

Sante PACS Server

The Web Server Module

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Overview

The Web Server module lets remote users of the system connect with it, query and retrieve studies that have been stored in the database of the DICOM Server. The Web Server module, for these connections, uses the HTTP protocol of the internet and the remote user must use a web browser like **Edge**, **Chrome** or **Mozilla** to query and retrieve studies.

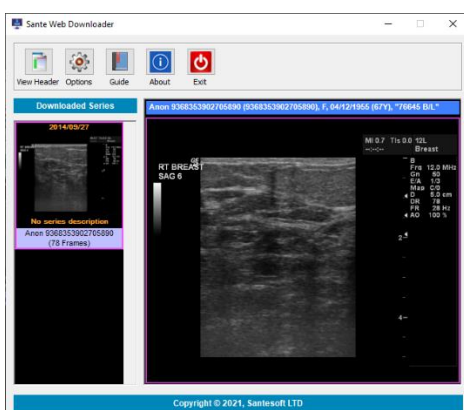
Free Applications

The remote user, from the initial web page of the web server can download and install two free applications for use with this server, Sante Web Downloader and Sante DICOM Web Viewer.

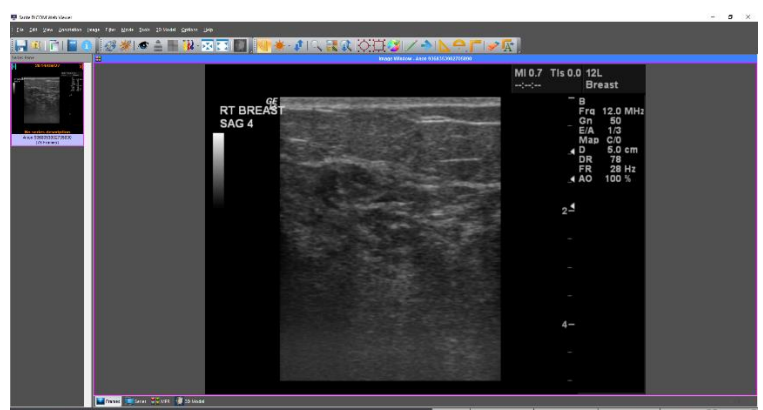


Sante Web Downloader lets the user inspect the downloading procedure. In the end of receiving Sante Web Downloader saves the received studies in a Zip file. The user can configure Sante Web Downloader to open the saved zip file with a DICOM Viewer of his/her choice like Sante DICOM Viewer Pro or Sante DICOM Editor. The DICOM Viewer must support opening zip files from command line. For more information, please read the **User Guide** of Sante Web Downloader. This application is useful when a remote user wishes to use a DICOM Viewer other than Sante DICOM Web Viewer.

Sante DICOM Web Viewer lets the user to inspect the downloading procedure as Sante Web Downloader does, but also it is a fully functional, feature rich, completely free 2D/3D DICOM Viewer, with all the necessary tools like measurements, MPR, and study/series comparison and allows the user to work smoothly in a multi-modality, multi-manufacturer environment. For more information please read the **User Guide** of the application.



Sante Web Downloader



Sante DICOM Web Viewer

Configure the HTTP Server

Select the menu command "Network ➔ HTTP Server Setup".

A dialog box appears and lets the user configure the HTTP server module.

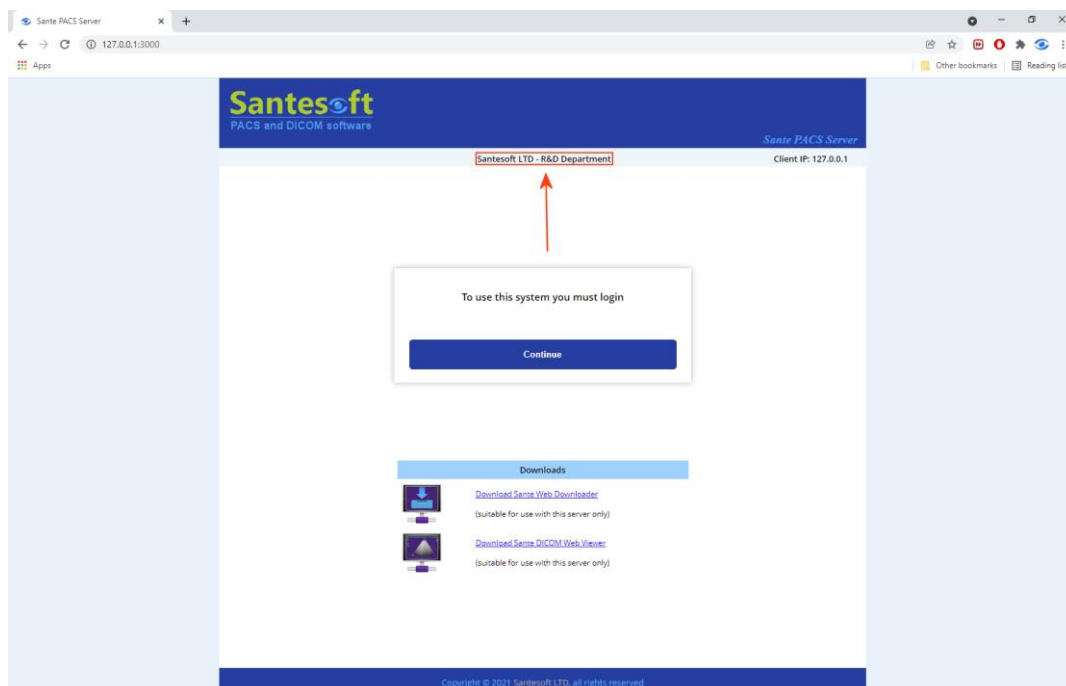
The screenshot shows the "Sante PACS Server" dialog box with the "HTTP Server Configuration" tab selected. The dialog is divided into several sections:

- This Web Server:**
 - Institution: Santesoft LTD
 - Department: R&D Department
 - Internet IP Address (True IP): 77.49.171.16
 - Local IP Address: 192.168.1.6
 - Web IP Port (must be forwarded by the router): 3000
 - Enable SSL Encryption:
 - Web server name (e.g. mycompany.com): [Empty field] (Keep this field blank if there is no a valid DNS server name)
- Web Server Usage:**
 - Send to web client zip files that contain:
 - Web Server Users...
 - DICOM files JPEG lossless compressed
 - Web Server Log...
- Accessibility of studies via tokens:**
 - Studies are accessible via tokens for:
 - 2 Months (60 Days)

At the bottom right, there are "OK" and "Cancel" buttons.

Institution, Department

This information appears on the web page of the server and informs the user with which server he has been connected.



Internet IP Address (True IP)

The internet IP address is received automatically from the internet service provider and it is the address with which the HTTP server goes to the internet. The user cannot change it.

Web IP Port

With this port the HTTP server goes to the internet. If the number of the Web port is equal to 0 the program does not open the port and the program cannot communicate with web clients. The port number 0 can be used if the user wants the HTTP server module to be disabled.

ATTENTION!

The Web IP port of the HTTP server must be forwarded by the router!

Web server name

This field is used by the database for creation of fully qualified study tokens, which are used by patients to retrieve their studies. If the server does not have a valid DNS name or the “**Web server name**” field has been kept blank, the database interface of the sever uses the “**Internet IP Address (True IP)**” arithmetic value for creating a token with a valid fully qualified web address:

<http://77.49.171.16:3000/token?4m5RHRCmSrWYcnmk8ICThvq0qy2KHA7K5ZldW7ZDNsEKsZ68NcJU4b83UtnYJfwx>

ATTENTION!

The Web server name must be kept blank if there is not a valid DNS server name!

Enable SSL Encryption

Because of the critical data contained in the server it is **strongly** recommended the HTTP server module to be used with the SSL encryption enabled and if it is possible only within VPN connections.

To get an SSL Certificate, the user must have a valid **ICAN** (Internet Corporation for Assigned Names) server name like **santesoft.com**.

When the user checks the **Enable SSL Encryption** checkbox, the program asks for the certificate file (.crt) and the private key file (.key) that the user has received from the SSL Certificate provider of his choice.

The screenshot shows a dialog box titled "Sante PACS Server" with a close button (X) in the top right corner. The dialog has a blue header bar that says "Select SSL Files". Below the header, there are two sections: "Certificate File" and "Private Key File". Each section has a text input field and a "Select..." button to its right. At the bottom of the dialog, there are three buttons: "OK", "Clear values", and "Cancel". The "OK" button is highlighted with a dashed border.

Study Accessibility

This combo box lets the user define the time that a patient or a remote physician can access studies via the mechanism of tokens. The time starts to count from the study date. With this control the user can reduce the workload of the server that is produced by remote users.

How to use the server

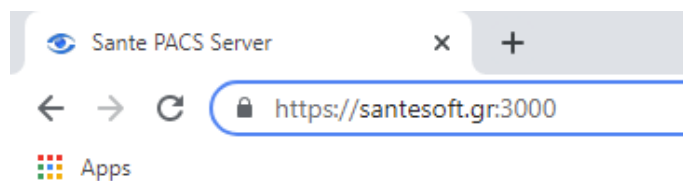
The user must use a web browser like **Edge**, **Chrome** or **Mozilla** to communicate with the web server.


If the SSL Encryption is enabled

The user must put in the address bar of the browser (Edge, Chrome or Mozilla) the server's ICAN name followed by a colon and the selected port. The protocol must be the encrypted https:// protocol.

e.g.

https://santesoft.gr:3000



Please note the padlock symbol  before the name of the server. That means that the encrypted protocol is used.

The local IP Address (e.g. 192.168.1.10) or the localhost IP Address 127.0.0.0 do not work because the encrypted https:// protocol requires a valid server name.

https://192.168.1.10:3000 (does not work)

https://127.0.0.1:3000 (does not work)

Furthermore, the simple protocol **http://** (without "s") does not work

http://santesoft.gr:3000 (does not work)

http://192.168.1.10:3000 (does not work)

http://127.0.0.1:3000 (does not work)

If the SSL Encryption is not enabled

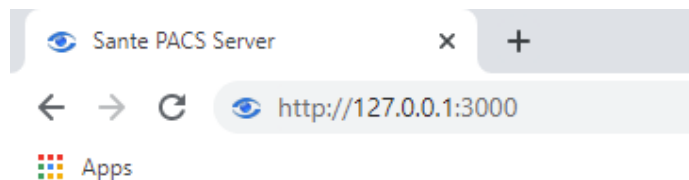
The user must put in the address bar of the browser (Edge, Chrome or Mozilla) the server's ICAN name, the local IP Address (e.g. 192.168.1.10) or the localhost IP Address 127.0.0.0 followed by a colon and the selected port. The protocol must be the simple http:// protocol.

e.g.

http://santesoft.gr:3000

http://192.168.1.10:3000

http://127.0.0.1:3000



Furthermore, the encrypted protocol **https://** (with "s") does not work

https://santesoft.gr:3000 (does not work)

https://192.168.1.10:3000 (does not work)

https://127.0.0.1:3000 (does not work)

ATTENTION!

We strongly discourage the use of the server with the SSL Encryption disabled. In that case it must be used only with VPN connections.

Edit button

This button is enabled when the user has selected a row of the HTTP Server User list and lets the administrator to add more useful information about the web user like the real name of the web user and his/her contact information.

“Is Active User” option

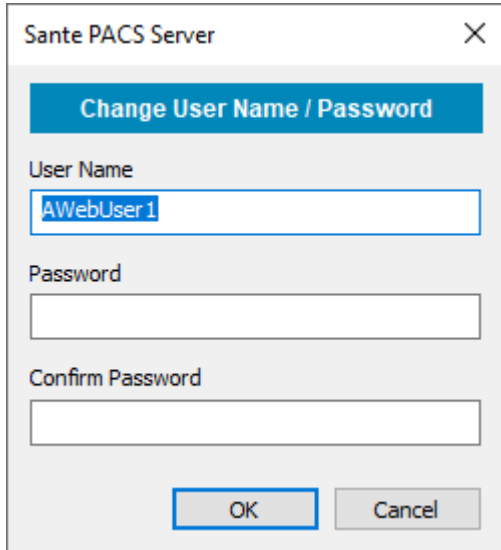
With this option the administrator can permit or prohibit the login of the user into web server, temporarily or permanently.

“Can upload files” option

If the **“Can upload files”** option is enabled, the query web page of the server displays a section for file uploading. Otherwise, this section does not appear. The files to be uploaded can be DICOM files or zip files that contain DICOM files that will be inserted into PACS server, and text files that contain HL7 messages that will be inserted into Worklist server.

Change User Name/Password button

By pressing this button, a dialog box appears and lets the user change the **User Name** and the **Password** of a web user. The password must be at least 8 characters and it is **strongly** recommended the rules of selecting a strong password to be followed. That means the password must be a mix of lowercase and uppercase numbers and symbols. This button is enabled when the user has selected a row from the HTTP Server User list.

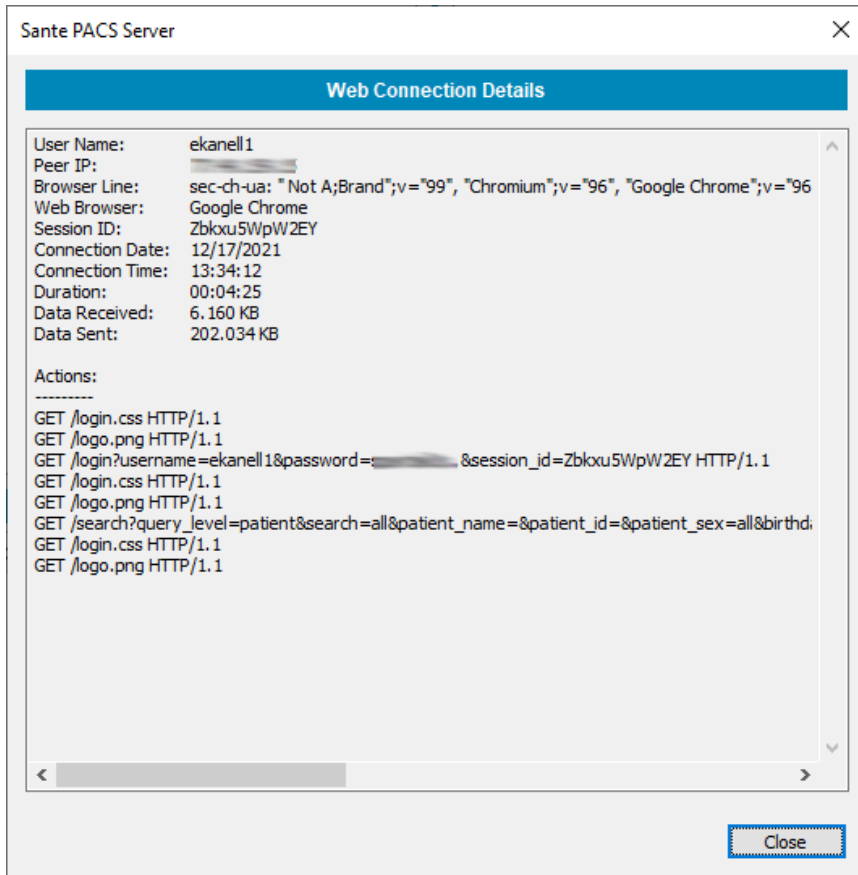


The image shows a dialog box titled "Sante PACS Server" with a close button (X) in the top right corner. Below the title bar is a blue button labeled "Change User Name / Password". Underneath, there are three input fields: "User Name" containing the text "AWebUser1", "Password" (empty), and "Confirm Password" (empty). At the bottom of the dialog are two buttons: "OK" and "Cancel".

Delete button

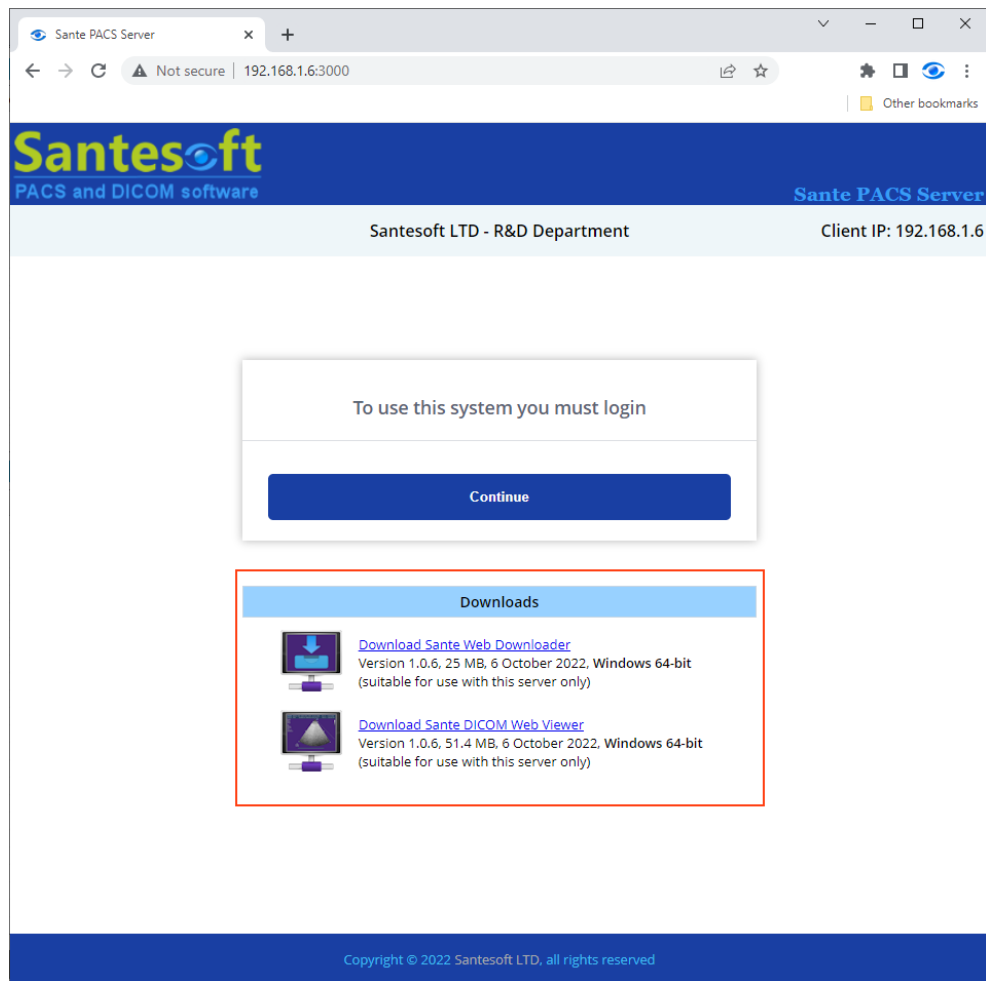
This button deletes a web user from the list and it is enabled when the user has selected a row of the HTTP Server User list.

To get a detailed report about every connection in all the three above lists, the user must double-click on the desired row. A dialog box appears and displays all the activity of the web user.



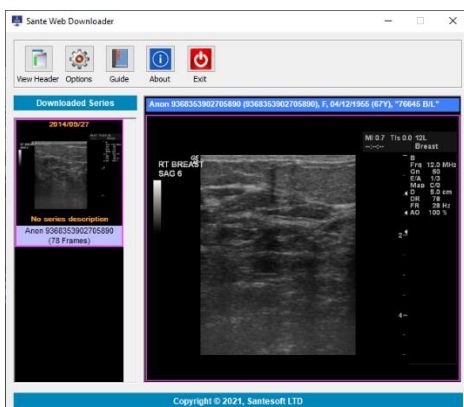
Remote connection with an internet browser

The initial page of the server informs the user that must have an account and must login to connect with the server. Also, it provides links for the two free applications, Sante Web Downloader and Sante DICOM Web Viewer.



Sante Web Downloader lets the user review the downloading procedure. In the end of receiving Sante Web Downloader saves the received studies in a Zip file. The user can configure Sante Web Downloader to open the saved zip file with a DICOM Viewer of his/her choice like Sante DICOM Viewer Pro or Sante DICOM Editor. The DICOM Viewer must support opening zip files from command line. For more information, please read the **User Guide** of Sante Web Downloader. This application is useful when a user wishes to use a DICOM Viewer other than Sante DICOM Web Viewer.

Sante DICOM Web Viewer lets the user review the downloading procedure as Sante Web Downloader does, but also it is a full featured, completely free 2D/3D DICOM Viewer, with all the necessary tools like measurements and study/series comparison and allows the user to work smoothly in a multi-modality, multi-manufacturer environment. For more information, please read the **User Guide** of the application.



Sante Web Downloader



Sante DICOM Web Viewer

The next page of the server asks the remote user for the username and the password. The administrator of the system must create an account for every user of the web server.

The next page of the server allows the user to query the PACS server remotely and find the studies of the desired patient and/or the studies of the desired date. The search criteria can be the patient's name, the patient ID, the patient sex, the patient birthdate, the study date, the accession number, the institution, the referring physician and the modality.

From this page the user can also upload files that can be DICOM files and zip files that contain DICOM files that will be inserted into PACS server, and text files that contain HL7 messages that will be inserted into Worklist server. The user can upload files if the administrator of the system has given this right to the particular remote user. Otherwise, the section of the page that allows uploading of files does not appear.

To search within a range of dates, the user must select the dates in the “Study date from” and “Study date to” and in the “Search” combo box must select the item “With Study Date”.

Query		
	<div style="border: 1px solid red; padding: 2px;"> Search With Study Date ▼ </div>	
Patient Name <input type="text"/>	Patient ID <input type="text"/>	Patient Sex All ▼
Date of birth <input type="text" value="mm/dd/yyyy"/>	<div style="border: 1px solid red; padding: 2px;"> Study date from <input type="text" value="01/20/2022"/> </div>	<div style="border: 1px solid red; padding: 2px;"> Study date to <input type="text" value="01/31/2022"/> </div>
Accession number <input type="text"/>	Institution <input type="text"/>	Referring Physician <input type="text"/>
Modality ALL ▼		
<div style="background-color: #0056b3; color: white; padding: 5px 15px; border-radius: 3px; display: inline-block;">Submit</div>		

After a query the system displays the patient results if any.

The screenshot shows the Santesoft PACS and DICOM software interface. The browser address bar shows the URL: 192.168.1.6:3000/search/query_level=patient&search=all&patient_name=anonymous+1&patient... The page header includes the Santesoft logo, "PACS and DICOM software", and "Sante PACS Server". The user is logged in as "Santesoft LTD - R&D Department" with a client IP of "192.168.1.6".

The main content area displays a table titled "Patients" with the following columns: #, Patient Name, Patient ID, Sex, Birthdate, and Actions. The table contains six rows of patient data:

#	Patient Name	Patient ID	Sex	Birthdate	Actions
0001	Anonymous 1042	91252	F		[Download] [Web Downloader] [DICOM Viewer] [Search]
0002	Anonymous 1051	10385145500009			[Download] [Web Downloader] [DICOM Viewer] [Search]
0003	Anonymous 1054	10385145500073			[Download] [Web Downloader] [DICOM Viewer] [Search]
0004	Anonymous 1064	无ID	M		[Download] [Web Downloader] [DICOM Viewer] [Search]
0005	Anonymous 1069	10385150047066			[Download] [Web Downloader] [DICOM Viewer] [Search]
0006	Anonymous 1128	10385150614080			[Download] [Web Downloader] [DICOM Viewer] [Search]

Below the table is a "Go Back" button. The footer of the page contains the copyright notice: "Copyright © 2022 Santesoft LTD, all rights reserved."

There are four buttons for patient result manipulation:




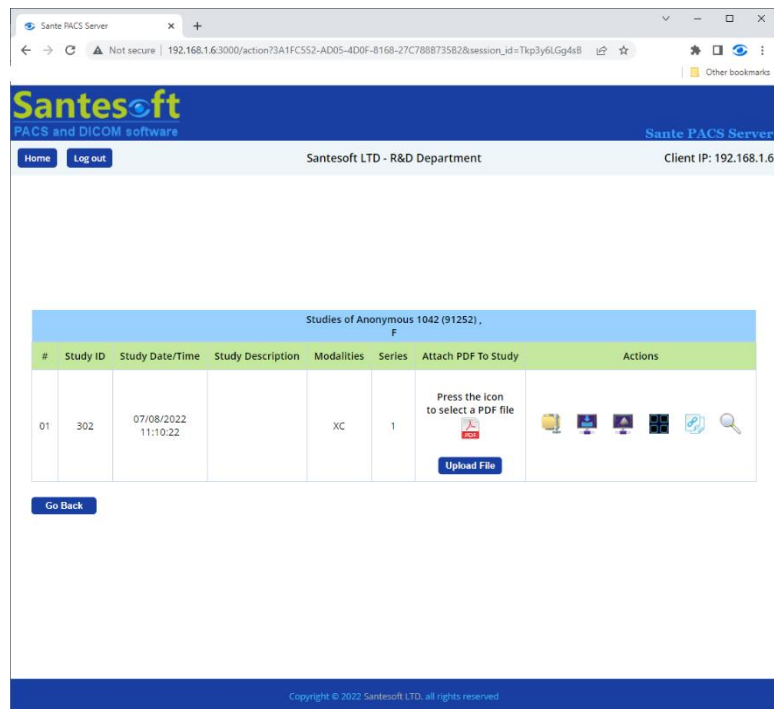
With this button the user can download all the studies of the patient in a zip file.

With this button the user can download all the studies of the patient with Sante Web Downloader.

With this button the user can download all the studies of the patient with Sante DICOM Web Viewer.

With this button the user can review all the studies of the patient.

If the user selects to review all the studies of a patient with the button  a new page appears with the study results.



Press the icon
to select a PDF file



Upload File

The remote user can attach a PDF report file to a study by using the **“Upload File”** button of the study’s row. Before that, a PDF file must be selected by pressing the **“Select PDF File”** icon.

There are other five buttons for study result manipulation:



With this button the user can download all the series of the study in a zip file.



With this button the user can download all the series of the study with Sante Web Downloader.



With this button the user can review all the series of the study with Sante DICOM Web Viewer.




With this button the user can review all the series of the study with the OHIF (Open Health Imaging Foundation) Viewer. This viewer works without installation in all systems (PCs, mobile phones, tablets, Windows, MacOS, Linux, Android, iOS etc.)

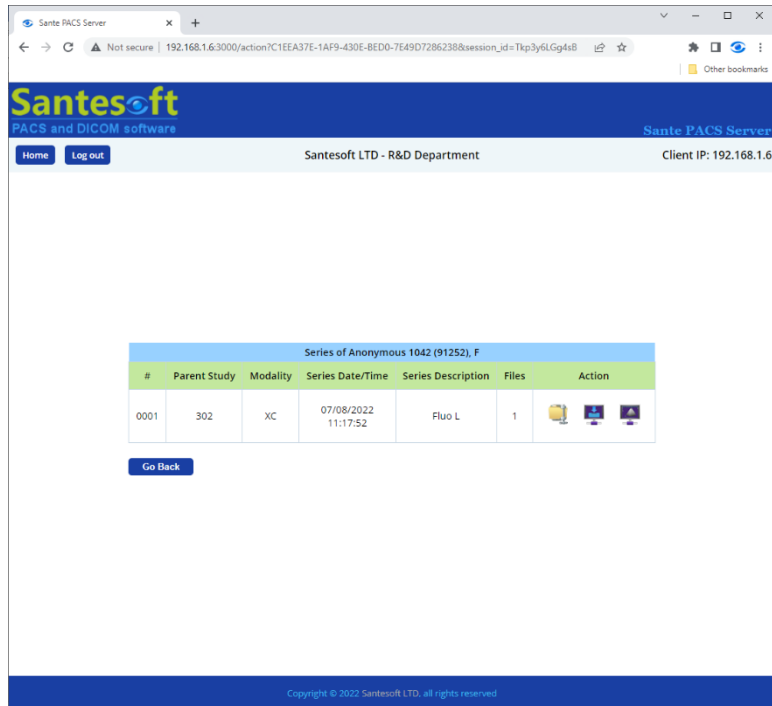


With this button the user can copy to clipboard the token of the study






With this button the user can review all the series of the study.

If the user selects to review all the series of a study with the button  a new page appears with the series results.



The screenshot shows a web browser window displaying the Santesoft PACS and DICOM software interface. The page title is "Santesoft PACS and DICOM software" and "Sante PACS Server". The user is logged in as "Santesoft LTD - R&D Department" with a client IP of "192.168.1.6". The main content area displays a table of series results for "Series of Anonymous 1042 (91252), F".

#	Parent Study	Modality	Series Date/Time	Series Description	Files	Action
0001	302	XC	07/08/2022 11:17:52	Fluo L	1	  

Below the table is a "Go Back" button. The footer of the page contains the text "Copyright © 2022 Santesoft LTD, all rights reserved".

Now, there are three buttons for series result manipulation:



With this button the user can download all the files of the series in a zip file.



With this button the user can download all the files of the series with Sante Web Downloader.



With this button the user can review all the series of the study with Sante DICOM Web Viewer.

Study retrieving by patients

Study retrieving with use of token

Patients can retrieve their studies from the web interface of the server. For that purpose, it is used a mechanism of tokens. A **token** is a keyword, 64 characters wide, that is unique for every study and it has a form similar to:

4m5RHRCmSrWYcnmk8ICTHvg0qy2KHA7K5ZldW7ZDNsEKsZ68NcJU4b83UtnYJfwx

By using a token like that, patients can have access to their studies from the web interface of the server, without having a user account on the server. The 64 characters wide token is way more secure than a user account with a username usually 8-12 characters wide and a password usually 8-12 characters wide and it does not require extra management like the creation of patient accounts. The patient's page on the server is like that:

The screenshot shows a web browser window with the URL `77.49.171.16:3000/token?S3WxByfduCpO5A9oQdr8CnBBBnedEiMhSme...`. The page header includes the Santesoft logo and "PACS and DICOM software". The main content area displays the following information:

- Patient name: Anonymous 1042
- Study ID: 302
- Study description:
- Study date/time: 07/08/2022 11:10:22
- Modalities: XC

Below the details, there are three main sections:

- Press here to view the study on-line with OHIF Viewer:** A link with an OHIF Viewer icon labeled "View the study on-line".
- Press here to view the study on-line with Sante DICOM Web Viewer:** A link with a Sante DICOM Web Viewer icon labeled "View the study on-line". A note below states: "(Sante DICOM Web Viewer must be installed, [download it from here](#))".
- Press here to download the study:** A link with a zip file icon labeled "Zip file of the study".
- Press here to download a free image viewer for the study:** A link with a Sante DICOM Viewer Lite icon labeled "Sante DICOM Viewer Lite".

Instructions:

1. Download and install Sante DICOM Viewer Lite (requires Windows 64-bit)
2. Download the zip file of the study
3. Run Sante DICOM Web Viewer, select the menu command "File->Open Zip File" and open the zip file of the study

The footer of the page contains the text: "Copyright © 2022 Santesoft LTD, all rights reserved".

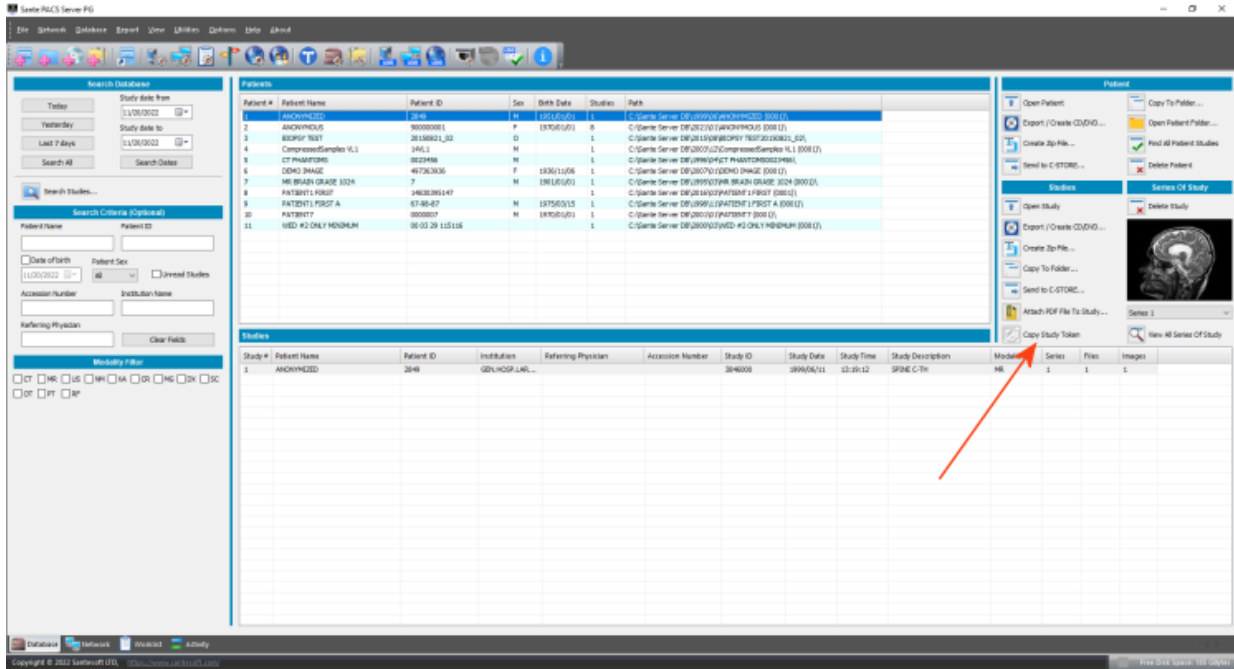
This page lets the users download their study and a free program to view them.

Obtaining the token of a study

There are two ways for obtaining the token of the study for sending to patient, from the interface of the database and from the web interface.








From the database

Select the study and press the **“Copy Study Token”** button. The token is copied to clipboard.



From the web interface

Studies of Anonymous 1042 (91252), F

#	Study ID	Study Date/Time	Study Description	Modalities	Series	Attach PDF To Study	Actions
01	302	07/08/2022 11:10:22		XC	1	Press the icon to select a PDF file  Upload File	      Copy study's token to clipboard

Go Back

If the browser does not allow copying to clipboard (it is a user option), the user must mark and copy the token manually.



Token with fully qualified web address

To access a study from the web, patients need a token with a fully qualified web address, i.e. a token with the web address of the server behind it: <http://mycompany.com:3000/token?4m5RHRCmSrWYcnmk8lCThvg0qy2KHA7K5ZldW7ZDNsEKsZ68NcJU4b83UtnYJfwx>

The token that is provided from the web interface of the server is always fully qualified, because the web interface knows its web address. The token that is provided by the database interface does not know the web address of the server. To solve this issue the user must set the web address of the server by using the menu command “**Network** → **HTTP Server Setup**”:

Sante PACS Server [X]

HTTP Server Configuration

This Web Server

Institution: Department:

Internet IP Address (True IP): 77.49.171.16
Local IP Address: 192.168.1.6

Web IP Port (must be forwarded by the router): Enable SSL Encryption

Web server name (e.g. mycompany.com): (Keep this field blank if there is no a valid DNS server name)

Web Server Usage

Send to web client zip files that contain:

Accessibility of studies via tokens

Studies are accessible via tokens for:

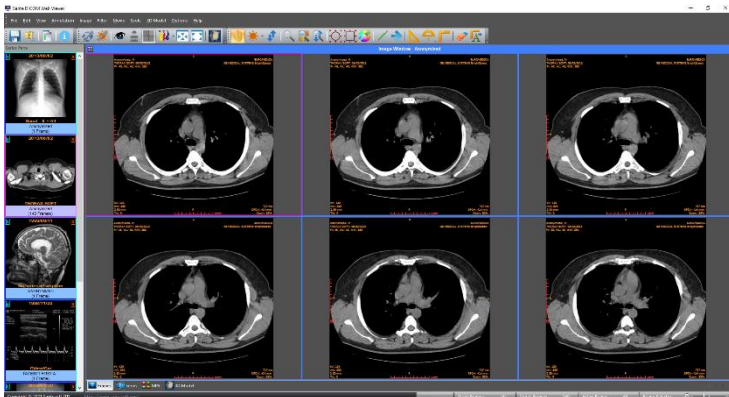
If the server does not have a valid DNS name or the “**Web server name**” field has been kept blank, the database interface of the sever uses the “**Internet IP Address (True IP)**” arithmetic value for creating a token with a valid fully qualified web address:

<http://77.49.171.16:3000/token?4m5RHRCmSrWYcnmk8lCThvg0qy2KHA7K5ZldW7ZDNsEKsZ68NcJU4b83UtnYJfwx>

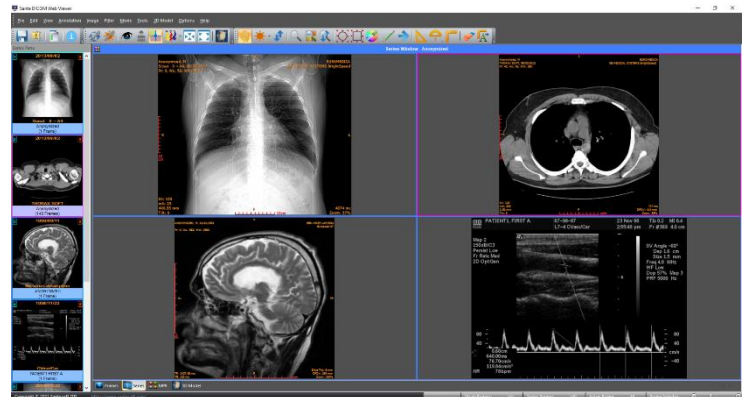
This fully qualified web address with the token must be sent to the patient. The patient has just to double-click it to go to the study’s page.

Sante DICOM Web Viewer

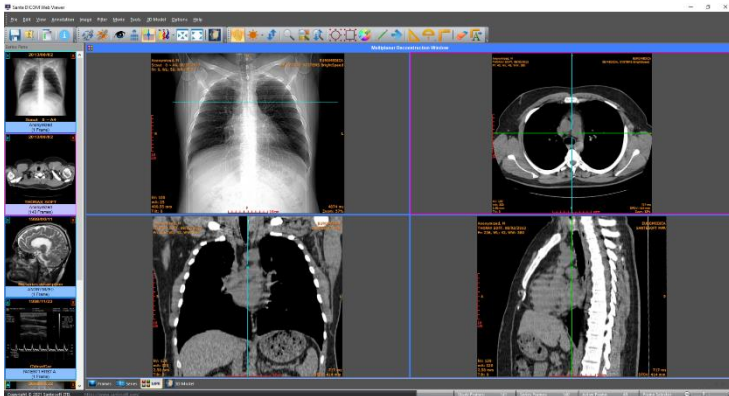
Sante DICOM Web Viewer is a fully functional, feature rich 2D/3D DICOM Viewer. For more information please read the **User Guide** of the application.



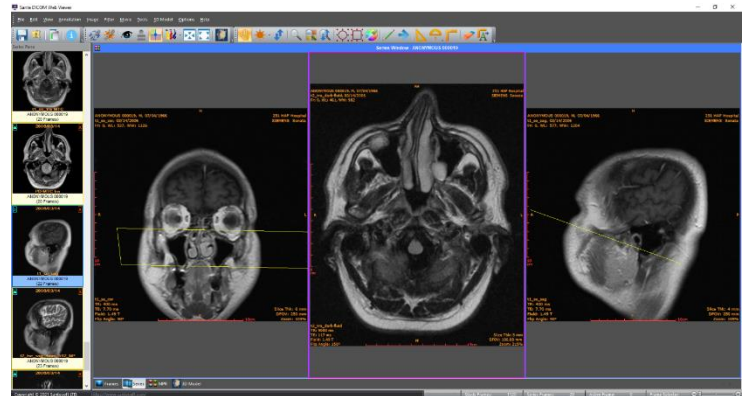
Frame View – 6 Tiles



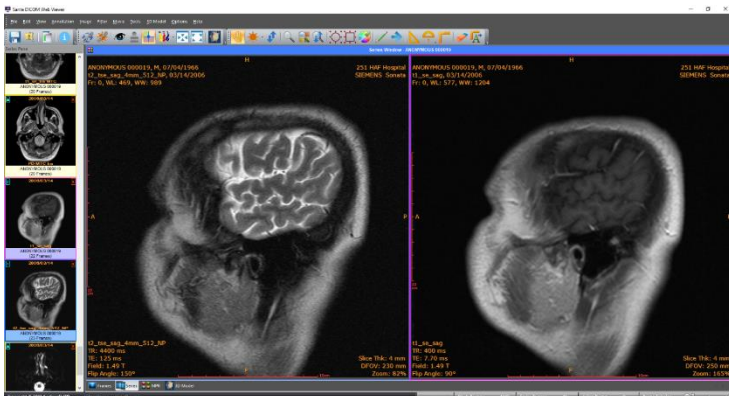
Series View – 4 Tiles



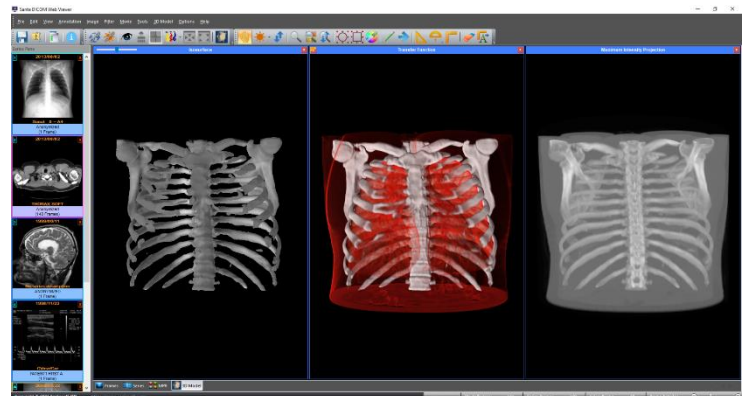
MPR View



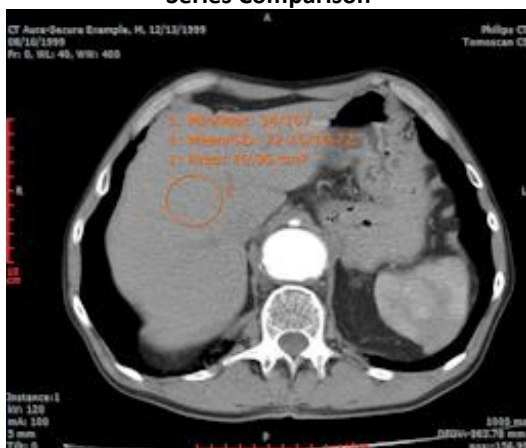
Scout lines – Localizer



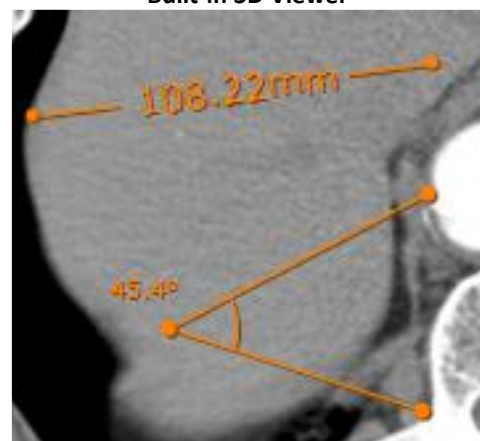
Series Comparison



Built-in 3D Viewer



ROI Statistics



Distance and Angle Measurements

The OHIF (Open Health Imaging Foundation) Viewer

The Open Health Imaging Foundation (OHIF) was launched in 2015 through a development partnership between Massachusetts General Hospital (MGH) Department of Radiology and Radical Imaging to create an open source web-based medical imaging platform for the global community. The partnership combines the project management, user experience design, and product testing experience of the MGH group with the software development and system design expertise of Radical Imaging. Funding for OHIF has been primarily through research grants to MGH, direct funding from MGH Department of Radiology and its Precision Imaging Metrics clinical trials informatics project, Radical Imaging through in-kind support, and academic-industry technical collaborations among MGH, Radical, and companies using the OHIF Framework. (From the web site of OHIF)

The MIT License

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The interface of the OHIF Viewer

The screenshot displays the OHIF Viewer web interface. The browser address bar shows the URL: `192.168.1.6:3000/viewer/1.2.392.200046.100.3.4.300071.302.20220708111310`. The interface includes a top navigation bar with the Open Health Imaging Foundation logo, a "Study List" button, and the text "INVESTIGATIONAL USE ONLY" and "Options". Below this is a toolbar with various icons for Series, Stack Scroll, Zoom, Levels, Pan, Length, Annotate, Angle, Reset, CINE, More, and Layout. A "Measurements" button is also present. The main area shows a large medical image (FluoL) with a zoom level of 21%. The image is labeled "91252" and "Jul 8, 2022 11:10:22". The bottom left corner shows "Ser: 5" and "4992 x 3328". The bottom right corner shows "Zoom: 21%", "W: 207 L: 104", and "Lossy: NaN : 1".