Sante PACS Server PG

The Web Server Module

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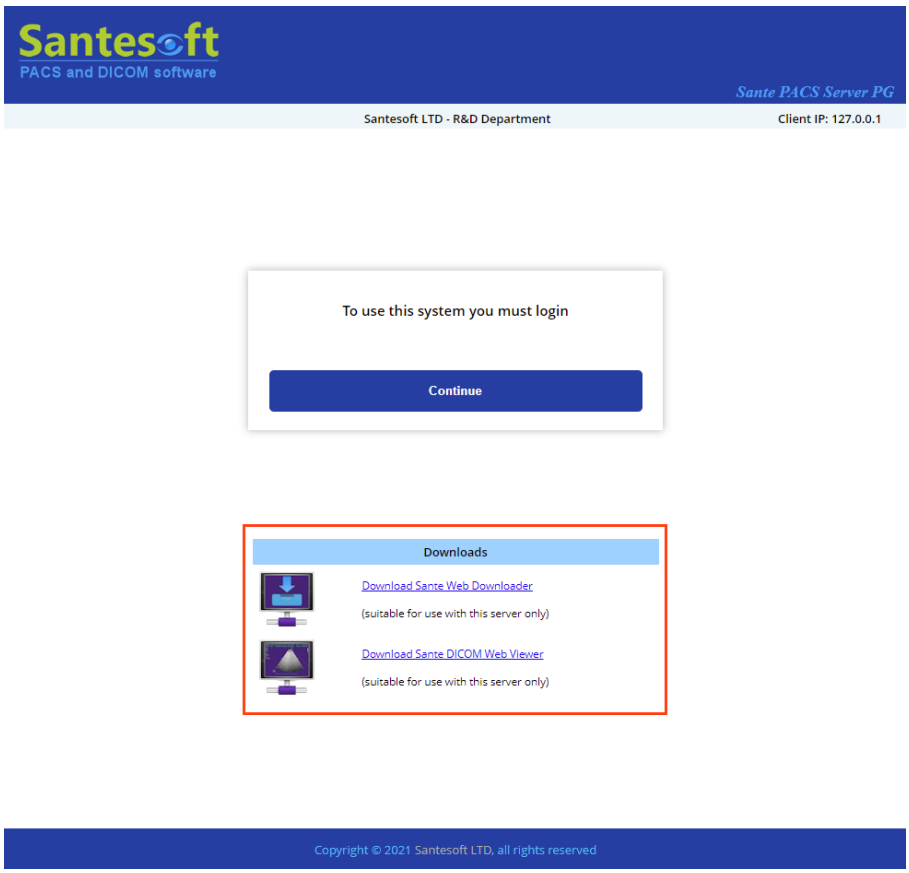
Overview

The Web Server module allows remote users to connect to the system and perform queries and retrieve studies stored in the DICOM Server database. The module uses the HTTP protocol for communication, and remote users must use a web browser such as **Microsoft Edge**, **Google Chrome**, or **Mozilla Firefox** to access the server and retrieve studies.

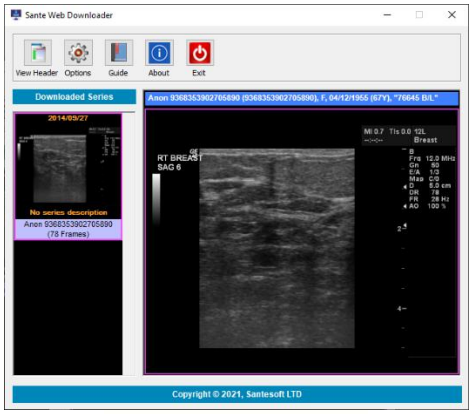
Free Applications

From the initial web page of the Web Server, the remote user can download and install two free applications designed for use with this server: **Sante Web Downloader** and **Sante DICOM Web Viewer**.



Sante Web Downloader allows the user to monitor the downloading process. When the download is complete, the application saves the received studies in a ZIP file. The user can configure **Sante Web Downloader** to automatically open the saved ZIP file with a preferred DICOM viewer, such as **Sante DICOM Viewer Pro** or **Sante DICOM Editor**. Note that the selected DICOM viewer must support opening ZIP files from the command line. For more information, please refer to the *Sante Web Downloader User Guide*. This application is particularly useful when a remote user prefers to view studies with a DICOM viewer other than **Sante DICOM Web Viewer**.

Sante DICOM Web Viewer also allows the user to monitor the downloading process, similar to **Sante Web Downloader**, but it additionally functions as a fully featured, free 2D/3D DICOM viewer. It provides a comprehensive set of tools, including measurement tools, MPR (Multi-Planar Reconstruction), and study/series comparison. The viewer is designed to operate smoothly in multi-modality and multi-manufacturer environments. For more information, please refer to the *Sante DICOM Web Viewer User Guide*.

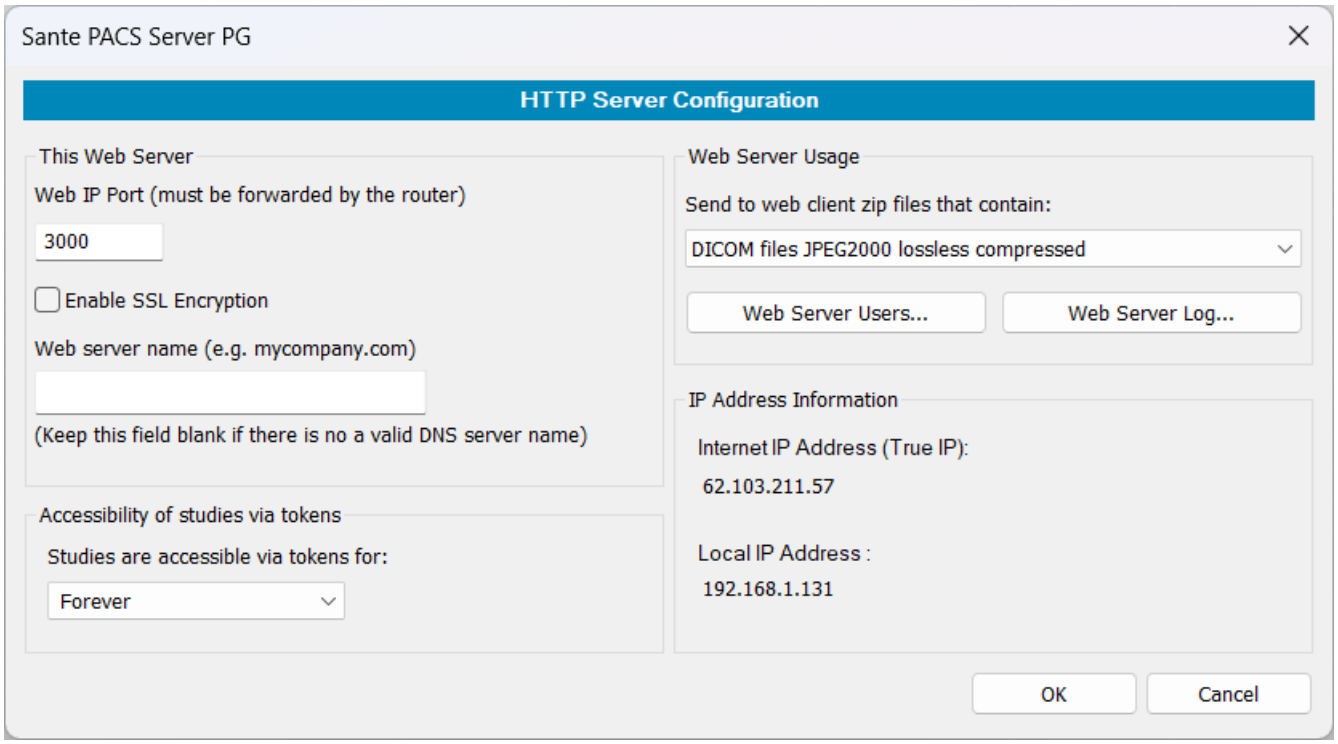


Sante Web Downloader

Sante DICOM Web Viewer

Configure the HTTP Server

Select the menu command **"Network ➡ HTTP Server Setup"**.
A dialog box appears, allowing the user to configure the HTTP Server module.



Internet IP Address (True IP)
The Internet IP address is automatically assigned by the Internet Service Provider (ISP). It is the address through which the HTTP Server communicates with the Internet. This address cannot be changed by the user.

Web IP Port
This is the port number used by the HTTP Server for Internet communication. If the Web Port value is set to **0**, the program does not open the port, and therefore the server cannot communicate with web clients. Setting the port number to **0** effectively disables the HTTP Server module.

ATTENTION!
The Web IP Port of the HTTP Server must be **forwarded by the router** to allow access from external clients.

Web Server Name
This field is used by the database to create fully qualified study tokens, which are provided to patients for retrieving their studies. If the server does not have a valid DNS name, or if the **Web Server Name** field is left blank, the database interface of the server automatically uses the **Internet IP Address (True IP)** to create a valid fully qualified web address, for example:
http://62.103.211.57:3000/token?4m5RHRCmSrWYcnmk8lCThvg0qy2KHA7K5ZldW7ZDNsEKsZ68NcJU4b83UtnYJfwx

ATTENTION!
Leave the **Web Server Name** field blank if the server does not have a valid DNS name.

Enable SSL Encryption

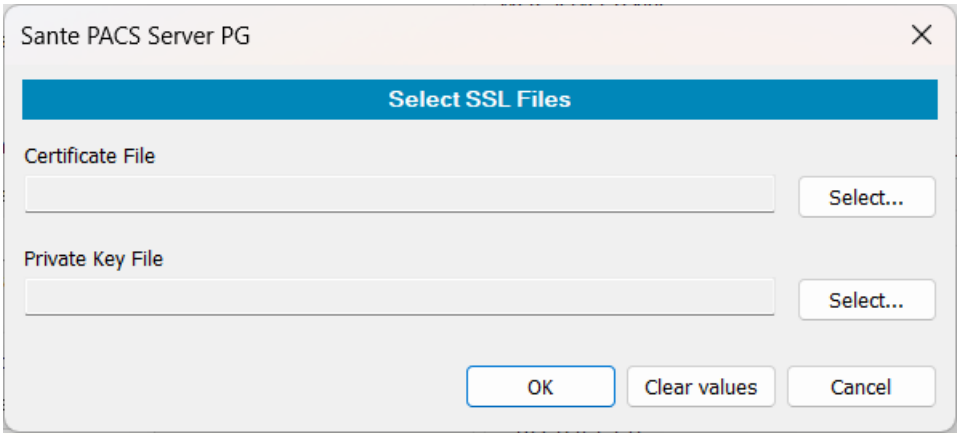
Because the server stores sensitive and confidential data, it is **strongly recommended** to use the HTTP Server module with **SSL encryption enabled**, and, if possible, to operate it only within **VPN connections**.

To obtain an SSL certificate, the user must have a valid **ICANN-registered domain name** (for example, *santesoft.com*).

When the **Enable SSL Encryption** option is selected, the program prompts the user to provide two files:

- the **certificate file** (.crt)
- the **private key file** (.key)

These files are issued by the SSL certificate provider chosen by the user.



ATTENTION!

When SSL encryption is enabled, the server can be accessed **only through its domain name** (for example, https://mycompany.com:3000) and **not** through its IP address (for example, https://62.103.211.57:3000 or https://192.168.1.131:3000).

Study Accessibility

This combo box allows the user to define the period of time during which a patient or a remote physician can access studies using the token mechanism. The time period is calculated starting from the **study date**. By adjusting this setting, the user can limit the duration of external access and thereby reduce the **server workload** generated by remote users.

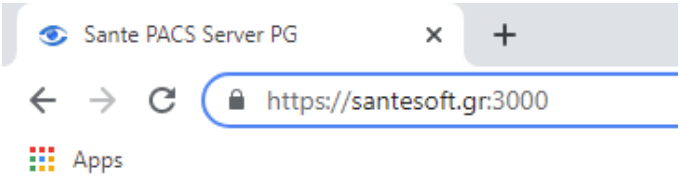
How to use the server

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. 192.168.1.131) or the localhost IP Address 127.0.0.0 do not work because the encrypted https:// protocol requires a valid server name.

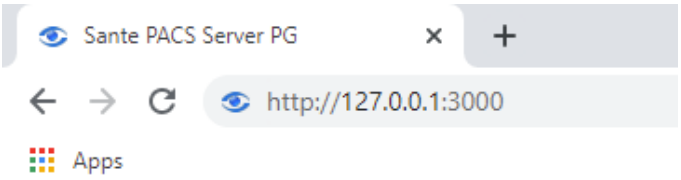
https://192.168.1.131:3000 (does not work)
https://127.0.0.1:3000 (does not work)

Furthermore, the simple protocol **http://** (without "s") does not work
http://santesoft.gr:3000 (does not work)
http://192.168.1.131:3000 (does not work)
http://127.0.0.1:3000 (does not work)

If the SSL Encryption is not enabled

The user must enter in the browser's address bar (Edge, Chrome, or Mozilla Firefox) the server's **ICANN-registered domain name**, the **local IP address** (e.g., 192.168.1.131), or the **localhost address** (127.0.0.1), followed by a colon and the selected port number.
The protocol must be the standard **http://** protocol.

e.g.
http://santesoft.gr:3000
http://192.168.1.131:3000
http://127.0.0.1:3000

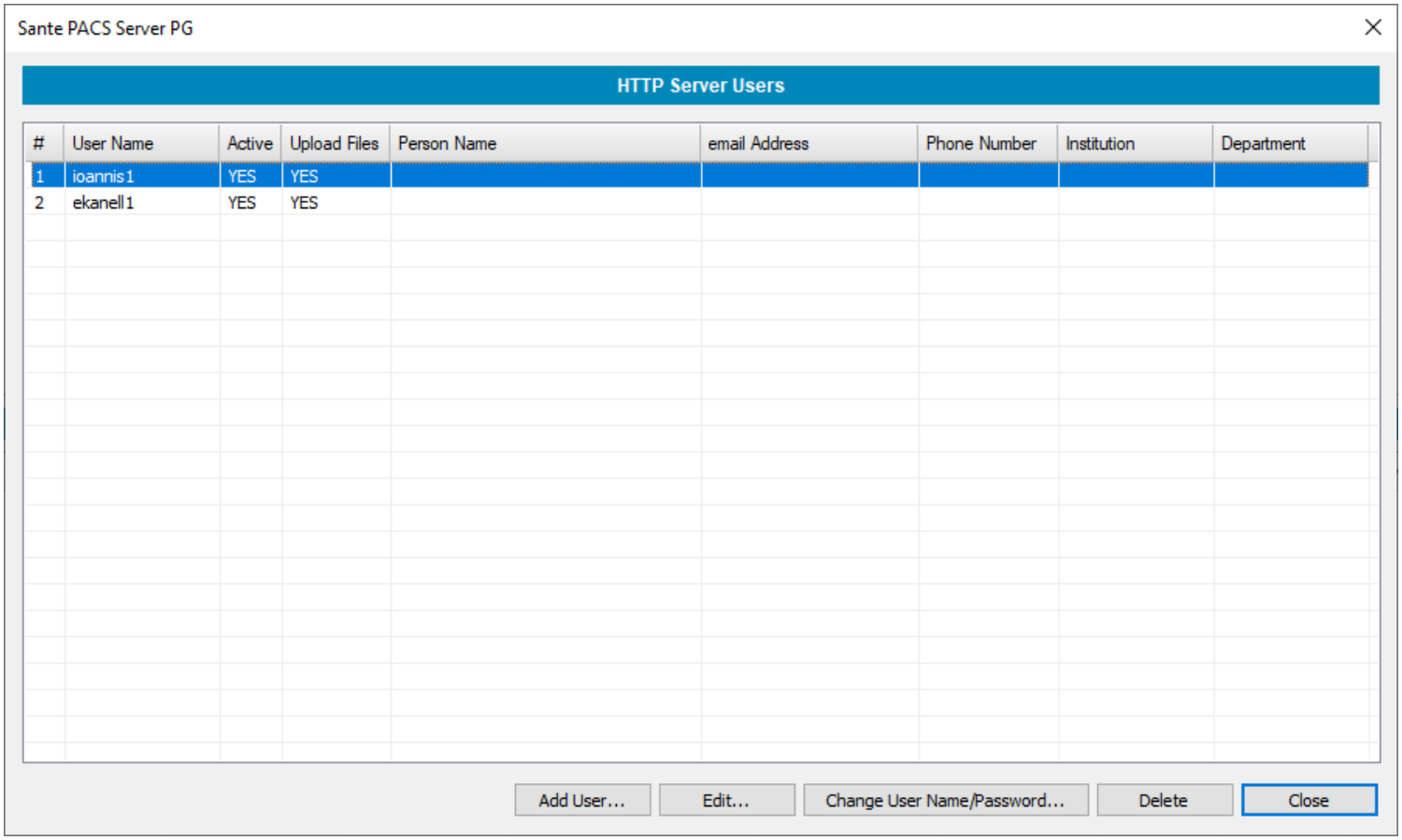


Furthermore, the encrypted protocol **https://** (with "s") does not work
https://santesoft.gr:3000 (does not work)
https://192.168.1.131:3000 (does not work)
https://127.0.0.1:3000 (does not work)

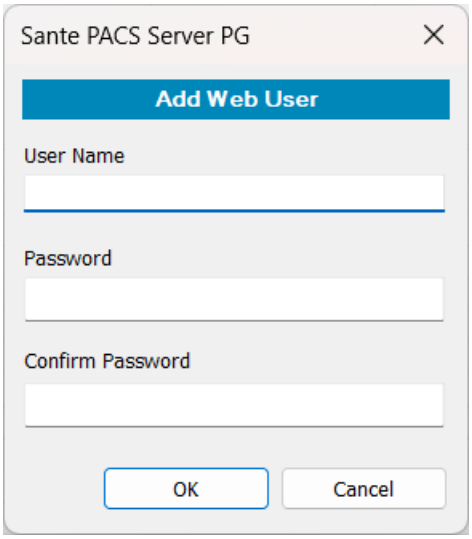
ATTENTION!
It is strongly discouraged to use the server without SSL encryption. In such cases, it should be operated exclusively within VPN connections.

Add Server User

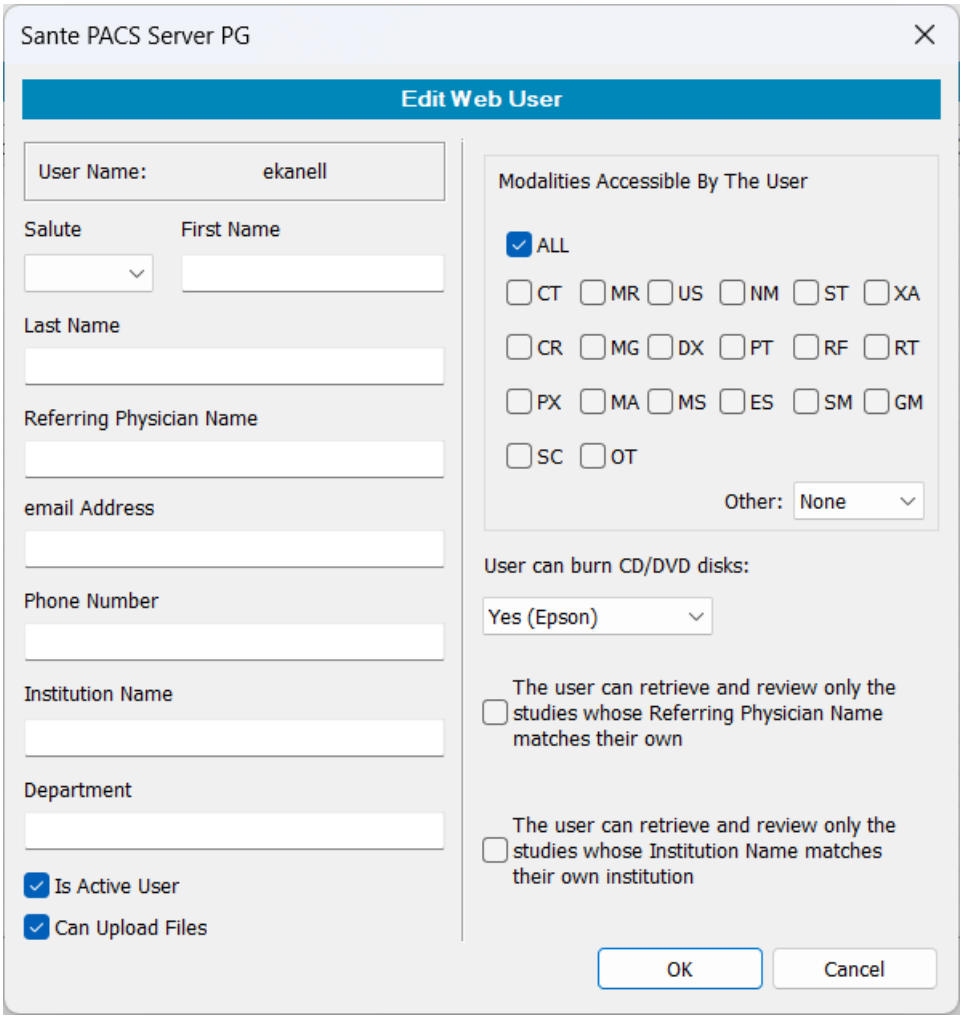
Select the menu command **"Network ➔ HTTP Server Users"**.
A dialog box appears, allowing the user to **add**, **edit**, **modify**, **delete**, and **review** the users of the HTTP Server module.



Add User button
By pressing this button, a dialog box appears and lets the user insert the **User Name** and the **Password** of the web user. The username must be unique and it must not exist already. The password must be at least of 8 character 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.

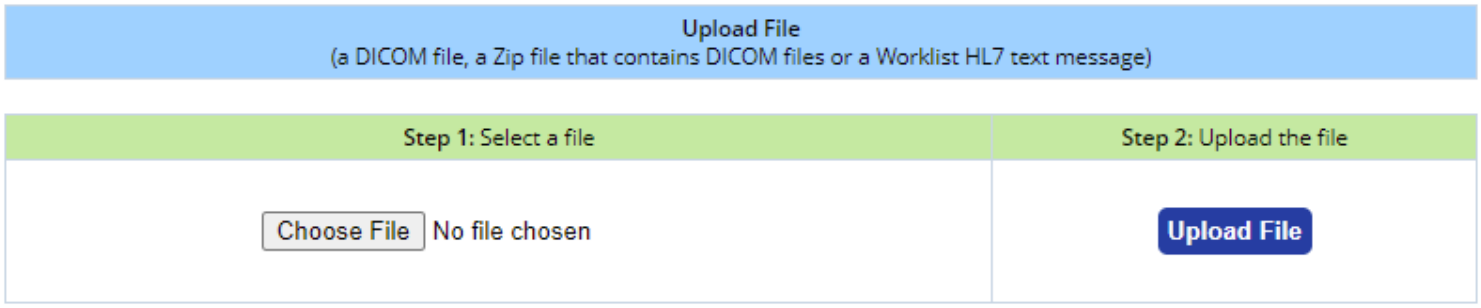


Edit button
This button is enabled when the user has selected a row of the HTTP Server User list and lets the administrator add more useful information about the web user like the real name of the web user and his/her contact information.

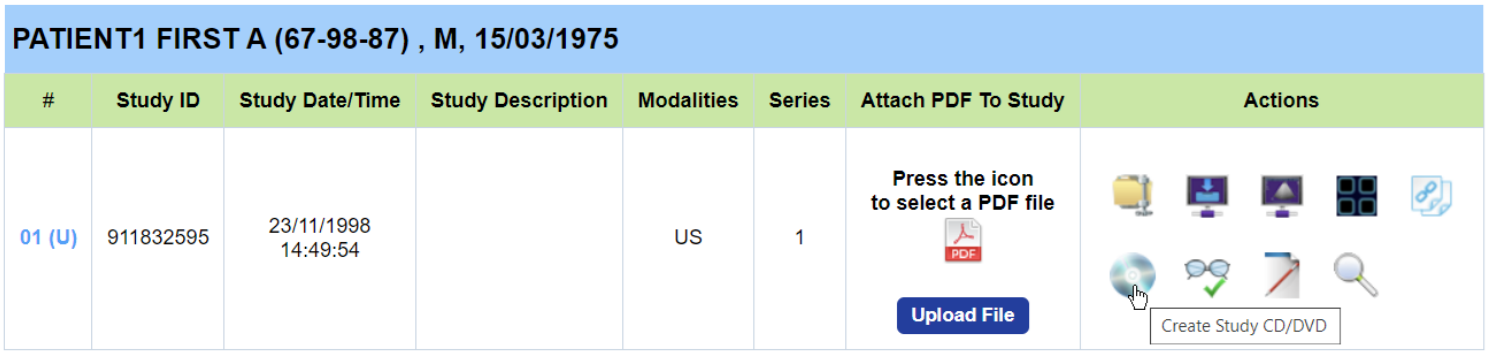


"Is Active User" option
With this option the administrator can permit or prohibit the login of the user into web server, temporarily or permanently.

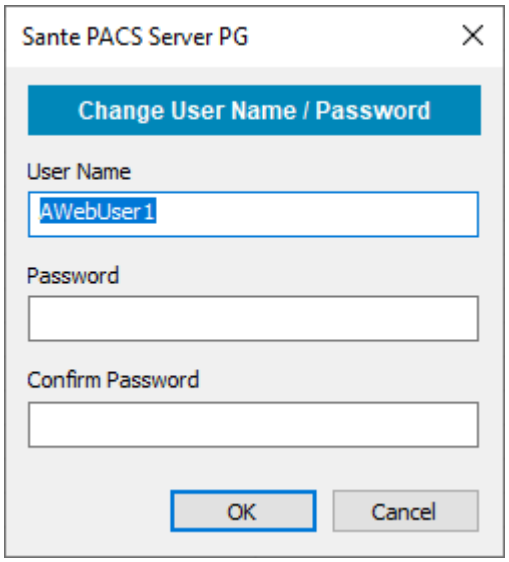
"Can upload files" option
If the **"Can upload files"** option is enabled, the query web page of the server displays a section for file uploading. Otherwise, this section does not appear. The files to be uploaded can be DICOM files or zip files that contain DICOM files that will be inserted into PACS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



"User can burn CD/DVD disks" combo box
It defines if the remote user can burn CD/DVD disks remotely on an Epson or Primera producer.



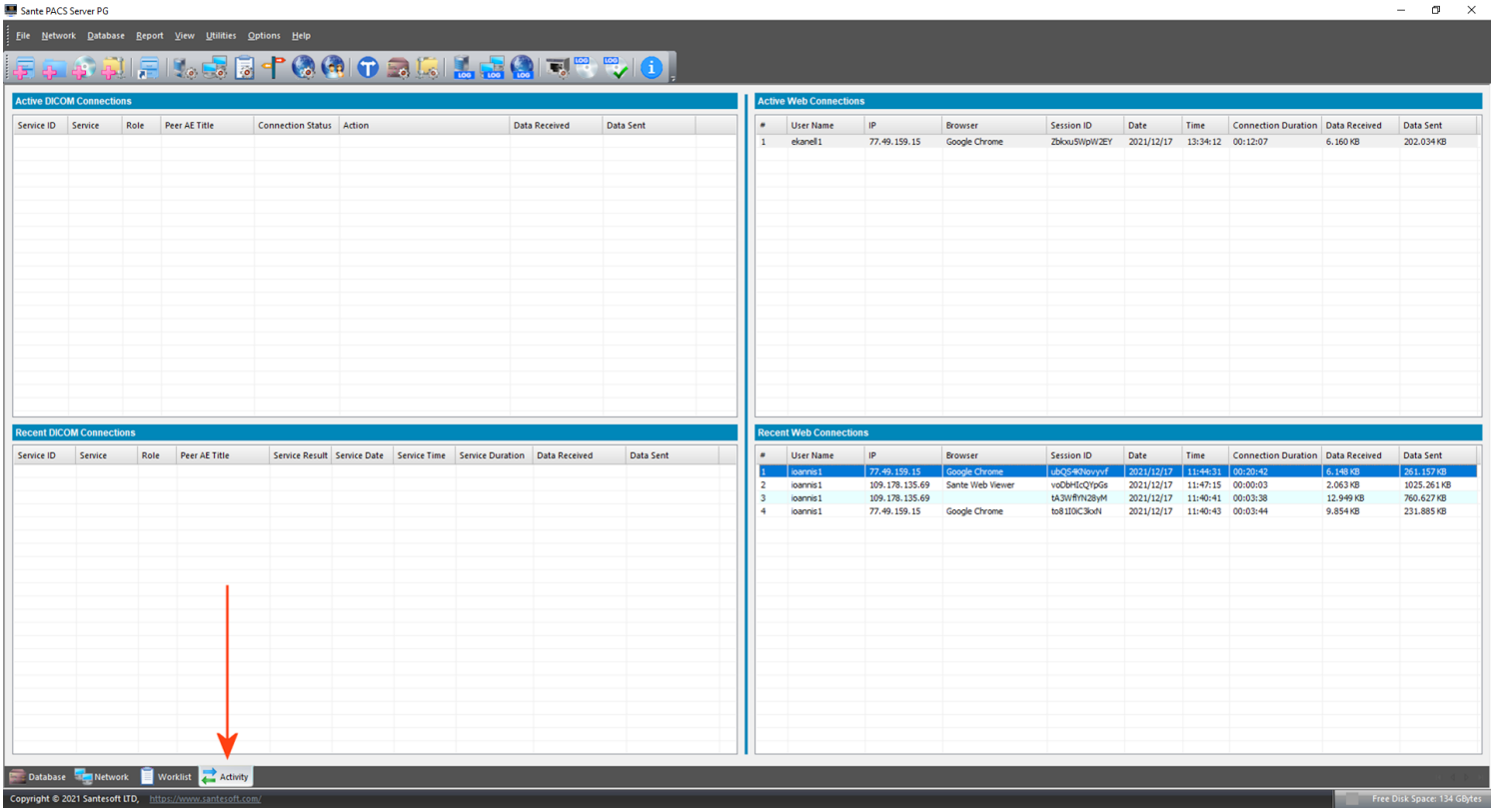
Change User Name/Password button
By pressing this button, a dialog box appears and lets the user change the **User Name** and the **Password** of a web user. The password must be at least 8 characters and it is **strongly** recommended the rules of selecting a strong password to be followed. That means 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.



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.

Server Activity

A user must select the tab **"Activity"** from the program's tabs to view the activity of the web server module.

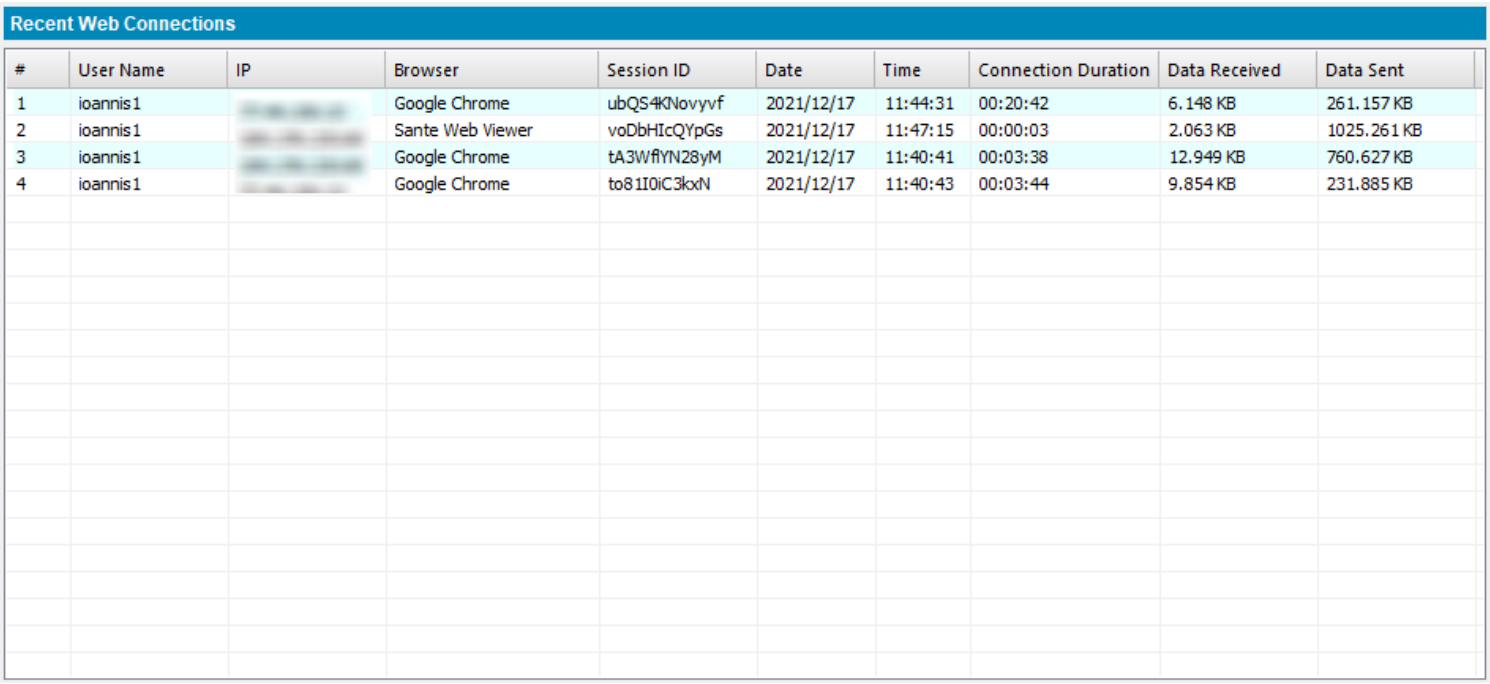


There are two lists that display the activity of the web server module. The list **"Active Web Connections"** displays the users and their activity that are currently connected with the server. The **"Active Web Connections"** displays a "live" report of the server's activity.

Active Web Connections

#	User Name	IP	Browser	Session ID	Date	Time	Connection Duration	Data Received	Data Sent
1	ekanell1	77.49.159.15	Google Chrome	ZbkxuSWpW2EY	2021/12/17	13:34:12	00:03:03	6.160 KB	202.034 KB

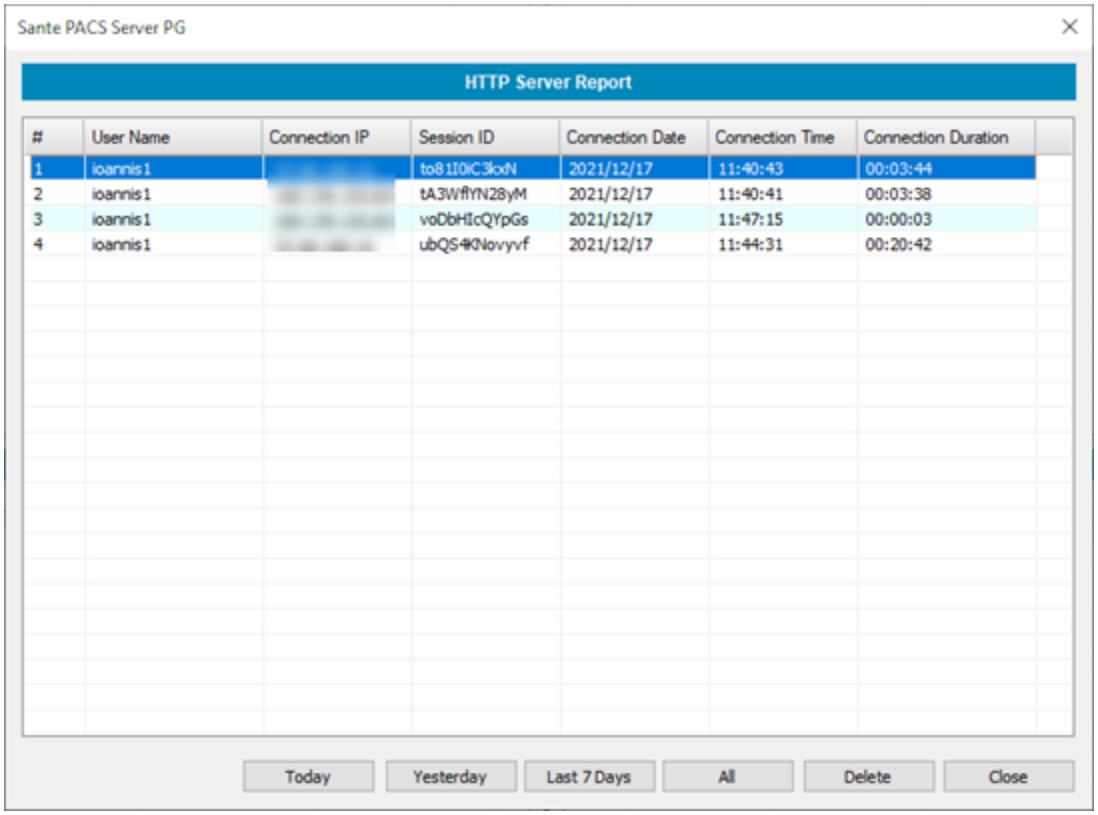
The list **“Recent Web Connections”** displays the users and their activity that were connected with the server the current day and their connection has been closed.



Recent Web Connections

#	User Name	IP	Browser	Session ID	Date	Time	Connection Duration	Data Received	Data Sent
1	ioannis1		Google Chrome	ubQS4KNovyvf	2021/12/17	11:44:31	00:20:42	6.148 KB	261.157 KB
2	ioannis1		Sante Web Viewer	voDbHIcQYpGs	2021/12/17	11:47:15	00:00:03	2.063 KB	1025.261 KB
3	ioannis1		Google Chrome	tA3WfIYN28yM	2021/12/17	11:40:41	00:03:38	12.949 KB	760.627 KB
4	ioannis1		Google Chrome	to81I0iC3kxN	2021/12/17	11:40:43	00:03:44	9.854 KB	231.885 KB

If the user wishes to review all the connections of the web server module must use the menu command **“Report ➧ HTTP Sever Report”**. The dialog box that appears displays all the connections of the server.



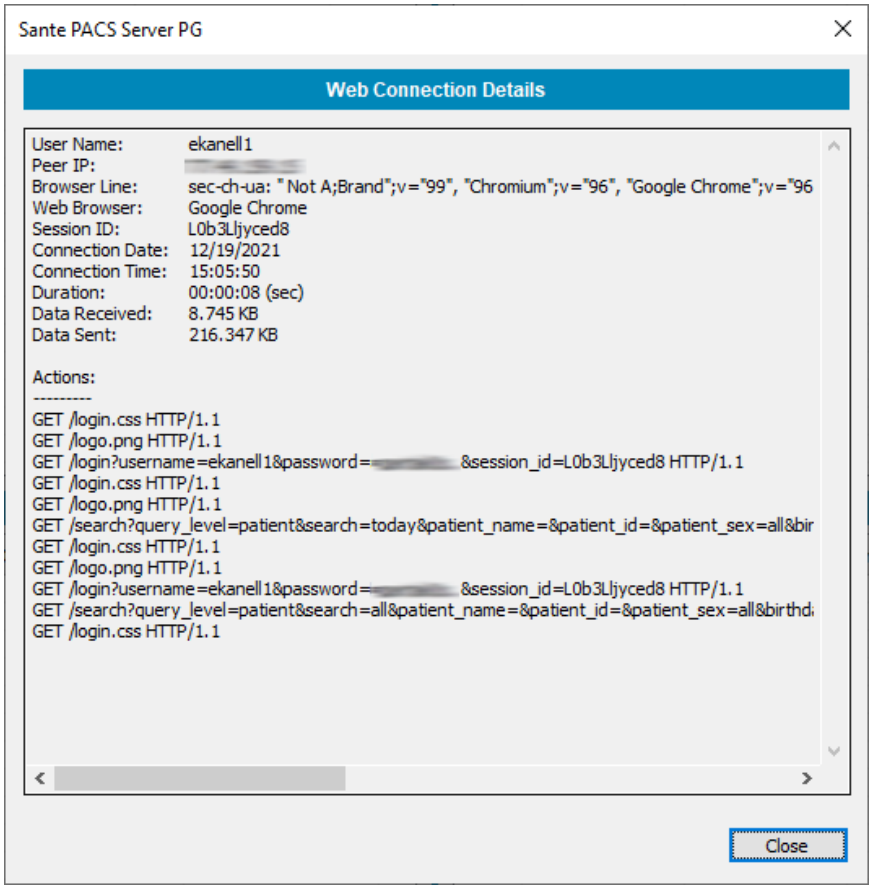
Sante PACS Server PG

HTTP Server Report

#	User Name	Connection IP	Session ID	Connection Date	Connection Time	Connection Duration
1	ioannis1		to81I0iC3kxN	2021/12/17	11:40:43	00:03:44
2	ioannis1		tA3WfIYN28yM	2021/12/17	11:40:41	00:03:38
3	ioannis1		voDbHIcQYpGs	2021/12/17	11:47:15	00:00:03
4	ioannis1		ubQS4KNovyvf	2021/12/17	11:44:31	00:20:42

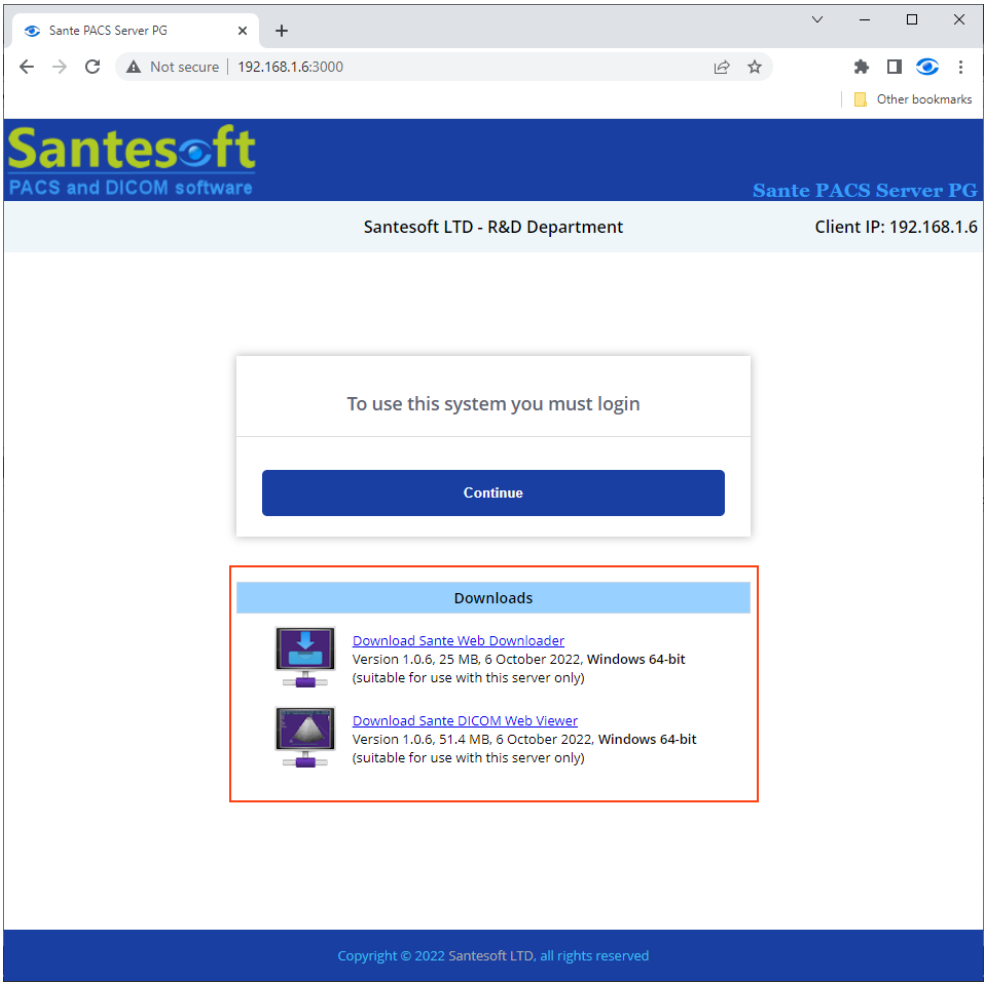
Today | Yesterday | Last 7 Days | All | Delete | Close

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.



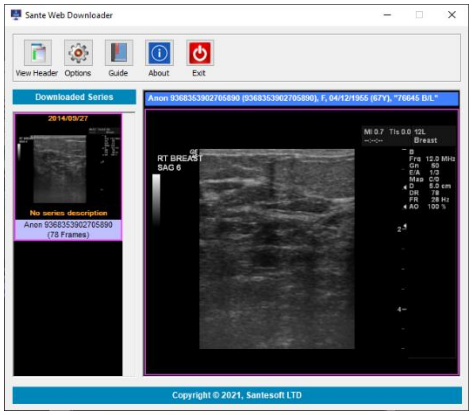
Remote connection with an internet browser

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.

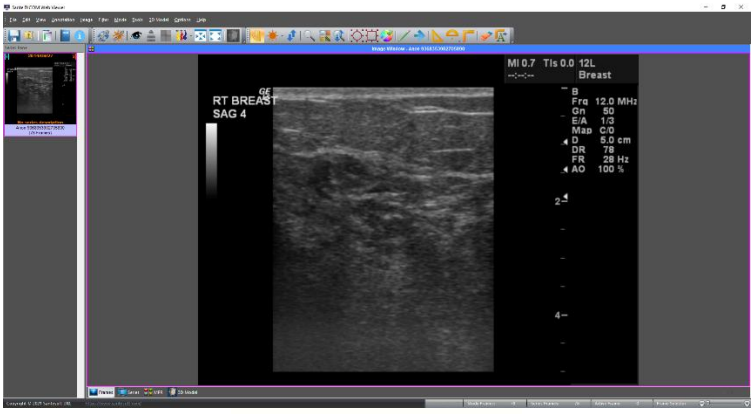


Sante Web Downloader lets the user review the downloading procedure. In the end of receiving Sante Web Downloader saves the received studies in a Zip file. The user can configure Sante Web Downloader to open the saved zip file with a DICOM Viewer of his/her choice like Sante DICOM Viewer Pro or Sante 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.

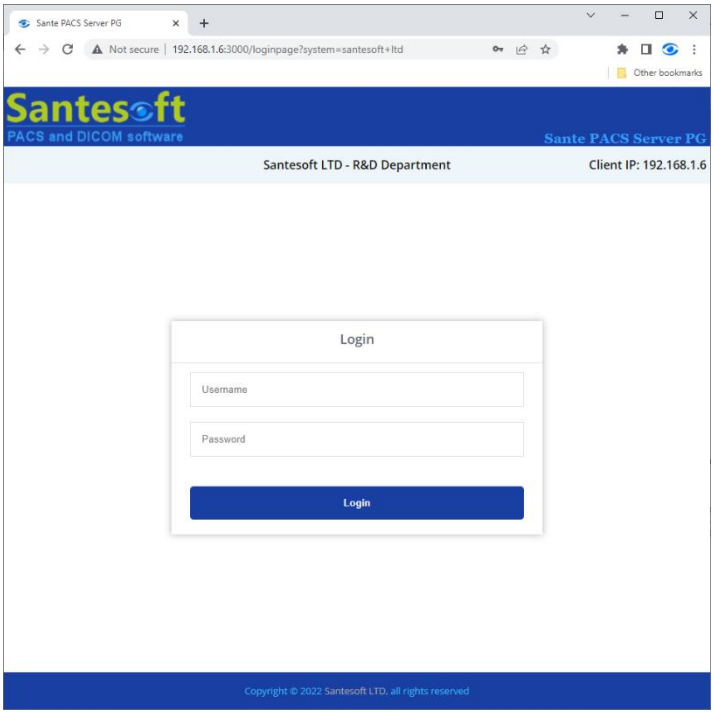


Sante Web Downloader



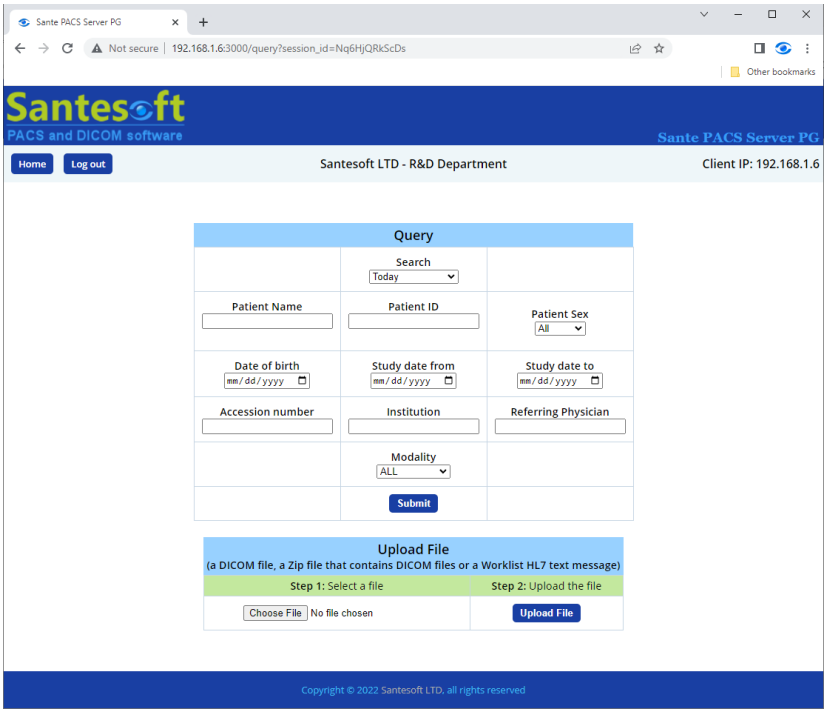
Sante DICOM Web Viewer

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.

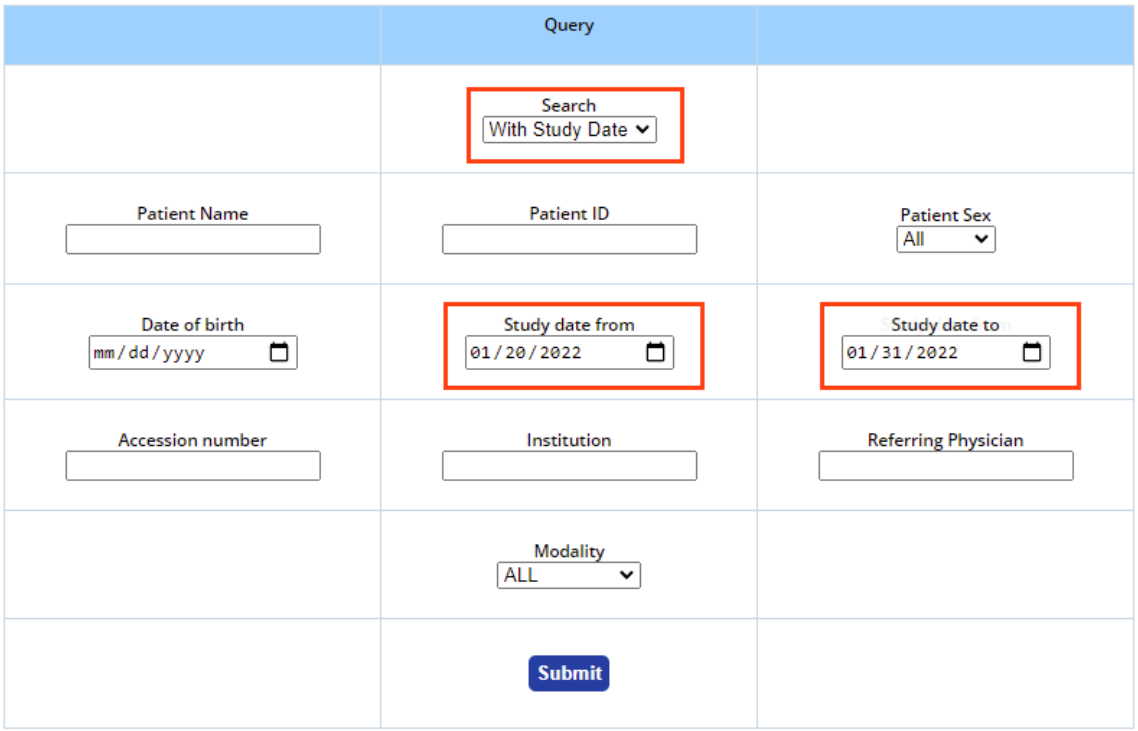


The next page of the server allows the user to query the PACS server remotely and find the studies of the desired patient and/or the studies of the desired date. The search criteria can be the patient's name, the patient ID, the patient sex, the patient birthdate, the study date, the accession number,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

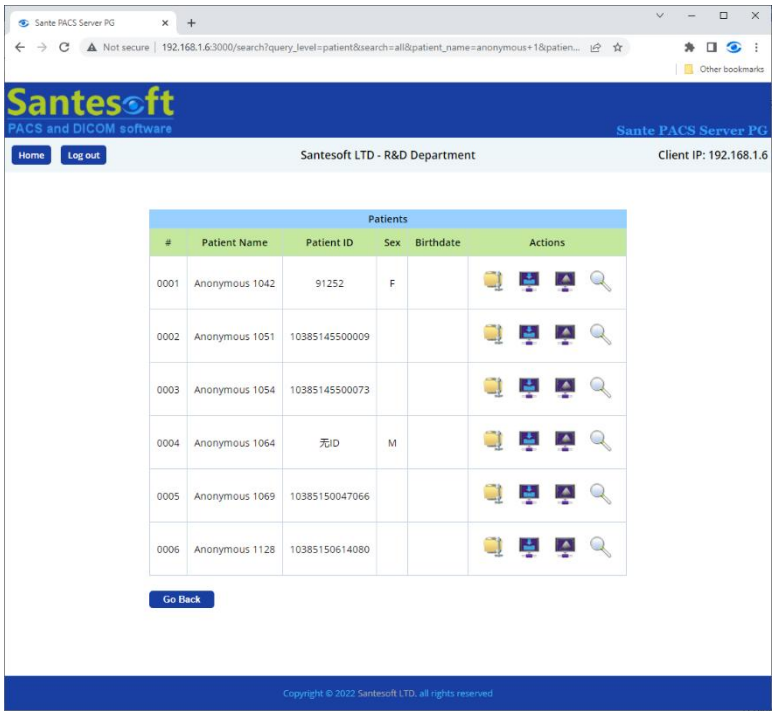
From this page the user can also upload files that can be DICOM files and zip files that contain DICOM files that will be inserted into PACS server, and text files that contain HL7 messages that will be inserted into Worklist server. The user can upload files if the administrator of the system has given 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"**.



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



There are four buttons for patient result manipulation:

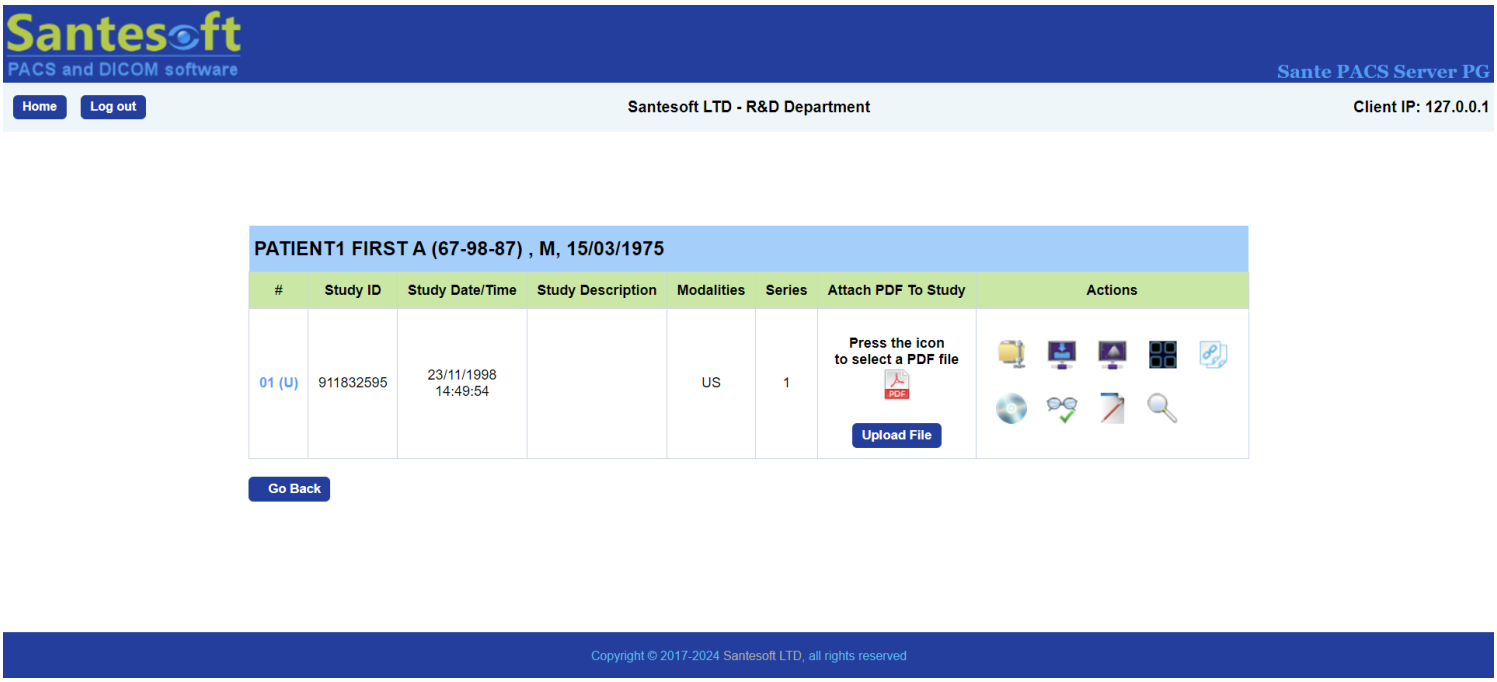
With this button the user can download all the studies of the patient in a zip file.

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.



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 burn a CD/DVD disk with the selected study on remote Epson or Primera producer.

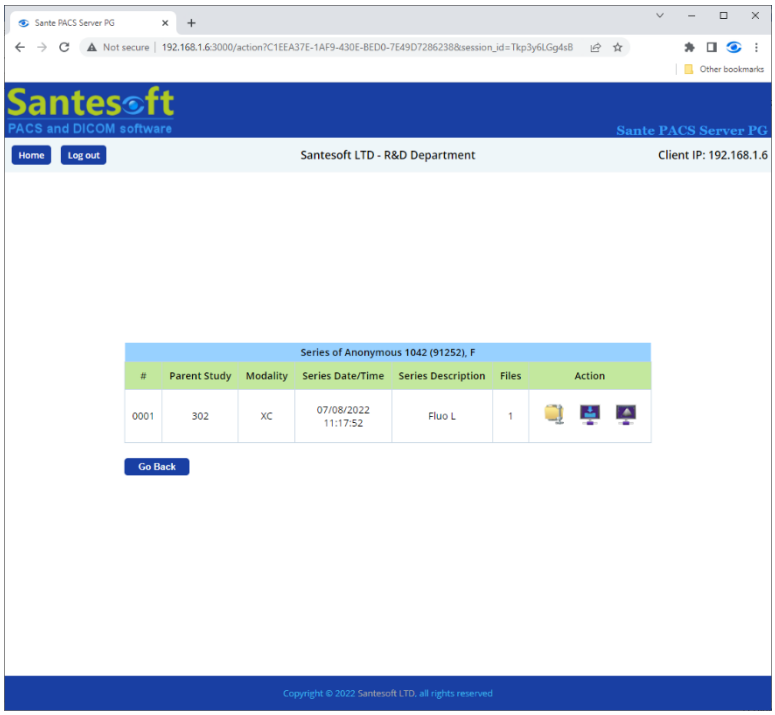
With this button the user can change the Read/Unread status of the selected study.

With this button the user can view the study comment if exists. If the study does not have any comment, this button does not appear.

With this button the user can insert, edit or delete a study comment.

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.



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.

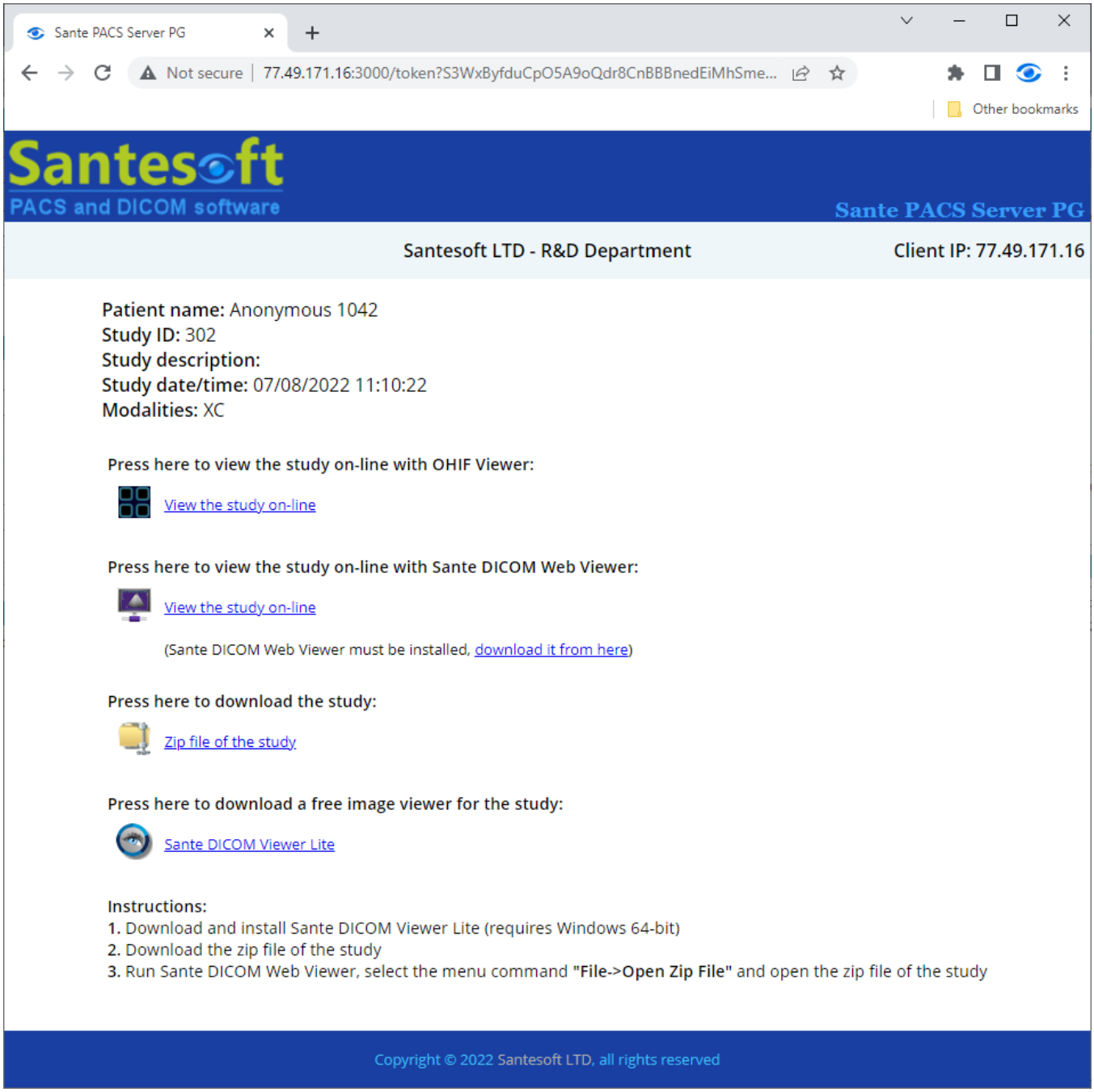
Study retrieving by patients

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:

4m5RHRCmSrWYcnmk8lCThvg0qy2KHA7K5ZldW7ZDNsEKsZ68NcJU4b83UtnYJfwx

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:



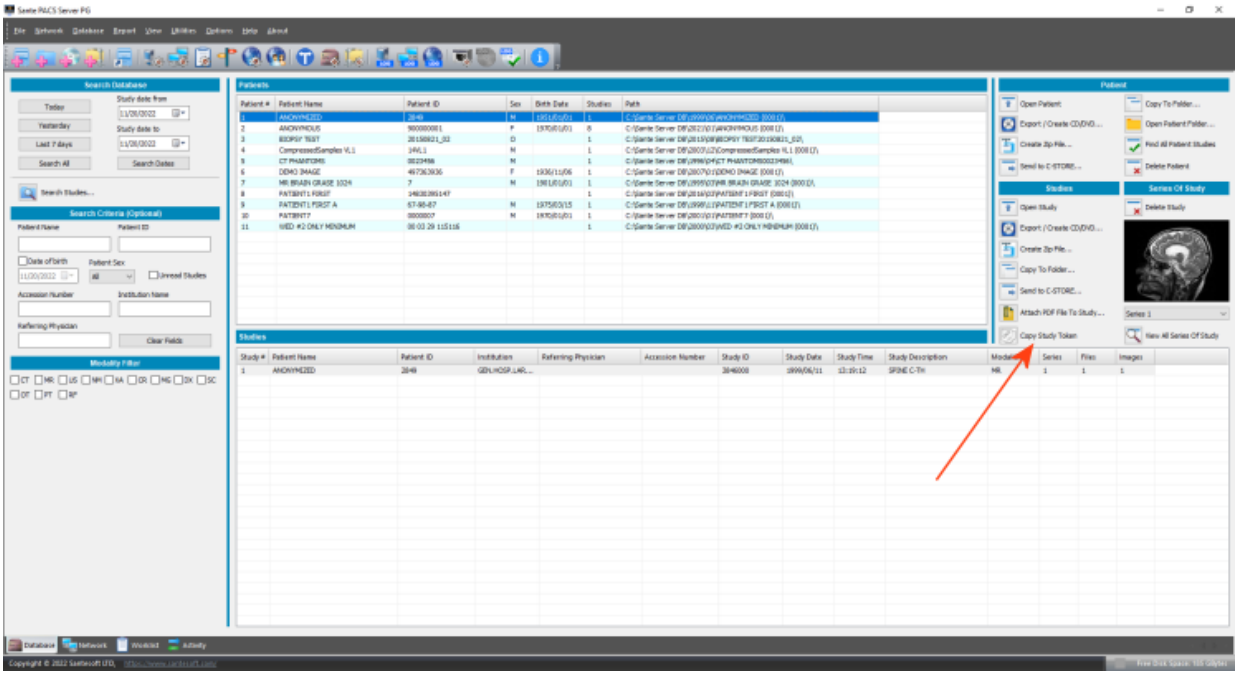
This page lets the users download their study and a free program to view them.

Obtaining the token of a study

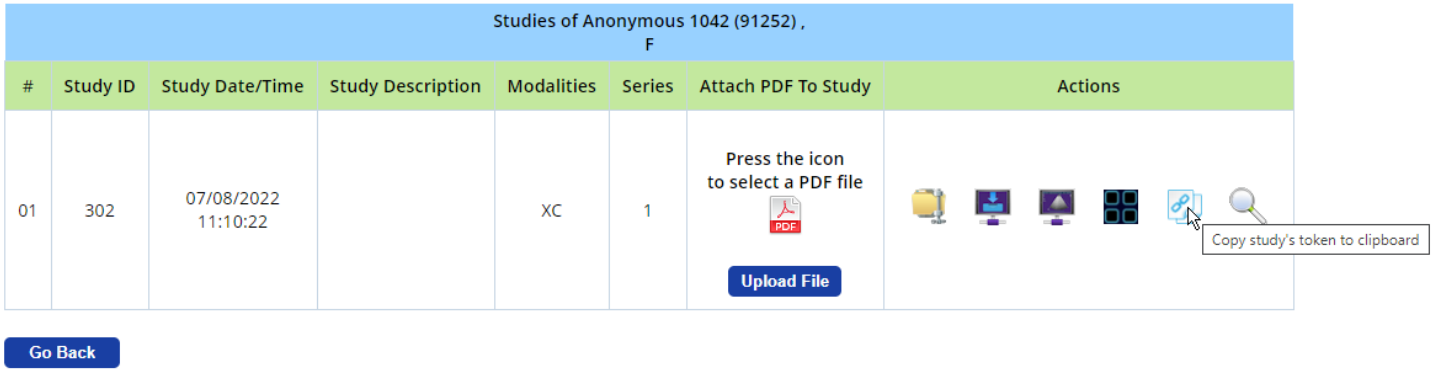
There are two ways for obtaining the token of the study for sending to patient, from the interface of the database and from the web interface.

From the database

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



From the web interface

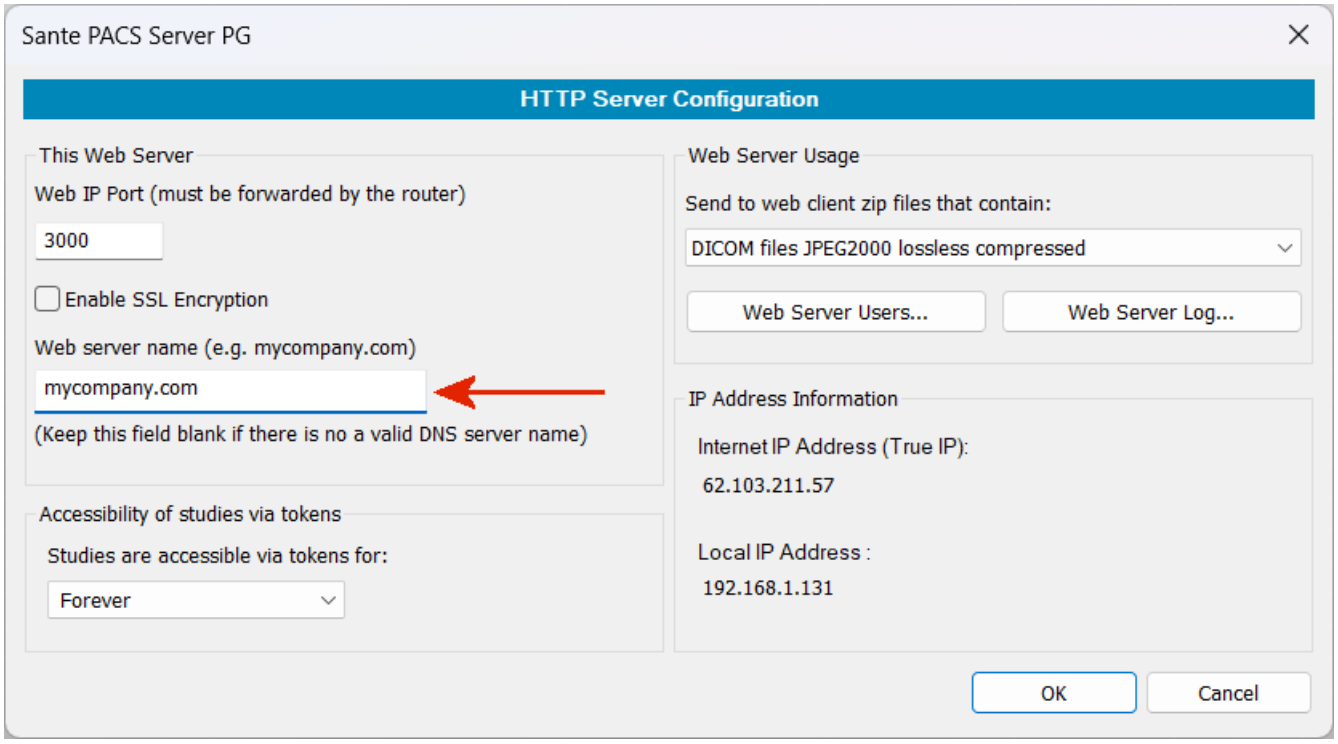


If the browser does not allow copying to clipboard (it is a user option), the user must mark and copy the token manually.

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"**:

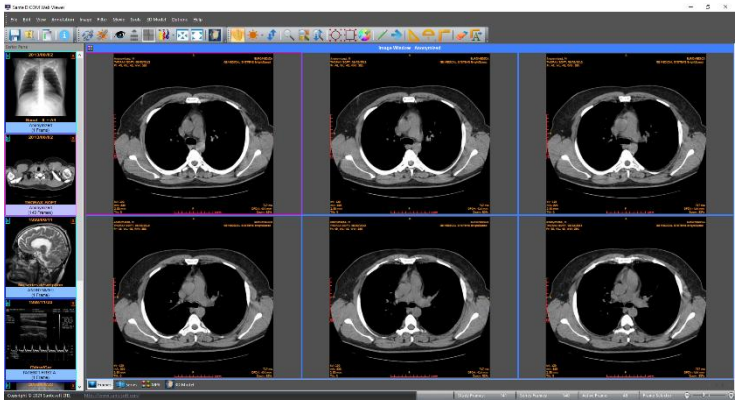


If the server does not have a valid DNS name or the **"Web server name"** field has been kept blank, the database interface of the sever uses the **"Internet IP Address (True IP)"** arithmetic value for creating a token with a valid fully qualified web address: **http://77.49.171.16:3000/token?**4m5RHRCmSrWYcnmk8lCThvg0qy2KHA7K5ZldW7ZDNsEKsZ68NcJU4b83UtnYJfwx

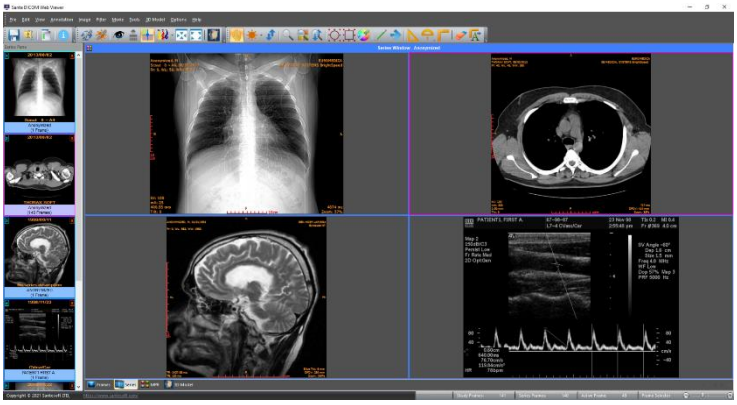
This fully qualified web address with the token must be sent to the patient. The patient has just to double-click it to go to the study's page.

Sante DICOM Web Viewer

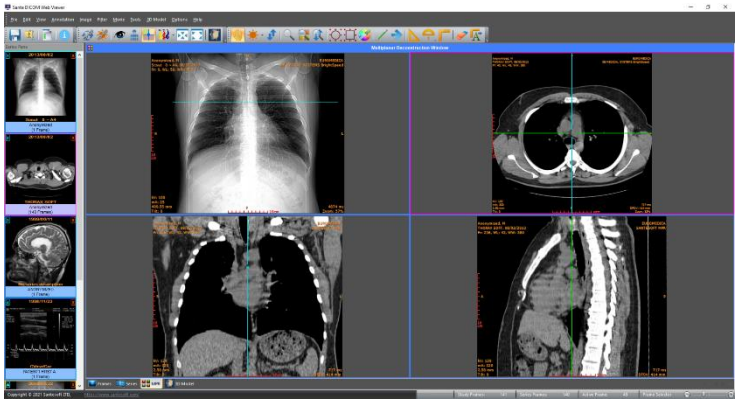
Sante DICOM Web Viewer is a fully functional, feature rich 2D/3D DICOM Viewer. For more information, please read the **User Guide** of the application.



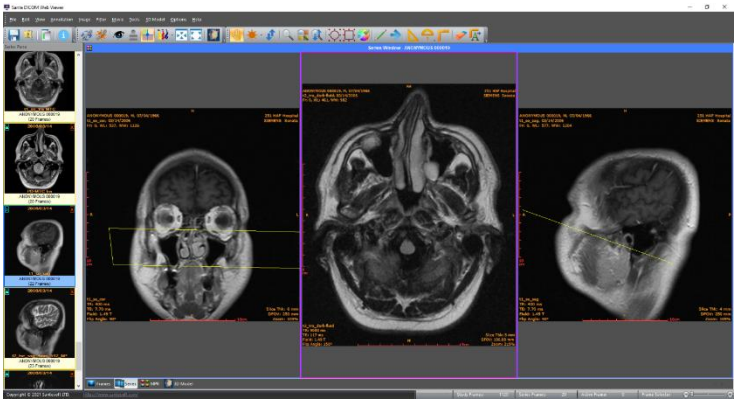
Frame View – 6 Tiles



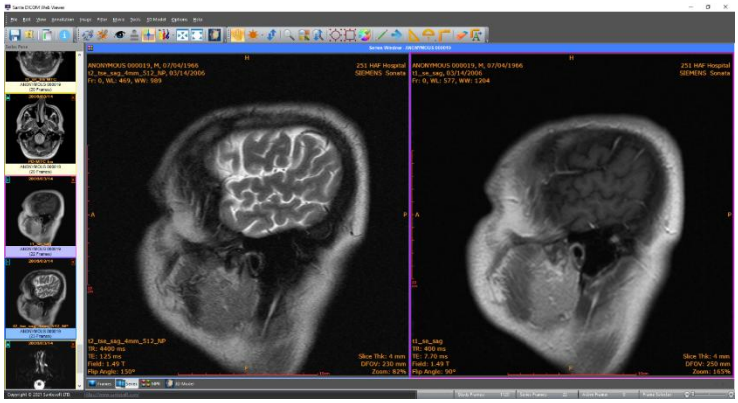
Series View – 4 Tiles



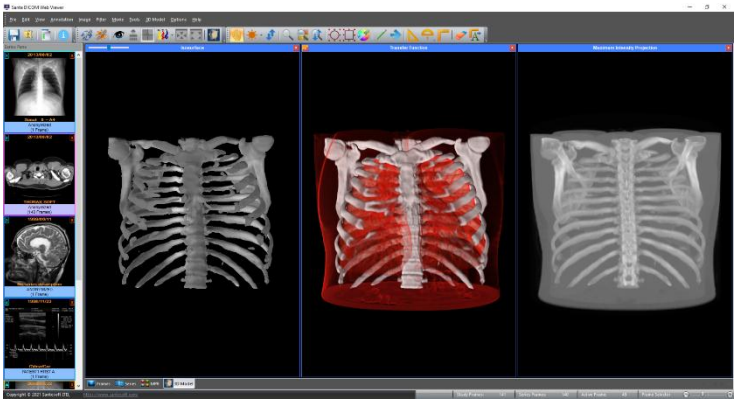
MPR View



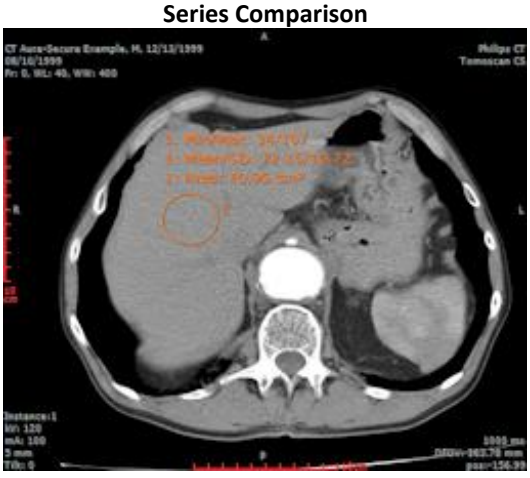
Scout lines – Localizer



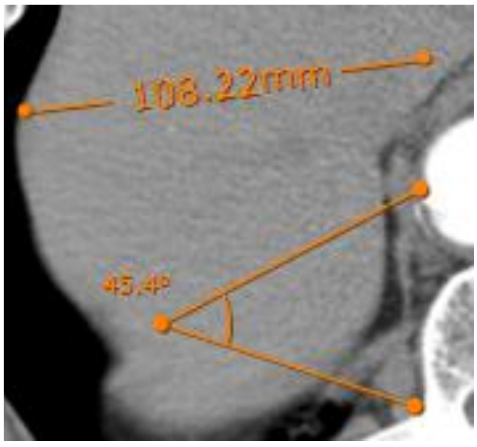
Series Comparison



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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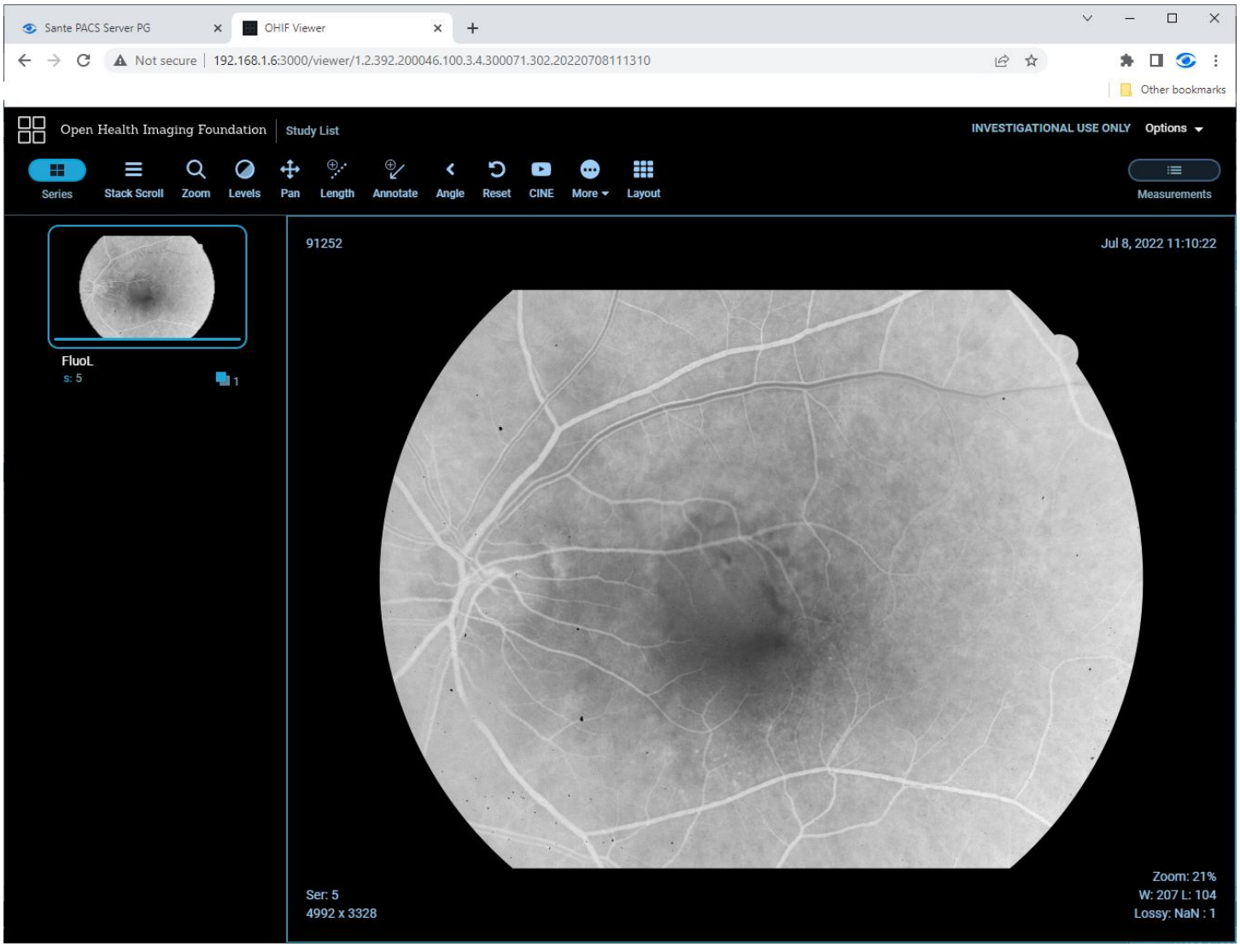
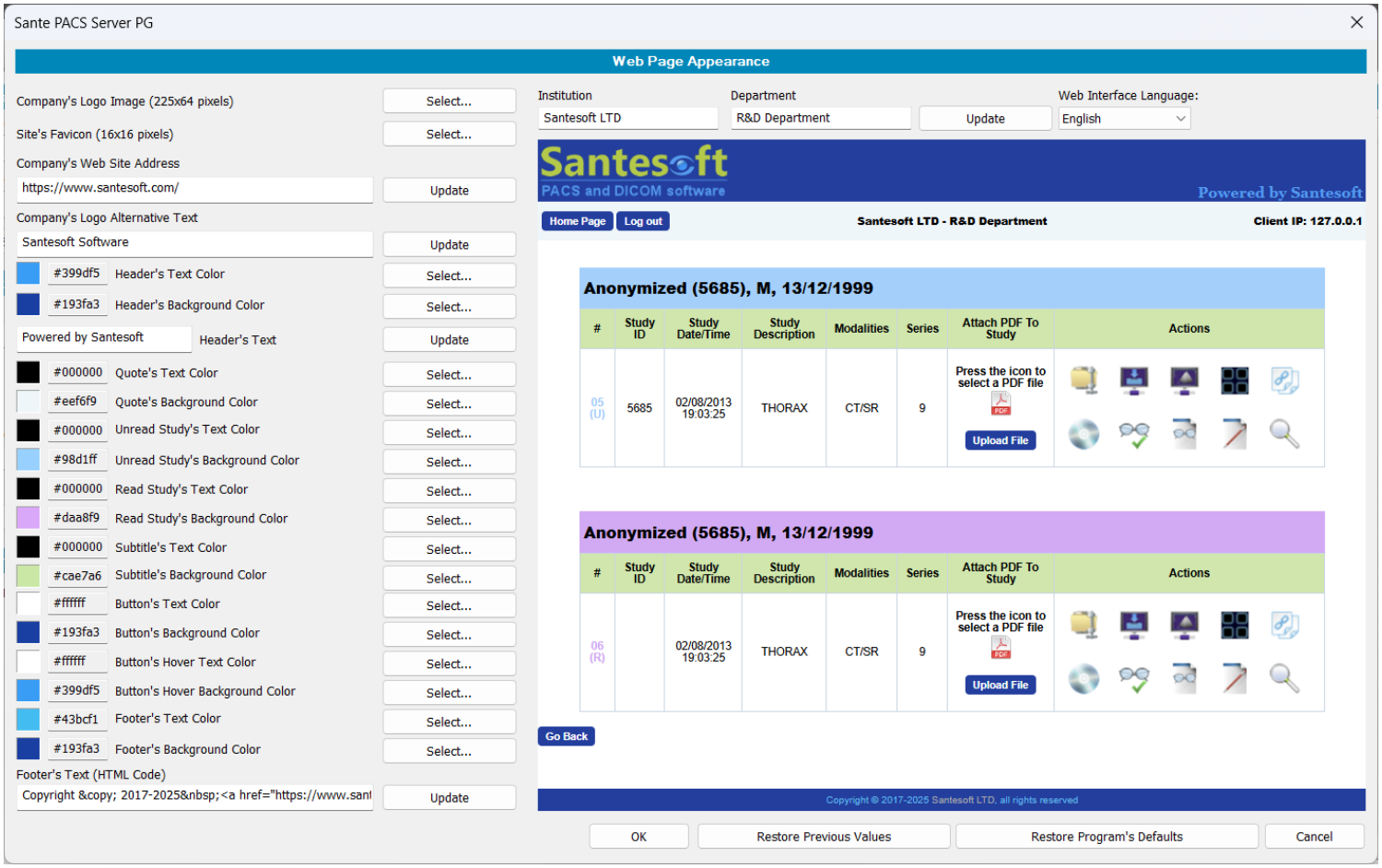
The interface of the OHIF Viewer



Customize the web page appearance

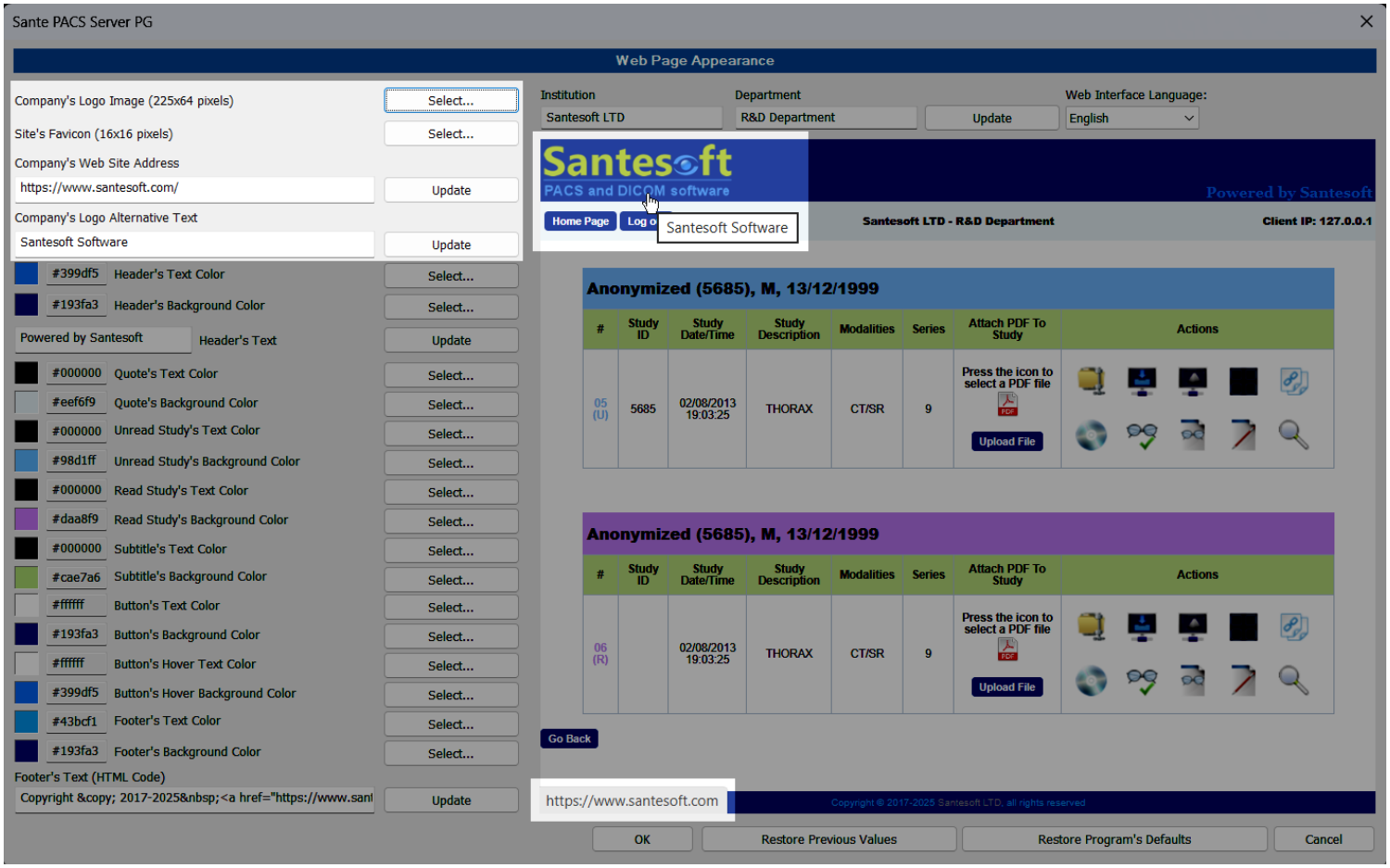
Select the menu command **"Network ➡ HTTP Server Setup"**.

A dialog box appears, allowing the user to customize the appearance of the pages of the program's built-in website, so that they match the company's colors, logos, and links.



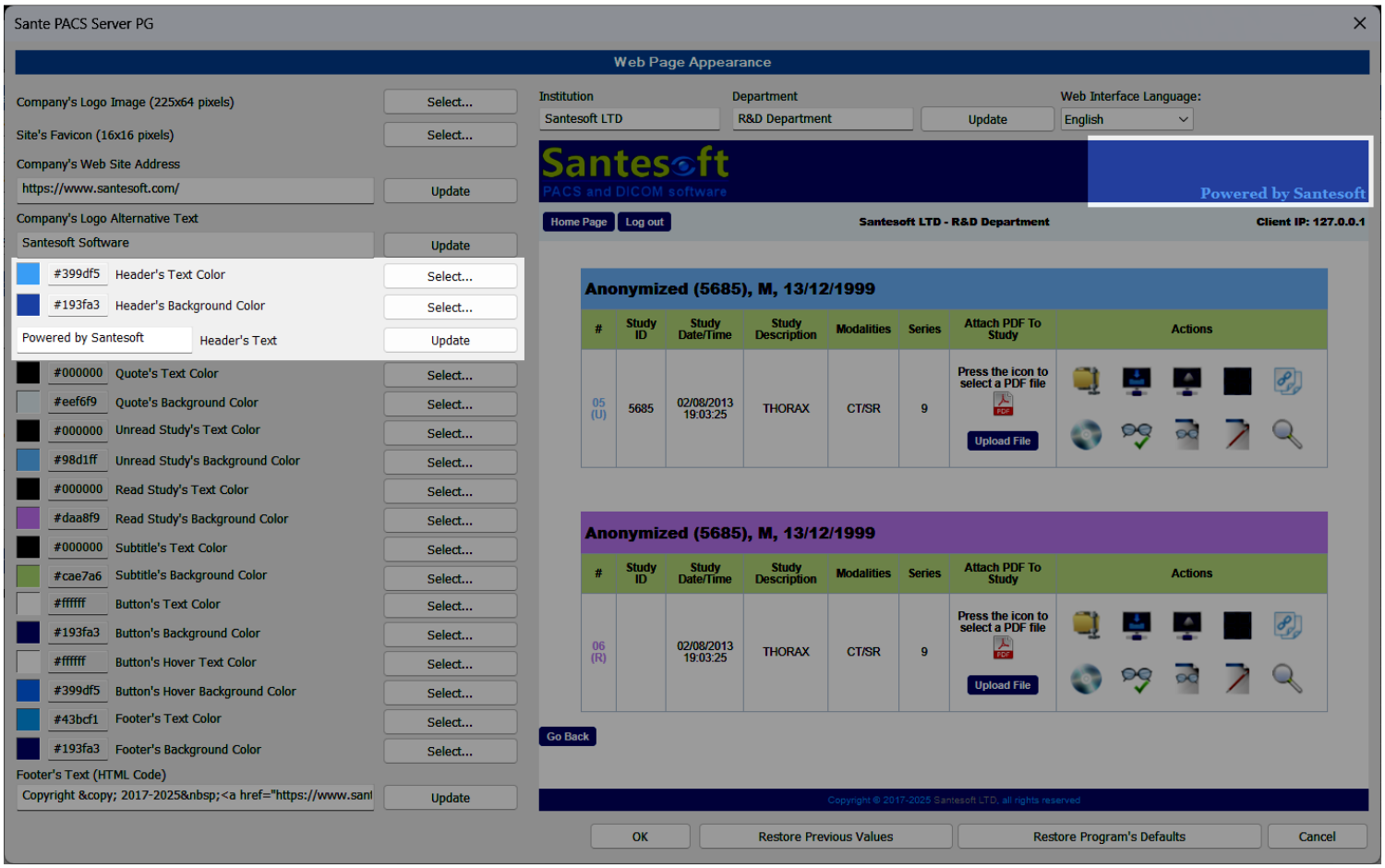
Customize the logo image, the favicon, the web site's address and the popup alternative text of the logo image

Use the highlighted controls below to customize the logo image, the favicon, the web site's address and the popup alternative text of the logo image.



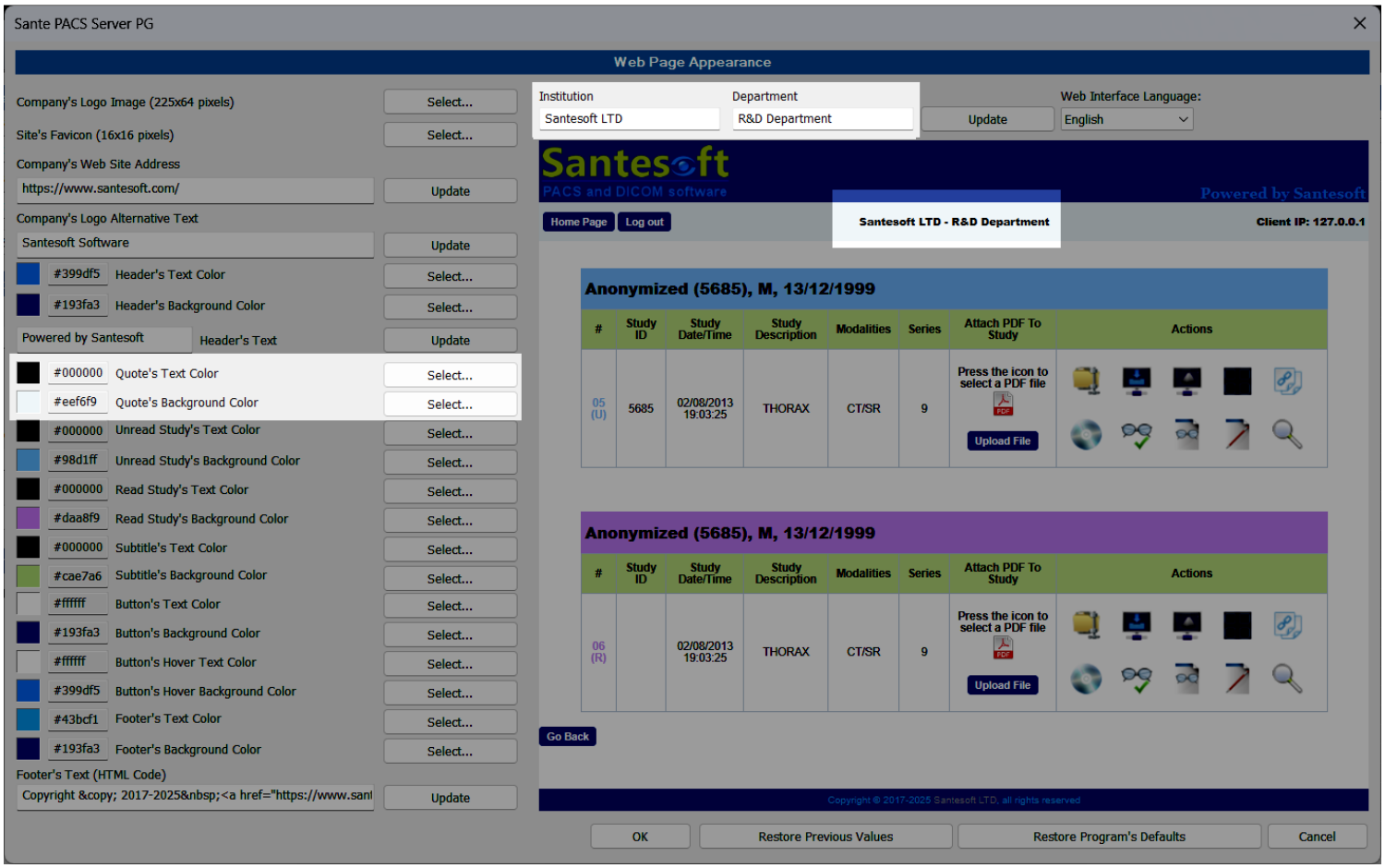
Customize the header's text, text and background color

Use the highlighted controls below to customize the header's text, text and background color.



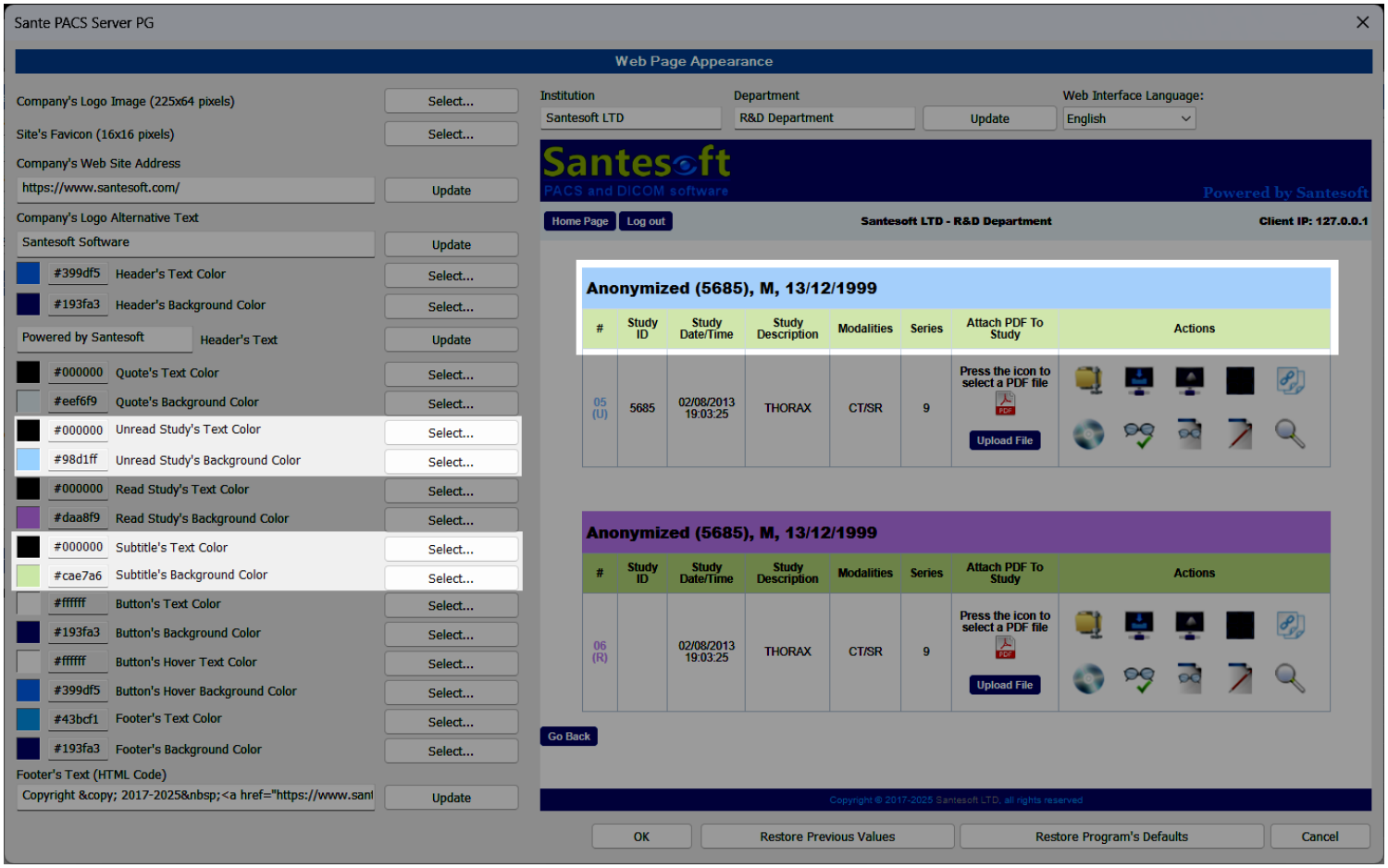
Customize the quote's text and background color

Use the highlighted controls below to customize the quote's text and background color.



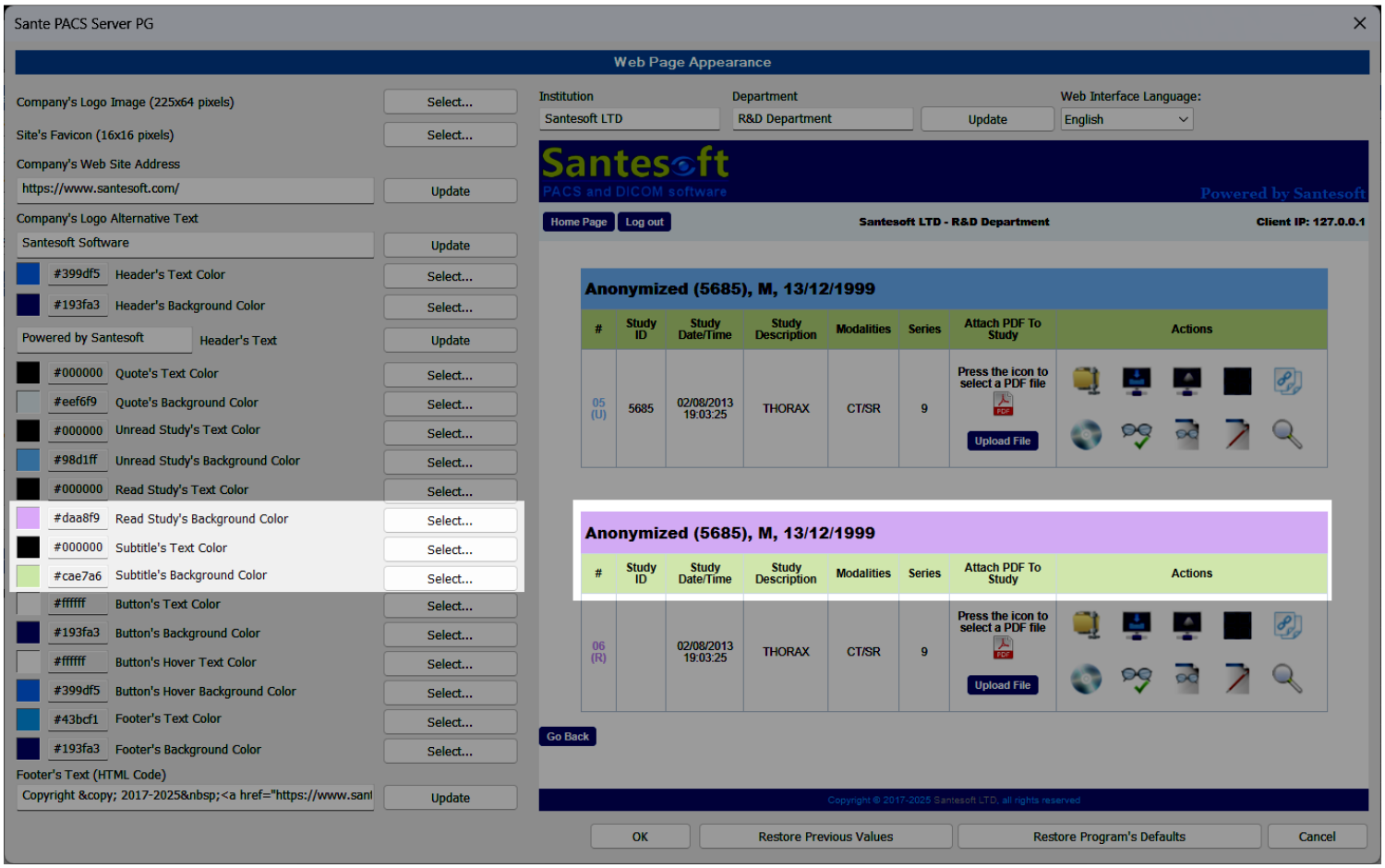
Customize the unread study's text and background color, and the subtitle's text and background color

Use the highlighted controls below to customize the unread study's text and background color, and the subtitle's text and background color.



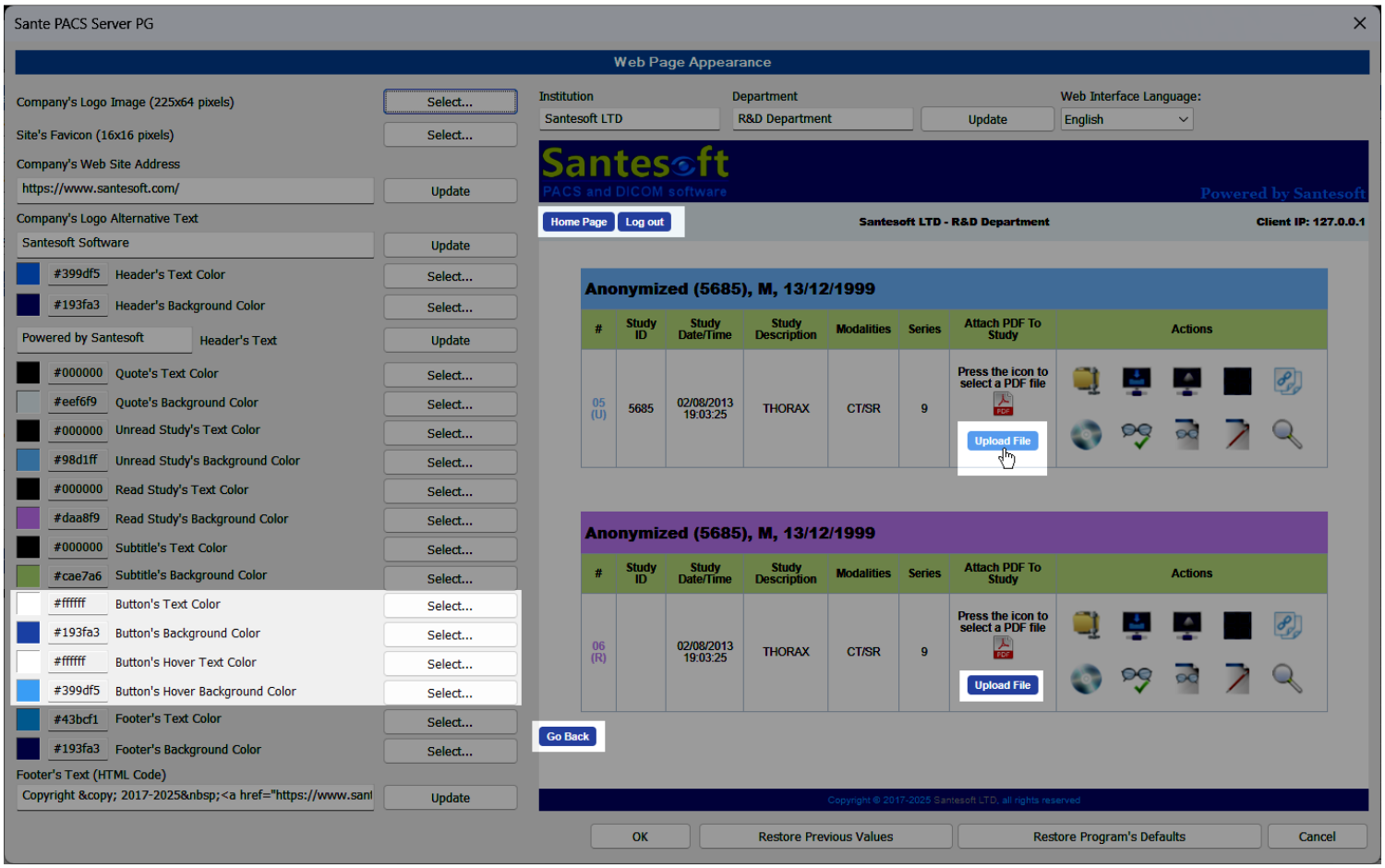
Customize the read study's text and background color, and the subtitle's text and background color

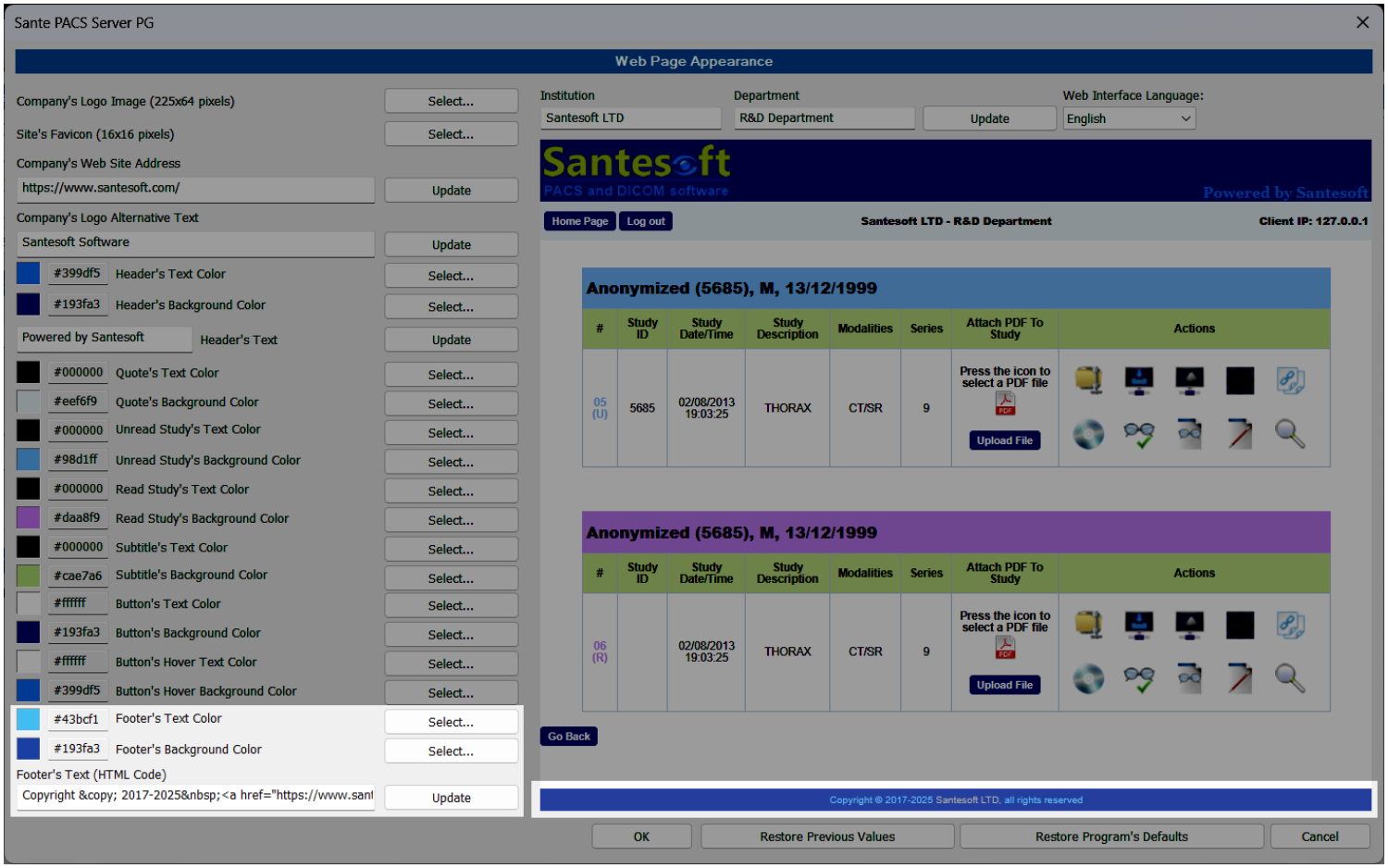
Use the highlighted controls below to customize the read study's text and background color, and the subtitle's text and background color.



Customize the button's text and background color, and the hover text and background color

Use the highlighted controls below to customize the button's text and background color, and the hover text and background color.



Customize the footer's text, text and background color and the company's link

Use the highlighted controls below to customize the footer's text, text and background color and the company's link. The text accepts HTML code.