diagnosis of your images. Most of the annotation tools described in this chapter have easy, one-click toolbar buttons to activate them. They are also available from the Annotations menu.

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Introduction



Annotation buttons



Annotating in Opal-RAD Image Viewer consists of adding text and graphical objects to enhance or isolate regions of interest within an image. Annotations do not permanently alter the image, but are stored separately from the image data, and are held in a transparent layer atop the image. (Think of a transparency sheet with writing that is placed over a picture.)

It is not possible for annotations to damage the original image data, and they can be hidden at any time to allow full analysis of the image. Most of the annotation tools described over the next several pages have easy, one-click toolbar buttons to activate them and are also available from the Annotation menu in the menu bar.

Each topic below names an image annotation tool, lists the ways to activate it (toolbar button, menu entry, etc.), and explores its usage.

Line



Line tool button

This tool creates a straight line on the image.

► To use the Line tool

1. On the **Annotations** menu, select the **Line** tool.
2. Left-Click on an area of the image to set the line's first endpoint.
3. Move the mouse pointer to where the second endpoint will be (notice that a preview of the line is drawn while you move the mouse).
4. Left-Click on an area of the image to set the line's second endpoint.

Freehand



Freehand tool button

This tool is used to draw freehand on the image. With the tool you are able to draw any shape or figure that you desire.

► To use the Freehand tool

1. On the **Annotations** menu, select the **Freehand** tool.
2. Move the mouse over the image to where you would like to start drawing.
3. Hold down the left mouse button and drag the mouse. As you move the mouse, the drawing will mimic your movements.
4. Continue to draw as necessary.
5. Release the left mouse button to end the freehand drawing.

Ellipse



Ellipse tool button

This tool creates a (hollow) ellipse on the image. This is often used to circle an ROI (region of interest).

► To use the Ellipse tool

1. Left-Click on the Ellipse tool on the Annotations toolbar, or select **Ellipse** from the **Annotations** menu.
2. Left-Click on an area of the image to start the ellipse.
3. Move the mouse pointer and observe the ellipse expanding. Move the mouse such that the ellipse will enclose the ROI.
4. Left-Click to set the ellipse in place.

It is generally best to click a spot that is above and left of the ROI, as you will then drag the ellipse down and to the right to enclose the ROI. It generally takes a few practice ellipses to master the technique.

Rectangle/Box



Rectangle/Box tool button

This tool creates a (hollow) box on the image. You can create a square or a rectangle of any ratio (tall, long, etc.) and is often used to indicate an ROI (region of interest).

► To use the Rectangle/Box tool

1. Left-Click on the **Rectangle** tool on the Annotations toolbar, or select **Rectangle** from the **Annotations** menu.
2. Left-Click on an area of the image to start the box.
3. Move the mouse pointer and observe the box expanding.
4. Left-Click again to set the box.

Your first click will set a corner of the rectangle in place. Generally, make your first click above and left of the ROI. This will set the top left corner of the box. You then move the mouse down and right to draw the box and enclose the ROI.

Arrow



Arrow tool button

This tool creates an arrow (or “pointer”) that will point at an area of the image.

► To use the Arrow tool

1. Left-Click on the Arrow tool on the Annotations toolbar, or select **Arrow** from the **Annotations** menu.
2. Left-Click the mouse on an area of the image to set the pointer end of the arrow.
3. Move the mouse and observe the trailing end of the arrow following your movements. You can rotate the arrow around and shorten or lengthen the trailing end.
4. Left-Click the mouse to set the other endpoint of the arrow.

Measure



Measure tool button

This tool is used to measure straight-line distance (in millimeters) of an area in the image.

► To use the Measure tool

1. Left-Click on the Measure tool on the Annotations toolbar, or select **Measure** from the **Annotations** menu.
2. Left-Click on the image to set the first end point of the ruler.
3. Move the mouse to where the end point of the measurement will be and Left-Click to set the end point.

Angle



Angle tool button

This tool is used to draw an angle and display the measurement of that angle.

► To use the Angle tool

1. Left-Click on the Angle tool on the Annotations toolbar, or select **Angle** from the **Annotations** menu.
2. Left-Click on the image to set the vertex (center point) of the angle.
3. Move the mouse to where the end point of the first vector should be and Left-Click to set it in place.
4. Move the mouse to where the end point of the second vector should be and Left-Click to set it in place.
5. The angle's measurement will then be displayed. Move your mouse to reposition the angle and Left-Click a final time to set it in place.

☀ Note that the ability to move the position of the measurement text allows you to leave the measured area uncovered and in full view.

Cobb Angle



Cobb Angle tool button

This tool is used to find the angle where two lines intersect.

► To use the Cobb Angle tool

1. Left-Click on the Cobb Angle tool on the Annotations toolbar, or select **Cobb Angle** from the **Annotations** menu.
2. Left-Click to set the first point for the first line.
3. Left-Click to set the last point for the first line.
4. Left-Click to set the first point for the second line.
5. Left-Click to set the last point for the second line.
6. A measurement now appears showing the angle where these two lines meet. Left-Click to set the angle measurement in place.

Note that the ability to move the position of the measurement text allows you to leave the measured area uncovered and in full view.

Left and Right Marker



Left Marker tool



Right Marker tool

These tools are used to label the image left or right.

► To use the Left or Right marker tools

1. Select the **Left Marker** or **Right Marker** tool button on the Annotations toolbar, or select the marker from the **Annotations** menu.
2. Left-Click on an area of the image to start the label.
3. Move the mouse pointer and observe the label expanding.
4. Left-Click again to set the label.

ROI (Region of Interest)



Region of Interest tool button

This tool creates an ellipse on the image, which is used to focus on a specific region of interest. This tool is used to highlight a specific region and to compute information about the area inside of the ROI box. This information includes not only the Length are Area, but also the Minimum, Maximum, Mean, and Standard Deviation in Hounsfield Units.

► To use the ROI tool

1. Left-Click on the ROI tool on the Annotations toolbar, or select **ROI** from the **Annotations** menu.
2. Left-Click on an area of the image to start the ROI ellipse.
3. Move the mouse pointer and observe the ellipse expanding. Move the mouse such that the ellipse will enclose the area for study.
4. Left-Click to set the ROI ellipse in place.

Text



Text tool button

This tool allows you to place typed text on the image. Many doctors use this in conjunction with other tools, such as the arrow or ellipse, to explain the ROI or indicate opinions / readings.

► To use the Text tool

1. Left-Click on the Text tool on the Annotations toolbar, or select **Text** from the **Annotations** menu.
2. Enter your text in the dialog box that appears.
3. To move your cursor to a new line, hold down CTRL and press ENTER (the text dialog box can support up to 3 lines of text).
4. When you are done typing, click the **OK** button or press ENTER to close the dialog box.
5. Left-Click on the area of your image where you wish the text to appear.

► To edit the text annotation

1. Enter Annotation Edit Mode (see next section).
2. Double-Click on the textbox and the text dialog box will appear.
3. Change the text as necessary and click the **OK** button or press ENTER when finished.

Magnify



Magnify tool button

This tool allows you to draw a box around on an image, which will then magnify the contents of the enclosed area.

► To use the Magnify tool

1. Left-Click on the **Magnify** tool on the Annotations toolbar, or select **Magnify** from the **Annotations** menu.
2. Left-Click on an area of the image to start the box.
3. Move the mouse pointer and observe the box expanding.
4. Left-Click again to set the box



Magnify Annotation (at 2x)

If you would like to increase or decrease the magnification factor of the magnify annotation, highlight the annotation (must be in Edit mode), and then press the “+” or “-” key.

Print ROI

Print ROI tool button

This tool creates will allow you to create a Region of Interest on your image and then have that portion of the image printed to paper..

► **To print a region of interest**

1. On the **Annotations** menu, select the **Print ROI** tool.
2. Left-Click on the image to start the ROI box.
3. Move the mouse pointer and observe the box expanding.
4. Left-Click again to set the ROI box.
5. Right-Click on the image and select **Add Image to Print Queue**.
6. Left-Click the **Print Queue** button in the bottom left corner of the screen to open the Print Queue window.
7. Select a layout and adjust any other options and then Left-Click on the **Print** button.

☀ Only the first ROI placed on an image will be added to the Print Queue. If you need to print a second ROI from the same image, remove the first ROI.

Spine Labels



Spine Labeling tool button

With the exception of C1 and S5, each of the Image Viewer's Spine Labels has a menu option for labeling "Up" or "Down" the spine. The labels include the following:

Cervical: C1, C2, C3, C4, C5, C6, C7

Thoracic: T1, T2, T3, T4, T5, T6, T7, T8, T9, T10, T11, T12

Lumbar: L1, L2, L3, L4, L5

Sacral: S1, S2, S3, S4, S5

► To use the Spine Labeling tool

1. Left-Click on the **Spine** tool on the Annotations toolbar, or select **Spine Labels** from the **Annotations** menu.
2. Hover over one of the 4 sub-menus and then select a marker from the pop-out menu.
3. Left-Click on the image to place the first label.
4. Continue Left-Clicking on the image until all of your labels have been placed.

When you begin the labeling process you must continue until you reach either C1 or S5, depending on the direction you have chosen. For example, if you select "L2 - Down," you will label your spine from L2 to S5.

☼ Unlike most other annotations the spine labels will appear on all slices in a series

Cervical and Lumbar Curve

Cervical and Lumbar Curve tool

► To use the Cervical Curve tool

1. On the **Annotations** menu, select the **Cervical Curve** tool from the **Chiropractic** sub-menu.
2. Left-Click on the image to set your first point.
3. Left-Click again to set your second point.
4. Move your mouse to either side of the axis that is created between the two points and Left-Click to place the curve.

► To use the Lumbar Curve tool

1. On the **Annotations** menu, select the **Lumbar Curve** tool from the **Chiropractic** sub-menu.
2. Left-Click on the image to set your first point.
3. Left-Click again to set your second point.
4. Move your mouse to either side of the axis that is created between the two points and Left-Click to place the curve.

Editing and Deleting Annotations



Annotation Edit Mode button

The Image Viewer includes the ability to select, edit and delete previously created annotations. Before you are able to edit or delete an annotation you must first select it, and to do this requires that you enter into “Annotation Edit Mode.”

► To enter Annotation Edit Mode

1. Left-Click on the Annotation Edit Mode tool on the toolbar, or select **Edit** from the **Annotations** menu.

► To select an annotation

1. Enter Annotation Edit Mode (see above)
2. Move the mouse over an annotation. Observe the annotation will light up when the mouse moves over it.
3. Left-Click the annotation to select it. It will change colors and several little filled boxes (called “handles”) will appear on the annotation.
4. The annotation is now selected.

Now that our annotation is selected, we can edit it (i.e. reposition or resize it). There are two types of editing cursors. When the cursor has four arrows pointing in all directions, the user can reposition, or move, the annotation. When the cursor is an upward pointing arrow, the user can resize the annotation.

► **To edit a selected annotation**

1. Select an annotation (see previous section).
2. Move your mouse over the top of the selected annotation.
3. If the cursor changes to an up arrow, you may Left-Click to grab the handle. Move your mouse to resize the annotation, and then release the button when you are done.
4. If the cursor changes to a four-way arrow, you may Left-Click to grab the annotation. Move your mouse, and then release the button to drop the annotation in place.

► **To delete an annotation**

1. Select the annotation (see previous section).
2. Right-Click anywhere on the image and choose **Delete Current Annotation** from the context menu or press DELETE on your keyboard.

► **To delete all annotations**

1. Right-Click on the image.
2. Select **Delete All Annotations** from the context menu.
3. If the annotation persists across multiple slices, such as the Spine Labels, then select **Delete All Annotations for Series**.

☼ Deleting all annotations from an image or series does not require that you first be in Annotation Edit Mode.

Saving Annotations

In order to save any additions, deletions, or alterations to your image's annotations, you must "Save" them to the database. There are two options for accomplishing this.

You can use the auto-save feature of the viewer (see Chapter 9: Image Viewer Settings for more details) or you can manually save your changes.

► To manually save your annotations

1. On the **Annotations** menu, select **Save**.

☼ If the auto-save feature is disabled, and you do not manually save your annotations, all of your changes will be lost upon closing the study.

Chapter Ten

Advanced Tools

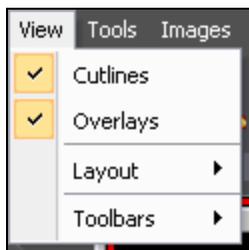
This chapter explores some of the more advanced viewing features found in the Opal-RAD Client Worklist. Some features are in the Web Worklist.

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Cut-Lines

Cut-Lines are simply white lines that depict the intersection between images in a study. Cut-lines are controlled via the option found in the View menu. This option allows the user to toggle between cut-lines on and cut-lines off.



The cut-line has been enhanced to show detail

☀ Note that cut-lines will only appear when the study contains intersecting images.

The Linking Series

The Image Viewer has a feature that will allow you to link multiple image series, so that as you scroll through one series the other will follow. This is very useful for comparing similar series from the same study.

► To link or unlink a series

3. Left-Click on the series in your image window to select it.
4. Right-Click on the series and select **Link** to activate the link, or **Unlink** to deactivate the link. You may also use the shortcut key “**L**” to achieve the same goal.
5. Repeat steps 1 and 2 for each series that you wish to link or unlink.

The word “Linked” with the letter “A” or “N” will appear at the bottom of each series you have linked. An “A” means that the series was linked successfully, an “N” means that it was not. If any of the series you have linked appear with an “N”, then all of your previous links will not function until you have unlinked the invalid series.



Linked



Linked

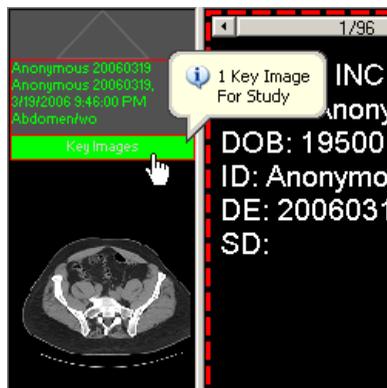
☀ Series will only link correctly if they are of the same body part and on the same plane (i.e. axial, coronal), but they do not have to contain the same number of images.

Key Images

The “Key Images” feature is designed to allow the quick identification of particularly important images in a study. The doctor reading the exam marks images, as “key” that are prominent in the study. A copy of each of these images is then placed in a separate thumbnail in the Series/Stacks window so that all of the key images in the study can be viewed quickly.

Additionally, when key images have been marked, the series description will appear to be highlighted.

The power of this tool is that, although the key images may reside in many separate series, the key image stack brings all of these images together into one stack, providing a more efficient read.



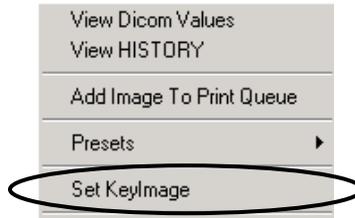
► To show or hide a study’s key images

1. Left-Click on **Key Images** just below the series description (pictured above).

☀ The “Key Images” button inside the Image Viewer and the “K” button on the Study List will be highlighted when present.

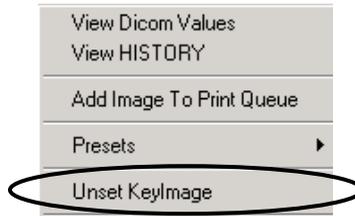
► **To Mark (Create) a Key Image**

1. Right-Click on the image and select **Set Key Image**, or press the “K” key on the keyboard.



► **To Unmark (Remove) a Key Image**

1. Right-Click on the original image that has a Key Image and select **Unset Key Image**, or press the “K” key on the keyboard.



☀ The Unset option is only available when the correct image is right clicked on.

Creating a Pre-Op Study

A Pre-Op study is a special type of study, which is created from one or more studies for a given patient. Creating one is simply a matter of opening a study in the image viewer and adding images. Once it's created, additional images from any of *that same patient's* previous studies may be added.

Pre-Op studies will appear on your Study List screen under the Modality of **UNQ** (short for unique). These studies will appear at or near the top of the study list. If the new study does not immediately appear, you may Left-Click on the Study List's **Refresh** button.

► To add an image to a new Pre-Op study

1. Right-Click on the image and select **Add Image To New UNQ Study**.
2. Enter a description for the study in the dialog that appears and click the **OK** button.
3. Enter a description for the image in the dialog that appears and click the **OK** button.

► To add an image to an existing Pre-Op study

1. Open a study from the patient with the existing Pre-Op study, and then open the image to be added.
2. Right-Click on the image and select **Add Image To UNQ Study**.
3. Enter a description for the image in the dialog that appears and click the **OK** button.
4. Repeat steps 1 and 2 for each image to be added.

Presets

The preset provide the user with a quick way to apply pre-define Window (Width) and Level (Center) to an image. These presets allow different types of tissue to be viewed depending on the modality.

Before using presets you must first define them through the Image Viewer Settings. Please see Chapter 9: Image Viewer Settings for detailed instructions on creating presets.

► To apply a Window/Level preset to your image

1. On the **Tools** menu, select a preset from the pop-out **Presets** menu.

-or-

2. Right-Click on the image and select a preset from the pop-out **Presets** menu.

-or-

3. Press the number (1-9), which corresponds to the preset you wish to apply. Alternately, you can hold the CTRL key while pressing the number.

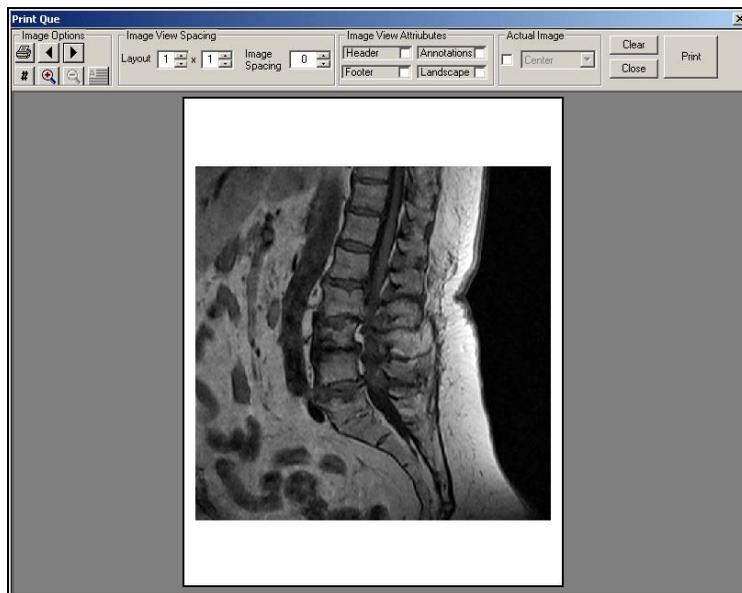
 In order for your presets to work as designed they must first be defined in your Image Viewers Settings.

Print to Paper

Printing to paper prints to any local printer.

► To print images to paper

1. Open an image in the Image Viewer.
2. Right click on the image and then Left-Click on **Add Image to Print Queue**.
3. Repeat steps 1 and 2 for all images to be printed.
4. Left-Click the **Print Queue** button in the bottom left corner of the screen to open the Print Queue window.
5. Select a layout and adjust any other options and then Left-Click on the **Print** button.



The Print Queue window offers many options for defining the layout of the printed page. There is also a preview of what the printout will look like.

Print to Paper Options:

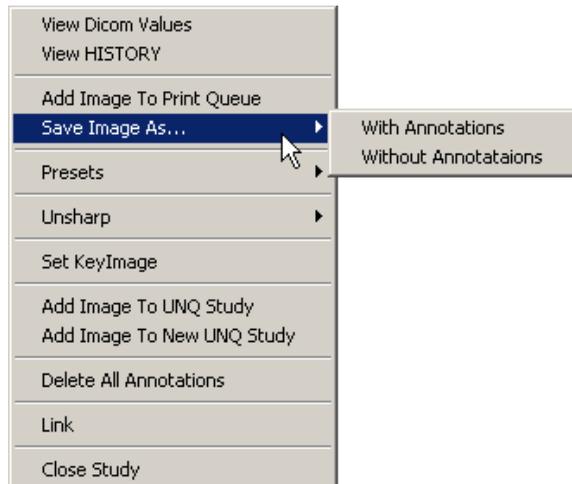
- **Set Layout:** You can choose a layout for the printed images by adjusting the column and row values with the text boxes. After configuring your values, click the Set Layout button. The supported layouts include common configurations such as “2 X 4”, indicating 2 columns by 4 rows.
- **Landscape:** Select this checkbox to change the view from Portrait (default) to Landscape.
- **Header:** Prints Institution name at top of each page.
- **Footer:** Prints patient data at bottom of each page.
- **Annotations:** Prints any annotations that have been placed on the image.
- **Image Spacing:** Adjusts the spacing between images when printing multiple images per/page.
- **Actual Image:** Increase image to actual size. If the viewing area is too small the image will be cropped. Use the dropdown list to position cropped image in frame.
- **#:** This is the number of pages to display in the preview window.
- **Clear:** Clears all images out of the print queue.

Saving Images to a File

The Opal-RAD Image Viewer has the ability to save any image in your study to an external file. This save feature supports the following file formats: Bitmap, JPEG, GIF, and PNG.

► To save an image to a file

1. Right-Click on the image and select either **With Annotations** or **Without Annotations** from the pop-out **Save Image As...** menu (See below).
2. The **Save As** dialog box will appear. Select the location where you wish to place your saved image.
3. Enter a file name in the **File Name** textbox.
4. Select file type from the **Save as Type** dropdown list.
5. Left-Click on the **Save** button.



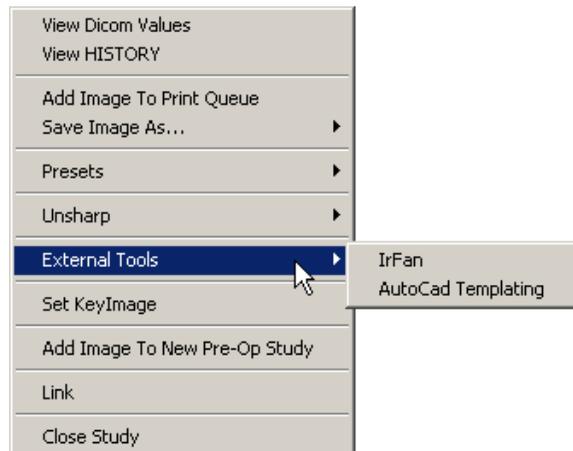
Sending an Image to an External Application

The Opal-RAD Image Viewer contains a feature, which allows the end-user to pass a DICOM image to an external 3rd party application.

Before using this feature your external applications must be configured through the Opal-RAD Image Viewer settings control panel (see Image Viewer Settings for more information).

► To send your image to an external application

1. Right-Click on the image to be sent.
2. Select an application from the **External Tools** pop-out menu.
3. Your 3rd party application should launch automatically and the DICOM data will be sent.



Chapter Eleven

Image Viewer Settings

This chapter will explore in detail the options available through the setting window of the Opal-RAD Image Viewer.

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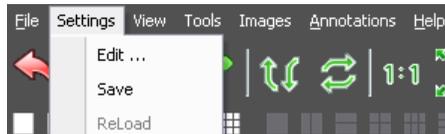
Settings Overview

The Opal-RAD Image Viewer (OpalViewer) contains a special section for the configuring your image viewer's settings. Through the Image Viewer's Settings window the end-user can:

- Add and edit presets.
- Modify the default screen layout.
- Configure the workstations display settings.
- Adjust the magnification window's size and zoom factor.
- Change your auto-save options
- Configure any external tools for integration with OpalViewer

► To access the Image Viewer Settings window

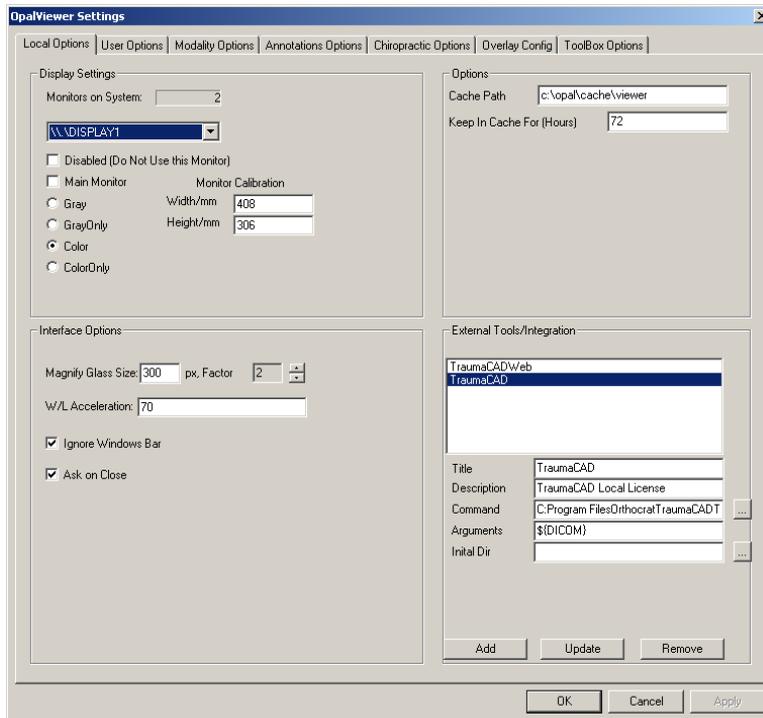
1. On the **Settings** menu, select **Edit**.



Once you have finished making your changes to the viewer's settings, Left-Click on the **OK** button to close the window. If you press the **Cancel** button, without first pressing **Apply**, then all your changes will be lost.

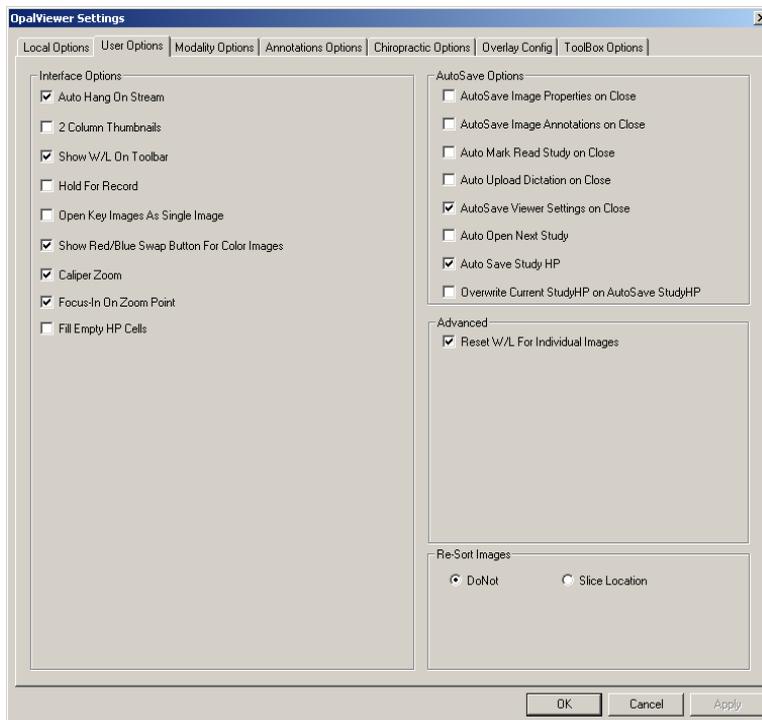
Local Tab

On the Locals Tab you will find the fields for adjusting your Display, Auto-Save, Interface, and External Tools Integration options.



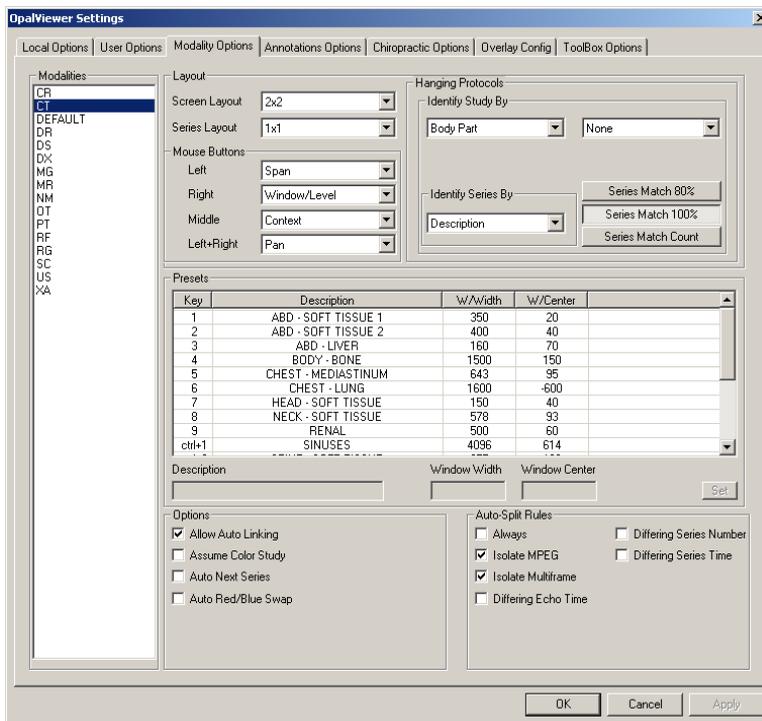
User Options Tab

On the Modality Option Tab you will find the fields for adjusting you Modality Presets, Screen Layout, and Series Layout defaults. Both the presets and layout options are modality dependent, which means that you can configure different settings for each modality in your Modality list.



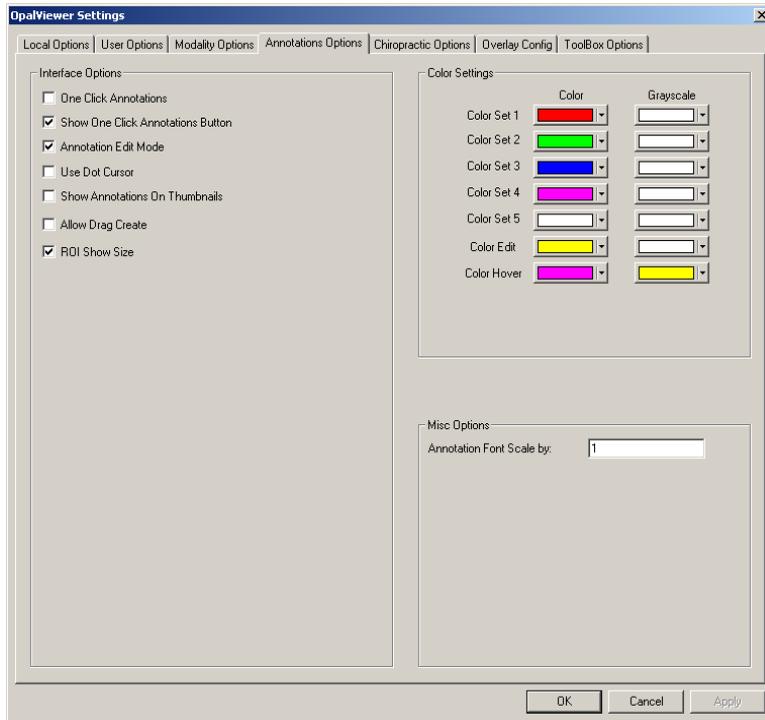
Modality Options Tab

On the Modality Option Tab you will find the fields for adjusting you Modality Presets, Screen Layout, and Series Layout defaults. Both the presets and layout options are modality dependent, which means that you can configure different settings for each modality in your Modality list.



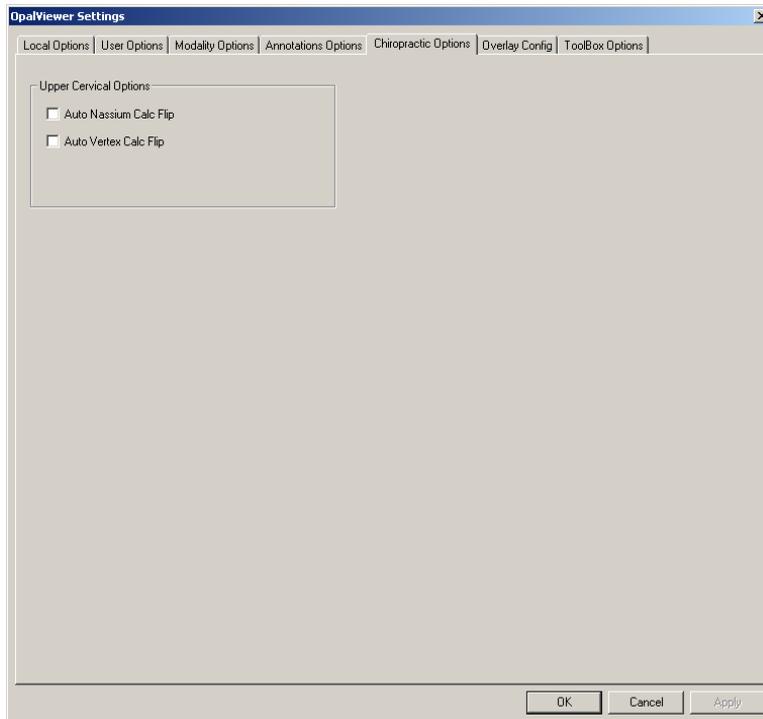
Annotations Options Tab

On the Annotations Option Tab you will find the settings necessary to adjust the behavior of the annotation tools and toolbar.



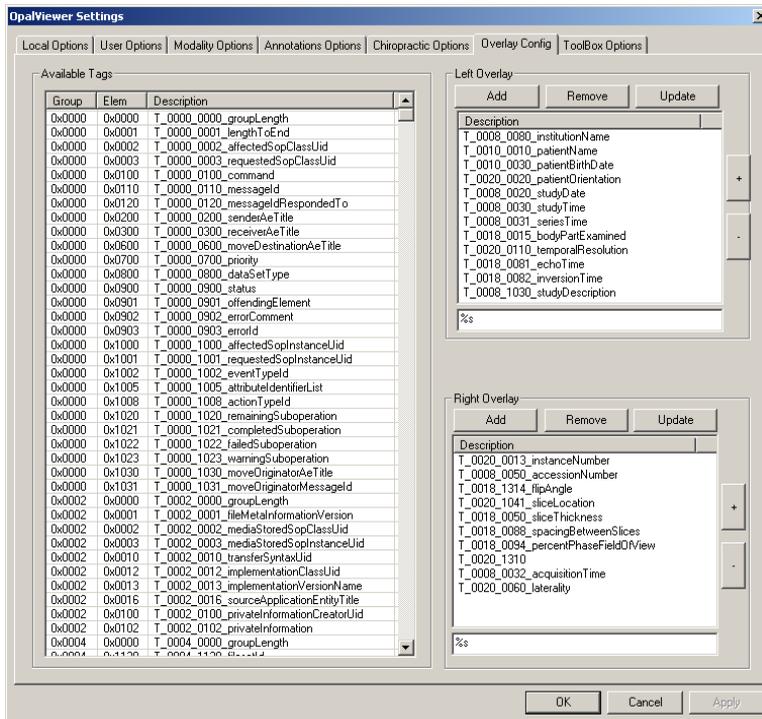
Chiropractic Options Tab

On the Modality Option Tab you will find the fields for adjusting you Modality Presets, Screen Layout, and Series Layout defaults. Both the presets and layout options are modality dependent, which means that you can configure different settings for each modality in your Modality list.



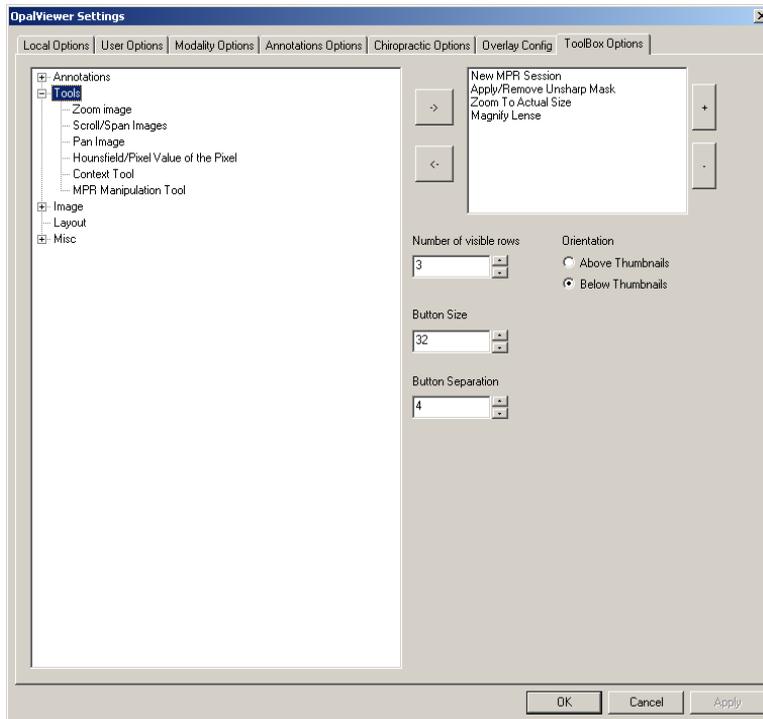
Overlay Config Tab

The Overlay Config Tab contains an interface, which is used to adjust the appearance and content of the Image Viewer's overlay text.



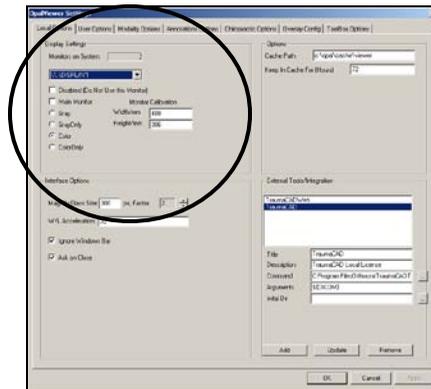
Toolbox Options Tab

The Toolbox Options contain controls which allow the enduser to build a customized set of Image Viewer tool and annotations.



Local Options: Display Settings

The Opal-RAD Image Viewer includes support for multiple displays. In most cases the pre-configured display settings should be sufficient for most hardware configurations. However, If you would like to reconfigure these settings you can do so through the Display Settings section of the Settings control panel.

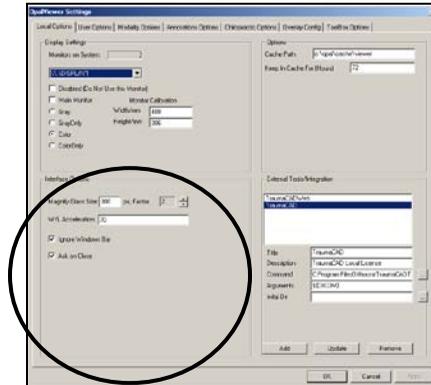


► To modify your display settings

1. On the **Settings** menu, select **Edit**.
2. Left-Click on the **Locals** tab.
3. Left-Click on the **Display Settings** dropdown list box and select your display.
4. Select one of the 4 display types (i.e. Color, Gray).
5. Optionally, you can “disable” your selected display, or promote it as your **Main Monitor**.

Local Options: Interface Options

Use these options if you wish to modify the behavior of the Image Viewer's Magnifying Glass tool or Windows and Level acceleration. Please see the Chapter 5: Image Viewing Tools for more details on the use of these tools.

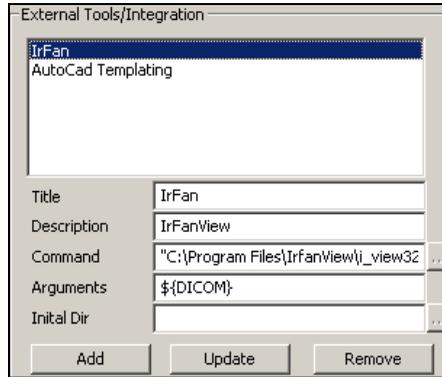


The Interface Options include the following settings:

- **Magnifying Glass:** This allows you to control the size of the magnifying glass window that appears, as well as the magnification factor. You can adjust the size by entering a new value (in pixels) in the textbox labeled “Magnify Glass Size.” You can adjust the magnification factor by clicking the up or down arrows on list box labeled “px, Factor.” The magnification factor ranges from 1 to 5.
- **Windows/Level Acceleration:** This represents the speed with which an image’s Window and Level are adjusted when using the Window/Level tool. The

higher the number, the faster your image's Window and/or Level will change when using the W/L tool. The lower the number, the slower the changes.

- **Ignore Windows Bar:** When active, this feature forces the Image Viewer to load in the entire viewable screen area. If the Windows Taskbar is visible it will likely obscure the very bottom of the viewer.
- **One Click Annotations:** Annotations, such as the Line or Angle tool, will normally only work once before having to be reactivated. If you would like to disable this default behavior, simply remove the checkbox for this item. After disabling this feature you will then have to manually deactivate each annotation tool when you have finished using it.



► **To update your application registration**

1. Select the application in the large list box.
2. Modify the fields as necessary.
3. Left-Click on the **Update** button.
4. Left-Click the **OK** button to close settings.

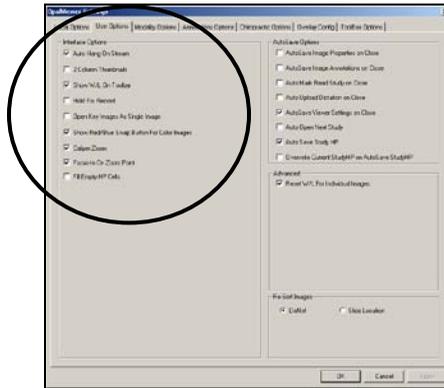
► **To remove your application registration**

1. Select the application in the large list box.
2. Left-Click the **Remove** button.
3. Left-Click the **OK** button to close settings.

☼ Currently the only argument the OpalViewer supports is **\${DICOM}**. The \${DICOM} argument is merely a pointer back to the originally saved DICOM Image on your server.

User Options: Interface Options

The Auto-Save options control how the Image Viewer responds when closing your study. By default, you will be prompted to save any changes to your images and setting on close. You may, however, disable this prompt; or even select which options are saved when the prompt appears.



The Interface Options include the following settings:

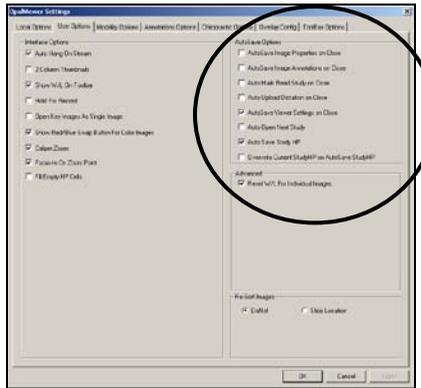
- **Auto Display on Stream:** By default, streamed studies will not auto-display in the viewer. This feature disables that behavior.
- **2 Column Thumbnails:** Displays 2, rather than 1 column of thumbnails in the Series Stack window.
- **Show W/L On Toolbar:** This will create a Window and Level tool button on the Image View toolbar.
- **Hold For Record:** This option will reconfigure the Philips Speechmike recorder to only record dictation if

the Record button is depressed. By default, the Record button operates as a toggle.

- **Open Key Images as Single Image:** This will stack key images in the Series Stack window, rather than separating them into individual thumbnails.
- **Show Red/Blue Swap Button For Color Images:** This will create a Red/Blue Swap tool button on the Image Viewer toolbar. Note – the red and blue areas of color Ultrasounds indicate the flow of blood toward or away from the Transducer.
- **Caliper Zoom:** When active, this feature will allow the user to Left-Click and drag on the measurement overlay to zoom into an image.
- **Focus-In On Zoom Point:** As images are magnified using the Zoom tool, the image will reposition itself to center on the cursor position.
- **Fill Empty Cells:** If there exists any remaining available Image viewer panes after a pre-saved display setting has been applied, they will be filled with additional series.

User Options: Auto-Save Options

The Auto-Save options control how the Image Viewer responds when closing your study. By default, you will be prompted to save any changes to your images and setting on close. You may, however, disable this prompt; or even select which options are saved when the prompt appears.



The Auto-Save Options include the following setting:

- **Ask on Close:** This will provide you with a dialog box each time you close the viewer.
- **AutoSave Image Properties on Close:** This will save any changes to your images window, level, rotation, or orientation to the database.
- **AutoSave Image Annotations on Close:** This will save any added, removed, or modified annotations to the database.

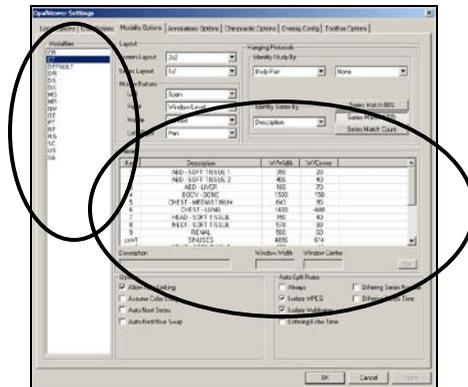
- **Auto Mark Read Study on Close:** This will automatically change the study's status to "Read" upon close.
- **Auto Upload Dictation on Close:** This will save any dictations to the Study upon close.
- **AutoSave Viewer Settings on Close:** This will automatically save any changes to your Image Viewer Setting upon close.
- **Auto Open Next Study:** The next study on the Study List, regardless on the status, will be opened in the viewer. When the current study is closed.
- **Auto Save Study DM:** The layout of the current study will be automatically saved as the "Default" display setting for the study.
- **Overwrite Current Study DM on Auto Save Study DM:** If Auto Save Study DM is active, and there already exists a "Default" display setting, the setting will be overwritten when the current study is closed.

Modality Options: Creating Presets

A preset is a pre-defined Window and Level setting which can be applied to an image by way of a Hot-Key or through the Image Viewer's context menu. The Window and Level presets settings can be found on the “Modality Options” tab.

► **To define a preset**

1. On the **Settings** menu, select **Edit**.
2. Select a “Modality” (i.e. CT, MR), and then a “Key” (i.e. 1, 2, ctrl+1)
3. Enter the **Description**, **Window Width** (Window), and **Window Center** (Level) in the provided textboxes.
4. Left-Click on the **Set** button.
5. Repeat steps 3 – 5 for each preset you need to define.
6. Left-Click the **OK** button to close settings.

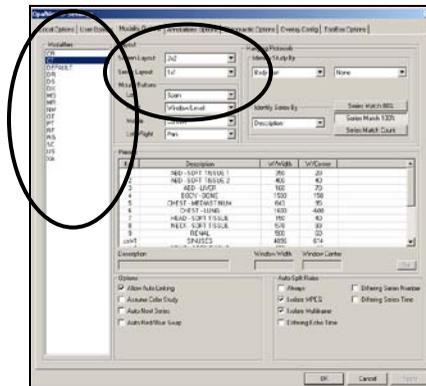


Changing the Default Layout

The ability to change the viewer's default layout is available on the “Modality Options” tab. This pre-configure layout is modality specific. For example, you could configure all CTs to be displayed in a 2x2 format, and all MRs to be displayed in a 1x3 format.

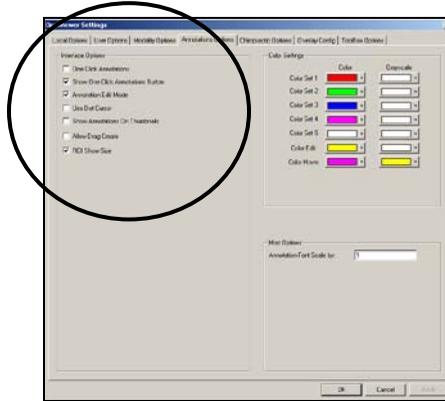
► To change your Screen or Series layout

1. On the **Settings** menu, select **Edit**.
2. Left-Click on a **Modality** (i.e. CT, MR)
3. From the **Screen Layout** (or “Series Layout”) dropdown list, select an option (i.e. 1x1, 2x2, 3x4).
4. Left-Click the **OK** button to close settings.



Annotations Options: Interface Options

In this section of the Annotations Option Tab you will find the settings necessary to adjust the behavior of the annotation tools and toolbar.



The Interface Options include the following settings:

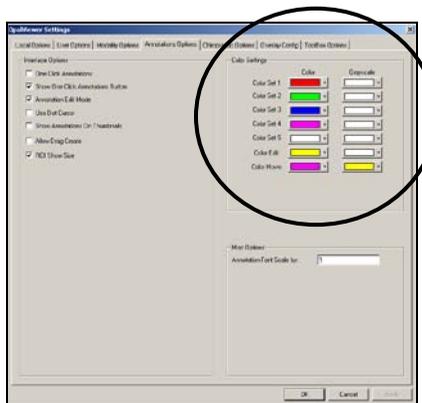
- **One Click Annotations:** When active, annotations will automatically turn themselves off after they have been drawn. If this is disabled, annotations will remain active until they are manually disabled.
- **Show One Click Annotations Button:** This will place the One Click Annotation toggle button on the toolbar.
- **Annotation Edit Mode:** This option sets the default state (on or off) of the Annotation Edit Mode button when the Image Viewer is launched.

- **Use Dot Cursor:** Activating this will change your Annotation Edit Mode cursor into a dot, rather than a crosshair.
- **Show Annotation On Thumbnails:** When this is on, all annotation drawn on an image will also appear on the images thumbnail in the Series Stack window.
- **Allow Drag Create:** Normally annotations are drawn by using a series of Left-Click operations. With this on, you will be able to Left-Click and Drag to draw many of your annotations.
- **ROI Show Size:** When this is on, the Length and Area values of a Region Of Interest (ROI) annotation will display along with the Min, Max, Mean, and STD Deviation values.

Annotations Options: Color Settings

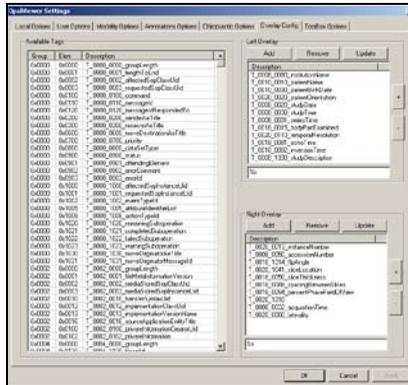
In this section of the Annotations Option Tab you will find the settings necessary to adjust the colors of your annotations for both color and grayscale monitors.

Using the dropdown color palettes, you may adjust the default color of all saved annotations that have been drawn on your images. You may also adjust the color of the annotation when the user either hovers the mouse cursor over it, or Left-Clicks on it.



Overlay Configuration

The Overlay Config Tab is use to customize the list of displayed DICOM element that appear when overlays are enabled in the Image Viewer.



► To add a DICOM tag to your image overlays

1. On the **Settings** menu, select **Edit**.
2. Left-Click on the **Overlay Config** tab.
3. Left-Click on the DICOM tag you wish to display from the Available Tags list.
4. Left-Click the **Add** button to in either the Left Overlay or Right Overlay panels to add the element to the list.
5. Left-Click the **OK** button to close the settings window.

► To remove a DICOM tag from your image overlays

1. On the **Settings** menu, select **Edit**.
2. Left-Click on the **Overlay Config** tab.

3. Left-Click on the DICOM tag you wish to remove from the overlay panel (Left or Right).
4. Left-Click the **Remove** button from the overlay panel which contains the highlighted tag to remove the element from the list.

► **To update a DICOM tag on your image overlays**

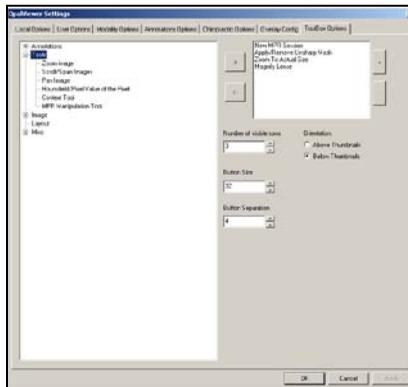
1. On the **Settings** menu, select **Edit**.
2. Left-Click on the **Overlay Config** tab.
3. Left-Click on the DICOM tag you wish to modify from the overlay panel (Left or Right).
4. Modify the value in the textbox directly below the overlay panel to adjust the display text, being careful not to erase the “%S” text string.
5. Left-Click the **Update** button from the overlay panel which contains the highlighted tag to save your changes.

You may optionally move your tags up or down the list of displayed tags, by Left-Clicking on the tag to be moved and then Left-Clicking on the “+” or “-” buttons.

☀ It is critically important that you do not modify or remove the %S text when adding or updating your overlay tags. If this text is removed, then no value will appear in the designated spot on the overlay text regions.

Toolbox Options

The Toolbox Options Tab is used to build a customized list of image tools and annotations. This benefits the user by giving him/her the ability to quickly locate and use tools that they frequently use.

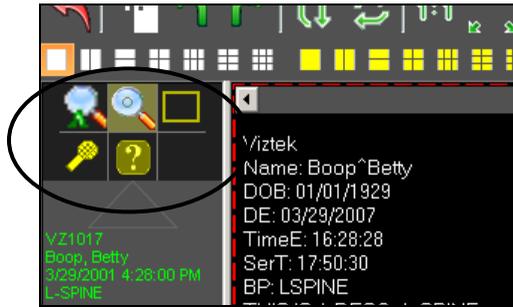


► To create a custom toolbox

1. On the **Settings** menu, select **Edit**.
2. Left-Click on the **Toolbox Options** tab.
3. Left-Click on the tool or annotation in the list on the left. Expand the list of tools, by Left-Clicking on the “+” icon.
4. Left-Click the “→” button to add the tool to your toolbox.
5. Repeat Steps 3 and 4 for each tool you wish to add.
6. Adjust your other options as needed, and then Left-Click the **OK** button to close the settings window.

The Toolbox Options include the following settings:

- **Number Of Visible Rows:** This sets the number of rows displayed when the toolbox is created.
- **Button Size:** This value represents the size of the toolbox buttons (in pixels).
- **Button Separation:** This value represents the amount of space (in pixels) that is placed between the buttons in the toolbox.
- **Orientation:** Set the position of the toolbox to either above or below the Series Stack window.



Custom Toolbox with 5 tools

You may optionally move your tools up or down the list to changed their position (left to right) within the toolbox control. This can be done by Left-Clicking on the tool to be moved and then Left-Clicking on the “+” or “-” buttons.

Saving Your Settings

Unless they are saved, any changes you make to your Image Viewer’s settings will only be temporary. In other words, they will only apply to the current study that you are viewing, and once you close the study, those changes will be lost. But there is a way to ensure your viewer’s settings are saved permanently.

► To save your Image Viewer settings

1. On the **Settings** menu, select **Save**.

If you would prefer to have your viewer’s settings saved automatically you can do so through the Auto-Save feature of the settings window. When using this feature it is not necessary to manually save your settings before closing the image viewer.

► To enable the Auto-Save Settings feature

1. On the **Settings** menu, select **Edit**.
2. Left-Click on the **Locals** tab.
3. Place a check in the box marked **Auto-Save Settings on Close**.
4. Left-Click the **OK** button to close settings.

☀ Please see “Auto-Save Options” in this chapter for more information on all your auto-save features.

Chapter Twelve

Windows Primer

Opal-RAD software is designed to run like many other Microsoft Windows programs, in order to facilitate its use. If you are unfamiliar with Windows in general, please use this chapter to get an understanding of basic concepts in Windows.

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Using the Mouse

The mouse is your basic interface with the computer. It has two large buttons on top (sometimes three, sometimes a mouse wheel in the center) and a ball on the bottom that detects movement. (Go ahead, pick the mouse up and look at the bottom side to see the ball!) The two large buttons are called the “left mouse button” and the “right mouse button,” respective of their placement on the mouse.

The intended method of using the mouse is to rest your right hand on the top of the mouse, with your index finger positioned over the left mouse button, and your middle finger positioned over the right mouse button.

If you look at the computer screen you should notice a small white arrow. This is called the “mouse pointer.” With your hand resting on the mouse as described above, move the mouse over the desk (or mouse pad) and observe that the mouse pointer will mimic your movements.

Move the mouse up, down, left, and right, in a circle, etc. and observe the mouse pointer. Practice trying to place the mouse pointer on a certain area of the screen, perhaps one of the icons you see on the screen.

The buttons are operated but simply pushing down and releasing the button. For example, to operate the left mouse button (with your hand resting on the mouse as described earlier) you simply push the button down with your index finger, then release. This is called “clicking” the mouse, named for the little click noise this action produces.

Thus, to “click” the mouse means to push one of the buttons. The vast majority of mouse click operations in any Windows program are performed with the left mouse button. Thus, whenever you are directed to “click” or “select” something, it is implied that you click with the left mouse button.

If the right mouse button is required to perform a function, the instructions will explicitly direct you to “Right-Click” or “click the right mouse button.” The right mouse button is generally not used as frequently as the left, and is generally used to call up “context menus” (pop-up menus that appear when right-clicking in certain areas or contexts.)

The other “clicking” term you hear about is to “double-click.” This means to click the left mouse button twice in quick succession. This is often a difficult technique to master for a beginning computer user, so practice makes perfect. Thankfully, Opal-RAD Client and Web Worklist only makes use of the Double-Click in one place (selecting a study to view from the Study List).

This manual uses the common notation:

- **Left-Click** or **Click**: This refers to clicking the left mouse button once.
- **Right-Click**: This refers to clicking the right mouse button once.
- **Double-Click**: This refers to rapidly clicking the left mouse button twice.

Using the Keyboard

While most tasks utilize the mouse, there are operations requiring the keyboard, such as typing in search terms or annotation text.

The keyboard is laid out much like a typewriter. If you are familiar with a typewriter you will feel right at home on the keyboard in a short time.

A notable addition on a computer's keyboard is the set of arrow keys. These are four keys, grouped together on the right side of the keyboard (between the main letter keys and the numerical keypad), which are labeled with arrows pointing up, down, left, and right.

The arrow keys can be used to move the cursor around while typing in text. Opal-RAD Client Worklist makes use of these keys as shortcut keys to scroll through series of images. Pecking the right-arrow key will take you to the next image; the left-arrow key will take you to the previous image.

Immediately above the arrow keys is a group of six keys also used as shortcut keys. The DELETE key (sometimes labeled "DEL" for short) can be used to delete annotations. The HOME and END keys are used in navigating a series of images; HOME will take you to first image, END to the final image. The PAGE UP and PAGE DOWN (sometimes labeled "PgDn and PgUp") will take you to the previous series or next series, respectively.

Menu bars (“Menus”)

Menu bars are found along the top of most Windows program, and are useful for concealing large menus while not in use.

Common menus seen in Windows programs are “File”, “Edit”, and “Help.” To pull down a menu from the menu bar, simply click the menu title. (For example, click “File”.) A menu drops down with entries. To activate an entry, just click it. To hide/close a menu until you need it again, simply click the menu name again (e.g., click “File” again.)

Context Menus

Context menus are pop-up menus that appear when you right-click in certain areas. For example, if you right-click on an image in the Image Viewer, the Image Context Menu appears. To cancel a context menu, simply move the mouse cursor off of the context menu and single-click the left mouse button.

Context menus are designed to provide quick access to functions or operations that are relevant to that part of the program. For more information on the Study List and Image Viewer context menus, please see the appropriate sections of this manual.

Toolbars

Toolbars are collections of shortcut buttons that generally appear near the top of a program window, usually under the menu bar. These buttons are designed to give quick one-click access to functions and operations in the program. For example, many Windows programs have toolbar buttons for Cut, Copy, and Paste, operations that people use quite frequently.

In Opal-RAD Image Viewer, many toolbar buttons also serve as an indicator regarding whether certain tools or options are enabled. For example, below are pictures of the “Magnify” toolbar button.



The image on the left shows this button when the “Magnify” tool is not selected; the one on the right indicates the “Magnify” tool is selected. Notice that the button on the right appears “lit up.” On grayscale monitors, and in this manual, the button will appear lighter in color than its deselected counterpart.

Scrollbars



Use of a scrollbar is quite simple, and there are a few different methods of using one:

Use the end cap arrow buttons.

To scroll down, click the down arrow button at the very bottom of the scrollbar.

To scroll up, click the up arrow button at the very top of the scrollbar.

Move the slider up or down by dragging it:

Position the mouse cursor (arrow) over the smaller gray bar contained inside the scrollbar. While holding the left mouse button down, move the mouse up or down to move the slider accordingly.

Click in the empty area of the scrollbar (in an area where the inner gray slider is not located) above or below the inner gray slider to move the bar up or down accordingly. This is similar to the operation of the “PAGE UP” and “PAGE DOWN” keys on the keyboard.

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