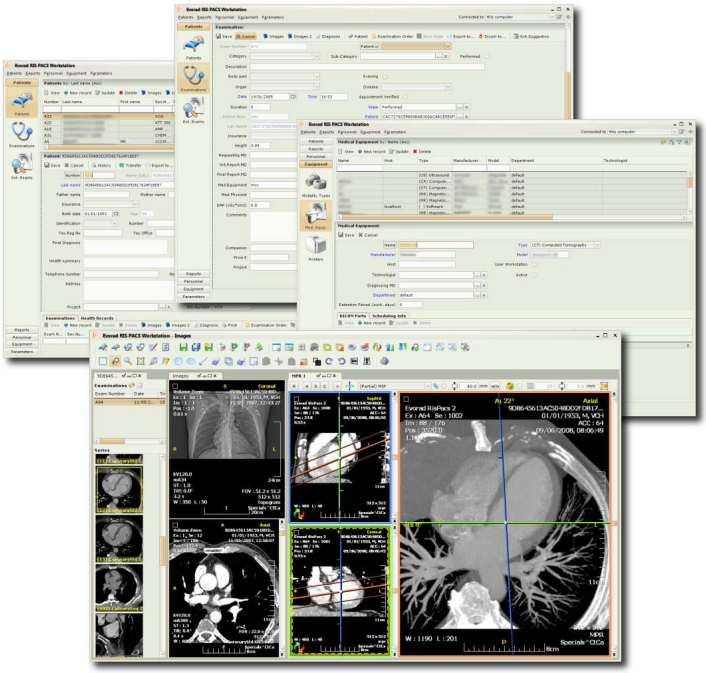

Evorad Workstation 2.1

Community Edition

Quick Start Guide

September 10, 2008

evorad

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Welcome

Thank you for downloading Evorad Workstation Community Edition.

The Community Edition offers the full functionality of our commercial product Evorad Workstation with the only limitation that it is supported by the community through forums. In the case that professional support is required then a commercial license needs to be purchased.

We hope that you enjoy this Edition and we await your comments and feature requests in our forums at http://www.evorad.com.

-- The Evorad team.

Installation and Updates

You have downloaded a self-contained setup executable that will install Evorad Workstation in your computer. The software will then automatically update from Evorad web-site once a new release is available.

Installation

Note
If you have already installed a previous release of the software, you can safely install this one in the same directory without loosing any settings or data.

Run the setup executable and follow the displayed wizard. Initially the End-User License Agreement (EULA) is presented for acceptance.

Then the setup procedure asks for the target directory in which Evorad Workstation will be installed. The default directory can be changed. In the case that you do not have administrative rights on the computer please select a different directory in which you have full access rights (read, write and execute).

The setup procedure also will create shortcut icons and links to the application, product information in Evorad web-site and this Quick Start Guide in electronic form.

Connecting to servers

Evorad Workstation has a local database of patients with their examinations including images. Additionally it can connect to one or more remote servers simultaneously.

Local Database

Initially, the application connects to its local database referred to as “this computer” in the “Connected to” drop-down list at the upper-right corner of the main window.

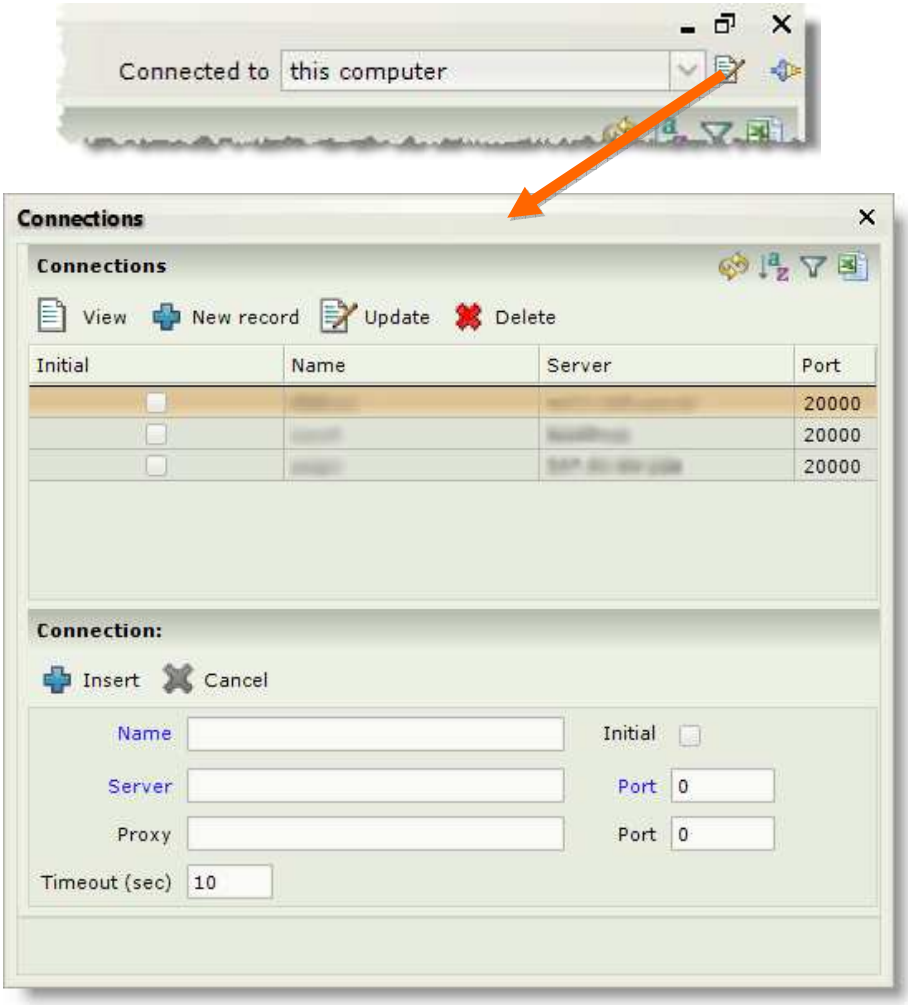
Remote Servers

In order to establish a connection with a remote Evorad RIS-PACS server you need to define it as follows:

1. Click on the button on the right of the “Connected to” drop-down list to open the connection management (“Connections”) dialog box.

2. Press “New Record” to define a new connection or “Update” to update an existing one.

3. Fill-in or change the form and press “Insert” for a new definition or “Save” for an existing one.



- **Name**: The name of your connection. You can use any name that is convenient to you (Required).
- **Initial**: Select this checkbox if you want to connect to this server immediately upon application startup.
- **Server, Port**: The address of the server you want to connect to. The address can be in IP format or as a hostname (Required). The port number that the server is listening (Required).
- **Proxy, Port**: The current local proxy server that you might be using (Optional). The Proxy port number (Optional).

Switch between servers and returning to the local database ("this computer") can be performed any time by just picking the appropriate item from the "Connected to" drop-down list.

Automatic Updates

Each time Evorad Workstation starts up it searches for the latest updates and proceeds to the corresponding downloads. When the download finishes, the user is requested to restart Evorad Workstation (note: the application not Windows) so that the updates will take effect.

The source of the updates can be one of the following:

- a remote Evorad RIS-PACS Server in the case that it has been defined as “Initial” in the connection configuration (see “Connecting to Servers”).

- the Evorad web-site (http://www.evorad.com) in the case that no server has been defined as “initial”.

If you have downloaded an early access version of Evorad Workstation (e.g. Beta 1, Beta 2, RC 1, etc) then the automatic update mechanism might be disabled requiring a manual download and installation of the new version. This is not the case for the final 2.1 version which searches for updates every time the application starts-up.

Patients and Examinations

Evorad Workstation offers basic patient and examination management for the local database. In the case that it is connected to a remote Evorad RIS-PACS server then the full electronic patient record functionality is available as provided by the RIS sub-system. RIS is responsible for supporting the full life-cycle of an imaging examination from order to report delivery.

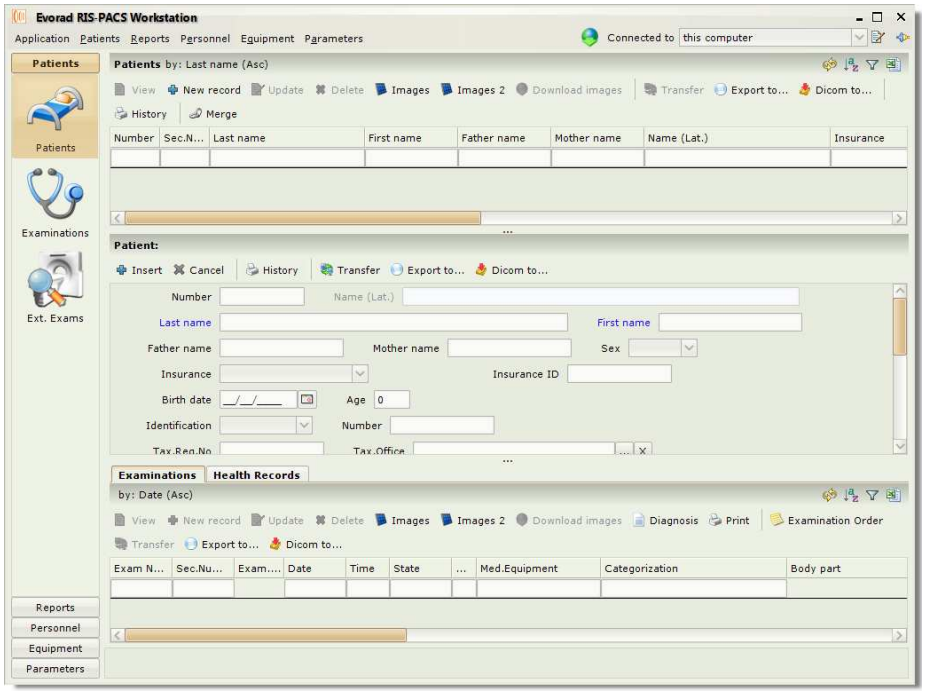
Managing Patients and Examinations

Patients and Examinations are managed from the following views:

Patient list view

It is accessible by the “Patients” button on the left or the Patients > Patients menu.

By pressing the appropriate button at the top toolbar to create or update/view a patient record, a form is displayed below the list to show the patient’s information (name, demographic data, etc)



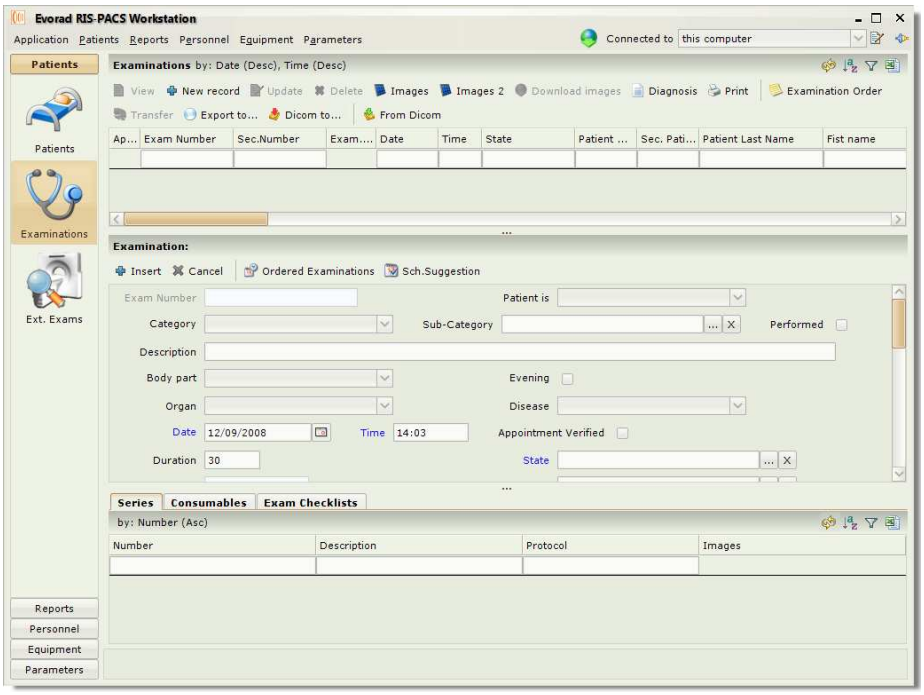
At the bottom of the form there is a set of tabs with additional information such as the examinations performed by this patient.

Note that the three views (table, form, tabs) are separated by a splitter-line with three dots in the middle that can be dragged to adjust the vertical size of each view

Examination list view

It is accessible by the “Examinations” button on the left or the Patients > Examinations menu.

By pressing the appropriate button at the top toolbar to create or update/view an examination record, a form is displayed below the list to show the examination’s information (date, type, patient, referring and diagnosing doctors, etc)



At the bottom of the form there is a set of tabs with additional information such as the image series comprising this examination.

Note that the three views (table, form, tabs) are separated by a splitter-line with three dots in the middle that can be dragged to adjust the vertical size of each view.

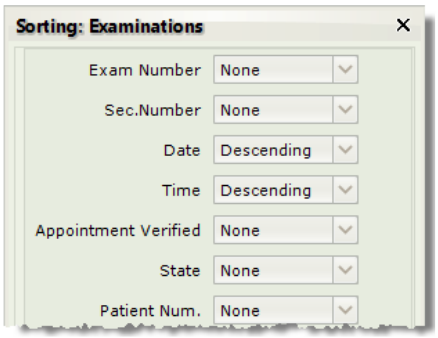
Searching and opening Patients/Examinations

Each table view (e.g. table of Patients, table of Examinations, etc) provides a set of tools at its upper-right corner.

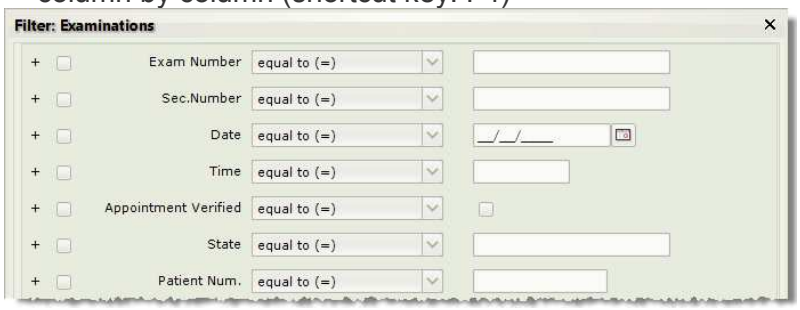
The tools perform the following actions from left to right:

1. **Refresh**: Refreshes the contents of the current view (shortcut key: F5).

2. **Sort**: Opens a dialog box to specify columns for sorting table items (shortcut key: F8). Sorting can be alternatively defined by clicking on the title of each column. Multiple columns can be selected by holding down the “Ctrl” key while clicking on their title.

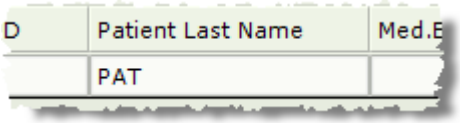


3. **Filter**: Opens a dialog box to specify contents filtering criteria column by column (shortcut key: F4)



Note that in order for the filter for a specific field to be active the checkbox on the left should be checked.

Alternatively, filtering can be defined in the edit box below the title of each column by specifying partially or completely the sought values. Type in the pattern and then press the enter key to activate it.



Examples of patterns:

AB	matches all entries *starting* from “AB”
AB*	matches all entries *starting* from “AB”
AB	matches all entries *containing* “AB”

4. **Export**: Exports the contents of the table to a spreadsheet specified by the user.

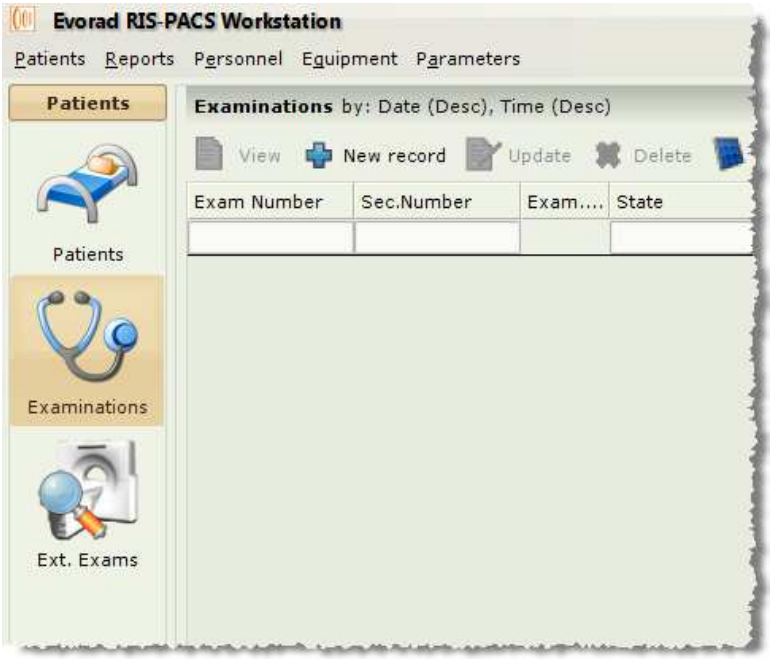
Importing examinations from DICOM files

DICOM files to be imported may reside in one or more nested directories. The application will scan the specified directory and all its sub-directories for valid DICOM files and import them while creating all appropriate patient and examination records in the database whether it

is the local one or a remote one available through an Evorad RIS-PACS server.

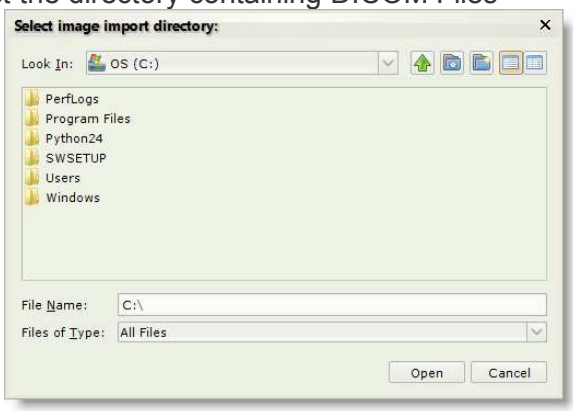
Steps to follow

1. Select the “Examinations” view by clicking on the corresponding button on the left or selecting the Patients > Examinations menu



2. Click the “From Dicom” button

3. Select the directory containing DICOM Files



Importing progress is shown at the lower-right corner of the main window.

Exporting examination images to DICOM files

Images can be exported to DICOM files or sent to a DICOM Storage Provider (Storage SCP) by pressing the “DICOM to” button in one of the following views:

- ***Patient list view***: images of all examinations of the selected patients will be exported or sent.
- ***Patient form***: images of all examinations of the patient will be exported or sent.
- ***Examination list tab below Patient view***: images of selected examinations of patient will be exported or sent.
- ***Examination list view***: images of selected examinations will be exported or sent.
- ***Examination form***: images of examination will be exported or sent.

The button opens a pop-up menu to select the destination:

- ***File Folder***: asks for a destination folder to export to.
- ***Send***: ask for a destination DICOM Storage Provider to send to via DICOM send. DICOM nodes are defined in “Medical Equipment” view (Equipment > Med. Equip.)

Note
CD/DVD burning requires Nero software by Ahead installed in the Program Files folder of your computer.

Exporting to folder or CD/DVD with viewer

Images can be exported to a folder or CD/DVD including a fully functional Evorad Viewer by pressing the “DICOM to” button in one of the following views:

- ***Patient list view***: images of all examinations of the selected patients will be exported.
- ***Patient form***: images of all examinations of the patient will be exported.
- ***Examination list tab below Patient view***: images of selected examinations of patient will be exported.
- ***Examination list view***: images of selected examinations will be exported.
- ***Examination form***: images of examination will be exported.

The button opens a pop-up menu to select the destination:

- ***File Folder***: asks for a destination folder to export to.
- ***CD/DVD***: starts the CD/DVD burning process

Image Viewing and Processing

Evorad Workstation offers advanced image viewing and processing tools some of which are generic while others specialize in specific examination/modality types.

The separate window “Images” is opened for this purpose by pressing the “Images” button from one of the following views:

- ***Patient list view***: opens images of all examinations of the selected patients.
- ***Patient form***: opens images of all examinations of the patient.
- ***Examination list tab below Patient view***: opens images of selected examinations of patient.
- ***Examination list view***: opens images of selected examinations.
- ***Patient form***: opens images of examination.

In any case the full examination list of the corresponding patients is opened to allow comparative reading without requiring any additional steps. However in the case of specific examination selection, that one will be initially selected for viewing. Additional patients with their examinations can be opened later from within the “Images” window.

The “Images” window supports both conventional / clinical review and diagnostic monitors in any of the following configurations:

- ***single head*** (conventional or diagnostic monitor)
- ***dual head*** (two conventional, two diagnostic or one conventional and one diagnostic monitor)
- ***triple head*** (one conventional and two diagnostic monitors)

In the case of using gray-scale diagnostic monitors a second window for viewing and processing images can be opened in the first color monitor by pressing the “Images 2” button.

Opening Image Series – Tabs

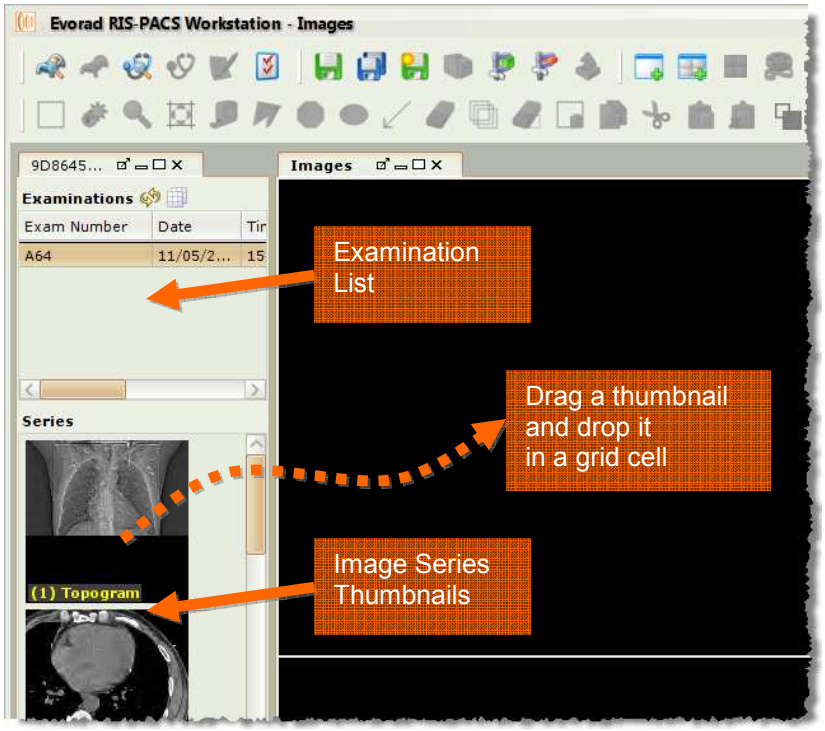
Follow the following steps to start working with image series:

1. Use the examination list in the Patient tab to pick the desired examination to view. The Patient tab will show all stored examination of that patient.

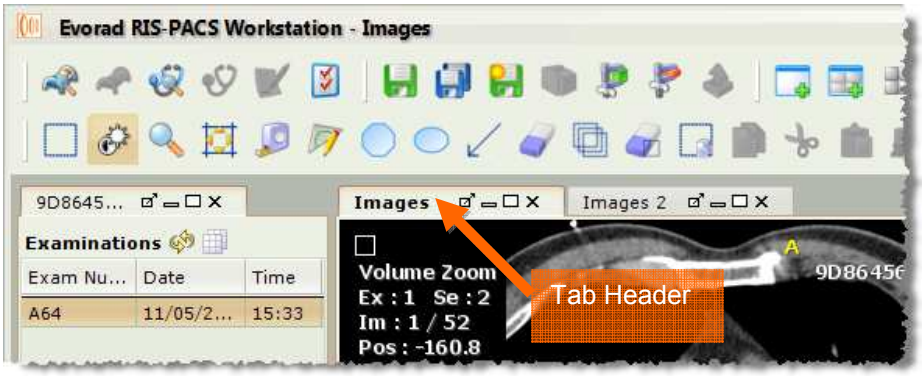
2. The thumbnail list is updated to show the series available in the selected examination.

3. Move the mouse over the thumbnail to display a tool tip with additional series information.

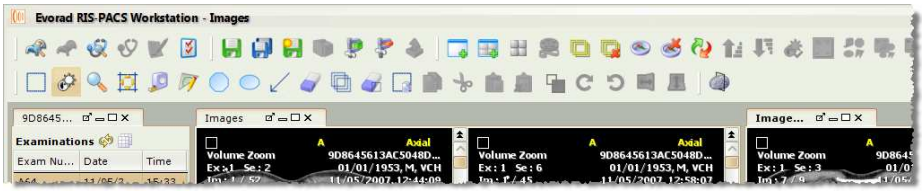
4. Drag a thumbnail and drop it in a cell of any available grid to open the series for viewing



	New grid / tab: Create a new grid as a new tab for viewing additional images.
	Grid layout: Select from the provided list the desired layout for the current grid (e.g. 3x2)



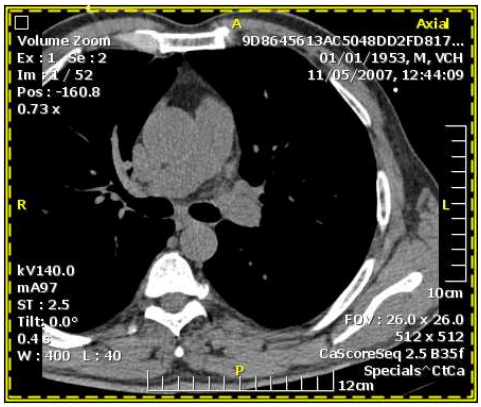
Use the tab header to drag any tab to a new position. Tabs can be dragged between dual-head monitors and between greyscale and color monitors.



In the above screenshot the second “Images” tab has been dragged to the right of the first “Images” tab.

Image Series navigation

Navigation with a series is performed in one of the following ways:



1. Use the mouse roller to roll images of the series.

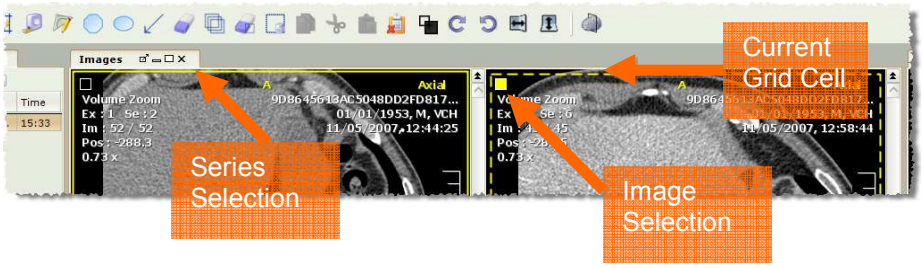
2. Use the scroll bar on the right side to roll images quickly. Use the double-arrow buttons to move to the first and last images of the series

3. Use Up / Down arrow keys to roll images and Home / End keys to move to the first and last images of the series

4. Use the Left / Right arrow keys to change to the previous / next series of the examination

Selecting images and series

Most image manipulation and processing operations require a selection of images or series:



Individual image selection: User the selection box at the top-left corner of each image series view. Use “Ctrl + Click” or “Shift + Click” for multiple selections. The box is yellow for selected images.

Image series selection: Use “Ctrl + Click” or “Shift + Click” in image series views to select one or multiple image series. Selected image series views bare a solid yellow border. Use “Ctrl + A” to select all image series in current tab.

	Select All: Selects all image series in current images tab.
	Select None: Cancels the current selection.

Note that the dashed yellow border indicates the current grid cell on which actions can be performed.

Current window and Modality Window Presets

	Window mode: Use the left mouse button and dragging to change the window of the current image. In any other mode (e.g. during creating measurements) window can be changed by holding the middle mouse button (roller) pressed and dragging horizontally and vertically.
	Window presets: Choose from the poped-up menu the desired modality or user-defined window. Predefined windows can be specified per modality type at Equipment > Modality Types.

Zoom and Pan Adjustments

	Zoom mode: Use the left mouse button and dragging to zoom in and out the current image. In any other mode (e.g. during creating measurements) zoom can be performed by holding the right mouse button pressed and dragging up or down.
	Pan mode: Use the left mouse button and dragging to pan the current image. In any other mode (e.g. during creating measurements) pan can be performed by holding both mouse buttons pressed and dragging to the desired direction.

Sorting

	Sort ascending: Select one or more series then press this button and choose from the pop-up list the desired field on which sorting in ascending order will be performed.

	Sort descending: Select one or more series then press this button and choose from the pop-up list the desired field on which sorting in descending order will be performed.

Localizer (Reference Lines)

	Add localizer: Select one or more series then press this button to activate localizer and show reference lines.
	Remove localizer: Select one or more series then press this button and choose from the pop-up list the desired field on which sorting in descending order will be performed.

Inverting, Rotating and Flipping

	Invert: Select one or more series then press this button to display the negative form of the images.
	Rotate clockwise: Select one or more series then press this button to rotate them clockwise.
	Rotate counter-clockwise: Select one or more series then press this button to rotate them counter-clockwise.
	Flip horizontally: Select one or more series then press this button to flip them horizontally.
	Flip vertically: Select one or more series then press this button to flip them vertically.

Tiled view (Film emulation)

	Add tiled tab: Create a new tiled grid as a new tab for viewing additional images. Tiled grids are similar to films in terms of displaying series as multiple pages of consecutive images.
	Grid layout: Select from the provided list the desired layout for the current grid (e.g. 3x2)

Cine

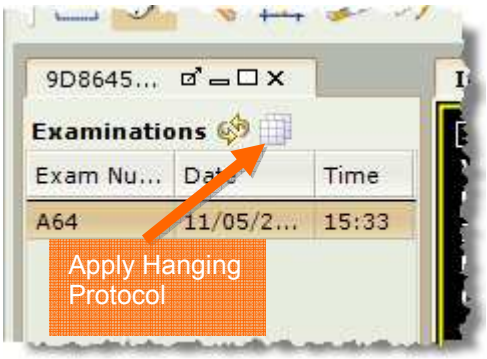
	Enter cine mode: Select one or more series then press this button to rotate them counter-clockwise.

Opening additional Patients / Examinations

	Search patient: Open patient list to select another patient.
	Open series patient: Open patient information related to currently selected series.
	Search examination: Open patient list to select another patient.
	Open series examination: Open examination information related to currently selected series.
	Open diagnosis: Open the diagnosis of the examination related to currently selected series.

Apply Hanging Protocol

Use the button indicated below to apply a matching hanging protocol to the current examination. A new tab with an image grid will open according to the protocol. In the case that more than one protocols match; the user will be prompted to choose the desired one.

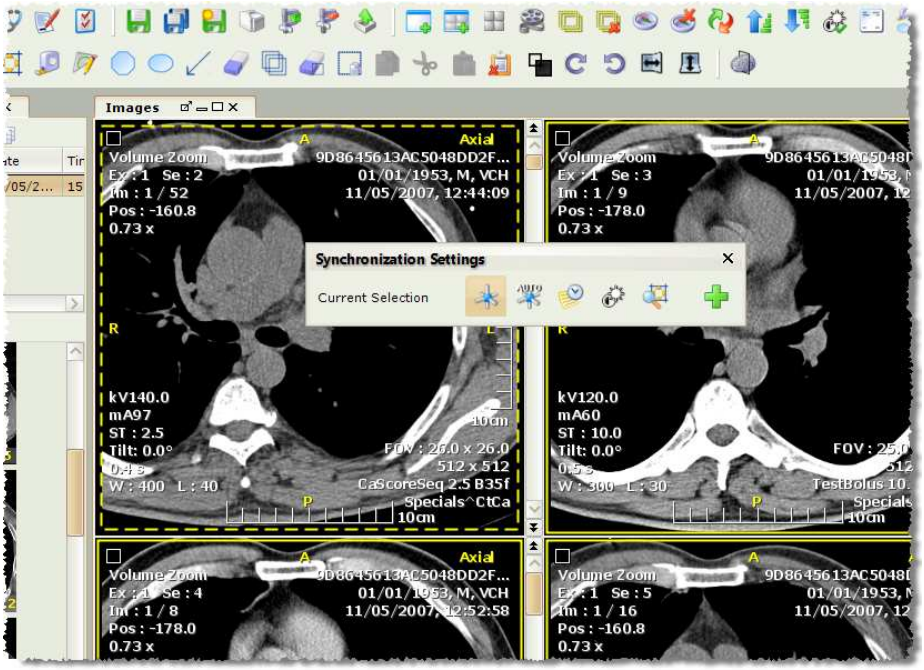


If no protocol matches then image series are opened starting from the one with the smallest number to fill in the current images tab. The tab enters a special serial viewing mode, where using horizontal arrow keys rolls all grid cells to the next or previous image series of the examination.

Image Series Synchronization

The current image series selection is additionally the running synchronization set configured by default for manual location-based synchronization therefore rolling images within one of them causes synchronized rolling in the rest of the set.

	Open synchronization settings: Opens the synchronization settings dialog for the running and all permanent synchronization sets.



Each synchronization set including the running one corresponds to one row of buttons that specify the image aspects to be synchronized:

	Location – manual: Synchronizes slice's geometric location manually taking into account the current images of each image series. In the case that image series come from different examinations or in any case have different reference frame, then manual is the only available location synchronization.
	Location – automatic: Synchronizes slice's geometric location automatically. In the case that image series come from different examinations or in any case have different reference frame, then automatic synchronization is not available.
	Parameters: Synchronizes parameters such as echo time, phase and B value in MRI series.
	Window: Synchronizes window level and width.
	Zoom / Pan: Synchronizes zoom factor and panning.

In the end of each setting row there is a button for making the running set permanent or removing an existing permanent synchronization set:

	Add as permanent set: Converts the running set to a permanent one by “linking” the image series comprising it.
	Remove set: Removes (cancels) the corresponding synchronization set and “unlinks” the image series comprising it.

Permanent sets enable the definition of more than one simultaneous set for complex synchronization needs.

Measurements & Annotations

Measurements and annotations are kept as separate entities and do not affect the underlying DICOM files. The user can save them in the database using the following buttons:

	Save selected: Select one or more series then press this button to save their measurements and annotations in the database.
	Save all: Press this button to save measurements and annotations of all open series in the database.
	Save as new series: Select one or more series and/or images then press this button to save them as a new series with number and name specified in the popped-up dialog.

Measurements and annotation can be individually or collectively selected:

- ***Individual selection***: Click on an annotation or measurement to select it, hold the Ctrl-key and click on another one to add it to the selection or unselect it if already selected.

- ***Collective selection***:

	Select all: Selects all annotations and measurements in current grid cell.

Selection is indicated by a rectangular dashed border and a different color (yellow). Selection can be cancelled by clicking in grid cell at a point that no annotation or measurement exists.

Measurements

	Distance measurement mode: Click and drag to create a distance measurement line. Drag the end-points to change size and orientation. Grab the body of the line and drag to move it as a whole. The label can also be dragged to accommodate multiple measurements in the same region.
	Angle Measurement mode: Click to add an angle measurement with a default size. Drag the end-point and the angle center to change size and orientation. Grab the body of the angle to move it as a whole.
	Polygon ROI mode: Click once at each desired position of a polygon vertex. Double-click at the last position to close the polygon. Drag vertices to change the shape. Click on an edge of the polygon to add a new vertex. Grab the body of the ROI and drag to move it as a whole. The label can also be dragged to accommodate multiple measurements in the same region. Double-click on the label to add additional text and set the visibility of measurements or change the line connecting the label to the ROI to an arrow.
	Oval ROI mode: Click and drag to create an oval ROI. Drag control points (small crosses) to change the shape. Grab the body of the ROI and drag to move it as a whole. The label can also be dragged to accommodate multiple measurements in the same region. Double-click on the label to add additional text and set the visibility of measurements or change the line connecting the label to the ROI to an arrow.

Annotations

	Arrow annotation: Click and drag to create an arrow annotation. Drag the arrow tip or the label to change size and orientation. Grab the body of the arrow to move it as a whole. Double-click on the label to change the text.

Erasing annotations and measurements

	***Eraser mode*:** Click on any measurement or annotation (end-points, body, or label) to delete it.
	***Erase selected*:** Press this button to erase all selected annotations and measurements.

Visibility

	Show / Hide text: Select one or more series then press this button to toggle text annotations such as patient information, institution name, and examination parameters.
	Show / Hide measurements and annotations: Select one or more series then press this button to toggle measurements and annotations.
	Show all: Select one or more series then press this button to show all measurements and annotations.
	Hide all: Select one or more series then press this button to hide all measurements and annotations.

Clipboard

	Duplicate selected: Duplicates selected measurement and annotations.
	Copy: Select grid cells (implying whole series selection) or individual images (using the box at the top-left side of each grid cell) from the same or different image series and press this button to copy their measurements and annotations to the application clipboard (note that nothing is copied to the system clipboard).
	Cut: The same as “Copy” but measurements and annotations are eventually deleted from their source images.
	Paste: Select grid cells (implying whole series selection) or individual images (using the box at the top-left side of each grid cell) from the same or different image series and press this button to paste measurements and annotations from application clipboard to them.
	Replace: The same as “Paste” but any existing measurements and annotations in destination images are deleted before the clipboard contents are pasted into them.

Exporting

	Export: Select grid cells (implying whole series selection) or individual images (using the box at the top-left side of each grid cell) from the same or different image series and press this button to export them to various formats. The button opens a pop-up menu with export options including popular image file formats such as JPEG and PNG and exporting measurements to worksheets

MPR and MIP

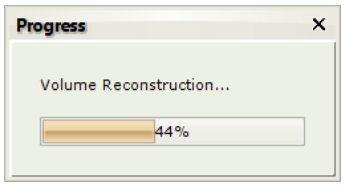
Evorad Workstation offers MPR, thick MPR, partial MIP and minIP visualization techniques.

Steps to activate the MPR/MIP tab:

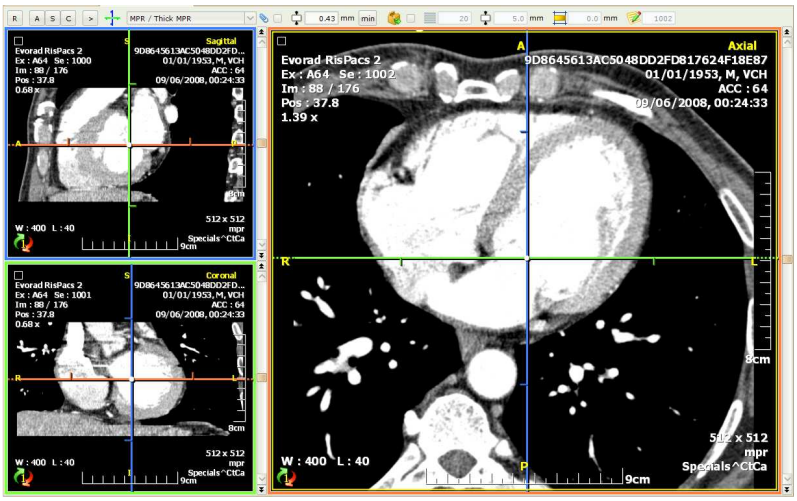
1. Select the image series to be processed.

2. Press the MPR/MIP button on the toolbar.

3. A progress bar dialog opens as the application loads the individual images in memory and then reconstructs a 3D volume from them.



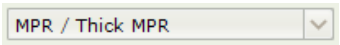
4. The MPR/MIP tab opens showing the three basic views of the 3D volume: namely axial, sagittal and coronal. Note that these views are computed based on the patient's coordinate system.



.

5. Change the orientation of the images in each view by rotating and translating in the other two views the axes that share the same color with the view's border.

6. Change the visualization technique:



7. Change the slice thickness:

Slice thickness is specified in the above section. The “min” button resets to the original ultra-thin slices for regular MPR.

Axis manipulation

To rotate an axis, put the mouse pointer after the short vertical line segments and drag. While dragging, you see the affected image rotating in real time. If the mouse pointer is dragged before the vertical line then the axis is translated accordingly unless the Ctrl key is pressed in which case rotation is performed. To move both axes drag their center point.

Additionally the following actions are available:

R	***Reset (orientation)***: Reset all images orientation to the default ones, axial for the central grid cell, sagittal and coronal for the two cells on the left side.
A S C	***Axial, Sagittal, Coronal***: Click to reset the current view to the corresponding orientation.
>	***Swap views***: Swaps the current view with the main one.
	Show/hide axes: Click to show or hide the axes in the current view.
	***Connect views*:** When checked, the current visualization technique is applied to all views. When unchecked, the technique is applied only to the main view.

Generate and save as new series

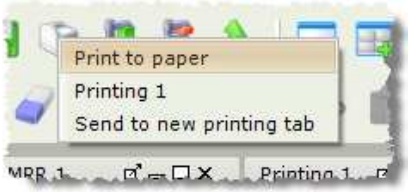
A new series can be generated and saved in the examination using the following section:

	Create Series: Check to activate this mode. Purple lines show in the secondary views the slices to be generated (main view).
20	***Slices number***: Total number of slices that will be generated.
5.0 mm	***Slice thickness***: The slices' thickness in millimeters (mm).
0.0 mm	***Slice gap***: Gap between consecutive slices in millimeters (mm). For continuous slices, enter 0 (no gap).
1002 MPR	***Series number and description***: Enter the number and series description that will be used to create the new series.
	Save: Click to save the generated slices in the examination.

Printing

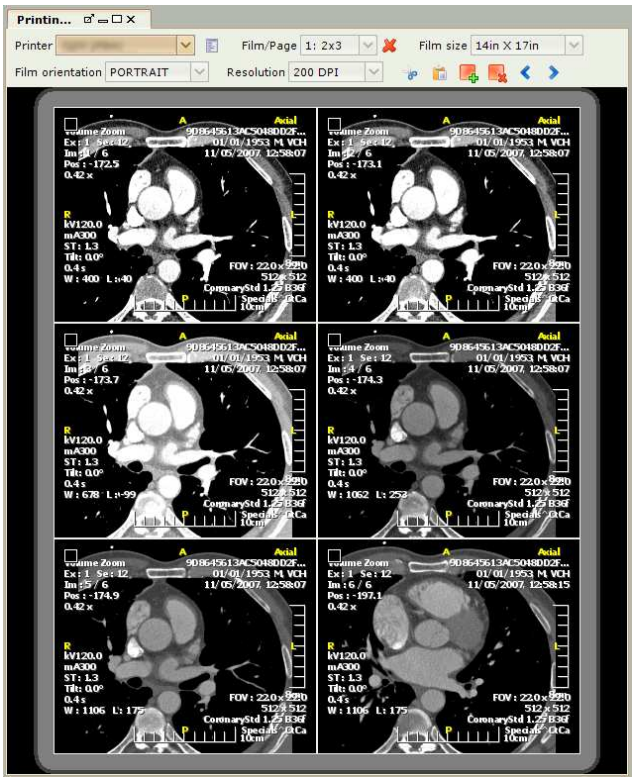
Depending on the context the Print button performs different actions:

If the current tab is a regular image series grid the following pop-up menu is displayed:



- The ***first option*** opens a printer selection dialog and prints current tab to a regular (e.g. laser, inkjet, etc) printer.
- The ***middle option*** sends current image/series selection to an existing printing tab. If no printing tabs are open then this option does not exist. If more than one printing tabs are open then we have accordingly more than one "middle" options.
- The ***last option*** creates a new printing tab for further image manipulation before printing to paper or for printing to a DICOM printer. In any case a dialog box is displayed to select the destination printing device.

One the other hand if the current tab is a printing tab then its defined pages are directly sent to the specified printer (regular or DICOM).



Printer	***Printer selection***: Change the selected printer and press the button next to the drop-down list to change its settings.
Film/Page 1: 2x3	***Film page***: View specific film/page layout and move to selected film page.
Film size 14in X 17in	***Film size***: Change current film/page size.
Film orientation PORTRAIT	***Film orientation***: Change current film/page orientation.
Resolution 200 DPI	***Print resolution***: Change selected printer resolution.
	Insert blank image.
	Delete selected image.

	Previous page/film.
	Next page/film.
	Cut: Cut selected images to the printing clipboard.
	Paste: Paste previously cut images from the printing clipboard.

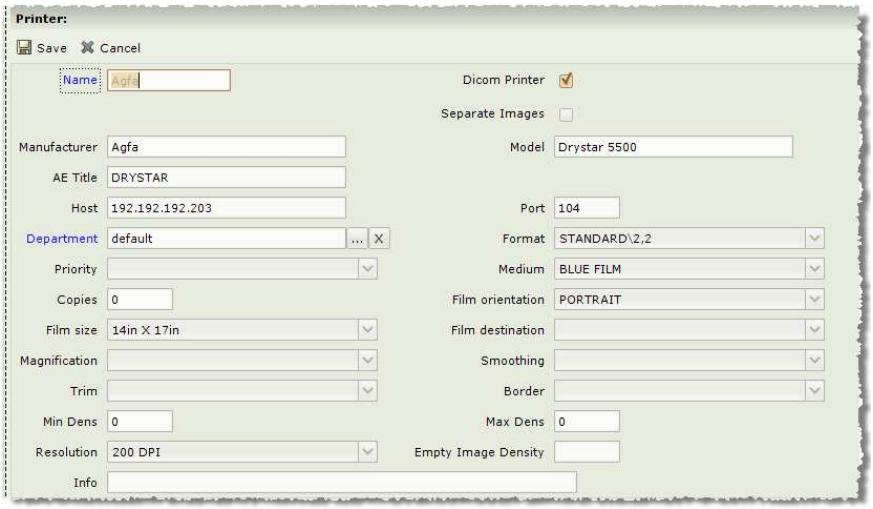
Configuring Printers

Printers can be defined in Equipment > Printers. Depending on the type of the printer two different sets of parameters/setting appear:

Common settings

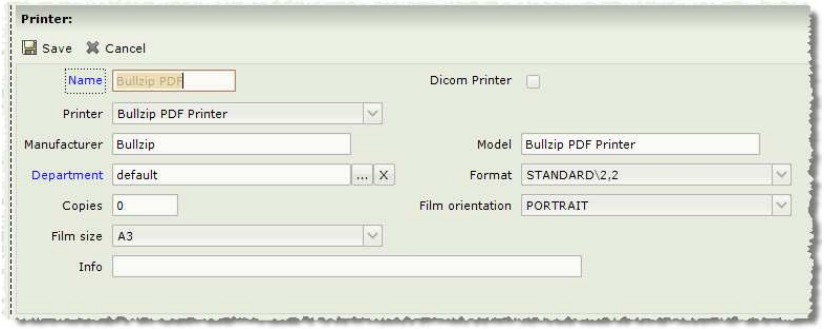
Printer Name:	Printer identification name
Printer Type:	Check if configuring printer is DICOM
Department:	Choose default department

DICOM Printer



AE Title:	DICOM Application Entity Title
Host:	IP address for DICOM
Port:	Port number for DICOM
Resolution:	Printer resolution in dpi
Medium:	Blue or Clear film or Paper
Format:	Film layout format
Film Orientation:	Portrait or Landscape
Film Size:	Select one of standard film sizes for DICOM printers

Regular (Paper) Printer



Printer: Select a system printer
Format: Film layout format
Film orientation: Portrait or Landscape
Film size: A3/A4 size for non DICOM printers

Modalities

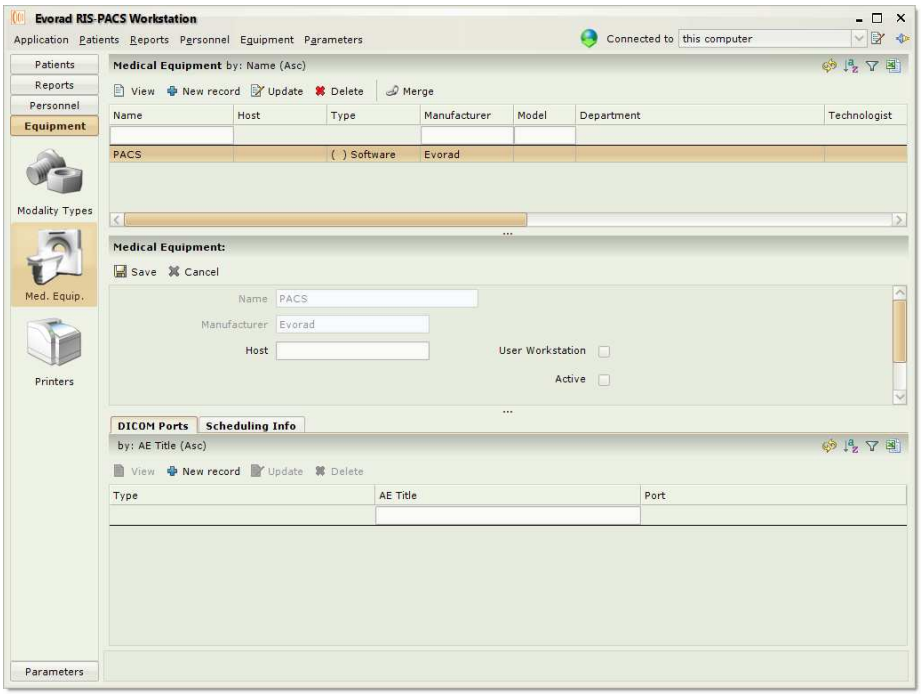
Evorad Workstation has separate views for defining:

- modalities to communicate with using the *DICOM* protocol,
- *hanging protocols* per modality type to specify automatic series layout schemes,
- named *predefined windows* (windows presets) per modality type.

Configuring DICOM

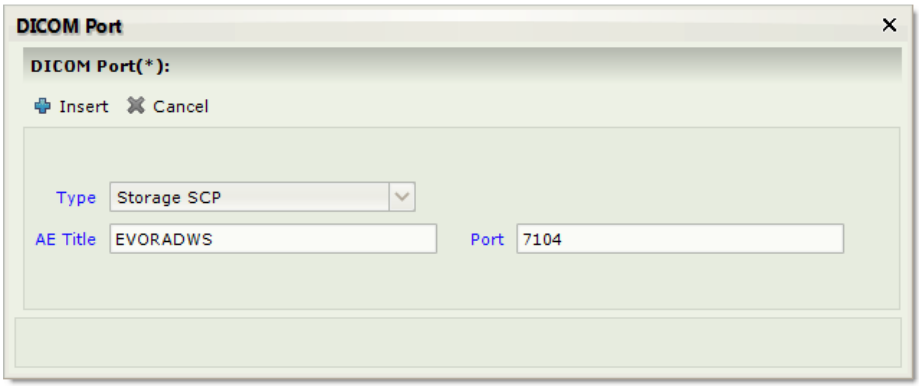
Modalities are accessible by the “Equipment” button on the left or the Equipment > Med. Equip. menu. Initially a special modality named “PACS” is inserted by the applications. This is for configuring and embedded DICOM server.

Select the “PACS” row in the table and press “Update” or just double click it to open its definition.



Use the “DICOM Ports” tab to configure DICOM. By pressing the “New Record” button a pop-up form appears requesting for specific information.

Any changes for the special “PACS” modality will not be effective until the Evorad Workstation is restarted. This does not apply to all other regular modalities.



The type of the port specifies the service that we need to activate based on the following table:

DICOM Port Type	Use
Storage SCP	For receiving image sent by modalities
Storage SCU	For sending images to modalities
Query SCP	For responding to Query/Retrieve requests from modalities
Query SCU	For issuing Query/Retrieve requests to modalities
Worklist SCP (Requires RIS)	For responding to Work-List requests from modalities
Worklist SCU (Requires RIS)	For issuing Work-List requests to Work-List providers

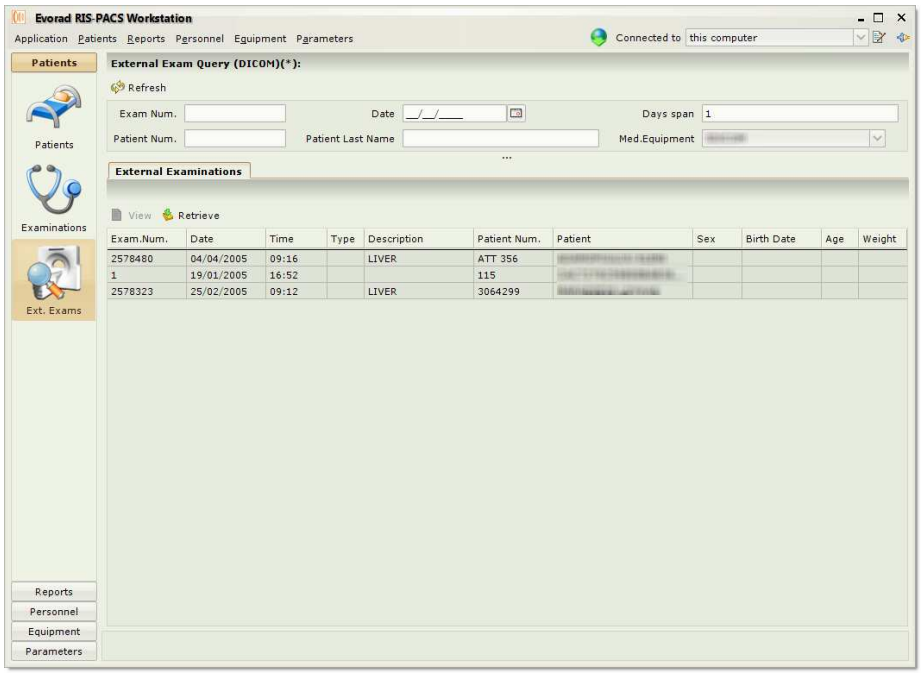
Modality records are created automatically when DICOM images are received by the Storage SCP service. Patient and Examination records are also created automatically based on the DICOM headers of the received images.

Modalities can also be defined manually using the “New record” button. If the modality actually corresponds to a medical imaging workstation then the “workstation” checkbox should be checked. In any case (manual or automatic), DICOM services should be configures for each one to enable image transfers.

The minimum configuration for all modalities, including the special “PACS” one, should include Storage SCP, Storage SCU, Query SCP, Query SCU services.

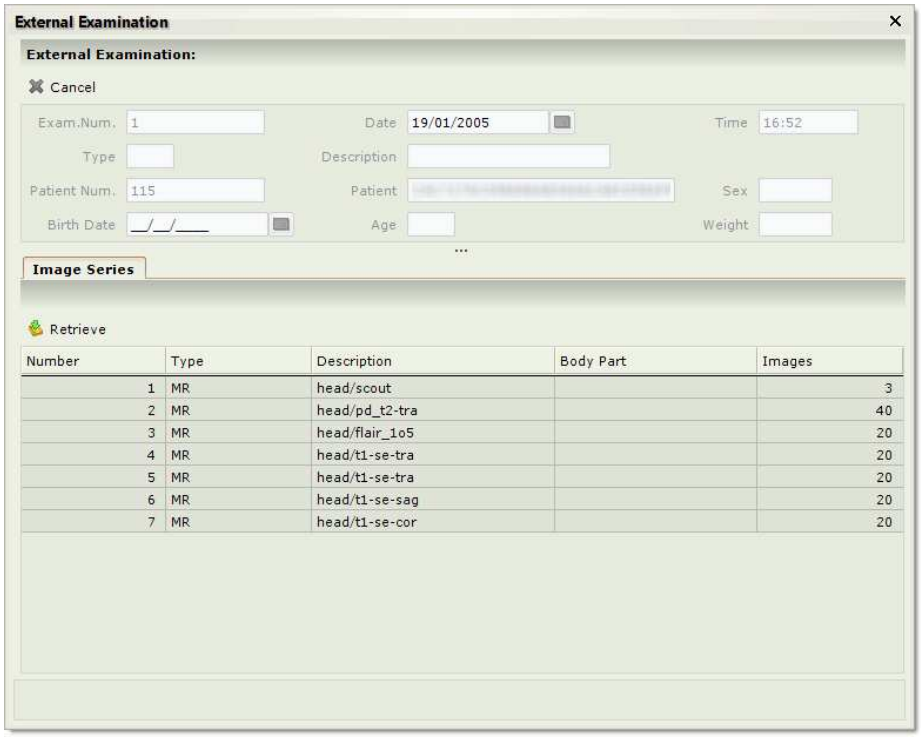
Querying modalities and retrieving images

The Query/Retrieve functionality is accessible by the “Ext. Exams” button on the left or the Patients > Ext. Exams menu. Fill in any filtering criteria at the top form of this view. The modality is required to specify the source of query.



By pressing the “Refresh” button at the top toolbar the modality is queried and the studies matching the given criteria appear in the list below (“External Examinations” Tab).

The “Retrieve” button sends the appropriate DICOM messages to the modality requesting a DICOM send of the selected studies. The progress of the process of receiving images can be monitored in the “Processes” view which is accessible from the corresponding button on the left or the Reports > Processes menu.

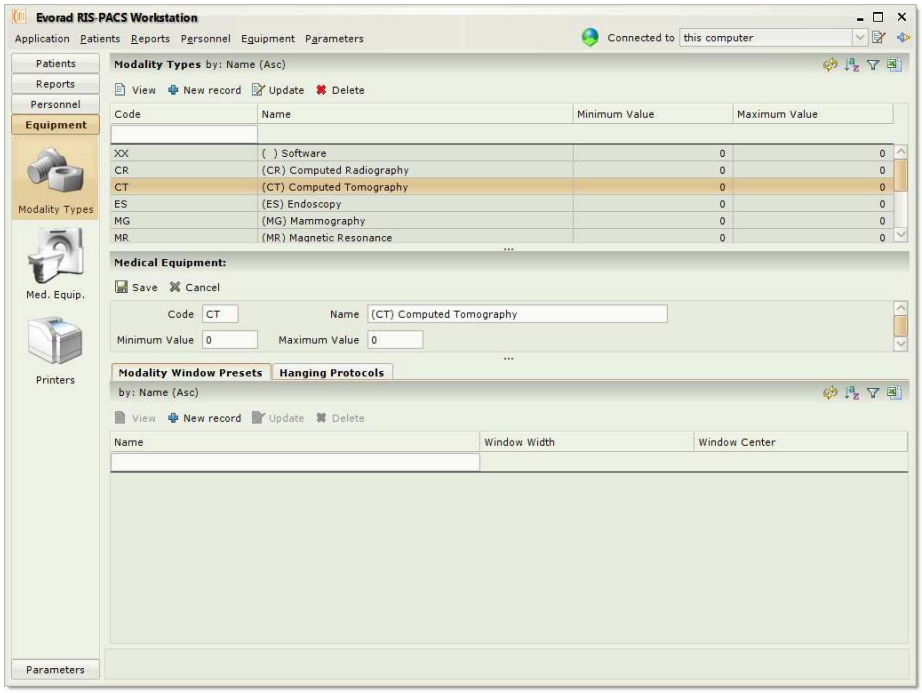


The “View” button open a popup view with the details of the study including the series that it contains. This view allows partial retrieval of selected series.

Modality Types

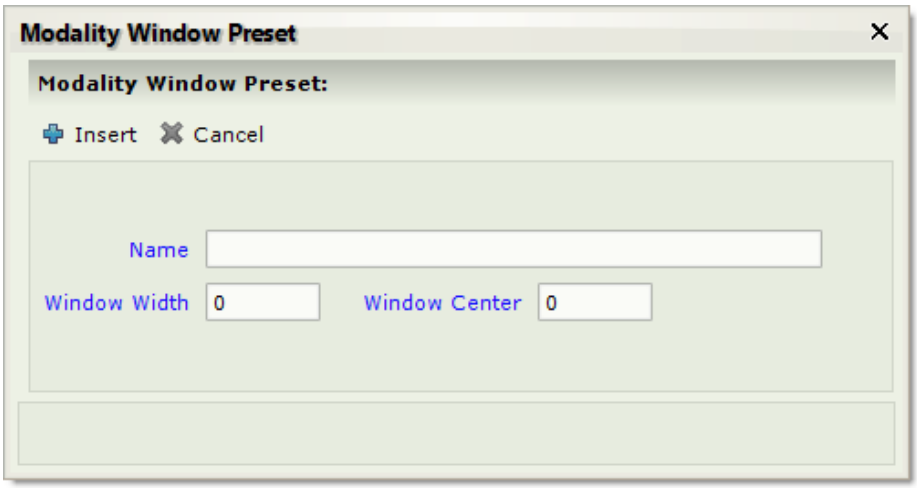
Modality Types are accessible by the “Equipment” button on the left or the Equipment > Modality Types menu.

By selecting a modality type (e.g. “CT”) and then pressing the “Update” button at the top toolbar, a form is displayed below the list and at the bottom of the form there is a set of tabs for predefined windows (modality windows presets) and hanging protocols.



Defining Modality Window Presets

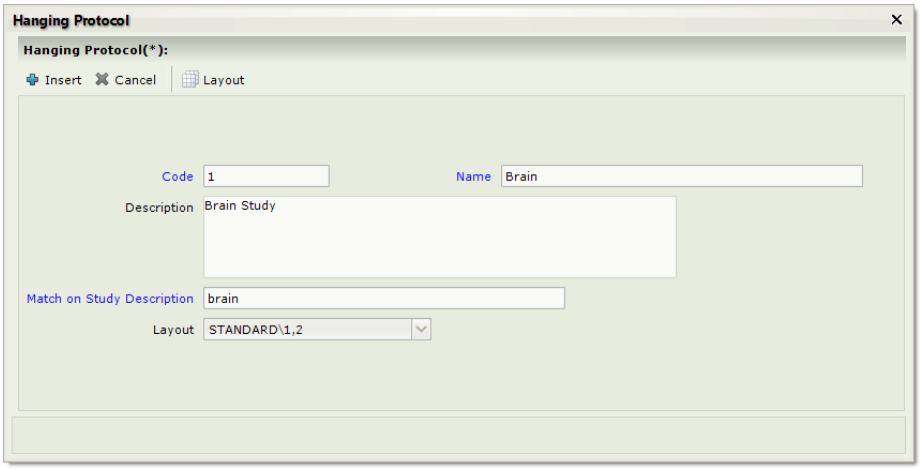
Press the “New Record” button at the top toolbar of the “Modality Window Presets” tab to open a pop-up form with window settings. More than one window can be defined per modality type provided that they have different names.



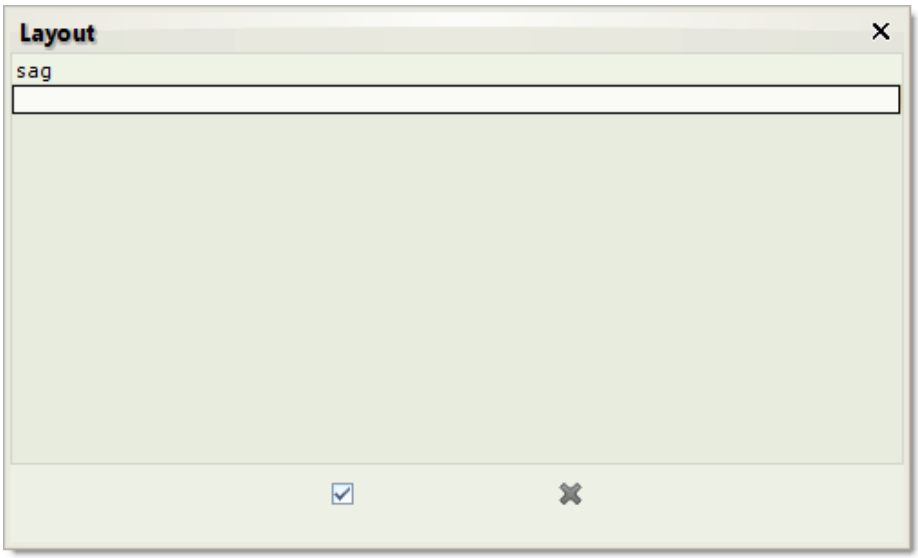
Defining Hanging Protocols

Press the “New Record” button at the top toolbar of the “Hanging Protocols” tab to open the definition pop-up form.

Each protocol should have a unique code and name. The description is optional but recommended for future reference.



Use the “Match on Study Description” to provide a pattern that the DICOM study description of an exam should match to select this specific protocol for application. Then select the required layout (e.g. 2 X 2).



The next step is to press the “Layout” button at the top toolbar of the dialog box to open a pop-up window with a grid corresponding to the selected layout. Each cell of the grid corresponds to an image series of the defined layout. A pattern needs to be entered in each sell to match the DICOM series description of the image series to be displayed in the corresponding view of the layout.

Patterns for study and series descriptions follow the regular expression format.

Summary of regular-expression constructs

Characters

x	The character x
\\	The backslash character

Character classes

[abc]	a, b, or c (simple class)
[^abc]	Any character except a, b, or c (negation)
[a-zA-Z]	a through z or A through Z, inclusive (range)
[a-d[m-p]]	a through d, or m through p: [a-dm-p] (union)
[a-z&&[def]]	d, e, or f (intersection)
[a-z&&[^bc]]	a through z, except for b and c: [ad-z] (subtraction)
[a-z&&[^m-p]]	a through z, and not m through p: [a-lq-z](subtraction)

Predefined character classes

.	Any character (may or may not match line terminators)
\d	A digit: [0-9]
\D	A non-digit: [^0-9]
\s	A whitespace character: [\t\n\x0B\f\r]
\S	A non-whitespace character: [^\s]
\w	A word character: [a-zA-Z_0-9]
\W	A non-word character: [^\w]

Boundary matchers

^	The beginning of a line
$	The end of a line

\b	A word boundary
\B	A non-word boundary
\A	The beginning of the input
\G	The end of the previous match
\Z	The end of the input but for the final terminator, if any
\z	The end of the input

Quantifiers

X?	X, once or not at all
X*	X, zero or more times
X+	X, one or more times
X{n}	X, exactly n times
X{n,}	X, at least n times
X{n,m}	X, at least n but not more than m times

Logical operators

XY	X followed by Y
X|Y	Either X or Y
(X)	X, as a capturing group

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