PUBLIC

iQ-WEB

ADMINISTRATION GUIDE

Version 6.7.3 PUB INT EN – 010R

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CE

IMAGE Information Systems Europe GmbH

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1 Introduction

1.1 Scope of the document

This document represents the iQ-WEB Administration Guide for software version 6.7.3 provided by IMAGE Information Systems Europe GmbH.

This Administration Guide provides all necessary information regarding the installation and licensing of the application as well as how the software is properly maintained to fulfill its intended use.

It contains instructions concerning the configuration and set-up of the application as well as hints regarding trouble-shooting problems. The Administration Guide covers the following topics, among others:

- System requirements
- Module description
- Installing, uninstalling and migrating the software
- Licensing
- Maintenance procedures
- Software and network configuration
- DICOM configuration
- User and privilege management
- Translation of the user interface
- Troubleshooting information

All patient names used in this administration guide are completely fictitious.

Throughout this guide trademark names are used. Rather than putting in a trademark symbol at every occurrence of the trademark name, we state that we are using the names only in an editorial fashion and to the benefit of the trademark owner with no intention of infringing upon the trademark.

We assume no responsibility for inaccurate information or descriptions of third-party products.

Disclosure level of this document is PUBLIC (PUB), which means that this document is freely available to anyone interested, such as resellers, current end users as well as potential customers. Primary color is orange.

1.2 Purpose of the software

iQ-WEB's intended use is to be a picture archiving and communication system for medical images and reports. It receives, stores and distributes imaging data and reports within a medical network. Patient studies created at modalities are typically sent to iQ-WEB for storage and archiving. Radiologists, physicians and other medical personnel access the data on iQ-WEB through workstations for reading, viewing and reviewing purposes. The application itself is divided into a server and a client component. The server component provides the main functionality of the intended use, i.e. the DICOM communication and the image data management including tasks such as storage and distribution. The client component's main purpose is to facilitate the administration and configuration of the server component.

As an optionally available function, iQ-WEB supports Web Access to DICOM Persistent Objects (WADO) for workflow purposes. This WADO functionality establishes a unidirectional interface between a Medical Information System (MIS), which holds and documents patient-relevant information, and iQ-WEB making it possible to access image data stored in iQ-WEB from the MIS. It then passes search parameters from the MIS to the archive to simplify the access to specific patient information in form of imaging and report data.

As a picture archiving and communication system (PACS), iQ-WEB's intended place of action is integrated into the medical workflow and physical network of hospitals, imaging centers and radiological practices where it runs continuously and is frequently accessed by the users themselves, either directly or indirectly via an MIS.

It is intended to be used by trained healthcare personnel only. Named by their profession these are radiologists, physicians and veterinarians, medical technical assistants, PACS administrators and IT administrators. The necessary information on how to use iQ-WEB is given by detailed user documentation and recurring trainings and workshops provided by the manufacturer or authorized sales partners.

iQ-WEB's functionality can further be extended by various applications that are independent in their design, development and documentation processes. These applications are the DICOM viewers iQ-X and iQ-4VIEW, the statistics tool iQ-DASHBOARD as well as iQ-WEBX WADO HL7 and iQ-WEBX REPORT CONVERTER. As a solution these products can be advertised and sold together as a bundle.

NOTICE:

*When the iQ-WEB software is used not for human medicine but for **veterinary medicine**, the product does **not** fall under the European Council Directive 93/42/EEC and, therefore, does not qualify as a medical device in the EEA. The regulations of the 93/42/EEC do not apply.*

Refer to the iQ-WEB Instructions for Use for more comprehensive details regarding the purpose of iQ-WEB, for an analysis of the intended patient population and the user groups and for information about the use conditions and contraindications.

1.3 Warnings and precautions

Technical limitations of the software

⚠ WARNING

Danger of study and patient data only partially available/displayed.
Although iQ-WEB accepts and stores patient data containing all sorts of special character sets, it is not able to perform case independent searches in the web GUI for non-Latin1 character sets. Performing such a search might not deliver the intended results and studies might not be displayed.

H.-No.: 1.1.5

NOTICE:

iQ-WEB is a 64 bit application. Due to this reason it is only possible to install and run iQ-WEB on a 64 bit operating system. On the client devices, from which the iQ-WEB web interface is accessed, however, the use of a 64 or 32 bit operating system is possible.

Behavior in case of software errors/failures

⚠ WARNING:

Although the iQ-WEB software is subjected to extensive validation and verification procedures by the manufacturer, it is nevertheless possible that unforeseen errors or failed processing may arise during use of the software. Users should at all times be aware and warned of such eventualities. In case faulty software behavior is observed that may put a patient or the user at risk, the user is asked to immediately contact the manufacturer or local reseller. The manufacturer's contact data is stated in the user documentation and inside the application itself.

H.-No.: 1.1.1 – 1.3.3

⚠ WARNING:

Danger of study and patient information not available.
iQ-WEB strongly relies on "Patient ID" information of DICOM data. If a received dataset doesn't contain this information the corresponding patient record may not displayed on the patient information related pages and can only be seen on study based pages. This might delay therapy decisions.

H.-No.: 1.1.4

User competence and training

⚠ WARNING:

Danger of delayed diagnosis due to use errors.
The iQ-WEB software is certified as a medical device according to the European Council Directive 93/42/EEC. Before using this application, make sure that you have thoroughly read and fully understood the content of the Instructions for Use and Administration Guide, including all of the warnings and notices.

H.-No.: 1.1.5, 1.1.7, 1.1.8, 1.1.10, 1.2.4

⚠ WARNING:

Danger of application failures or unavailability.

Only authorized and trained personnel shall install and configure iQ-WEB, such as trained PACS or IT administrators. Refer to the installation information in the Administration Guide to ensure the correct installation. An improper installation or configuration may lead to non-functioning or limited functionality of the software and could damage, affect or delete important patient health data, which can cause serious harm or death of patients.

H.-No.: 1.1.1, 1.1.4, 1.2.3, 1.2.4

NOTICE:

A PDF reader must be installed on the system to open and view the iQ-WEB Instructions for Use and Administration Guide.

Conditions of installation and use / software environment

⚠ WARNING:

Danger of application failures or missing data due to misconfiguration.

The installation of the software on a server as well as the configuration settings should be made by a system administrator with technical know-how and experience concerning in-house procedures and processes for the organization. If the installation and/or configuration is performed by personnel not sufficiently qualified, this may lead to non-functioning or limited functionality of the software as well as failure of communication with other devices within the network.

H.-No.: 1.1.1, 1.1.4, 1.2.3, 1.2.4

⚠ WARNING:

Danger of application failures or unavailability.

All modifications to the medical software have to be made by service personnel. The risk of malfunction is relatively high when modifying software. Abnormal termination of the software as well as data losses are possible when improperly administered.

Modifying application folders and or moving files to different locations, deleting or renaming them without considering other parts may cause problems in the functioning of iQ-WEB. Keep the file and folder structure intact and only follow the user documentations' instruction for configuring the application.

H.-No.: 1.1.1, 1.1.4, 1.2.3, 1.2.4

⚠ WARNING:

Danger of application failures or unavailability.

The software application contains areas in which changes in the configuration or licensing can be made. It is recommended that only the system administrator makes such changes. Access to these sensitive areas is restricted for administrator accounts. Thus unauthorized access is impossible.

H.-No.: 1.1.1, 1.1.4, 1.2.3, 1.2.4

⚠ WARNING:

Danger of application failures or unavailability.

The capabilities and the performance of the software can be affected by limitations caused by the hardware. Therefore an appropriate setup and maintenance of the hardware is necessary (e.g. professional connection to power and network, sufficient ventilation, regular cleaning of the fan, etc.).

The available hard disk space must be checked regularly – once per quarter is recommended – to ensure that enough storage capacity is available to temporarily save patient studies on the client machine. The computer must be shut down regularly to ensure the deletion of the temporary data.

H-No.: 1.1.1, 1.1.4, 1.1.7, 1.2.1, 1.2.3

⚠ WARNING:

Danger of delayed diagnosis due to high network latency.

An insufficient wide area or local network speed can cause serious delays. It is strongly recommended that the appropriate network or an optional product called iQ-ROUTER be used to compress data. Refer to the document "Medical Image Data Compression Guide" for details. Improper medical data compression may affect the diagnostic accuracy of data which could cause serious damage or even death to patients!

H.-No.: 1.1.3

⚠ WARNING:

Danger of data loss/inconsistencies or application failures.

Computer viruses hold a considerable risk. A virus infection may potentially lead to data losses and to data inconsistencies. To avoid the risk of a virus infection of the computer, on which the application is running, all systems should be furnished with anti-virus software that needs to be updated regularly.

H.-No.: 1.1.1, 1.1.4, 1.1.8, 1.2.3

NOTICE:

Anti-virus software or firewalls may affect the iQ-WEB software or the connection between iQ-WEB and connected stations as they may accidentally block necessary application files or communication (e.g. ports). It is recommended to configure such applications accordingly to ensure the faultless running of iQ-WEB on the system and to establish stable connections between all communication partners (e.g. the modalities or the MIS). A system test should be performed before using it productively.

Manipulated, incomplete, missing and/or compressed data

⚠ WARNING:

Danger of misdiagnosis due to manipulated data.

The user should make sure that the whole chain of data flow from the acquisition device via DICOM routers, PACS and workstations does not affect the diagnostic accuracy of received data, e.g. regarding pixel aspect ratios, compression artifacts, slice thickness, etc.

H.-No.: 1.1.5, 1.1.9

⚠ WARNING:

Danger of data loss or corruption.
Modifying or deleting DICOM information in study data might lead to image corruption! It should only be done if absolutely necessary and only by knowledgeable personnel.

H.-No.: 1.1.4, 1.1.6, 1.1.7, 1.2.4

Security and protection of patient data

⚠ WARNING:

Danger of unauthorized access to patient data.
Unauthorized access to the software may lead to non-functioning or data losses. To minimize these risks and since iQ-WEB as a PACS system is a centralized point of storage for patient image data, it has to be ensured that the physical access to the server system is restricted to authorized personnel. To do so, password-protected user accounts should be established for the server, on which the software is installed. Authorized persons then access the system using their personal account.

H.-No.: 1.1.8

Any further warnings or precautions regarding individual functions of iQ-WEB are documented in the respective sections of the iQ-WEB Instructions for Use and the iQ-WEB Administration Guide.

1.4 Integrated software products and interfaces

iQ-WEB 6.7.3 is bundled with several integrated software products and interfaces that may be activated separately by additional licenses. This bundle is called iQ-WEBX. Refer to the table below to learn about the versions and/or additional requirements.

Software/interface name	Version/special requirements
iQ-4VIEW	Software version 2.2
iQ-X	Software version 2.2.0
iQ-WEB2GO	Software version 1.2
iQ-VIEW CALL	Requires iQ-VIEW 2.8.0.101 or higher (latest version is highly recommended)

1.4.1 iQ-4VIEW

In order to provide a zero-footprint HTML5 based web-viewer, the iQ-4VIEW software is bundled with the iQ-WEB installer. iQ-4VIEW is a full-fledged diagnostic DICOM viewer including structured reporting features. Consult the iQ-4VIEW Instructions for Use and the Administration Guide for more details regarding capabilities, configuration and administration. Within the iQ-4VIEW web interface, the documentation can be accessed via the book symbol in the top-right corner.

1.4.2 iQ-X

The software iQ-X is included into the iQ-WEB installation to provide an ActiveX-based DICOM web-viewer with optional structured reporting capability (REPORT EDITOR). For detailed information, refer to the iQ-X Instructions for Use and the Administration Guide.

Both documents are also accessible via the web interface. Within the iQ-X interface, click the "HELP" menu and choose "Admin Guide (X)" in the menu bar.

NOTICE:

iQ-X can be used in Internet Explorer only. Other web browsers, such as Mozilla Firefox or Google Chrome, do not support the required ActiveX plugins.

1.4.3 iQ-WEB2GO

The module iQ-WEB2GO is included in the iQ-WEB installation and optimizes the web interface for mobile devices. It can be used in connection with the iQ-WEB image archive. It provides healthcare professionals with access to image information when they work with mobile devices. It is used to search for and access patient and image information that is stored in the iQ-WEB database.

In addition, the application provides an access point for the diagnostic viewer iQ-4VIEW from mobile devices.

The application is only intended for non-diagnostic purposes. The image data that can be accessed through the interface is derived from the original DICOM data and no longer of diagnostic quality. As access point to iQ-4VIEW, the module's sole purpose is to request iQ-4VIEW to open and load the image data that was previously searched for in the mobile iQ-WEB interface. The image data is then provided – in original quality – directly by the iQ-WEB archive, not by the module.

As a module of iQ-WEB its intended place of action is within the medical network of hospitals, imaging centers and radiological practices. As part of iQ-WEB it is installed on server hardware, but is used from mobile devices that access the server via URL (internet).

The graphical user interface is used by radiologists, physicians and veterinarians. Besides the necessity to read the user documentation no further training for general usage is needed. This module does not require a separate installation. For information on the installation of iQ-WEB see chapter 3.

Refer to the iQ-WEB Instructions for Use for more comprehensive details regarding the purpose of the module, for an analysis of the intended patient population and the user groups and for information about the use conditions and contraindications.

The iQ-WEB Instructions for Use document can be accessed by clicking the "Help" button in the user interface.

NOTICE:

The server-side installation of the mobile interface module generally requires the same hardware and software as the iQ-WEB server. Therefore, refer to chapter 2 for detailed information on hardware and software requirements.

For the **iQ-WEB2GO client** the system requirements concerning both hardware and software are:

- Mobile devices (tablets, smartphones) with the following operating systems:
  - Android ≥ 4.2
  - iOS ≥ 6.1
  - Windows Phone ≥ 8.1
- Hardware should comply with the requirements set by the device manufacturer and the requirements set by the used operating system.
- > 512 MB RAM
- Network connection; with 1 Gbit/s when used in combination with iQ-4VIEW
- Large, high-resolution display
- One of the following web browsers:
  - Microsoft Internet Explorer ≥ 11
  - Microsoft Edge ≥ 80
  - Mozilla Firefox ≥ 69
  - Google Chrome ≥ 77
  - Safari ≥ 13
  - Opera ≥ 66

  It is recommended to use the device's stock web browser. All stated web browsers shall be available with the latest version in respect to the used operating system. JavaScript functionality has to be activated. Cookies have to be accepted.
- Any PDF reader for the opening of the instructions for use and administration guide.

⚠ WARNING:

When using the iQ-WEB2GO client to access the iQ-4VIEW viewer other system requirements apply. This is especially the case when iQ-4VIEW is going to be used for diagnostic purposes. Consult the respective iQ-4VIEW user documentation for details concerning the requirements.

H-No.: 1.1.1 – 1.3.3

On mobile devices the mobile web interface of iQ-WEB will be activated in case the user agent of the used browser contains one of the following strings:

- "iPhone"
- "Android"
- "webOS"
- "BlackBerry"
- "Nokia"
- "SonyEricsson"
- "iPod"
- "iPad"
- "Mobile"
- "Windows Phone"
- "PlayBook"
- "Kindle

For additional system requirements including hardware and software compatibility as well as system security see section 2.3.

NOTICE:

The iQ-WEB2GO module does no longer require a separate license (starting with iQ-WEB 6.7.3). A valid iQ-WEB license will automatically provide access via the mobile interface.

1.4.4 iQ-VIEW CALL

The iQ-VIEW Call is an interface function that provides direct access to iQ-VIEW from iQ-WEB's web interface. For detailed information about iQ-VIEW, refer to the iQ-VIEW Administration Guide and the Instructions for Use.

NOTICE:

A licensed copy of iQ-VIEW is necessary on each client where the iQ-VIEW CALL will be used. The iQ-VIEW CALL interface itself does not require a separate license.

1.5 Specialized software tools

In addition to the software options included in the iQ-WEB 6.7.3 setup, there exist several specialized tools and interfaces that allow the realization of specific workflow scenarios. Those must be ordered and activated separately. These software products are not part of the iQ-WEBX bundle. Refer to the table below to learn about the versions and/or additional requirements.

Software/interface name	Version/special requirements
iQ-WEBX WADO HL7	Software version 1.2.0
iQ-WEBX REPORT CONVERTER	Software version 1.2.0
iQ-3DVIEW	Software version 3.0.0
iQ-FUSION	Software version 7.5.1
SR-to-PDF-Converter	Software version 1.1.0

1.5.1 iQ-WEBX WADO HL7

iQ-WEBX WADO HL7 is an interface for exchanging information between PACS and EMR/RIS/HIS. The main feature of this product is the transmission of a specific WADO link to external systems via a HL7 message. This enables the user to view and work easily with images stored in iQ-WEB using an existing HL7 message system.

For detailed information and description of the product refer to the iQ-WEBX WADO HL7 administration guide.

NOTICE:

The WADO interface of iQ-WEB 6.7.3 requires at least version 1.2.0 of iQ-WEBX WADO HL7.

1.5.2 iQ-WEBX REPORT CONVERTER

iQ-WEBX REPORT CONVERTER is a module for iQ-WEB that uses a state-of-the-art algorithm to automatically convert and transmit DICOM Structured Reports and HL7 text reports between information systems and iQ-WEB. This process applies to new reports as well as to corrections and additions to existing reports. The product has no graphical interface and contains a light HL7 server.

1.5.3 iQ-3DVIEW

iQ-3DVIEW is a zero-footprint 3D viewer which offers web-based 3D visualization for iQ-WEB. It runs on both tablets and desktop computers and requires no client installation.

1.5.4 iQ-FUSION

iQ-FUSION is a web-based DICOM viewer for PACS servers that is designed for the display and processing of medical images, especially PET/CT fusion, and can optionally be integrated with iQ-WEB as an additional viewer.

1.5.5 SR-to-PDF-Converter

The SR-to-PDF-Converter is a tool for the conversion of structured reports from DICOM format into the PDF format. If configured in the routing settings of iQ-WEB, the SR-to-PDF-Converter will save the structured report as a PDF file and automatically attach it to the respective study stored in the iQ-WEB archive.

2 System requirements

NOTICE:

The system requirements stated below are the requirements and recommendations valid at the release of this software version and/or the release date of this document.
This information is subject to change over the course of the product's life-cycle. The manufacturer will inform about updates regarding the system requirements when iQ-WEB becomes available for systems other than those defined below (e.g. newer operating systems). Contact your reseller or the manufacturer for the latest information.
Keep in mind that iQ-WEB as a medical device will not automatically support any new technology that becomes available on the market. The software will have to be tested according to legal regulations before being released for such systems.

2.1 General hardware and software requirements for the iQ-WEB server

For the **iQ-WEB server-side installation** the system requirements concerning both hardware and software are:

- Multi-core CPU > 2.00 GHz
- 16 GB RAM
- 1 GB of free space for iQ-WEB application files
- Access to sufficient storage capacity to hold the projected amount of image data
- Network connection with 1 Gbit/s
- Any consumer graphics card, e.g. system's onboard card
- Normal consumer display as control monitor
- Mouse and keyboard
- Operating systems, each 64 bit, Professional edition or higher, with current patch version:
  - Windows 11
  - Windows 10 (not later than 2025-08-14*)
  - Windows 8.1 (not later than 2022-11-10*)

  *IMAGE Information Systems will stop technical support and licensing for its products when Microsoft's extended support ends
- Server operating systems, Standard edition only, with current patch version:
  - Windows Server 2022 (not later than 2031-08-14*)
  - Windows Server 2019 (not later than 2028-11-09*)
  - Windows Server 2016 (not later than 2026-11-12*)
  - Windows Server 2012 R2 (not later than 2023-08-10*)

  *IMAGE Information Systems will stop technical support and licensing for its products when Microsoft's extended support ends
- Database server MySQL, version 5.7.x (x ≥ 37), 64 bit
- Web server Apache, version 2.4
- PHP, version 7.2
- Any PDF reader (for opening the instructions for use and administration guide)
- Software applications manufactured by IMAGE Information Systems that can optionally be used in combination with iQ-WEB 6.7.3:
  - iQ-4VIEW 2.2
  - iQ-X 2.2.0

- iQ-FUSION 7.5.1

NOTICE:

iQ-WEB requires the Visual C++ 2017 redistributable package (64 bit) in order to run correctly. Generally, this package will be deployed automatically during the installation of the software. If the automatic deployment of the 64 bit package does not work correctly, it will be possible to finish the installation of iQ-WEB successfully but the Apache service will not start afterwards. In such cases, download the Visual C++ 2017 redistributable package (64 bit) package from https://aka.ms/vs/15/release/vc_redist.x64.exe and install it manually on the system. Afterwards, start the Apache service from the "Services" panel.

NOTICE:

The actual amount of storage capacity needed depends on many factors. To determine the appropriate size of your PACS, visit http://www.pacscalculator.com and the IMAGE Hardware Purchasing Guide for specific details.

⚠ WARNING:

Danger of application failures and/or unavailability.

Any MySQL version greater than the recommended version 5.7 might not be compatible with iQ-WEB. Contact your local reseller or the manufacturer for additional information. Incompatibilities of the MySQL database version can lead to non-functioning of the iQ-WEB database, which results in the unavailability of patient data. This may delay diagnosis processes.

H.-No.: 1.1.1, 1.1.4

2.2 General hardware and software requirements for the iQ-WEB client

For the **iQ-WEB client-side access** the system requirements concerning both hardware and software are:

- Multi-core CPU > 1.80 GHz
- ≥ 2 GB RAM
- Network connection with 1 Gbit/s
- Graphics card, resolution of ≥ 1280 x 768 px, True Color mode (24 bit)
- Normal consumer display
- Mouse and keyboard
- Operating systems, each 64 bit, Professional edition or higher, with current patch version:
  - Windows 11
  - Windows 10 (not later than 2025-08-14*)
  - Windows 8.1 (not later than 2022-11-10*)
  - *IMAGE Information Systems will stop technical support and licensing for its products when Microsoft's extended support ends
- Server operating systems, Standard edition only, with current patch version:
  - Windows Server 2022 (not later than 2031-08-14*)
  - Windows Server 2019 (not later than 2028-11-09*)
  - Windows Server 2016 (not later than 2026-11-12*)
  - Windows Server 2012 R2 (not later than 2023-08-10*)

- *IMAGE Information Systems will stop technical support and licensing for its products when Microsoft's extended support ends

- One of the following web browsers:
  - Microsoft Internet Explorer ≥ 11
  - Microsoft Edge ≥ 80
  - Mozilla Firefox ≥ 69
  - Google Chrome ≥ 77
  - Safari ≥ 13
  - Opera ≥ 66
- The chosen web browser has to meet the following requirements:
  - JavaScript functionality has to be activated.
  - Cookies have to be accepted and stored.
  - An installed Flash player plugin is needed to view DICOM videos in the web interface (if Flash format is used for video conversion).
- Any PDF reader, currently available version (for opening the Instructions for Use and the Administration Guide)
- For use with diagnostic viewer: iQ-4VIEW 2.2, iQ-X 2.2.0 (only in combination with Microsoft Internet Explorer 32 bit version) (see also section 2.3.1)
- For use of the iQ-VIEW call: ≥ iQ-VIEW 2.8.0.101

NOTICE:

Refer to the corresponding Administration Guide documents of additional software that can be connected to and used in combination with iQ-WEB, such as iQ-X, iQ-4VIEW, iQ-WEBX WADO HL7 and iQ-WEBX REPORT CONVERTER, to obtain information about their hardware and software requirements.

2.3 Additional system requirements

2.3.1 Verifying hardware and software compatibility

If using additional iQ-SYSTEM PACS software (e.g. iQ-X or iQ-4VIEW) or any third-party applications, higher system requirements may apply. We recommend consulting the respective user documentation of all software products and select the highest level. It is also possible that certain third-party applications do not support specific operating systems. In such a case, use an operating system that is referenced for all applications you wish to install.

2.3.2 Ensuring system security

It is recommended that the application is used only within a secured environment. This concerns in particular the server system, on which iQ-WEB is installed, but also extends to the web clients. A secured environment includes at a minimum:

- A secure location for the physical iQ-WEB server with limited access only for authorized personnel, e.g. IT/PACS administrators.
- Firewall or router protections to ensure that only approved external hosts have network access to iQ-WEB.

- Firewall or router protections to ensure that iQ-WEB only has network access to approved external hosts and services.
- These protections should include measures that prevent DoS (Denial of Service) attempts that try to flood the network with requests that tie up its resources and may, therefore, lead to a non-functioning of iQ-WEB.
- Any communication with external hosts and services outside the locally secured environment use appropriate secure network channels (e.g. such as a Virtual Private Network (VPN)).
- iQ-WEB servers connected to the internet shall use a TLS/SSL secured connection via https. Read section 10.1.1.1 for instructions on how to set up an https connection.
- Use of an up-to-date firewall.
- A regularly updated anti-virus/malware software.

We recommend the use of up-to-date anti-virus software on the computer on which iQ-WEB is installed and/or run. The virus definitions must be updated regularly (they should not be older than 2 weeks).

Other network security procedures such as automated intrusion detection may be appropriate in some environments. Additional security features may be established by the local security policy and are beyond the scope of these instructions.

NOTICE:

Anti-virus software or firewalls may affect the iQ-WEB software as they may accidentally block necessary application files or communication (e.g. ports). It is recommended to configure such applications accordingly to ensure faultless operation of iQ-WEB on the system. A system test should be performed before using it productively.

To keep constant power supply voltage we strongly recommend the use of an uninterruptible power supply (UPS) on the iQ-WEB server. The interposition of such a device prevents data losses and data inconsistencies that can be produced at the occurrence of fluctuations in the power supply voltage.

2.3.3 Using hardware encryption for data protection

In order to comply with data protection laws, such as the European General Data Protection Regulation 2016/679 (GDPR), it is highly recommended to use hardware encryption on the iQ-WEB server and on the hard drives / NAS where the actual patient data is stored.

Since data on an encrypted hard drive cannot be read by anyone who does not have access to the appropriate key or password, such a mechanism ensures that no unauthorized person will get access to the actual patient data even if they have access to the server hardware.

As such, hardware encryption ensures that the data and the privacy of your patients will be protected from unauthorized access.

2.3.3.1 Encrypting with BitLocker

The BitLocker Drive Encryption allows you to encrypt the entire drive chosen. BitLocker Drive Encryption is available on:

- Pro and Enterprise editions of Windows 8.1
- Pro and Enterprise editions of Windows 10
- Windows Server 2012 and 2012 R2
- Windows Server 2016
- Windows Server 2019

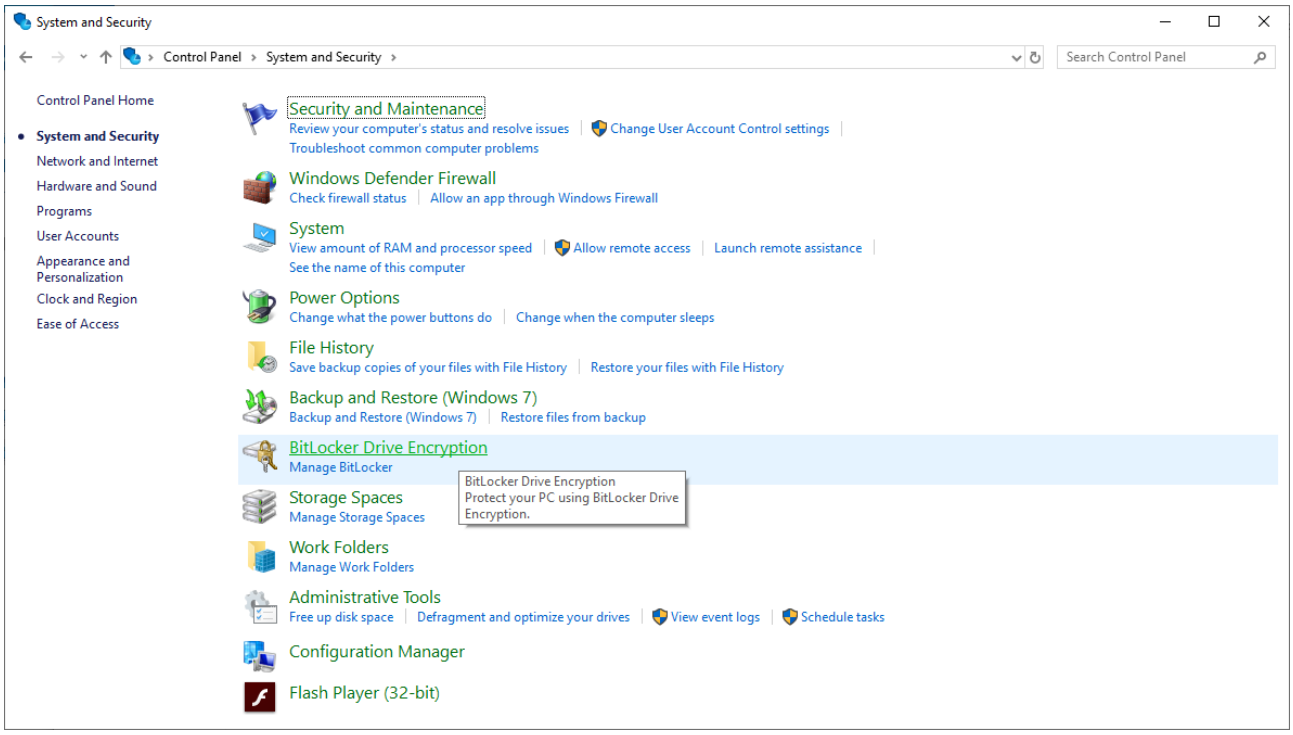
Your computer's BIOS must support TPM (Trusted Platform Module) or USB devices during startup. If this is not the case, you will need to check your PC manufacturer's support website to get the latest firmware update for your BIOS before trying to set up BitLocker. The process to encrypt an entire hard drive is not difficult, but it is time-consuming. Depending on the amount of data and size of the drive, this can take a very long time (on average 180 GB per hour). Make sure to keep your computer connected to an uninterrupted power supply throughout the entire process.

TPM is a microchip installed on the motherboard where BitLocker can store the encryption keys, which is more secure than simply storing them on the computer's data drive. The TPM will only provide the encryption keys after verifying the state of the computer. An attacker cannot read a removed computer's hard disk or create an image of an encrypted disk and decrypt it on another computer, whereas the stealing of the system cannot be prevented by BitLocker.

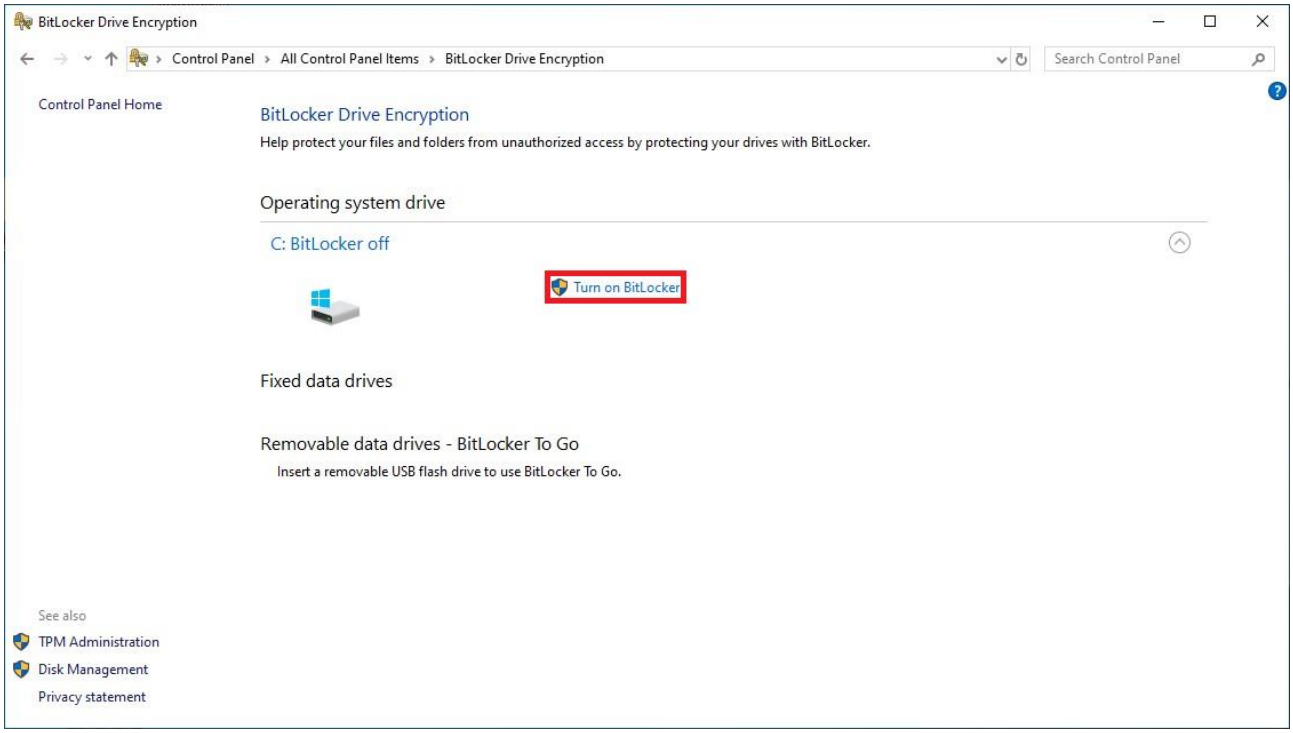
The following steps will guide you through the encryption process with BitLocker.

Step 1: Enable BitLocker for a drive

- Click the Windows start menu search, type "control panel" and press "Enter".
- Click "System and Security" in the control panel.
- Click the option "BitLocker Drive Encryption".



- Click “Turn on BitLocker” under “Operating system drive”.



If the system on which you are enabling BitLocker has a Trusted Platform Module (TPM), continue with the unlock method when using a TPM under step 2. If the system does not have a TPM, you will see the following message:

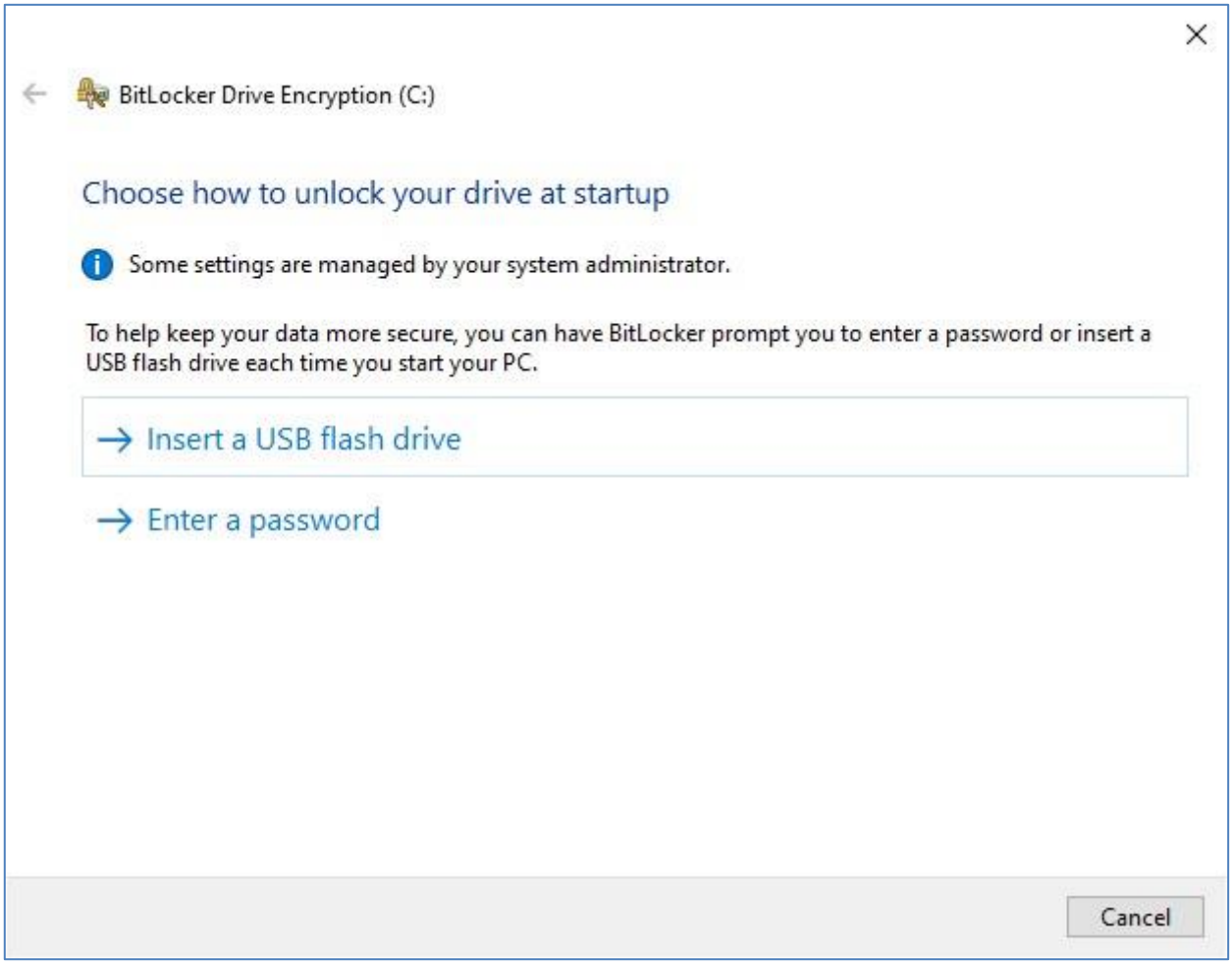
This device can't use a Trusted Platform Module. Your administrator must set the "Allow BitLocker without a compatible TPM" option in the "Require additional authentication at startup" policy for OS Volumes.

To **configure BitLocker without TPM**, follow the instructions below.

- Open the "local group policy editor" of your Windows system. You can use your system's search bar and type "gpedit" to access it.
- When the group policy editor opens, navigate to Computer Configuration → Administrative Templates → Windows Components → BitLocker Drive Encryption → Operating System Drives, and then double-click "Require additional authentication at startup" in the main window (Make sure to select the right option as there is another entry for Windows Server).
- Select "Enabled" in the upper left and activate "Allow BitLocker without a compatible TPM" below. This requires a password or a startup key on a USB flash drive.
- Afterwards, click "Apply" and "OK" to save all changes.
- Update the group policy: Press "Win" + "R", type "gpupdate /force" and press "Enter" for the changes to take effect immediately.
- Go back to the BitLocker Drive Encryption window and click "BitLocker Drive Encryption". This time the setup wizard will start without showing any error.

Step 2: Choose an unlock method (when using a USB flash drive or a password)

The dialog in the next window will ask you to choose how to unlock your drive at startup.



If you select the option "Insert a USB drive", you need to insert a USB drive to unlock the system. If you select "Enter a password", you need to enter a password every time you start the system. After you clicked "Enter a password", you are required to create a secure password consisting of upper and lower case letters, numbers and special characters.

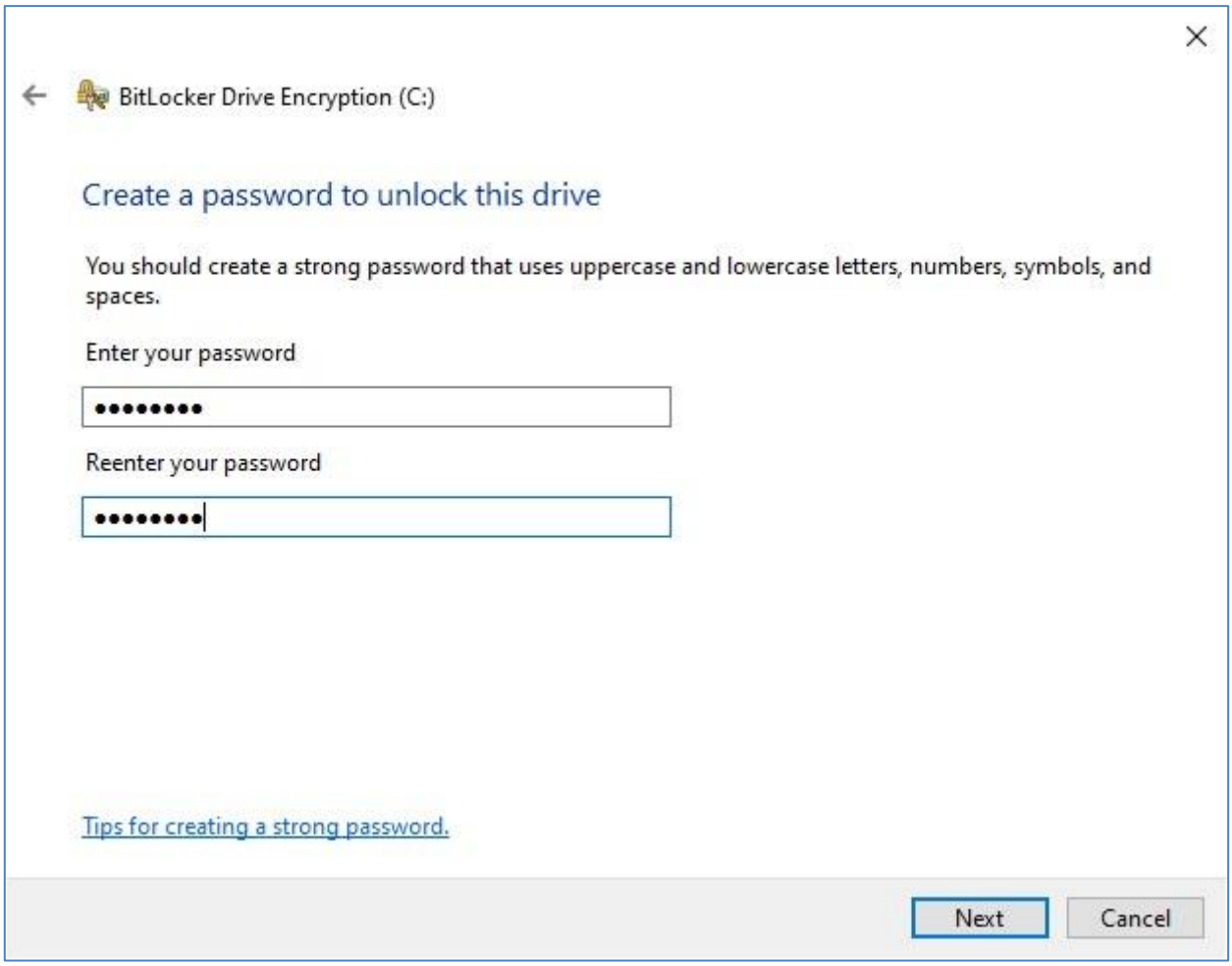
NOTICE:

When setting up a password for a system drive, do not use umlauts or vowel mutations as only characters of the English keyboard layout are supported. The use of a keyboard layout other than the English layout could also lead to wrong entries of the password.

NOTICE:

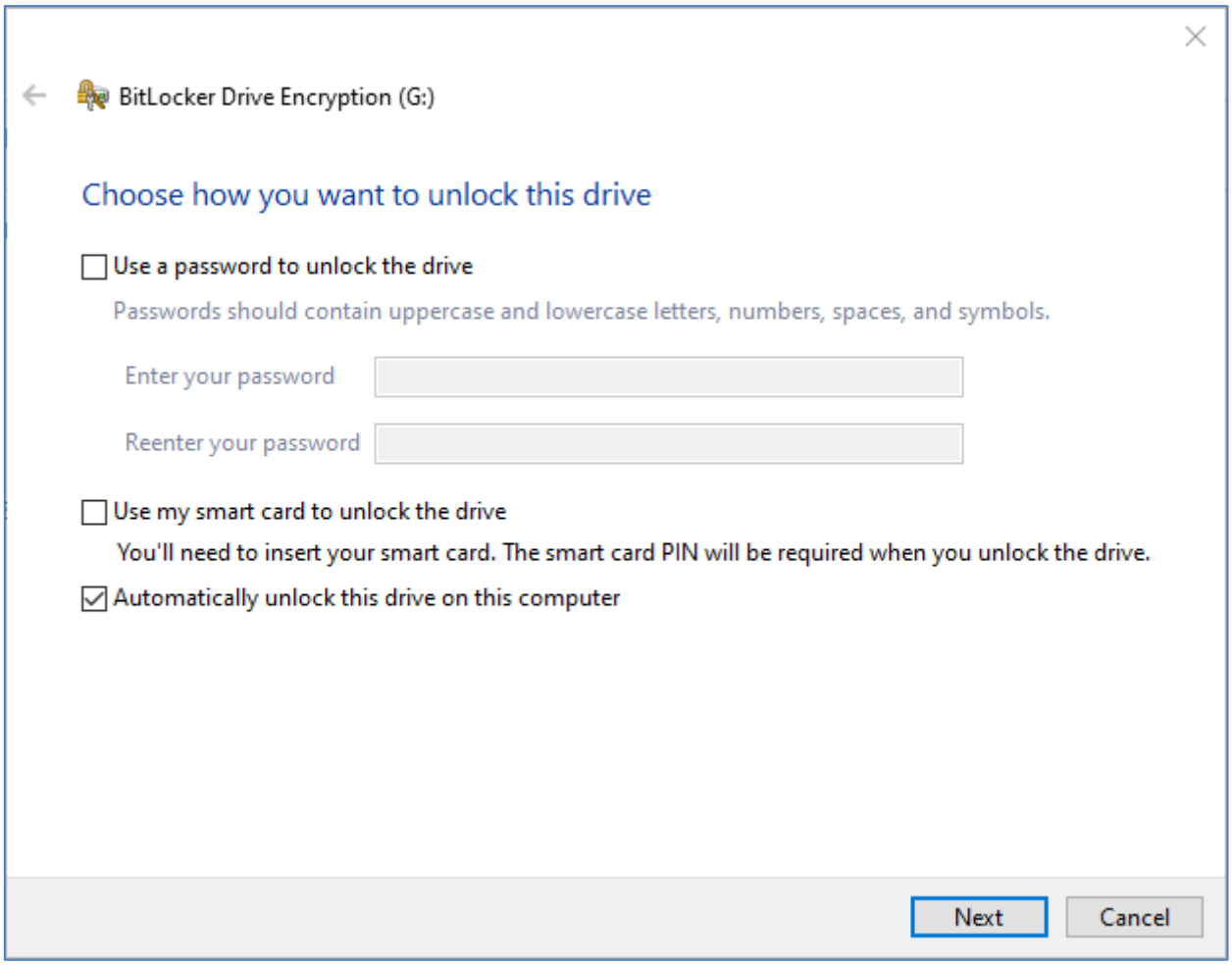
When setting up a password for a system drive, do not use a password you already use for another account.

To confirm your password, reenter it into the second entry field below. Afterwards, click "Next".



Choose an unlock method (when using a TPM)

To automatically unlock the drive using a TPM, select the option “Automatically unlock this drive on this computer” and click “Next”.



Step 3: Back up your recovery key

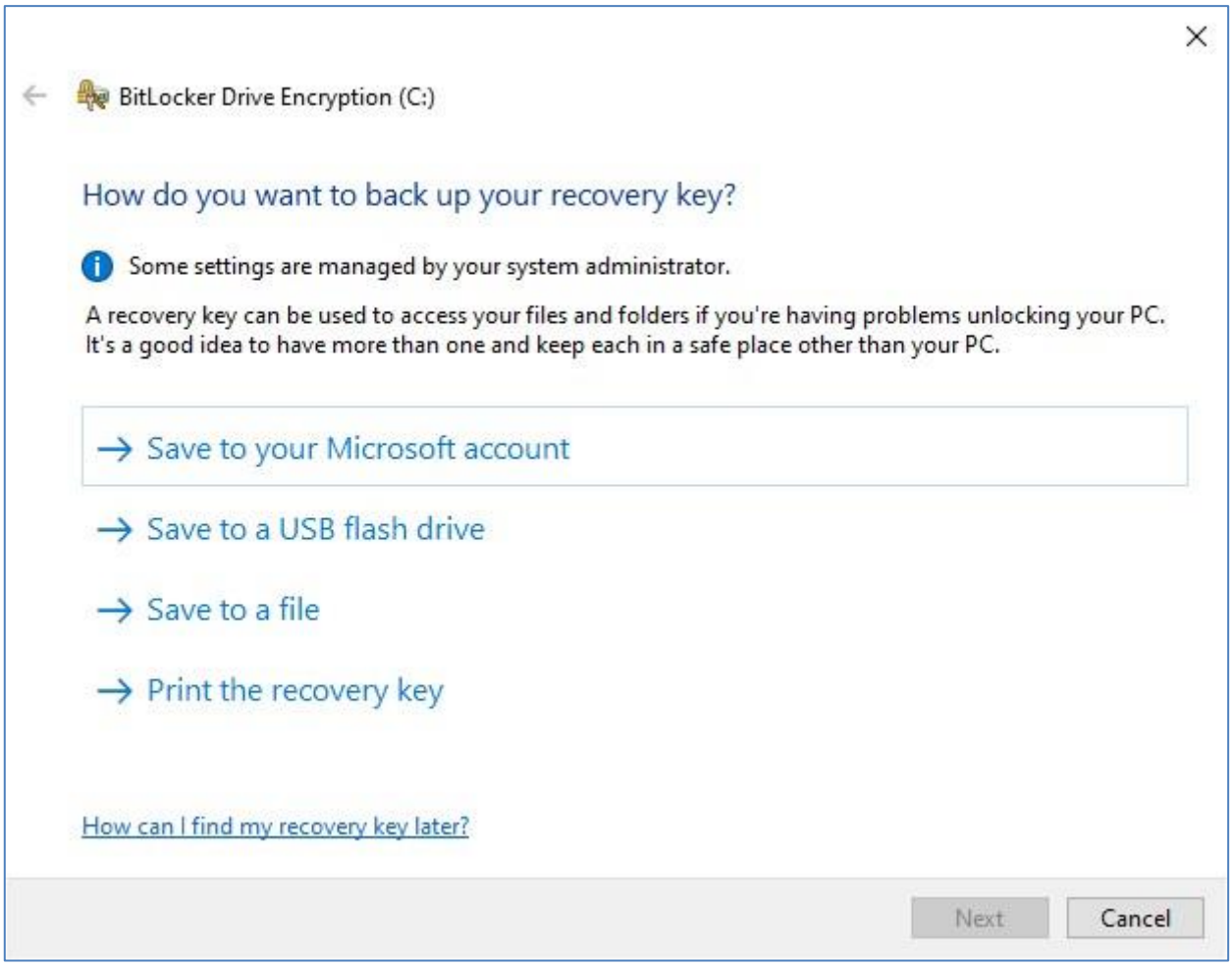
The next window will ask you to choose how you want to back up your recovery key. You can choose between the following options:

- Save to your Microsoft account
- Save to a USB flash drive
- Save to a file
- Print the recovery key

NOTICE:
If your system does not have a TPM, it is recommended to save the recovery key to a USB flash drive and to print it.

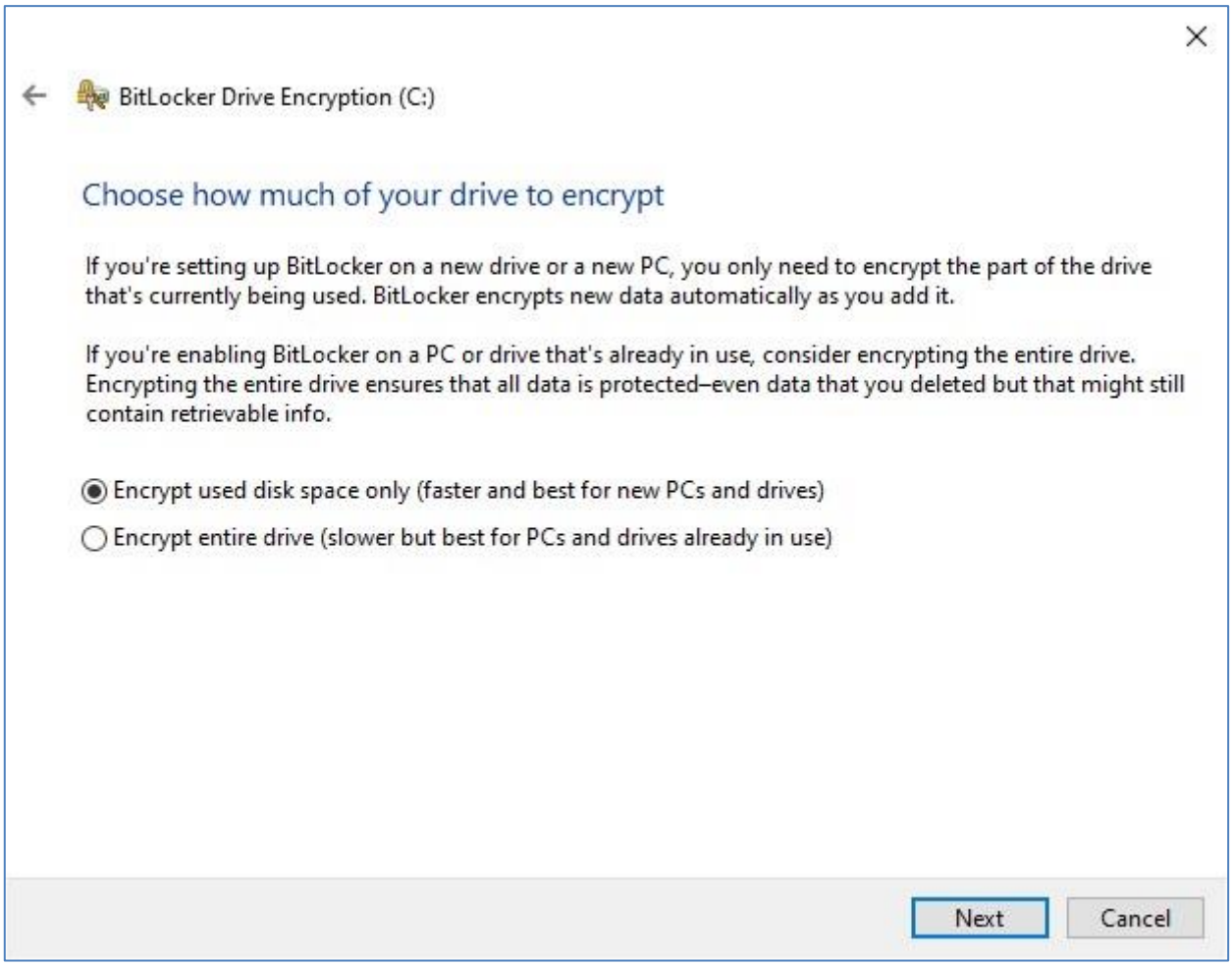
If you use the TPM, click on "Save to a file". The recovery key will then be saved on a different drive than the one you want to encrypt. Afterwards, click "Next".

If you select the option "Save to a USB flash drive", a window will pop up and ask you to insert the USB device. Select the proper device from the list and click "Save". Then click "Next".



Step 4: Encrypt and unlock the drive

Now you have to choose how much of your drive you want to encrypt. You can select "Encrypt used disk space only", which is faster and is the best option for new PCs and drives, or "Encrypt entire drive, which is slower but is the best option for PCs and drives already in use. If you choose the latter option, be aware that this will take more time (the average duration of the encryption process is 180 GB per hour) and make sure that your computer is connected to an uninterruptible power source in case of a power failure. Click "Next" to continue.



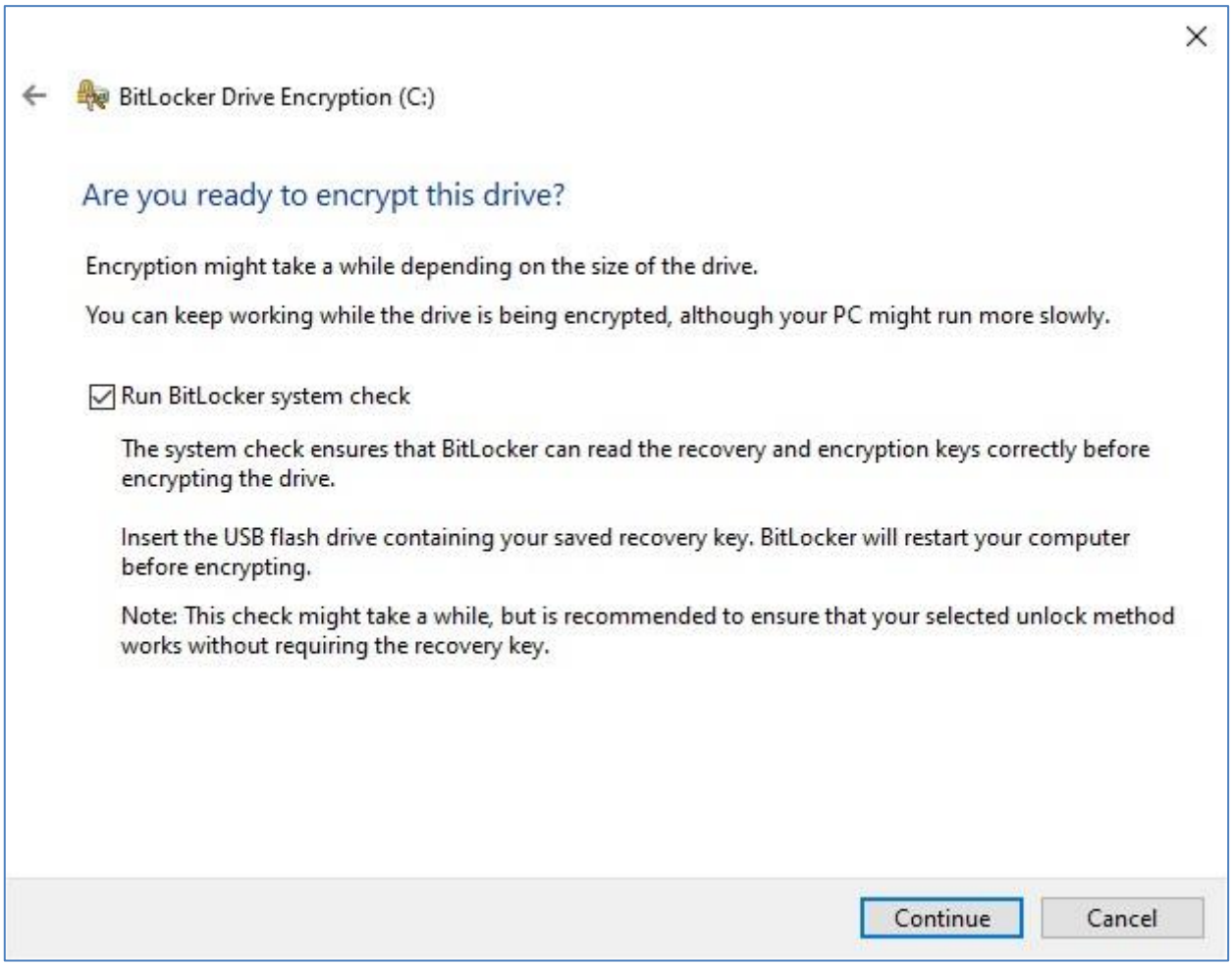
Step 5: Choose an encryption method (Windows 10 only)

Choose between the two encryption options:

- New encryption mode – best option for fixed drives on your device
- Compatible mode – best option for drives that can be moved from your device

Step 6: Run the encryption and the BitLocker system check

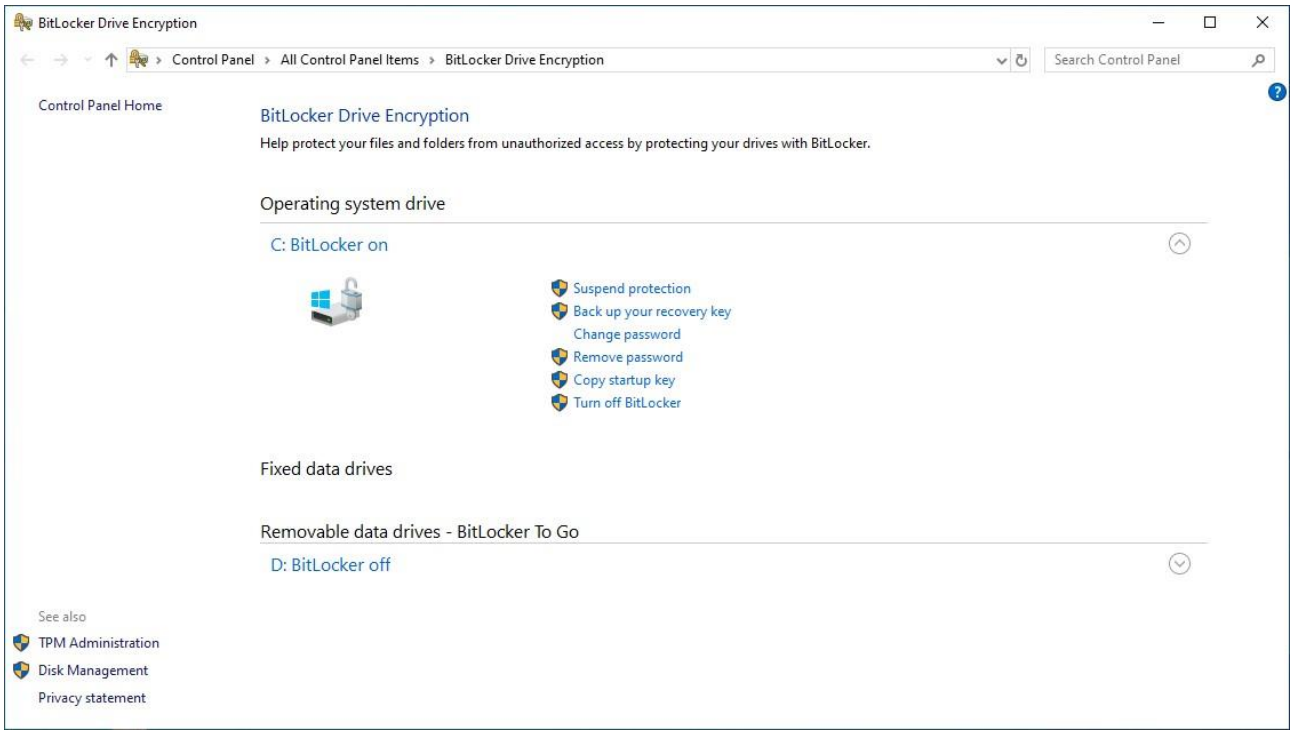
On the next screen you have to confirm that you are ready to encrypt the drive chosen. Make sure that you enable the "Run BitLocker system check" option to avoid any data loss, then click "Continue". If you do not enable this option, you can start the encryption immediately.



- When you click "Continue", BitLocker will reboot the system drive and prompt Windows 10 to finish the setup and begin the encryption.
- Before you start the encryption, remove any CD or DVD, and before closing all open windows, save any work. Then restart Windows.
- The system will boot again and BitLocker will ask you for the password that you created during the BitLocker configuration. Type in the password and press "Enter" to continue.
- After that you can log in to Windows and use your computer as usual while any content created additionally will be secured. The encryption keeps working in the background, but you can check the status of it by double-clicking the BitLocker symbol in the taskbar. When the encryption is complete, you will be notified. Then you will be able to use your computer as usual again.

Managing BitLocker

The BitLocker Drive Encryption window gives you an overview of the drives encrypted with BitLocker and a list of options for the corresponding drive. Some of these options will only work with administrative rights.



Click the BitLocker Encryption control panel item or right-click the encrypted drive and select the option "Manage BitLocker" from the right-click menu. This will open the BitLocker Drive Encryption window with the following options:

- **Suspend protection:** Use this option if you want to suspend the encryption. You might need to temporarily suspend BitLocker if you are updating your PC's firmware, hardware or operating system. If you forget to resume BitLocker protection, it will resume automatically the next time you restart your PC. Be aware that your data will not be protected anymore if you suspend BitLocker protection.
- **Back up your recovery key**: If you lose your recovery key and you are still signed into your account, you can use this option to create a new backup of the key.
- **Change password**: Use this option to create a new encryption password. You still need to supply the current password to make the change.
- **Remove password**: You cannot use BitLocker without a form of authentication. You can remove a password only when you configure a new method of authentication.
- **Turn off BitLocker**: If you do no longer need encryption on your computer, BitLocker provides a way to decrypt all your files. After turning off BitLocker, your sensitive data will no longer be protected. The decryption process may also take a long time depending on the size of the drive, but it is still possible for you to use your computer.

2.3.4 Ensuring system availability when using energy-saving modes

Computers offer options to manage how the system uses power and tries to save energy by reducing the computers performance and by putting to sleep defined hardware components. Usually computers come with pre-configured and pre-selected power plans.

It is important to keep in mind that in energy-saving modes not all hardware components of the system may be functional. As consequence, also the performance of iQ-WEB may be limited. For instance, if you switch off the network cards, the application will no longer be able to receive image data from other stations. It might also be that the hard disk is turned off in sleep mode, which makes it impossible for the application to store received data onto the hard disk.

It is recommended to check the system's power plan and power options and to configure the various elements in a way that does not interfere with the functioning of the application or ensure that components like the hard disk and the network cards or the computer as a whole are never put to sleep.

3 Installing the software

The iQ-WEB 6.7.3 setup not only includes the iQ-WEB server, but some extensions as well (i.e. iQ-X and iQ-4VIEW). While included in the installation, each of these additional modules still requires a specific configuration and licensing procedure. The formerly separate software module iQ-WEB2GO, which provides a limited user interface for access from smaller mobile devices, does no longer need any separate configuration or licensing procedure, but works in connection with a valid iQ-WEB license (starting from iQ-WEB 6.7.3). Directly integrated is also the optional WADO functionality. Since the WADO interface only accesses the iQ-WEB database from a medical information system (MIS), there is no further installation necessary on the individual MIS client stations from which the data on iQ-WEB will be requested.

Moreover, the iQ-WEBX 6.7.3 setup depends on 3rd party components and software. Some of these are not included in the installation package due to technical or legal reasons – most notably the MySQL database server. Hence, the installation of iQ-WEB is a three part process consisting of the following steps:

1. Installation of all mandatory Windows Updates
2. Installation of the MySQL database server
3. Installation of iQ-WEB

NOTICE:
Before installing iQ-WEB, it is absolutely necessary to fully update the operating system using Windows Update. Missing updates can lead to non-functioning installation.

NOTICE:
Before installing any components of iQ-WEB, it is recommended that any anti-virus or security software be disabled during this process to avoid interruptions.

NOTICE:
It is mandatory that iQ-WEB be installed with full administrative privileges on the server.

NOTICE:
The manufacturer does not warrant that newer versions of the 3rd-party components like MySQL, Apache and PHP will work properly with the iQ-WEB server. The installation steps described in this document may also differ in newer versions or cause errors during the installation process.

NOTICE:
It is recommended that iQ-WEB be installed on a dedicated server and that the server not be shared with other performance critical applications to avoid conflicts and performance reduction.

NOTICE:
It is mandatory that the iQ-WEB server be restarted after the installation procedure is completed to ensure a fully operational state of iQ-WEB and its components.

3.1 Full Windows update

Because the iQ-WEB server makes use of the newest technology available, its correct installation depends on the operation system being up-to-date. This step includes all system restarts necessary to finish the update. If the operating system has not been updated for some time, several update/restart cycles may be necessary. This includes, in particular, also all updates relating to redistributable packages. Failure to fully update the system can lead to missing or outdated system components resulting in a defunct iQ-WEB installation. Refer to the documentation of the Windows version in use for detailed instructions on performing updates.

3.2 Installation and configuration of the MySQL database server

iQ-WEB requires the installation of a MySQL Database Server in order to operate properly. IMAGE Information Systems Europe GmbH has tested and verified MySQL Community Server release 5.7 to use with iQ-WEB 6.7.3.

MySQL 5.7 can be downloaded using the following links:

- 64-bit OS: https://dev.mysql.com/downloads/windows/installer/5.7.html
- If the link above have been moved, try a manual search at: https://downloads.mysql.com/archives/community/

Once you downloaded the appropriate installation file, proceed by executing the file with administrator privileges.

During the setup you will be asked to choose the setup type. For iQ-WEB, the "Server only" installation is sufficient.

MySQL Installer initiates the configuration. Select the following options:

1. Standalone MySQL Server / Classic MySQL Replication
2. Config type: Server Machine
3. TCP/IP port: 3306
4. No additional user is required
5. Windows Service name: MySQL
   By default, MySQL adds the version number to the service name. Remove the version number to ensure that the iQ-WEB setup will be able to recognize the MySQL installation.
6. Start the MySQL server at system startup
7. Run Windows Service as: Standard System Account
8. No Document Store required

For further installation and configuration details consult the official MySQL 5.7 documentation. https://dev.mysql.com/doc/refman/5.7/en/windows-installation.html.

3.3 Installation and configuration of iQ-WEB

Once MySQL has been installed, the installation of iQ-WEB can take place. The installation package and all available updates can be found in the "Download Center" of the manufacturer's website.

NOTICE:
The iQ-WEBX setup can also upgrade any iQ-WEBX installation version greater than or equal to version 6.3.8. If such an upgrade is intended, proceed to chapter 5 for those instructions.

To begin the installation, execute the iQ-WEBX setup with administrative privileges and follow its instructions.

During the installation process the setup will ask for initial configuration parameters of the categories MySQL, Apache and PACS.

3.3.1 MySQL configuration

The setup will create a database for iQ-WEB named "iqweb" and an administrator account "iqwebadmin". Therefore a password for the administrator account needs to be set and the password of the MySQL root user needs to be entered to give the necessary access rights to the setup.

3.3.2 Apache configuration

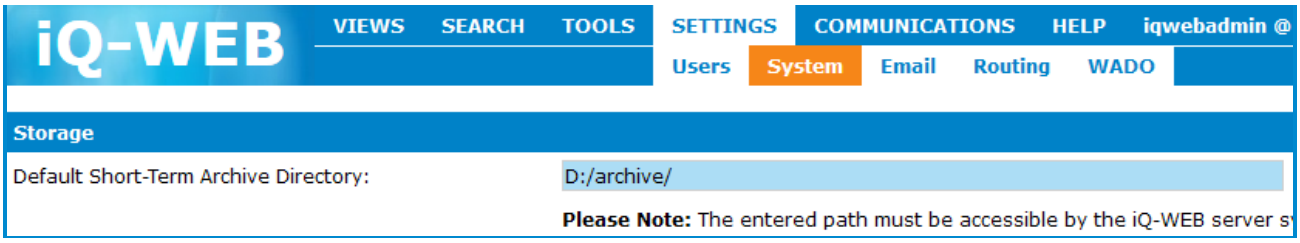
The setup will install an Apache web server. Access via HTTP and/or HTTPS can be enabled and the used port for each protocol can be defined. If HTTPS shall be used, the setup can optionally create a self-signed certificate.

3.3.3 PACS configuration

The Application Entity Title that shall be used by iQ-WEB has to be defined.

The location of the default short-term archive directory where all incoming DICOM data will be stored, must be defined. The set folder is automatically created in case it does not yet exist. By default it is set to C:\Archive. However, this location may not be the best choice for a high data volume.

NOTICE:
If you do not want to make the choice for the location of your PACS' the short term archive now, you can configure it later in the iQ-WEB web interface in the menu item "SETTINGS" → "System".



3.3.4 Improving the PACS performance

A smooth PACS performance is always dependent on an optimal configuration. Therefore, it is necessary that you keep an eye on the core configuration, including PHP and MySQL, described in section 10.1.

1. Check the memory size in the MySQL settings. The recommended innodb_buffer_pool_size is 80% of the machine's physical memory size on a dedicated database server. Find more details in section 10.1.3 under *innodb_buffer_pool_size*.
2. Check whether the default value of the memory_limit and the post_max_size in the PHP settings is sufficient for your demands. For more information on how to increase these values, see section 10.1.2.

3.4 Validating the installation

To validate a successful installation, it is recommended that you perform the following steps:

- Check the Windows Service Control Manager to see if a service named "Apache" is present and running.
- Check the Windows Service Control Manager to see if a service named "iQ-WEBX" is present and running.
- Check the Windows Service Control Manager to see if a service named "MySQL" is present and running.
- Check the Windows Event Viewer Application Log for any errors referencing one of the three iQ-WEB relevant services listed above.
- Open a web browser on the server and open the URL "[PROTOCOL]://localhost:[PORT]" where [PROTOCOL] equals "http" or "https" and [PORT] equals the corresponding network port chosen during installation (e.g. http://localhost:80 or https://localhost:443).
- Click the "Here" link on the opening page to go to the iQ-WEB login area and login to the interface using the MySQL credentials of the "root" user.
- Navigate to the "Tools" page of iQ-WEB, click the "Today's Log" tab, and check the displayed log for any errors.

3.5 Launching the application

iQ-WEB itself and all of the external components (i.e. Apache web server, MySQL database server) are implemented as Windows services. In order to simplify operation of iQ-WEB, these services are configured by default to automatically launch on system startup. However, this

behavior can be altered using the Windows Service Control utility. For more information on stopping and starting services, refer to section 10.3.3.1.

In order to access the iQ-WEB web interface on the server machine, launch a supported web browser and open the URL "[PROTOCOL]://localhost:[PORT]" where [PROTOCOL] equals "http" or "https" and [PORT] equals the corresponding network port chosen during installation (e.g. http://localhost:80 or https://localhost:443). To access the web interface from remote machines, either the hostname or IP address of the server is necessary. Consult the iQ-WEB Instructions for Use for details concerning usage of the web interface.

The WADO interface can be accessed only after an appropriate license was obtained (see chapter 6). You can find the interface's configuration page by logging into the iQ-WEB web interface as an administrator, opening the "SETTINGS" tab and selecting the menu item "WADO".

4 Uninstalling the software

The iQ-WEB software can, at any time, be removed easily and safely from the system.

To uninstall iQ-WEB, execute the setup file again or use the "Programs and Features" menu of Windows located in the Control Panel and follow the instructions to "Uninstall a program". The instructions of the wizard will step through the rest of the process.

Uninstalling the iQ-WEBX setup will also remove all software products that were delivered with this setup besides the iQ-WEB archive software. This includes iQ-4VIEW and iQ-X as well as the integrated interfaces iQ-WEB2GO and WADO. Make sure that none of these applications will be needed anymore or are replaced with a new iQ-WEBX installation on a different system before proceeding with the uninstallation.

Since iQ-WEB does not deploy any persistent data to the MIS client stations in order to use the optional WADO interface, there is no need for an uninstallation procedure on the clients from which the interface is accessed.

NOTICE:

No file that was created or changed during the runtime process of iQ-WEB will be deleted. This includes image data, log files, and license information as well as database tables. This data must be deleted manually for a complete uninstall.

MySQL must be uninstalled separately.

NOTICE:

To uninstall MySQL, use the "Programs and Features" menu of Windows located in the Control Panel and follow the instructions to "Uninstall a program."

5 Managing software upgrades and software migrations

As manufacturer of iQ-WEB we highly recommend to always use the latest software version. This guarantees the use of all available cyber-security measures to protect your system and the stored data. It also allows you to stay up-to-date on the latest developments and to benefit from new features. And, additionally, it increases the compatibility of iQ-WEB within your medical network.

At the same time, you are also required to ensure that the underlying hardware and software (e.g. operating systems) remain state-of-the-art.

As a consequence, you will have to perform software upgrades and even migrations of the software from one system to a new one. Both processes not only involve the iQ-WEB software, but also the data stored in the iQ-WEB archive as well as the MySQL database, in which the data and the entire configuration is registered.

There are different possible scenarios. In the subsequent sections of this chapter we will discuss the following use cases:

1. **Software version upgrade on the same system:** An older software version installed on a system is upgraded to version 6.7.3 on the same system.
2. **Simple software migration:** Software version 6.7.3 is installed on one system but shall be moved to another system, including the existing database and data.
3. **Upgrade-migrations:** The database and the data of an older iQ-WEB installation is migrated to a new system combined with a software version upgrade to version 6.7.3.
4. **Special cases involving third-party PACS:** In these cases iQ-WEB is supposed to replace the PACS of another manufacturer.

All these scenarios require a certain amount of preparation and planning in order to perform the actual upgrade and/or migration as smoothly and with as little downtime as possible. Challenges to any upgrade or migration include handling the large amount of data collected over time and the consistency of the database/storage to be processed.

We strongly advise you to take the preparation steps seriously. Not following them will mean potentially considerable delays during the upgrade/migration procedure or even lead to its termination.

5.1 Upgrading to version 6.7.3 on the same system

You want to upgrade your existing iQ-WEB installation to the new version 6.7.3 and have verified that the currently used server is sufficient and complies with the hardware and software requirements defined for version 6.7.3.

In this case, you perform an upgrade to version 6.7.3 on the same system.

NOTICE:
Only upgrades of iQ-WEB version ≥ 6.3.8 are supported.

If a version lower than 6.3.8 is currently installed on your system, you must first upgrade to version 6.3.8 or 6.4.5 before upgrading to version 6.7.3 becomes possible.
Follow the upgrade procedures described in the Administration Guides of version 6.3.8 or 6.4.5 respectively or contact your local reseller for assistance.

In order to ensure a proper upgrade of both the MySQL database server and iQ-WEB, specific steps must be performed in a particular order. Otherwise, the upgrade may fail and lead to more complex tasks afterwards, such as restoring the configuration and reimporting images.

Follow the steps below to ensure a smooth upgrade process, a properly working system and as little downtime of the server as possible.

5.1.1 Preparing for the upgrade

Before you start with the actual upgrade procedure, you need to prepare for it. This involves the following steps:

1. **User credentials:** Collect the necessary user credentials that you will need during the software upgrade:
   - Windows administrator
   - "root" user password of the current MySQL installation
   - If your current version is 6.6.2 or 6.7.1, the "iqwebadmin" password

2. **License files:** In order to license the new iQ-WEB 6.7.3 installation, acquire an "upgrade password" and, if necessary, a license for version 6.7.3.
   - Log in to iQ-WEB with user "root".
   - Under "TOOLS" → "Licensing", download the current iQ-WEB license information in a ZIP file.
   - Send the "LicenseInfo.zip" to your local reseller, announce that you are intending to perform an upgrade and request the necessary "upgrade password".
   - Gaining the licensing information may involve ASP renewals or other financial transactions. Therefore, it can take several days. Wait until you have received all licensing information before scheduling the actual upgrade.
   - Save all received license files to the system where the upgrade shall be performed.

⚠ WARNING:
Danger of application unavailability.
*An upgrade password and, depending on the previously installed iQ-WEB version, a new license for version 6.7.3 is necessary in order to upgrade iQ-WEB properly. Contact your local reseller to obtain all required license files **before** proceeding with any steps of the upgrade process. Without an upgrade password it will not be possible to start the upgrade procedure, resulting in a longer downtime than scheduled. Without a valid license, the upgraded iQ-WEB installation will not be functional.*
H.-No.: 1.1.1

3. **iQ-WEB setup:** Download the iQ-WEB 6.7.3 setup and save a copy to the system where the upgrade shall be performed.

4. **MySQL setup:** If necessary, download the setup of MySQL server 5.7.XX and save a copy to the system where the upgrade shall be performed. This should be required if you currently use iQ-WEB version 6.3.8 or 6.4.5.

5. **Time schedule:** You need to schedule when the upgrade procedure shall take place. It should best be done in a time frame where downtime interferes the least with the institution's workflow, i.e. when there is no or only little traffic to/from iQ-WEB. Make sure to inform everybody affected that iQ-WEB will not be available and plan alternative ways to ensure the institution's necessary medical workflows.

NOTICE:

Depending on the size of the database and on the currently used iQ-WEB and MySQL versions, the iQ-WEB server will be down for a longer period of time. It will not be able to either receive or distribute imaging data. Also access to the iQ-WEB web interface and the connected viewers iQ-4VIEW and iQ-X will not be possible.
Afterwards, this backup also has to be restored and, in addition, both iQ-WEB and iQ-4VIEW, which is included in the setup, need to be upgraded. Also these actions depend on the database size. Therefore, estimate the following downtimes:
- MySQL backup: approx. 45 min per 10 GB of database
- MySQL restore: approx. 30 min per 10 GB of database
- iQ-WEB/iQ-4VIEW upgrade: approx. 60 min per 10 GB of database
Keep in mind that the exact downtime will depend also on the performance of the server and its storage system.

Only when all these items are finished, you should start with the actual upgrade procedure.

5.1.2 Performing the software upgrade

When you have finished all preparations and the scheduled day has come, you can perform the actual software upgrade. Verify that the necessary user credentials, the setups and the license files are available and ready to be used.

The steps that must be performed will partly depend on the iQ-WEB and MySQL versions that are currently installed on the system.

There are up to four steps needed in order to complete the upgrade process:

1. Create a backup of the current MySQL databases.
2. Update the MySQL server to version 5.7.XX.
3. Restore and upgrade the database from the backup.
4. Upgrade iQ-WEB.

NOTICE:

It is possible to modify the AE title of the iQ-WEB after the initial installation, which requires the assignment of an AE title. This can be done from within the iQ-WEB web interface.

Check your current iQ-WEB installation, if the AE title has been changed. Log in to iQ-WEB as administrator, go to "TOOLS" → "System" and check for a previously used AE title in section "DICOM Network Configuration". If that is the case, restore the original value found under "Original AET name" before proceeding with the upgrade. Otherwise, there may be issues during the upgrade process.
After the upgrade process finishes successfully, you may change the AE title back to the preferred value.

NOTICE:
When you update iQ-WEB to a new version, the default php.ini configuration file will be installed, which overwrites your customized php.ini file. However, your previous modifications will be stored in a php.ini backup file in the same folder. You can transfer the changes from this file to the php.ini file after the update.

5.1.2.1 Creating a current MySQL backup

iQ-WEB registers the path to all DICOM objects as well as other metadata and specific configurations (e.g. users, connected devices, specific processes) in a MySQL database. This means that an image can only be displayed properly if the database storage path and the physical file location match.

Therefore, the first step in the upgrade process is to create a backup of the MySQL databases. A MySQL backup of the current iQ-WEB database is important for two reasons:

- When a MySQL version < 5.7 is currently installed (for iQ-WEB ≤ 6.4.5), MySQL needs to be updated to version 5.7 and the iQ-WEB database will require upgrading as well.
- For the improbable case that something goes wrong with the upgrade, a backup of the current iQ-WEB database provides a safety net and allows to restore the previous state.

For iQ-WEB installations using MySQL version < 5.7 (iQ-WEB 6.3.8 and 6.4.5)

NOTICE:
Depending on the size of the database, the creation of the backup will take a while. Estimate around 45 to 60 minutes per 10 GB of MySQL database file size for creating a MySQL backup. The exact time will depend on the performance of the server and its storage system.

1. Under "Services", stop the iQ-WEB and Apache services to prevent incoming data during the MySQL backup and upgrade process.

2. Open the Command Prompt as Administrator ("Run as administrator") and browse to the current MySQL installation folder, e.g. "C:\Program Files\MySQL Server X.X\bin". (Where "X.X" stands for the version number of the currently installed MySQL version, e.g. "5.5".)

3. Run the command below to save all databases into the "mysql_backup.sql" file:

```
mysqldump.exe -uroot -p --add-drop-table --routines --events --all-databases
--force --result-file C:\mysql_backup.sql
```

The resulting dump will be written to the "C:\" drive. Alternatively, you may change the location to which the backup file is written by changing the command above. `--result-file` might be exchanged for `-r`. This command ensures that the output is created in ASCII format. Otherwise it will be impossible to re-import that dump into MySQL.

4. Enter the "root" user password when prompted.

NOTICE:
The database backup will later be restored into the new version of MySQL.

For iQ-WEB installations using MySQL version 5.7 (iQ-WEB 6.6.2 and 6.7.1)

If you are currently already using MySQL version 5.7, the backup is done for safety reasons only. In this case, it would be sufficient to simply create a backup of the current MySQL configuration and data folder.

1. Under "Services", stop the iQ-WEB and Apache services to prevent incoming data during the MySQL backup and upgrade process.
2. Open the Windows Explorer and browse to "C:\ProgramData".
3. Search for the "MySQL" folder and copy it to a backup location of your choice.

NOTICE:
By default, not only the MySQL configuration but also the iQ-WEB databases will be stored under "C:\ProgramData\MySQL". However, it is possible to change the storage path of the actual databases. If you have stored the databases in another path, e.g. on a different hard disk, you need to copy these contents as well. Follow the additional instructions below:
1. Go to "C:\ProgramData\MySQL\MySQL Server 5.7" and find the file "My.ini".
2. Open this file in a text editor and search for command "datadir=". This is the storage path of the actual database data.
3. Copy that folder with all its content to a backup location of your choice.

Alternatively, you can also follow the steps above and perform a MySQL dump. However, this will take much longer than simply creating a copy of the current MySQL folder.

5.1.2.2 Updating the MySQL server to version 5.7

This step is only necessary for iQ-WEB installations using a MySQL version lower than 5.7 (iQ-WEB 6.3.8 and 6.4.5).

Once the MySQL backup has been created properly, you can continue with the MySQL upgrade. Since MySQL does not support an automatic upgrade of previous versions during installation, it is recommended that the existing MySQL Server be uninstalled first:

1. Open the "Control Panel".
2. Under "Programs" → "Programs and Features" search for "MySQL Server X.X". (Where "X.X" stands for the version number of the currently installed MySQL version, e.g. "5.5".)
3. Select "Uninstall" and proceed with the uninstallation.
4. Verify that the uninstallation was successful.

Once the previous MySQL Server is uninstalled, you can continue with installing the new MySQL Server version.

1. Open the folder where you have stored the MySQL 5.7.xx setup previously downloaded in preparation of this upgrade.
2. Follow the instructions of the MySQL 5.7.xx Installer and Configuration Wizard as detailed in section 3.2 of this Administration Guide.

NOTICE:
When asked for the "root" password, we strongly recommend that the previous "root" password from the old iQ-WEB installation be used. This way, it is not necessary to deal with multiple passwords during the upgrade process. In addition, restoring the MySQL backup (in the next section) will overwrite the password specified here.

5.1.2.3 Restoring and upgrading the iQ-WEB database from the MySQL backup

This step is only necessary for iQ-WEB installations using a MySQL version lower than 5.7 (iQ-WEB 6.3.8 and 6.4.5).

After the new version of MySQL has been installed and is working properly, the next step is to restore the previous iQ-WEB database:

1. Open the Command Prompt as Administrator ("Run as administrator") and browse to the new MySQL installation folder, e.g. "C:\Program Files\MySQL\MySQL Server 5.7\bin".

2. Run the command below to import the previously created backup:

```
mysql.exe -f -uroot -p < C:\mysql_backup.sql
```

NOTICE:
If the backup file was given a different path or file name, be sure to substitute the appropriate information for "C:\mysql_backup.sql" in the command above.

3. As before, enter the "root" user password when prompted.

4. The backup is now being imported.

NOTICE:
This may take some time depending on the size of the database file. Estimate around 30 minutes per 10 GB of MySQL database file size for database restoration.

5. After the import has completed, run the next command to finish the upgrade of the databases:

```
mysql_upgrade.exe -uroot -p --force
```

6. Enter the "root" user password again when prompted.

5.1.2.4 Performing the iQ-WEB software upgrade

The actual upgrade of iQ-WEB depends on the software version from which you are about to upgrade to version 6.7.3. Refer to the appropriate section below to continue with the upgrade procedure.

NOTICE:
Depending on the size of the database, the iQ-WEB server will be down for a longer period of time while being upgraded. Estimate approx. 60 minutes per 10 GB of MySQL database for the actual iQ-WEB/iQ-4VIEW upgrade. The exact downtime will depend also on the performance of the server and its storage system.

5.1.2.4.1 Upgrading from iQ-WEB 6.6.2 or 6.7.1

NOTICE:
Make sure that you have obtained the necessary upgrade.password file. You will need it in order to successfully complete the upgrade.

1. Open the folder where you have stored the iQ-WEB 6.7.3 setup previously downloaded in preparation of this upgrade.
2. Copy the "upgrade.password" file that you have received from your local reseller into the same directory.
3. Run the iQ-WEB 6.7.3 setup and follow the instructions given in the installation wizard.
   The setup will use the configuration of the previous iQ-WEB version for the upgraded installation.
4. During the upgrade procedure, the information provided in the "upgrade.password" file will automatically be used to verify the validity of the upgrade.
5. iQ-WEB will also prompt you for the password of the administrative user "iqwebadmin". Enter the password you have used for the previous installation.

NOTICE:
In MySQL, the path to images is by default limited to 255 characters. However, for certain installations longer paths may be needed.
If your image paths will be longer than 255 characters, you need to change the "character_maximum_length" setting of MySQL in order to allow longer paths. To do this, follow the procedure below to make the necessary adaptations:
1. Make sure that the iQ-WEB and Apache services of the iQ-WEB server are stopped. This prevents incoming data during the process.
2. Open the command prompt as administrator and run the following command:

mysql.exe -f -uroot -p < "C:\Program Files\iQ-WEBX\PACS\expensive_database_changes.sql"
During the process, the value will then be changed to 512 characters.
3. Restart the iQ-WEB and Apache services.

5.1.2.4.2 Upgrading from iQ-WEB 6.4.5

NOTICE:
Make sure that you have obtained the necessary upgrade.password file. You will need it in order to successfully complete the upgrade.

1. Open the folder where you have stored the iQ-WEB 6.7.3 setup previously downloaded in preparation of this upgrade.
2. Copy the "upgrade.password" file that you have received from your local reseller into the same directory.
3. Run the iQ-WEB 6.7.3 setup and follow the instructions given in the installation wizard.
   The setup will use the configuration of the previous iQ-WEB version for the upgraded installation.
4. During the upgrade procedure, the information provided in the "upgrade.password" file will automatically be used to verify the validity of the upgrade.
5. iQ-WEB will automatically generate a new administrative user called "iqwebadmin". When prompted, enter a password of your choice for this user (a minimum of 8 characters is required).

NOTICE:
In MySQL, the path to images is by default limited to 255 characters. However, for certain installations longer paths may be needed.
If your image paths will be longer than 255 characters, you need to change the "character_maximum_length" setting of MySQL in order to allow longer paths. To do this, follow the procedure below to make the necessary adaptations:
1. Make sure that the iQ-WEB and Apache services of the iQ-WEB server are stopped. This prevents incoming data during the process.
2. Open the command prompt as administrator and run the following command:
mysql.exe -f -uroot -p < "C:\Program Files\iQ-WEBX\PACS\expensive_database_changes.sql"
During the process, the value will then be changed to 512 characters.
3. Restart the iQ-WEB and Apache services.

5.1.2.4.3 Upgrading from iQ-WEB 6.3.8

NOTICE:
Make sure that you have obtained the necessary upgrade.password file. You will need it in order to successfully complete the upgrade.

Before starting the actual iQ-WEB upgrade by running the iQ-WEB 6.7.3 setup, one more preparation step is needed in order to avoid errors during the upgrade setup:

1. Stop the "Windows Font Cache Service" from the Windows Services window and set the "Startup type" to "Manual".
2. Restart the system.
3. Delete all of the following font files:
   - [iQ-WEB installation folder]\PACS\php\iui\ext-sandbox\t\android\droidsans.ttf
   - [iQ-WEB installation folder]\PACS\php_css\CenturyGothic.ttf
   - [iQ-WEB installation folder]\PACS\php_css\CenturyGothicBold.ttf
   - [iQ-WEB installation folder]\PACS\php_css\CenturyGothicBoldItalic.ttf
   - [iQ-WEB installation folder]\PACS\php_css\CenturyGothicItalic.ttf
4. Start the "Windows Font Cache Service" and set the "Startup type" back to "Automatic".

Now, the iQ-WEB upgrade can begin. Follow the procedure below to perform the upgrade from iQ-WEB 6.3.8 to 6.7.3 and to apply the license file(s):

1. Open the folder where you have stored the iQ-WEB 6.7.3 setup previously downloaded in preparation of this upgrade.
2. Copy the "upgrade.password" file that you have received from your local reseller into the same directory.
3. Run the iQ-WEB 6.7.3 setup and follow the instructions given in the installation wizard. The setup will use the configuration of the previous iQ-WEB version for the upgraded installation.
4. During the upgrade procedure, the information provided in the "upgrade.password" file will automatically be used to verify the validity of the upgrade.
5. iQ-WEB will automatically generate a new administrative user called "iqwebadmin". When prompted, enter a password of your choice for this user (a minimum of 8 characters is required).
6. After the upgrade is completed, log on to the iQ-WEB web interface as an administrative iQ-WEB user (e.g. "root" or "iqwebadmin").
7. Navigate to "TOOLS" → "Licensing". In the top section "iQ-WEB", use the option "Browse" to select the directory where you have saved the "license.zip" file received from your local reseller and then the "Install License File" button to install the new license.
8. Confirm the installation of the new license. The interface will show a green text: "License successfully installed!" Click the "Back" link to validate the activation status of iQ-WEB.

NOTICE:

In MySQL, the path to images is by default limited to 255 characters. However, for certain installations longer paths may be needed.

If your image paths will be longer than 255 characters, you need to change the "character_maximum_length" setting of MySQL in order to allow longer paths. To do this, follow the procedure below to make the necessary adaptations:

1. Make sure that the iQ-WEB and Apache services of the iQ-WEB server are stopped. This prevents incoming data during the process.

2. Open the command prompt as administrator and run the following command:

mysql.exe -f -uroot -p < "C:\Program Files\iQ-WEBX\PACS\expensive_database_changes.sql"

During the process, the value will then be changed to 512 characters.

3. Restart the iQ-WEB and Apache services.

As last step, restart the server.

5.1.3 Wrapping up the software upgrade

In order to finalize the iQ-WEB upgrade to version 6.7.3 and to ensure that everything is working as intended, you should perform the following actions:

1. Verify that the upgrade installation was successful.
2. Order and import WADO, iQ-4VIEW and iQ-X licenses.
3. Perform the acceptance tests.

5.1.3.1 Verifying the upgrade installation

To validate a successful installation, it is recommended that you perform the following steps:

- Check the Windows Service Control Manager to see if the following services are present and running:
  - Apache
  - iQ-WEBX
  - MySQL
- Check the "Application Log" in the Windows Event Viewer for any errors referencing one of the three iQ-WEB relevant services listed above.
- Check the iQ-WEB log for any errors. To do that:
  - Open a web browser on the server and open the URL "[PROTOCOL]://localhost:[PORT]". (Where [PROTOCOL] equals "http" or "https" and [PORT] equals the corresponding network port chosen (e.g. http://localhost:80 or https://localhost:443)].
  - Click the "Here" link on the opening page to go to the iQ-WEB login area and log in to the web interface using the MySQL credentials of the "root" user.
  - Navigate to "TOOLS" → "Today's Log" and check the displayed log.

5.1.3.2 Licensing WADO, iQ-4VIEW and iQ-X

During the upgrade from your previous iQ-WEB installation to iQ-WEB 6.7.3, also other software products included in the iQ-WEB setup were potentially upgraded to new versions. As a consequence, their previous software licenses may no longer be valid and the products need to be re-licensed for the new version.

If you had not yet purchased these products or interfaces for your previous iQ-WEB installation and wish to use them now, you will need licenses in any case.

If you have previously used these products or interfaces before and have, therefore, had installed licenses for them, it depends on your previous iQ-WEB version whether you will need new licenses or not:

- **iQ-4VIEW:** During the upgrade to iQ-WEB 6.7.3, iQ-4VIEW was upgraded to a new software version as well (version 2.2). You will need a new license.
- **iQ-X:** If you have upgraded from iQ-WEB version ≥ 6.4.5, the iQ-X license will still be valid (version 2.2.0.6). After upgrading from iQ-WEB 6.3.8, also a new iQ-X license will be needed.
- **iQ-WEBX REPORT EDITOR:** If you have upgraded from iQ-WEB version ≥ 6.4.5, the iQ-WEBX REPORT EDITOR license will still be valid (version 2.2.0.6). After upgrading from iQ-WEB 6.3.8, also a new license for the report editor will be needed.
- **WADO:** If you have upgraded from iQ-WEB version ≥ 6.6.2, the WADO license will still be valid. After upgrading from prior iQ-WEB versions, also a new WADO license will be needed.

NOTICE:

With software version 6.7.3, the formerly separately sold software module iQ-WEB2GO was discontinued and its functionality – a limited user interface for access from smaller mobile devices – was directly integrated into iQ-WEB. Therefore, no separate license is needed anymore. The functionality will be covered by the purchased iQ-WEB license.

In order to request the new licenses, you first need to collect the necessary license information:

1. Log in to iQ-WEB with user "root".
2. Under "TOOLS" → "Licensing", download the current license information in a ZIP file.
3. Send the "LicenseInfo.zip" to your local reseller and request licenses for the software and/or interfaces you wish to use.
4. Gaining the licensing information may involve ASP renewals or other financial transactions. Therefore, it can take several days. New software versions generally run in trial mode for 30 days so that there is time for acquiring the new full licenses. Where no trial versions are available (e.g. WADO), you can request one from your local reseller.
5. After you have received the requested license information, follow the instructions provided with them to install these licenses.

5.1.3.3 Performing acceptance tests

In order to ensure the faultless running of iQ-WEB after the upgrade, you should perform system acceptance tests before putting the system back into productive use.

You will find a checklist with the recommended iQ-WEB acceptance tests in the annex to this document. Refer to section 13.1.

5.2 Migrating version 6.7.3 to a new system

You already use the latest iQ-WEB version but have decided to update your server hardware.

In this case you perform a migration of iQ-WEB version 6.7.3 from the old system to a new one. This also includes migrating the MySQL database of iQ-WEB and any data that exists on the old system and needs to be moved.

In order to ensure a proper migration of iQ-WEB, the MySQL database and the data, specific steps must be performed in a particular order. Otherwise, the migration may fail and lead to more complex tasks afterwards, such as restoring the configuration and reimporting and re-registering the image data.

Follow the steps below to ensure a smooth migration process and a properly working new iQ-WEB server.

5.2.1 Setting up the new iQ-WEB server

Before you start with the actual migration procedure, you need to prepare for it. In the first case, you should set up the new server. This involves the following steps:

1. **New server hardware:** You need to purchase and set up the new server. Verify that the hardware and software (e.g. operating system) of the new server complies with the requirements defined for version 6.7.3 in this Administration Guide. Connect the new server to the network. If LDAP is supposed to be used for the iQ-WEB users, make sure that the new server has sufficient permissions to access the LDAP server. If you use external storage devices (NAS, external hard disks etc.) to archive the data received by iQ-WEB, these devices need to be connected. iQ-WEB will need permissions to read and write data on these devices.

2. **User credentials:** Collect the necessary user credentials that you will need during the setup of iQ-WEB 6.7.3 on the new server:
   - Windows administrator credentials for the new server
   - "root" user password of the current MySQL installation on the old server

3. **iQ-WEB configuration details:** In order to set up the new server with settings as close to the old server as possible, you will need to collect some information from the old iQ-WEB server:
   - AE title and port of iQ-WEB used in the current installation

NOTICE:

It is possible to modify the AE title of the iQ-WEB after the initial installation, which requires the assignment of an AE title. This can be done from within the iQ-WEB web interface. Check your current iQ-WEB installation, if the AE title has been changed. Log in to iQ-WEB as administrator, go to "TOOLS" → "System" and check for a previously used AE title in section "DICOM Network Configuration". If that is the case, restore the original value found under "Original AET name" before proceeding with the upgrade. Otherwise, there may be issues during the upgrade process.

After the upgrade process finishes successfully, you may change the AE title back to the preferred value.

Step 4 is only needed for any data referred to in iQ-WEB and/or registered in the iQ-WEB database that is directly stored on the old iQ-WEB server and needs to be moved over to the new server.

4. **Collecting iQ-WEB data storage paths:** You will need all paths where data is stored, in order to set up the same paths on the new server. To do that, log in to iQ-WEB as user "root" and collect the following paths (if needed):
   - **General short-term storage**: "SETTINGS" → "System" → "Default Short-Term Archive Directory"
   - **AE title-specific short-term storage:** "COMMUNICATIONS" → "DICOM" → select AE title → "Short-Term Archive Directory"
   - **General long-term storage**: "SETTINGS" → "System" → "Default Long-Term Archive Directory"
   - **AE title-specific long-term storage:** "COMMUNICATIONS" → "DICOM" → select AE title → "Long-Term Archive Directory"
   - **Purged data:** "TOOLS" → "Automatic Purge Storage", if you have purged old data to a different storage area directly on the old server.
   - **Uploaded attachments to study/image notes:** "SETTINGS" → "System" → "Upload Directory"
   - **Images imported via auto-scan function:** "SETTINGS" → "System" → "Destination Folder"
   - **Imported DICOM objects:** "TOOLS" → "Import":
     - "Local directory" for data imported without moving it into the iQ-WEB storage
     - "Destination archive directory" into which data was **imported**
   - **External DICOM viewer for patient media:** "TOOLS" → "Export" → path in which the files for that external viewer are stored.

5. **Download setups:** Download both the iQ-WEB 6.7.3 setup and the MySQL server 5.7.XX setup and save a copy of each to the new server.

6. **Perform full Windows update:** iQ-WEB requires the operating system, incl. specific redistributable packages, to be up-to-date in order to make use of the newest technology available. Run all available Windows updates. Restart the system if necessary to finish the update. If the operating system has not been updated for some time, several update/restart cycles may be necessary. Failure to fully update the system can lead to missing or outdated system components resulting in a defunct iQ-WEB installation. Refer to the documentation of the Windows version in use for detailed instructions on performing updates.

7. **Install MySQL:** Perform the MySQL server 5.7.XX installation:
   - Open the folder where you have stored the previously downloaded MySQL 5.7.xx setup.
   - Follow the instructions of the MySQL 5.7.xx Installer and Configuration Wizard as detailed in section 3.2 of this Administration Guide.

NOTICE:

When asked for the "root" password, we strongly recommend that the previous "root" password from the old iQ-WEB installation be used. Since you will later restore a MySQL backup from the old server to the new one, the old "root" password will be restored anyway.

8. **Install iQ-WEB 6.7.3:** Now you can also install iQ-WEB 6.7.3:
   - Open the folder where you have stored the iQ-WEB 6.7.3 setup previously downloaded in preparation of this upgrade.

- Run the iQ-WEB 6.7.3 setup and follow the instructions given in the installation wizard. Complete the installation by validating it. Refer to the installation instructions detailed in chapter 3.

9. **Order and install software licenses:** After the installation, iQ-WEB and all other software products and interfaces shipped in the same setup will run in trial mode with limited trial licenses. You will have to order replacement licenses for all products/interfaces that you intend to use on the new iQ-WEB server: iQ-WEB, WADO, iQ-4VIEW, iQ-X and iQ-WEBX REPORT EDITOR.
   In order to request replacement licenses, you first need to collect the necessary license information:
   - Log in to iQ-WEB on the **old** server with user "root".
   - Under "TOOLS" → "Licensing", download the current license information in a ZIP file. You need this as reference for the current installation.
   - Now log in to iQ-WEB on the **new** server with user "root".
   - Under "TOOLS" → "Licensing", download the current license information in a ZIP file.
   - Send both "LicenseInfo.zip" archives to your local reseller and request replacement licenses for all software and/or interfaces you wish to use. Make sure to indicate which file is from the old and which from the new server.
   - Gaining the licensing information may involve ASP renewals or other financial transactions. Therefore, it can take several days.
   - After you have received the requested license information, follow the instructions provided with them to install these licenses on the new server.

NOTICE:

With software version 6.7.3, the formerly separately sold software module iQ-WEB2GO was discontinued and its functionality – a limited user interface for access from smaller mobile devices – was directly integrated into iQ-WEB. Therefore, no separate license is needed anymore. The functionality will be covered by the purchased iQ-WEB license.

Step 10 is only needed for any data referred to in iQ-WEB and/or registered in the iQ-WEB database that is directly stored on the old iQ-WEB server and needs to be moved over to the new server.

10. **Creating iQ-WEB data storage paths:** While you are waiting for the replacement licenses, you have time to perform this action. In step 4 you collected all paths where data is stored directly on the old server. In order to move this data later from the old server to the new one, you will have to create all those paths on the new system.

NOTICE:

Generally, it makes migrations easier if all data is stored on an external device (shared network drive, NAS or fast external drives, such as USB 3.x or Thunderbolt) that can simply be connected to the new iQ-WEB server. You may want to think about moving the old data to an external device while doing this migration. Such an action will involve further steps in order to adapt the old data paths to the new ones but it will simplify future migrations. For further instructions refer to section 5.2.2.4.

Only when all these items are finished and the new server is prepared, you should start with the actual migration procedure involving the moving of the database and the data.

5.2.2 Performing the software migration

When you have finished the setup of the new iQ-WEB server and also the replacement licenses are installed, you need to schedule when the backup of the iQ-WEB database and any data stored on the old iQ-WEB server shall take place. It should best be done in a time frame where downtime interferes the least with the institution's workflow, i.e. when there is no or only little traffic to/from iQ-WEB. Make sure to inform everybody affected that iQ-WEB will not be available and plan alternative ways to ensure the institution's necessary medical workflows.

NOTICE:

Depending on the size of the database, the current iQ-WEB server on the old system will be down for a longer period of time. It will not be able to either receive or distribute imaging data. Also access to the iQ-WEB web interface and the connected viewers iQ-4VIEW and iQ-X will not be possible.

Plan enough time to perform the MySQL backup and for copying any existing data. Estimate around 45 to 60 minutes per 10 GB of MySQL database file size for creating a MySQL backup. The time for copying data depends on the amount of data affected. The exact downtime will also depend on the performance of the server and its storage system.

Depending on the new storage areas, there are up to four steps needed in order to migrate the database and the data:

1. Create a backup of the current MySQL database on the old iQ-WEB server.
2. Copy the data on the old iQ-WEB server to the new server or an external device.
3. Restore the database from the backup on the new iQ-WEB server.
4. Update the MySQL database to the new storage areas.

5.2.2.1 Creating a current MySQL backup

iQ-WEB registers the path to all DICOM objects as well as other metadata and specific configurations (e.g. users, connected devices, specific processes) in a MySQL database. This means that an image can only be displayed properly if the database storage path and the physical file location match.

Therefore, the first step is to create a backup of the MySQL configuration and of the databases on the old server. You need this database backup to restore it into the new iQ-WEB server.

Since you are simply migrating iQ-WEB 6.7.3 from an old system to a new one and the MySQL version is the same on both systems (version 5.7.XX), it would be sufficient to simply create a backup of the current MySQL folder:

1. Under "Services", stop the iQ-WEB and Apache services to prevent incoming data during the MySQL backup.

2. Open the Windows Explorer and browse to "C:\ProgramData".
3. Search for the "MySQL" folder and copy it to a backup location of your choice.

NOTICE:

By default, not only the MySQL configuration but also the iQ-WEB databases will be stored under "C:\ProgramData\MySQL". However, it is possible to change the storage path of the actual databases. If you have stored the databases in another path, e.g. on a different hard disk, you need to copy these contents as well. Follow the additional instructions below:

1. Go to "C:\ProgramData\MySQL\MySQL Server 5.7" and find the file "My.ini".

2. Open this file in a text editor and search for command "datadir=". This is the storage path of the actual database data.

3. Copy that folder with all its content to a backup location of your choice.

Alternatively, you may also perform a real MySQL dump. However, this will take much longer than simply creating a copy of the current MySQL folder and will unnecessarily extend the downtime of the iQ-WEB server.

5.2.2.2 Copying existing data from old to new storage

If you have verified that the old iQ-WEB server contains data that needs to be restored in the new system (or be moved to an external device), you need to copy this data to the new system (or external device):

1. Make sure that the iQ-WEB and Apache services of the old iQ-WEB server remain stopped. This continues to prevent incoming data during the copying process and inconsistencies with the previously created MySQL backup.
2. Open the Windows Explorer and browse to all of the paths that you have identified beforehand (e.g. short-term archive, upload directory, import directory etc.).
3. Copy the content of each of these folders to the same folders on the new iQ-WEB server (or into the newly assigned folders of an external device).

NOTICE:

After finishing the MySQL and the data backup on the old iQ-WEB server, you can restart the iQ-WEB and Apache services so that the server can be used again.

It is strongly recommended to limit the use of the old iQ-WEB server to the imperative needs, since all data received by iQ-WEB at this point will not be included on the new server and must be updated later during productive use.

5.2.2.3 Restoring the iQ-WEB database from the MySQL backup

The next step is to restore the backup of the MySQL databases on the old server to the new one:

1. On the new server, open the "Services" panel and stop the MySQL, iQ-WEB and Apache services while restoring the MySQL database.
2. Open the Windows Explorer and browse to "C:\ProgramData".

3. Copy the "MySQL" folder from the old iQ-WEB server from its backup location into the "C:\ProgramData" path on the new server. Overwrite the existing files.

NOTICE:

If you had changed the default storage path to the database data in the "My.ini" to a different path, you will have to reestablish this database data in the same location on the new server. Follow the additional instructions below:

1. Go to "C:\ProgramData\MySQL\MySQL Server 5.7" and find the file "My.ini".

2. Open this file in a text editor and search for command "datadir=". This is the storage path of the actual database data.

3. Create the same path on the new server and copy the created backup folder with all its content from its backup location into that new path. Alternatively, you can change the patch in the "datadir=" command of the "My.ini" and copy the backup folder into the new place.

4. Afterwards restart all three services, starting with the "MySQL" service.

5.2.2.4 Updating MySQL and iQ-WEB to new storage areas

In case that data that existed on the old iQ-WEB server was not copied to the same folders on the new iQ-WEB server but into other storage folders either on the new server or (preferably) on an external device, you are required to:

- Update the affected data paths in the iQ-WEB web interface.
- Update the MySQL database in order to re-register this data.

Updating affected data paths in iQ-WEB

NOTICE:

Updating data paths in iQ-WEB will only affect new data arriving in iQ-WEB in the future.

1. Log in to the iQ-WEB web interface with user "root" or "iqwebadmin".
2. Point the following paths (only where needed) to the new storage areas.
   - **General short-term storage:** "SETTINGS" → "System" → "Default Short-Term Archive Directory"
   - **AE title-specific short-term storage:** "COMMUNICATIONS" → "DICOM" → select AE title → "Short-Term Archive Directory"
   - **General long-term storage:** "SETTINGS" → "System" → "Default Long-Term Archive Directory"
   - **AE title-specific long-term storage:** "COMMUNICATIONS" → "DICOM" → select AE title → "Long-Term Archive Directory"
   - **Purged data storage:** "TOOLS" → "Automatic Purge Storage".
   - **Folder for attachment uploads to study/image notes:** "SETTINGS" → "System" → "Upload Directory"

- **Folder for imports via auto-scan function:** "SETTINGS" → "System" → "Destination Folder"
- **Folder for DICOM object imports:** "TOOLS" → "Import":
  - "Local directory" for data imported without moving it into the iQ-WEB storage
  - "Destination archive directory" into which data was imported
- **Folder for external DICOM viewer (for patient media):** "TOOLS" → "Export" → path in which the files for that external viewer are stored.

NOTICE:
When external devices are used, make sure that iQ-WEB has access to these paths and sufficient permissions to write, modify and read data in the specified folders.

Updating the MySQL database

1. Open the MySQL Command Line via the respective link in the "Start" menu. Alternatively, open the Command Prompt and browse to the current MySQL installation folder, e.g. "C:\Program Files\MySQL Server 5.7\bin".

2. Run the command:

```
mysql -uroot -p
```

3. Enter the following command to switch to your database:

```
USE <YOURDBNAME>;
```

NOTICE:
Replace "<YOURDBNAME>" with the actual name of your database. The default database name of iQ-WEB 6.7.3 is ***iqweb****. If the iQ-WEB 6.7.3 installation on your old server was an upgrade from a previous version, the database name may be different.*

4. Run the commands below to update the necessary tables to re-register the stored data:

   For DICOM data

```
UPDATE image SET path = replace(path,'OldDrive:/Path/To/OLD/Archive/Folder/',
'NewDrive:/Path/To/NEW/Archive/Folder/');
```

NOTICE:
Replace "OldDrive:/Path/To/OLD/Archive/Folder/" with the actual path, where your DICOM data is stored on the old system, and "'NewDrive:/Path/To/NEW/Archive/Folder/" with the storage location of the data that you want to use now. If data is stored on network shares, UNC paths can also be used.
Keep in mind that the REPLACE path is case sensitive, so make sure to enter it exactly as is.
Example: The "Archive" is moved from the local "C:" drive to a network share:
UPDATE image SET path = replace(path,'C:/Archive/', '//192.168.1.1/Archive/');

NOTICE:

This command can be used for any storage folder that contains DICOM data, i.e. the general and AE title specific long-term and short-term archives, the purged data storage folder(s), the DICOM upload folder and the import folders.
If you had multiple such folders, the command will have to be executed separately for each of these folders.

For uploaded attachments to study/image notes

```
UPDATE attachment SET path =
replace(path,'OldDrive:/Path/To/OLD/Attachment/Folder/',
'NewDrive:/Path/To/NEW/Attachment/Folder/');
```

NOTICE:

Replace "OldDrive:/Path/To/OLD/Attachment/Folder/" with the actual path where your DICOM data is stored on the old system, and "'NewDrive:/Path/To/NEW/Attachment/Folder/" with the storage location of the data that you want to use now. If data is stored on network shares, UNC paths can also be used.
Keep in mind that the REPLACE path is case sensitive, so make sure to enter it exactly as is.

5.2.3 Wrapping up the software migration

In order to finalize the switch from the old iQ-WEB server to the new one, you need to perform the following actions:

1. Perform the acceptance tests.
2. Switch productive use to the new iQ-WEB server.
3. Include newly received data on the new iQ-WEB server.

5.2.3.1 Performing acceptance tests

In order to ensure the faultless running of the new iQ-WEB server, you should perform system acceptance tests before putting the system into productive use.

You will find a checklist with the recommended iQ-WEB acceptance tests in the annex to this document. Refer to section 13.1.

5.2.3.2 Switching productive use to new iQ-WEB server

At this point, the entire PACS workflow still involves your old iQ-WEB server. Modalities still send data and reading stations still request studies and provide reports. Users work with iQ-4VIEW and iQ-X on the old server. In order to switch the entire workflow over to the new server as smoothly as possible, the following procedure is recommended:

1. On the old iQ-WEB server, stop the iQ-WEB, Apache and MySQL services under "Services".

2. Make a note of the IP address of the old server. You will use it for the new server so that you do not have to change the DICOM configuration of every connected DICOM node or point users to new links for accessing the viewers.
3. Afterwards, change the IP address of the old server.
4. On the new iQ-WEB server, stop the iQ-WEB, Apache and MySQL services under "Services".
5. Change the server's IP address to the one that the old server has previously used.
6. Restart the three services on the new server.
7. Verify that all connected DICOM nodes can successfully communicate with the new server and query, retrieve and/or send DICOM data. Also verify user access to the viewers.

NOTICE:

You need to ensure that from now on none of the connected DICOM nodes can communicate anymore with the old iQ-WEB server or that it is used for any other action, including access to viewer, data import, HIS/RIS connections etc.).

But do not disable the old server completely. The new server still has to collect all the data that the old server received in the time frame between creating the MySQL backup and now.

5.2.3.3 Updating newly received data on the new iQ-WEB server

Any data that the old iQ-WEB server received in the time between creating the MySQL backup and the moment where the old server was removed from productive use, is not yet available in the iQ-WEB database of the new server. Therefore, the last step in wrapping up the migration procedure is to make also this new data available and usable on the new server.

The easiest and safest way to do that is to re-import the new data. How to do that depends on whether the new iQ-WEB server uses the same data storage as the old server or not.

The old server and the new server use the same data storage (i.e. external device)

If both the old and the new server use the same storage, the image data is already available but still needs to be registered in the iQ-WEB database in order to become usable:

1. First, you need to identify all the data that needs to be registered. By default, iQ-WEB will store the data received on a specific day in a folder with a respective date stamp.

   Example: \\192.168.120.12\IQWEBDB\2019-07-31-WED
   For all data received on Wednesday, July 31, 2019

   If you created the MySQL backup the day before, you must register all images still received on the old server on the current day and the day before. This means the content of two folders:

   Current day: \\192.168.120.12\IQWEBDB\2019-07-31-WED
   Previous day: \\192.168.120.12\IQWEBDB\2019-07-30-TUE

2. Log in to iQ-WEB with user "root" or "iqwebadmin".
3. Navigate to "TOOLS" → "Import".

4. Use the first option "Import studies from a DICOM Part 10 formatted local directory".
5. Select the first of the data folders containing newly received data.
6. Select the import option "Import all patients found".
7. Click the "Import Study(ies)" button. iQ-WEB will now register the data in the specified folder but keep the data where it is already stored.
8. Repeat steps 5 to 7 with all the other folders that contain data that needs to be registered.

The new server stores the data in a different storage

If the new server uses different storage areas than the old server, preferably an external device, the image data that was received after the MySQL backup was performed must be moved (or copied) to the new storage and must be registered in the iQ-WEB database in order to become usable:

1. First, you need to identify all the data that needs to be moved and registered. By default, iQ-WEB will store the data received on a specific day in a folder with a respective date stamp.

   Example: \\192.168.120.12\IQWEBDB\2019-07-31-WED
   For all data received on Wednesday, July 31, 2019

   If you created the MySQL backup the day before, you must register all images still received on the old server on the current day and the day before. This means the content of two folders:

   Current day: \\192.168.120.12\IQWEBDB\2019-07-31-WED
   Previous day: \\192.168.120.12\IQWEBDB\2019-07-30-TUE

2. On the new storage, browse to the iQ-WEB short-term archive (path as defined under "SETTINGS" → "System" → "Default Short-Term Archive Directory") and create a new folder into which you will put the newly received data. (Note: Use a short name to avoid issues with long Windows paths.)
3. Copy the content of all identified folders into the new folder.
4. After the data is stored in its correct storage area, log in to iQ-WEB with user "root" or "iqwebadmin".
5. Navigate to "TOOLS" → "Import".
6. Use the first option "Import studies from a DICOM Part 10 formatted local directory".
7. Select the just created folder that now contains all newly received data.
8. Select the import option "Import all patients found".
9. Click the "Import Study(ies)" button. iQ-WEB will now register the data in the specified folder but keep the data where it is already stored.

5.3 Combining migration to a new system with an upgrade to version 6.7.3

The most sophisticated scenario is to combine the migration of an existing iQ-WEB installation to another server with a simultaneously performed software upgrade to the latest version.

However, such an upgrade-migration might make the most sense in specific situations, e.g. when not only the current iQ-WEB version but also the underlying hardware have become outdated or when you want to use the latest iQ-WEB version but the hardware and software requirements of that version are no longer covered by the system in use (e.g. 32-bit platform instead of 64-bit or unsupported OS).

Over the years and over the different versions of iQ-WEB the application has evolved. New technologies were introduced (e.g. 64-bit platform), many new features were implemented, components were updated and – with iQ-4VIEW – a new viewer was included in the iQ-WEB setup. As a consequence, the differences between old iQ-WEB versions and the latest one have constantly grown. These differences require handling during such upgrade-migrations. Therefore, the procedures differ a bit depending on the iQ-WEB version that you are currently using.

When you have decided on an upgrade-migration, you require a new server on which to install the latest iQ-WEB version. But from the old iQ-WEB installation you will want to migrate the MySQL database of iQ-WEB with the data registration and the user and device configuration as well as any data that exists on the old system and needs to be moved.

In order to set up the new server and to ensure a proper migration of the MySQL database and the data, specific steps must be performed in a particular order. Otherwise, the upgrade-migration may fail and lead to more complex tasks afterwards, such as restoring the configuration and reimporting and re-registering the image data.

Follow the steps below to ensure a smooth upgrade-migration process and a properly working new iQ-WEB server.

NOTICE:

The following sections will cover upgrade-migrations from the iQ-WEB software versions 6.1.3, 6.2.3, 6.3.8, 6.4.5, 6.6.2 and 6.7.1 to 6.7.3. If you are still using an iQ-WEB version prior to 6.1.3, contact your local reseller in order to discuss options to migrate it to the latest version.

5.3.1 Setting up the new iQ-WEB server

The first step of the upgrade-migration is setting up the new server with the appropriate MySQL version and the iQ-WEB 6.7.3 installation. Follow the instructions given in section 5.2.1 step by step in order to prepare the new server.

ATTENTION: Step 9 "Order and install software licenses" requires some changes as you will not need replacement licenses but upgrade licenses. Follow the steps below in order to receive the correct licenses:

1. Collect the two "LicenseInfo.zip" archives as described in the following:
   - Log in to iQ-WEB on the **old** server with user "root".
   - Under "TOOLS" → "Licensing", download the current license information in a ZIP file. You need this as reference for the current installation.
   - Now log in to iQ-WEB on the **new** server with user "root".
   - Under "TOOLS" → "Licensing", download the current license information in a ZIP file.

2. Send both to your local reseller and acquire the following licenses:
   - An "upgrade password" and a license for version 6.7.3.
   - Upgrade licenses for all software and/or interfaces you have used before and wish to use also with the new server.
   - Licenses for software products that you have not used before or that were not yet available but that you wish to use now (e.g. iQ-4VIEW).

   Also make sure to indicate which file is from the old and which from the new server.
3. When you receive the licenses, install them as provided in the instructions.
4. Copy the "upgrade.password" file to a location on the new server. You will need it later when upgrading the iQ-WEB database tables to the DB scheme used by version 6.7.3.

⚠ WARNING:

Danger of application unavailability.

*An upgrade password and a new license for version 6.7.3 is necessary in order to perform the iQ-WEB upgrade-migration successfully. Contact your local reseller to obtain all required license files **before** proceeding with the upgrade-migration. Without a valid license, the iQ-WEB installation will not be functional. Without an upgrade password it will not be possible to update the iQ-WEB database properly, leading to an inconsistent and maybe even non-functional database.*

H.-No.: 1.1.1

Only after completing these preparations you should start with the actual migration procedure involving the moving of the database and the data.

5.3.2 Necessary preparation steps for old iQ-WEB versions

The older iQ-WEB versions 6.1.3, 6.2.3, 6.3.8 and 6.4.5 require some additional preparation steps that involve an adaptation of Registry keys and the transfer of specific configuration items over to the new server.

Follow the appropriate steps below. Make sure to choose the steps applying to your current iQ-WEB version.

5.3.2.1 Steps required for iQ-WEB 6.1.3

Perform the following additional preparation steps when your current iQ-WEB version is 6.1.3:

1. Log in to the old iQ-WEB server.
2. Export the following Registry key:
   - For 32-bit systems: `HKEY_LOCAL_MACHINE\SOFTWARE\Rainbowfish Software\PacsOne\`
   - For 64-bit systems: `HKEY_LOCAL_MACHINE\SOFTWARE\WOW6432Node\Rainbowfish Software\PacsOne\`
3. Open the file with the exported Registry key in a text editor.
4. Replace `Rainbowfish Software\PacsOne` with `IMAGE Information Systems Ltd.\iQ-WEBX`.
5. If iQ-WEB is installed on a 64-bit system, also remove the portion `WOW6432Node\` from both given paths.

6. Save the changes.
7. Open the Windows Explorer and browse to the iQ-WEB installation folder.
8. In sub-folder "PACS", search for the file "<CurrentAETitle>.ini" (where "<CurrentAETitle>" stands for the AE title that you use for your current iQ-WEB, e.g. "PACS.ini").
9. Copy both the Registry file and the "<CurrentAETitle>.ini" from the "PACS" folder to a folder of your choice on the new server. You will later need to integrate them into the new installation.

5.3.2.2 Steps required for iQ-WEB 6.2.3 and 6.3.8

Perform the following additional preparation steps when your current iQ-WEB version is either 6.2.3 or 6.3.8:

1. Log in to the old iQ-WEB server.
2. Export the following Registry key:
   - For 32-bit systems: `HKEY_LOCAL_MACHINE\SOFTWARE\IMAGE Information Systems Ltd.\iQ-WEBX\`
   - For 64-bit systems: `HKEY_LOCAL_MACHINE\SOFTWARE\WOW6432Node\IMAGE Information Systems Ltd.\iQ-WEBX\`
3. If iQ-WEB is installed on a 64-bit system, open the file with the exported Registry key in a text editor and remove the portion `WOW6432Node\` from both given paths.
4. Save the changes.
5. Open the Windows Explorer and browse to the iQ-WEB installation folder.
6. In sub-folder "PACS", search for the file "<CurrentAETitle>.ini" (where "<CurrentAETitle>" stands for the AE title that you use for your current iQ-WEB, e.g. "PACS.ini").
7. Copy both the Registry file and the "<CurrentAETitle>.ini" from the "PACS" folder to a folder of your choice on the new server. You will later need to integrate them into the new installation.

5.3.2.3 Steps required for iQ-WEB 6.4.5

Perform the following additional preparation steps when your current iQ-WEB version is 6.4.5:

1. Log in to the old iQ-WEB server.
2. Export the following Registry key: `HKEY_LOCAL_MACHINE\SOFTWARE\IMAGE Information Systems Ltd.\iQ-WEBX\`
3. Open the Windows Explorer and browse to the iQ-WEB installation folder.
4. In sub-folder "PACS", search for the file "<CurrentAETitle>.ini" (where "<CurrentAETitle>" stands for the AE title that you use for your current iQ-WEB, e.g. "PACS.ini").
5. Copy both the Registry file and the "<CurrentAETitle>.ini" from the "PACS" folder to a folder of your choice on the new server. You will later need to integrate them into the new installation.

5.3.3 Performing the upgrade-migration

When you have finished the setup of the new iQ-WEB server and also the new software licenses are installed, you need to schedule when the backup of the iQ-WEB database and any data stored on the old iQ-WEB server shall take place. It should best be done in a time frame where downtime interferes the least with the institution's workflow, i.e. when there is no or only little traffic to/from iQ-WEB. Make sure to inform everybody affected that iQ-WEB will not be available and plan alternative ways to ensure the institution's necessary medical workflows.

NOTICE:

Depending on the size of the database, the current iQ-WEB server on the old system will be down for a longer period of time. It will not be able to either receive or distribute imaging data. Also access to the iQ-WEB web interface and the connected viewers iQ-4VIEW and iQ-X will not be possible.

Plan enough time to perform the MySQL backup and for copying any existing data. Estimate around 45 to 60 minutes per 10 GB of MySQL database file size for creating a MySQL backup. The time for copying data depends on the amount of data affected. The exact downtime will also depend on the performance of the server and its storage system.

Depending on the new storage areas, there are up to six steps needed in order to migrate the database and the data:

1. Create a backup of the current MySQL database on the old iQ-WEB server.
2. Copy the data on the old iQ-WEB server to the new server or an external device.
3. Restore and upgrade the database from the backup on the new iQ-WEB server.
4. Adapt the Registry keys and transfer specific configuration items to the new iQ-WEB server.
5. Update the MySQL database to the new storage areas.
6. Upgrade the iQ-WEB database tables to the current scheme.

5.3.3.1 Creating a current MySQL backup

iQ-WEB registers the path to all DICOM objects as well as other metadata and specific configurations (e.g. users, connected devices, specific processes) in a MySQL database. This means that an image can only be displayed properly if the database storage path and the physical file location match.

Therefore, the first step in the process is to create a backup of the MySQL databases.

NOTICE:

Depending on the size of the database, the creation of the backup will take a while. Estimate around 45 to 60 minutes per 10 GB of MySQL database file size for creating a MySQL backup. The exact time will depend on the performance of the server and its storage system.

1. Under "Services", stop the iQ-WEB and Apache services to prevent incoming data during the MySQL backup and upgrade process.

2. Open the Command Prompt as Administrator ("Run as administrator") and browse to the current MySQL installation folder, e.g. "C:\Program Files\MySQL Server X.X\bin". (Where "X.X" stands for the version number of the currently installed MySQL version, e.g. "5.5".)

3. Run the command below to save all databases into the "mysql_backup.sql" file:

   ```
   mysqldump.exe -uroot -p --add-drop-table --routines --events --all-databases
   --force --result-file C:\mysql_backup.sql
   ```

   The resulting dump will be written to the "C:\" drive. Alternatively, you may change the location to which the backup file is written by changing the command above. `--result-file` might be exchanged for `-r`. This command ensures that the output is created in ASCII format. Otherwise it will be impossible to re-import that dump into MySQL.

4. Enter the "root" user password when prompted.

5. Finally, copy the created MySQL dump to the new server, preferably to the same location (C:\mysql_backup.sql).

NOTICE:
The database backup will later be restored into the MySQL installation on the new server.

5.3.3.2 Copying existing data from old to new storage

If you have verified that the old iQ-WEB server contains data that needs to be restored in the new system (or be moved to an external device), you need to copy this data to the new system (or external device):

1. Make sure that the iQ-WEB and Apache services of the old iQ-WEB server remain stopped. This continues to prevent incoming data during the copying process.
2. Open the Windows Explorer and browse to all of the paths that you have identified previously (e.g. short-term archive, upload directory, import directory etc.).
3. Copy the content of each of these folders to the same folders on the new iQ-WEB server (or into the newly assigned folders of an external device).

NOTICE:
After finishing the MySQL and the data backup on the old iQ-WEB server, you can restart the iQ-WEB and Apache services so that the server can be used again.
It is strongly recommended to limit the use of the old iQ-WEB server to the imperative needs, since all data received by iQ-WEB at this point will not be included on the new server and must be updated later during productive use.

5.3.3.3 Restoring and upgrading the iQ-WEB database from the MySQL backup

The next step is to restore the backup of the MySQL databases on the old server to the new one:

1. On the new server, open the Command Prompt as Administrator ("Run as administrator") and browse to the new MySQL installation folder, e.g. "C:\Program Files\MySQL\MySQL Server 5.7\bin".

2. Run the command below to import the previously created backup:

```
mysql.exe -f -uroot -p < C:\mysql_backup.sql
```

NOTICE:

If the backup file was copied to a different path or another file name was used, be sure to substitute the appropriate information for "C:\mysql_backup.sql" in the command above.

3. As before, enter the "root" user password when prompted.

4. The backup is now being imported.

NOTICE:

This may take some time depending on the size of the database file. Estimate around 30 minutes per 10 GB of MySQL database file size for the restoration of the database.

5. After the import is complete, run the next command to finish the upgrade of the databases:

```
mysql_upgrade.exe -uroot -p --force
```

6. Enter the "root" user password again when prompted.

5.3.3.4 Adapting Registry keys and transferring specific configuration items

These steps are only necessary when migrating from iQ-WEB versions 6.1.3, 6.2.3, 6.3.8 or 6.4.5.

During the preparation for the upgrade-migration you have exported the iQ-WEB Registry keys and the "<CurrentAETitle>.ini" from the old iQ-WEB installation and copied both files to the new server. It is now time to integrate these items into the iQ-WEB installation on the new server.

1. Under "Services" stop the iQ-WEB and Apache services.
2. Open the Windows Explorer and browse to the folder to which you have copied the Registry key file and the "<CurrentAETitle>.ini".
3. Double-click the Registry file and import the Registry settings.
4. Now copy the "<CurrentAETitle>.ini" with the settings from the old server to the folder „C:\Program Files\iQ-WEBX\PACS". Overwrite any existing file.

5.3.3.5 Updating MySQL and iQ-WEB to new storage areas

In case that data that existed on the old iQ-WEB server was not copied to the same folders on the new iQ-WEB server but into other storage folders either on the new server or (preferably) on an external device, you are required to:

- Update the affected data paths in the iQ-WEB web interface.
- Update the MySQL database in order to re-register this data.

Updating affected data paths in iQ-WEB

NOTICE:
Updating data paths in iQ-WEB will only affect new data arriving in iQ-WEB in the future.

1. Under "Services" stop the iQ-WEB and Apache services.
2. Log in to the iQ-WEB web interface with user "root" or "iqwebadmin".
3. Point the following paths (only where needed) to the new storage areas.
   - **General short-term storage:** "SETTINGS" → "System" → "Default Short-Term Archive Directory"
   - **AE title-specific short-term storage:** "COMMUNICATIONS" → "DICOM" → select AE title → "Short-Term Archive Directory"
   - **General long-term storage:** "SETTINGS" → "System" → "Default Long-Term Archive Directory"
   - **AE title-specific long-term storage:** "COMMUNICATIONS" → "DICOM" → select AE title → "Long-Term Archive Directory"
   - **Purged data storage:** "TOOLS" → "Automatic Purge Storage".
   - **Folder for attachment uploads to study/image notes:** "SETTINGS" → "System" → "Upload Directory"
   - **Folder for imports via auto-scan function:** "SETTINGS" → "System" → "Destination Folder"
   - **Folder for DICOM object imports:** "TOOLS" → "Import":
     - "Local directory" for data imported without moving it into the iQ-WEB storage
     - "Destination archive directory" into which data was imported
   - **Folder for external DICOM viewer (for patient media):** "TOOLS" → "Export" → path in which the files for that external viewer are stored.
4. Afterwards restart the iQ-WEB and Apache services.

NOTICE:
When external devices are used, make sure that iQ-WEB has access to these paths and sufficient permissions to write, modify and read data in the specified folders.

Updating the MySQL database

1. Open the MySQL Command Line via the respective link in the "Start" menu. Alternatively, open the Command Prompt and browse to the current MySQL installation folder, e.g. "C:\Program Files\MySQL Server 5.7\bin".

2. Run the command:

```
mysql -uroot -p
```

3. Enter the following command to switch to your database:

```
USE <YOURDBNAME>;
```

NOTICE:
Replace "<YOURDBNAME>" with the actual name of your database. The default database name of iQ-WEB 6.7.3 is ***iqweb****. If the iQ-WEB 6.7.3 installation on your old server was an upgrade from a previous version, the database name may be different.*

4. Run the commands below to update the necessary tables to re-register the stored data:

   For DICOM data

```
UPDATE image SET path = replace(path,'OldDrive:/Path/To/OLD/Archive/Folder/',
'NewDrive:/Path/To/NEW/Archive/Folder/');
```

NOTICE:
Replace "OldDrive:/Path/To/OLD/Archive/Folder/" with the actual path, where your DICOM data is stored on the old system, and "'NewDrive:/Path/To/NEW/Archive/Folder/" with the storage location of the data that you want to use now. If data is stored on network shares, UNC paths can also be used.
Keep in mind that the REPLACE path is case sensitive, so make sure to enter it exactly as is.
Example: The "Archive" is moved from the local "C:" drive to a network share:
UPDATE image SET path = replace(path,'C:/Archive/', '//192.168.1.1/Archive/');

NOTICE:
This command can be used for any storage folder that contains DICOM data, i.e. the general and AE title specific long-term and short-term archives, the purged data storage folder(s), the DICOM upload folder and the import folders.
If you had multiple such folders, the command will have to be executed separately for each of these folders.

   For uploaded attachments to study/image notes

```
UPDATE attachment SET path =
replace(path,'OldDrive:/Path/To/OLD/Attachment/Folder/',
'NewDrive:/Path/To/NEW/Attachment/Folder/');
```

NOTICE:
Replace "OldDrive:/Path/To/OLD/Attachment/Folder/" with the actual path where your DICOM data is stored on the old system, and "'NewDrive:/Path/To/NEW/Attachment/Folder/" with the storage location of the data that you want to use now. If data is stored on network shares, UNC paths can also be used.

Keep in mind that the REPLACE path is case sensitive, so make sure to enter it exactly as is.

5.3.3.6 Upgrading the iQ-WEB database tables to the current scheme

While you have already restored the old iQ-WEB's MySQL database in your iQ-WEB installation on the new server and have also upgraded it to the new MySQL version, the database still does not use the same structure and content that a fresh iQ-WEB 6.7.3 installation uses.

With the following steps you perform the necessary updates to the iQ-WEB database scheme:

1. Open the Windows Explorer and browse to the iQ-WEB installation folder "C:\Program Files\iQ-WEBX\".

2. In the sub-folder "PACS", find the file "Setup.exe".

3. Execute this file, using the option "Run as administrator" in the right-click context menu.

4. Click the "Upgrade" button in the lower left corner to start the iQ-WEB database upgrade.

5. When prompted for the upgrade password, open the file "upgrade.password" received together with the new licenses in a text editor and copy the upgrade password from the file into the edit field. Confirm the entered password.

6. Enter the "root" user password when prompted.

7. After the database upgrade was finished successfully, open the Command Prompt and browse to the current MySQL installation folder, e.g. "C:\Program Files\MySQL Server 5.7\bin".

8. Run the following command:

   ```
   mysql.exe -f -uroot -p DATABASE < "C:\Program Files\iQ-
   WEBX\PACS\upgrade_schema.sql"
   ```

   Replace "**DATABASE**" with the database name of iQ-WEB. You can find the database name as parameter "Database =" in the file "<CurrentAETitle>.ini" under "C:\Program Files\iQ-WEBX\PACS\", e.g. `Database = iqweb`.

9. Again, enter the "root" user password when prompted.

NOTICE:

Depending on the size of the database, the iQ-WEB server will be down for a longer period of time while being upgraded. Estimate approx. 60 minutes per 10 GB of MySQL database for the actual iQ-WEB/iQ-4VIEW upgrade. The exact downtime will depend also on the performance of the server and its storage system.

NOTICE:

In MySQL, the path to images is by default limited to 255 characters. However, for certain installations longer paths may be needed.

If your image paths will be longer than 255 characters, you need to change the "character_maximum_length" setting of MySQL in order to allow longer paths. To do this, follow the procedure below to make the necessary adaptations:

1. Make sure that the iQ-WEB and Apache services of the iQ-WEB server are stopped. This prevents incoming data during the process.

2. Open the command prompt as administrator and run the following command:

```
mysql.exe -f -uroot -p < "C:\Program Files\iQ-WEBX\PACS\expensive_database_changes.sql"
```

During the process, the value will then be changed to 512 characters.

3. Restart the iQ-WEB and Apache services.

As final step of the actual upgrade-migration, restart the server.

5.3.4 Wrapping up the upgrade-migration

In order to finalize the switch from the old iQ-WEB server to the new one, you need to perform the following actions:

1. Check and adapt iQ-WEB system paths.
2. Perform the acceptance tests.
3. Switch productive use to the new iQ-WEB server.
4. Include newly received data on the new iQ-WEB server.

5.3.4.1 Checking and adapting iQ-WEB system paths

Due to different iQ-WEB installation paths in older versions or as a consequence of using a 32-bit iQ-WEB on a 64-bit operating system, it can happen that during the restoring of the MySQL backup old system paths are written into the configuration of the new iQ-WEB installation that are no longer used by this version. Therefore, it is necessary to check these paths and to adapt them where needed. To do that, follow the steps below:

1. Log in to iQ-WEB with user “root” or “iqwebadmin”.
2. Navigate to “SETTINGS” → “System”.
3. In section “Administrative”, check the following paths. The value stated next to the item is the value that iQ-WEB 6.7.3 needs. If the value you see in the iQ-WEB interface differs, adapt the path accordingly (Do not forget the “/” at the end!):
   - PHP Runtime Executable: `C:/Program Files/iQ-WEBX/PHP/php.exe`
   - Thumbnail Directory: `C:/Program Files/iQ-WEBX/PACS/php/thumbnails/`
   - Web Images: `C:/Program Files/iQ-WEBX/PACS/php/images/`
4. In section “Upload”, check and – if necessary – adapt the following path:
   - Upload Directory: `C:/Program Files/iQ-WEBX/PACS/php/upload/`
5. Save the changes.
6. Navigate to “TOOLS” → “System”.

7. In section "Log Level", check and – if necessary – adapt the following path:
   - Log Path: `C:/Program Files/iQ-WEBX/PACS/log/`
8. Save the changes.

5.3.4.2 Performing acceptance tests

In order to ensure the faultless running of the new iQ-WEB server, you should perform system acceptance tests before putting the system into productive use.

You will find a checklist with the recommended iQ-WEB acceptance tests in the annex to this document. Refer to section 13.1.

5.3.4.3 Switching productive use to new iQ-WEB server

At this point, the entire PACS workflow still involves your old iQ-WEB server. Modalities still send data and reading stations still request studies and provide reports. In order to switch the entire workflow over to the new server as smoothly as possible, follow the instructions in section 5.2.3.2.

NOTICE:

You need to ensure that from now on none of the connected DICOM nodes can communicate anymore with the old iQ-WEB server or that it is used for any other action, including access to viewer, data import, HIS/RIS connections etc.).

But do not disable the old server completely. The new server still has to collect all the data that the old server received in the time frame between creating the MySQL backup and now.

5.3.4.4 Updating newly received data on the new iQ-WEB server

Any data that the old iQ-WEB server received in the time between creating the MySQL backup and the moment where the old server was removed from productive use, is not available in the iQ-WEB database of the new server. Therefore, the last step of the migration procedure is to make also this new data available and usable on the new server.

The easiest and safest way to do that is to re-import the new data. How to do that depends on whether the new iQ-WEB server uses the same data storage as the old server or not.

Follow the appropriate instructions in section 5.2.3.3.

5.4 Migration from a third-party PACS

If you want to replace an existing PACS from a different manufacturer with an iQ-WEB 6.7.3 installation, the migration will mainly concern the availability of all DICOM imaging and report data that is archived in the current PACS in the new iQ-WEB.

However, switching from one PACS vendor to a new one involves more than making available the data through the new PACS. It concerns all workflows handled with or by means of the PACS and how they are going to be set up with the new system, but may also include non-DICOM data or data in proprietary formats not supported by iQ-WEB. Therefore, it is important to involve both the old and the new vendor in discussing possible strategies of a smooth migration.

In general, there are three possibilities to make the archived DICOM data available in a new iQ-WEB 6.7.3 installation:

1. Importing the archive through file access to previous PACS or storage system
2. Using DICOM transfer to move the archive to iQ-WEB
3. Using iQ-MIGRATION to handle the data migration

The file based migration would be fastest because there is no overhead of the DICOM communication during the process. The images are either copied and imported or just imported into iQ-WEB, but the import might not work if the images are stored in a proprietary format. Even though the DICOM based migration is slower, it might solve such incompatibilities. However, additional limitations might apply to the DICOM-based migration such as a limited number of studies that can be transferred at once.

5.4.1 Importing the archive through file access to previous PACS or storage system

If there is access to the DICOM data that were archived by the previous PACS server, this data images can simply be kept in the current storage system and registered to the iQ-WEB. If the data is directly stored on the old PACS system, a new storage system should be used to copy the data to.

NOTICE:
In order to simplify later migrations of iQ-WEB to new state-of-the-art hardware, we do not recommend storing the data directly on the iQ-WEB server system.

After the data is stored in its correct storage area, you can start an import job in iQ-WEB to import all images from their new or previous location. This is done via the main web interface menu:

1. Log in to iQ-WEB with user "root" or "iqwebadmin".
2. Navigate to "TOOLS" → "Import".
3. Use the first option "Import studies from a DICOM Part 10 formatted local directory".
4. Select the whole archive folder that now contains all of the currently archived data.
5. Select the import option "Import all patients found".
6. Click the "Import Study(ies)" button. iQ-WEB will now register the data in the specified folder and keep the data where it is already stored.

NOTICE:
The import can consume a significant amount of time depending on the total number of datasets that are imported.

5.4.2 Using DICOM transfer to move the archive to iQ-WEB

If DICOM access is available to the previous PACS itself, the usual DICOM communication possibilities can be used to transfer images to iQ-WEB. The use of these DICOM transfer options depend on the access possibilities and general options of the previous PACS. For example, if iQ-WEB cannot be added into the configuration of the previous PACS to allow DICOM communication, the details of another, already configured, station might be used temporarily.

For more information about the possible functions, consult the DICOM Conformance Statement of the previous PACS and compare it to the iQ-WEB 6.7.3 documentation.

- C-STORE
  If iQ-WEB can be added as a new DICOM node within the previous PACS, all data can simply be transferred to iQ-WEB using C-STORE. Depending on the possibilities offered, studies may be transferred all at once or in smaller portions.

- C-FIND and C-MOVE
  iQ-WEB can be used to manually search (C-FIND) for the studies that are stored on the previous PACS and transfer them (C-MOVE) to iQ-WEB. To enable this possibility in iQ-WEB, configure the PACS as a "Query/Retrieve SCP Server".

- Synchronization
  Similar to "C-FIND and C-MOVE" is the approach to use the synchronization feature offered by iQ-WEB. Instead of manually searching for studies, the synchronization automatically queries the remote station and retrieves studies on a scheduled basis.

5.4.3 Using iQ-MIGRATION to handle the data migration

IMAGE Information Systems provides a special tool called iQ-MIGRATION that is specifically intended for the migration of data from one PACS to another. As such, it only initiates this data transmission by means of DICOM protocol and monitors the transfer that is performed between the two PACS stations. It can help you with the migration of huge volumes of DICOM data, which otherwise would take more effort and constant human attendance to manually move from one archive to another.

Contact your local iQ-WEB reseller to discuss how iQ-MIGRATION can help you to make the migration of your data archive as painless as possible.

6 Licensing

6.1 Licensing system

The following sections contain all necessary information about the licensing system of iQ-WEB, like the available license types and what they entail, the license activation process and the possibilities of migrating a purchased license to a different system. Also the separate licensing of the optional WADO interface will be described.

The iQ-WEBX setup contains the product iQ-WEB with its optional WADO functionality and several other products. Each of these products has to be licensed separately.

6.1.1 License types

There exist different forms of licenses for the iQ-WEB software:

- Time-limited evaluation license (Trial license)
- Time-limited demonstration licenses (Demo license)
- Time-limited full license (Subscription license)
- Time-unlimited full license (Life-time license)

All these licenses do not activate the WADO interface. For the licensing of the optional WADO functionality, see section 6.1.5.

⚠ WARNING

Danger of application unavailability.

All time-limited licenses are date-sensitive. Intended or involuntary modification of the Windows system date is handled as an attempt to tamper with the license and will invalidate a time-limited license. As a result the application can no longer be accessed. In case of date corruption, contact your local reseller. Keep in mind that the issuing of a replacement key might only be possible for a fee.

H.-No.: 1.1.1

6.1.2 Time-limited evaluation license (trial)

The evaluation (trial) version of iQ-WEB is available as a free download at https://www.image-systems.biz. The evaluation license is automatically generated during the installation and runs for 30 days.

This version is limited to a maximum of 5 connected DICOM stations and 1,000,000 images stored in the database. The iQ-WEB application will not accept any DICOM communication when the license has expired or if the DICOM stations and/or the maximum number of images has been exceeded.

NOTICE:

An evaluation (trial) license is limited to 1,000,000 images and 5 AE titles.

6.1.3 Time-limited demonstration license

A demonstration license of iQ-WEB can be ordered by our sales partners and resellers only. This version is not for sale and is valid for 1 year. It is usually also limited in the number of connectable DICOM AE titles.

6.1.4 Time-limited and time-unlimited full licenses

Full licenses can be obtained as life-time licenses that are not limited in time and will not expire. They can also be obtained as subscription licenses that run over a specified period of time (e.g. one year) and have to be renewed afterwards to use the software further.

All licenses are restricted to the computer where the product is installed. Contact your local reseller or license@image-systems.biz to order a license or to obtain up-to-date licensing information.

6.1.5 Licensing the WADO interface

The iQ-WEB trial license does not extend to the WADO interface. This functionality must be activated separately from the core license, which means that you will have to obtain a trial or a full license before being able to test or use this option.

Similar to the core license, the WADO interface can be activated with one of the following license types:

- A trial license that allows you to evaluate all WADO functions for a specified period of time. In general, such a trial license is valid for 30 days. Longer periods as well as trial extensions can be provided on request. Contact your local reseller.

- A full time-unlimited license that allows you to use the WADO interface without any limitations regarding features or time.

- A full time-limited license that allows you to use the WADO interface without any feature limitations for a specified period of time.

Trial and full licenses are strictly bound to the system they were ordered for, which means the server, on which iQ-WEB was installed. The license issued for one designated system cannot be used on another one.

6.2 Activating the software

This section describes the licensing process for the core of iQ-WEB and for the optional WADO interface. For information regarding licensing of the bundled add-ons refer to section 10.3.4. If there are questions about the various licenses, contact your local reseller or the license department of IMAGE Information System Europe GmbH at license@image-systems.biz.

6.2.1 Activating iQ-WEB

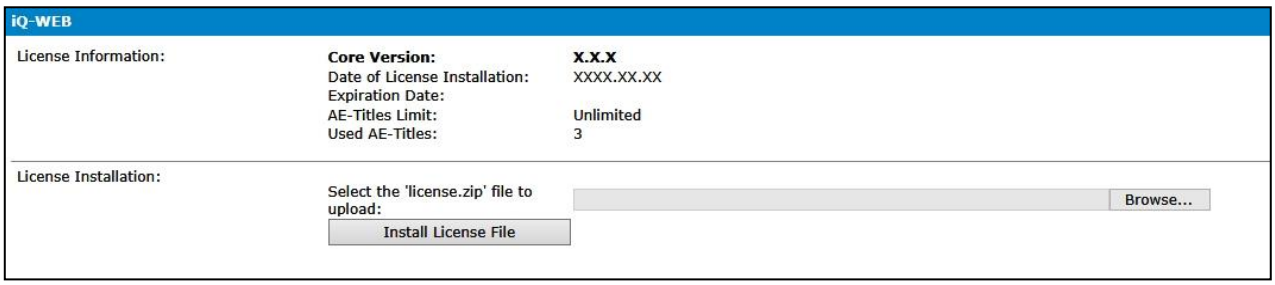


Figure 1 – License overview iQ-WEB

The top section of the licensing page contains the version of the iQ-WEB core and, if present, the license installation and expiration date.

To install a new license, use the "Browse" button to browse to the "license.zip" file provided by IMAGE Information Systems Europe GmbH. Then use the respective "Install License File" button to upload and apply the license. The iQ-WEB service will be stopped and started as necessary during this process to register the new license in the system.

To manually install the license, stop the iQ-WEB service and unzip the "license.zip" file. Copy the "license.dat" and "license.aes" files, and paste them into the "[iQ-WEB installation folder]\PACS\" folder. Next, restart the iQ-WEB service. For more information on stopping and starting the service, refer to section 10.3.3.1.

For licenses with a limited validity period (trial), an email reminder will be sent ten days before the expiration date to the administrator's email address to inform about the upcoming expiration. This requires that an SMTP server has been registered in "Settings" → "Email" and the administrator's email address has been included on the "Settings" → "System" page. For more information on configuring an SMTP server, see section 10.4.3

To verify if the license file has been installed correctly, choose any of the following steps:

1. Navigate to the Windows Event Viewer and check the "Application" log under the "Windows Logs" section. There should be an entry for iQ-WEB that states "Service started". If there is an error entry stating "Invalid license information or license has expired", try to install the license again or contact the support team at support@image-systems.biz.
2. Visit the website of iQ-WEB and navigate to "Tools" → "Today's Log". If there is no entry logged, install the license again or contact the support team.
3. Check the Windows Task Manager and look for the process named "iQ-WEBX.exe". If there is no such entry, install the license again or contact the support team.
4. As a final step, send a test study to iQ-WEB via DICOM from another application, after configuring both stations correctly. If there is an error during the connection, try the license installation again or contact the support team.

6.2.2 Activating the WADO interface

Contact your local reseller or the manufacturer's license team and provide your current IP configuration (ipconfig –all output) together with the version number of the iQ-WEB that you have installed and the license type you apply for. In return, the license team will send you a file which will be named "wado.lic".

Now there are two ways to install the license for the WADO interface:

The first way is via the iQ-WEB web interface. On the "TOOLS" page navigate to the "Licensing" tab. In the WADO section you can browse to your "wado.lic" file and use the "Install License File" button to upload and install the license.

The second way is a manual approach. Copy the "wado.lic" file and paste it into the folder "[iQ-WEB installation directory]\PACS\php".

NOTICE:

If you are replacing an existing license, make sure to back up the old license file before copying the new license into the folder.

6.2.3 Ordering licenses and requesting support

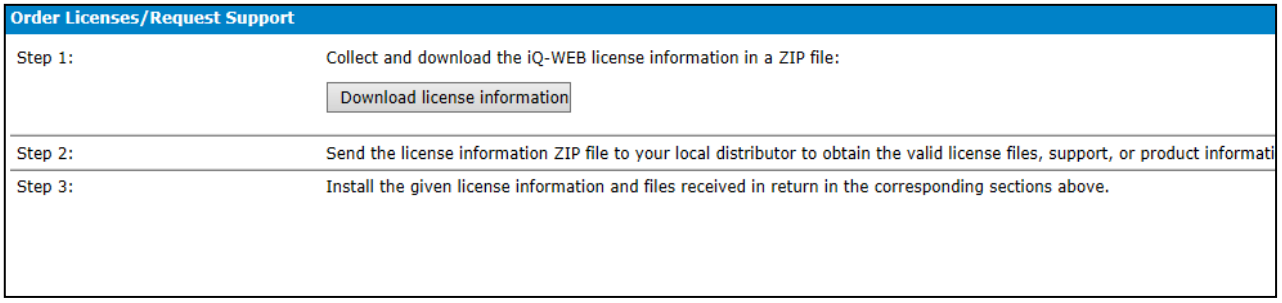


Figure 2 – License ordering

When licenses are requested, certain information is required by the license team to process those licenses for new installations, migrations, or updates. The last area of the licensing page contains information to guide the user through the ordering process. Click the "Download license information" button to create a "LicenseInfo.zip" file. Then send this zip file to your local distributor or the License department of IMAGE Information Systems Europe GmbH to obtain the desired license(s).

6.3 Ensuring the validity of the iQ-WEB license

After the iQ-WEB software has been licensed, certain system parameters must remain consistent in order to keep the license valid and iQ-WEB accessible.

The following table contains different system settings and their influence on the license status:

Risk for license status	Changes to the system
Invalidates the license	▪ Renaming the computer (hostname) ▪ Changing, removing or replacing any real or virtual network adapters (MAC addresses)
May invalidate the license	▪ Changing the system's main board ▪ Replacing the primary hard disk ▪ Adding or removing memory (RAM)
Does not affect the license	▪ Changing or adding IP addresses ▪ Adding or replacing additional storage devices ▪ Changing or adding a graphics card

7 License migration and renewal

7.1 Changing an existing license

In some cases it may become necessary to change an existing license, i.e. to enter new activation data even though a license is currently active. This may happen if:

- You wish to switch from a trial to a full license (core license and WADO).
- You wish to renew a time-limited license that is about to expire (core license and WADO).
- You wish to adjust the maximum number of DICOM nodes (core license only).
- You wish to upgrade from to time-limited to a time-unlimited license (core license and WADO).

After you have received the new license activation data for the iQ-WEB core and/or the WADO interface from your local reseller (registration name and activation key), follow the respective instructions described in the section 6.2.

NOTICE:
Contact your local reseller for the procedures of changing an existing license.

7.2 Migrating licenses

To migrate an iQ-WEB license with or without WADO option to another PC, a new installation of iQ-WEB is necessary. Before beginning the migration, contact your local reseller or license@image-systems.biz in order to receive a new license and further instructions on this process.

NOTICE
For replacement licenses a fee will be charged. Therefore, contact your reseller BEFORE you transfer your iQ-WEB license(s) to a new server!

8 Maintenance

The purpose of this chapter is to describe tasks that are necessary to operate iQ-WEB over long periods of time. It gives you details about how to keep the system running smoothly, how to keep sufficient free space on the hard disc (e.g. by regularly deleting old log files), how to maintain database consistency or where to take extra care in the configuration. This also includes maintenance actions that need to be performed regularly to adhere to the laws and regulations concerning medical devices.

Generally, the capabilities and the performance of the iQ-WEB archive software can be affected by limitations and failures caused by the hardware, the network or other software installed on the system. Therefore, the proper operation and the maintenance of the hardware (i.e. client stations and iQ-WEB server) and the network are necessary. Instructions regarding hardware and software specifications as well as software maintenance given by the manufacturers must be adhered to.

In addition, you should always use the latest compatible software version and update existing installations when updates become available.

Although iQ-WEB was designed to work as a PACS with rare manual interventions, there are a few maintenance tasks that administrative personnel must perform to ensure high performance, reliability of the product and data consistency. These manual tasks are described in the following sections.

8.1 Maintenance schedule

In order to ensure the faultless operation of iQ-WEB, it is necessary to properly keep up the system by performing specific recommended maintenance tasks.

In the following you find a checklist with the recommended iQ-WEB acceptance tests. You may use this checklist to document your performed acceptance tests. Print out the checklist and fill in your results.

The following table provides you with an overview of all recommended maintenance activities and states when and how often you should schedule them. You will find all details for every task in the section stated under "Reference".

Time interval	Task	Reference
Daily	Checking the DICOM communication logs	8.3
	Perform data and database backups	8.4
	Update anti-virus definitions	8.9
	Run anti-virus/anti-malware check (after definition up-dates)	8.9
	Check availability and performance of all network/internet connections	8.10

Time interval	Task	Reference
Weekly	Reboot iQ-WEB system (when installed on client computer)	8.2
	Install Windows security updates/patches	8.11
Monthly	Reboot iQ-WEB system (when installed on server system)	8.2
	Delete unused/unauthorized user accounts	8.5
	Check iQ-WEB server for hard disk failures and S.M.A.R.T. errors	8.6
	Check all storage devices and RAID controllers for hard disk failures and S.M.A.R.T. errors	8.6
	Check iQ-WEB server for sufficient hard disk space	8.6
	Check all storage devices for sufficient storage space	8.6
	Investigate application logs for potential failures	8.8
Quarterly	Perform database integrity check	8.7
	Check for new Windows system drivers (update only after verification by local reseller!)	8.11
	Check for iQ-WEB patches for installed software version. Update, if available.	8.11
	Check for new iQ-WEB software versions. Verify possibilities for software update (together with local reseller!).	8.11
	Check for patches of PHP, Apache and MySQL (update only after verification by local reseller!).	8.11
	Check for new iQ-LITE software versions (if used as external viewer). Verify possibilities for software update (together with local reseller!).	8.11
Annually	State-of-the-art check for system hardware	8.12
On demand	Record and report software malfunctions of iQ-WEB (at least severe software errors)	8.13

8.2 Regular software and system restarts

The performance of computer systems may go down in case the system runs over a longer period of time without being restarted. As a software application, iQ-WEB is intended for frequent, but not for continuous use.

Usually, the software will be installed on a Windows server system. The system must be shut down and restarted at least once a month. This automatically also restarts the software and ensures the freeing of potentially blocked system resources.

In cases where the software is installed on a client computer (e.g. with Windows 10 OS), the software and the system must be shut down and restarted at least once a week.

8.3 Checking the DICOM communication logs

Since iQ-WEB is the central point of storing and archiving all performed study and report data, it is important to make sure that all data is successfully received by iQ-WEB. Otherwise, imaging data may be lost when it is automatically deleted at the modalities, leading to missing diagnoses or to newly required patient visits to repeat an already performed study, including potential repeated radiation exposure.

Therefore, check on a daily basis the application's DICOM communication logs in order to verify that all studies were completely received.

8.4 Performing daily backups of stored data and databases

In the event of disaster or hardware failure, it is important that iQ-WEB and the stored data can be restored with minimum delay and as little data loss as possible and to ensure that the storage of image data and its distribution within the medical network becomes possible again. In order to ensure this, you need to perform scheduled backups of all storage devices that contain stored and archived DICOM data as well as of the MySQL database that is responsible for access to this data.

⚠ WARNING:

Danger of application failures or unavailability.

Not performing regular data and database backups can lead to permanent data losses and unavailability of access to diagnostic data within the medical network in case of disasters or hardware failures, resulting in delayed or incorrect diagnoses or repeated study acquisition (incl. repeated radiation exposure), thus affecting patient safety.

Daily backups are required. The institution is responsible for implementing the necessary backup measures. iQ-WEB does not manage data and database backup tasks automatically. Also check your local legal restrictions for additional requirements.

H.-No.: 1.1.1, 1.1.4, 1.2.3, 1.2.4

The following measures are recommended:

- Perform a daily backup of **all** storage devices containing image and report data. This means short-term and long-term archives, storage devices where aged data is stored, modality-specific archives, but also storage areas where uploaded DICOM and non-DICOM data is kept.
- Perform a daily backup of the iQ-WEB databases stored in MySQL. This is easiest be done by creating a backup of the MySQL folder under "C:\ProgramData" and the folder with the actual iQ-WEB databases (in case their storage path was changed from the default "C:\ProgramData\MySQL" to some other path).

NOTICE:

If you have stored the databases in another path, e.g. on a different hard disk, you need to create backups of these contents as well. You will find the storage path in the command "datadir=" of the file "My.ini" under "C:\ProgramData\MySQL\MySQL Server 5.7".

We recommend establishing automatic backup procedures. Manual backups should be performed only where automatic backup procedures are not possible. In such cases, MySQL backups should at least be done once a month.

When a disaster or hardware failure actually happens and you have to restore the iQ-WEB server and/or the data storages, the chances are high that there are inconsistencies between the stored data and the database. This is especially the case when aging and/or purging procedures are used. It is, therefore, highly recommended to perform a database integrity check before putting the iQ-WEB server back into operation. Also the acceptance tests should be performed in order to ensure the correct functioning of the system. Refer to section 13.1.

8.5 Deleting unused and unauthorized user accounts

At least once a month you should check the active user accounts in iQ-WEB's user management and delete those user accounts that are not needed anymore. This increases system security by preventing access from outdated accounts and from persons no longer authorized to access the system.

For security reasons it is highly recommended, however, to disable user accounts immediately when the person to whom the account is allocated is no longer authorized to access the system.

8.6 Ensuring sufficient data storage and server hard disk space

An iQ-WEB archive is a continuously growing system. Every day new image and report data is received and must be stored. Every day the iQ-WEB application has to perform many different jobs. As a consequence, the storage space both on the iQ-WEB server and on the storage devices gets filled.

Therefore, it is necessary to regularly check the storage status of the iQ-WEB server itself and of every one of the used storage devices. This does not only include checking for the still available space but also for potential failures.

The following maintenance activities are required on the **iQ-WEB server**:

1. Check monthly that the system does not show any hard disks failures or S.M.A.R.T. error messages in the system logs.
2. Check monthly if there is enough storage capacity to perform the necessary tasks but also to store log files. In order to clean up server hard disk space, perform the tasks described in section 8.6.1.

The following maintenance activities are required on the **data storage devices**:

1. Check monthly that the storage devices and RAID controllers do not show any hard disks failures or S.M.A.R.T. error messages in the system logs.
2. Check monthly if there is enough storage capacity to store and archive the image and report data received by the iQ-WEB server. If necessary, extend storage space, add new storage devices or migrate to storage devices with higher volumes. Refer to the sections 8.6.2 and 8.6.3 for further instructions.

8.6.1 Cleaning the iQ-WEB server's hard disk space

Delete temporary files that often get left behind during irregular operations of iQ-WEB:

- **Anti-spam image files**: Due to a high number of simultaneous logins to the iQ-WEB web interface, the iQ-WEB installation subfolder "…\iQ-WEBX\PACS\php\antispam" may contain many "*.jpg" image files that have been left behind. Deleting these files regularly when no users are logged into the system helps save disk resources.
- **Temporary image and data files**: Due to a high number of simultaneous logins to the iQ-WEB web interface, the iQ-WEB installation subfolder "…\iQ-WEBX\PACS\php\images" may contain leftover image files that match the following naming schemes: "temp*.jpg" or "temp*.gif". Deleting these files regularly when no users are logged into the system helps save disk resources.
  In addition, the iQ-WEB installation subfolder "…\iQ-WEBX\PACS\php\tmp" may contain leftover files. Deleting these files regularly when no users are logged into the system helps save disk resources.
- **Session files of web server**: Due to the session management system of Apache webserver, under rare circumstances, the iQ-WEB installation subfolder "…\iQ-WEBX\WWW_TMP" may contain leftover files that match the naming pattern "sess_*". Deleting these files regularly when no users are logged into the system helps save disk resources.
- **Windows temporary files**: Due to corrupt DICOM data or insufficient machine resources, one of the PC's temp folders ("…\Windows\Temp" or user based "%TEMP%") may contain leftover files that match the naming pattern "PacsOne*". Deleting these files regularly when no users are logged into the system helps save disk resources.

NOTICE:
Before deleting any files mentioned in this section, it is best to ensure that no user or scheduled task is using them. Stopping the appropriate services before deleting the files can prevent any issues.

Delete failed jobs that reached the maximum number of retries and are not continued by the system. This reduces clutter in the jobs view and allows the user to see potential issues with current jobs much easier. Refer to section 10.3.2.3 for detailed instructions.

NOTICE:
Before deleting any jobs, ensure that the tasks are not currently running and that they are resubmitted afterwards, if necessary.

8.6.2 Adding storage to an existing storage device

1. **Extending the space of a storage device**

   While the archive gets bigger, the currently available disk space probably should be extended. Follow the instructions of the storage system manufacturer to add new hard disks or to exchange hard disks with larger ones. Once the space of the storage system has been extended, iQ-WEB will automatically use this extended storage as long as the path to the main archive directory is kept as it was.

   Make sure that the previously stored images are still accessible after extending the storage system. The manufacturer of the storage system may offer instructions on how to keep the previous content.

2. **Using an additional storage device**

   On the other hand, an additional storage device could be added to the server. Assuming the initial storage device has already exceeded its disk space, the path of the short term archive can simply be changed to the newly attached storage device.

   Consider that from now on all new images will be saved to the new storage device. However, examining images stored on the old storage is still possible as long as the path does not change.

   Another option is to use the new storage device as the long term archive. Using this feature, iQ-WEB will automatically move images from the short term to the long term archive according to the date the images were received.

3. **Using different storage devices/partitions for different modalities**

   A new storage device can be added or a new partition used to store the images from one specific modality. In this case, a custom path will need to be entered for the modality on the "Communications\DICOM" page. From this point forward, all images received from this modality will be stored on the new storage device/partition while images from all other modalities will continue to be stored on the initial storage device/partition configured for the whole PACS.

8.6.3 Storage migration and replacement

The following scenario assumes that the DICOM images are stored on a different physical drive or storage system than the iQ-WEB or MySQL installation.

It is important to transfer all DICOM data to the new storage device before shutting down the old one. Be sure to preserve the directory structure during this process.

One possible transfer option is the simple file-based transfer, where the archive (including subfolders) can be copied to the new storage system, e.g. by using Windows and its integrated "Explorer". If necessary, access restrictions that have been changed during the copy process can be re-applied afterwards.

Another option is the creation of an image of the current archive which will be restored afterwards on the new storage device.

Most importantly, the mounted drive letter of the new storage device must be the same as the old one. If an NAS is used that can be accessed via TCP/IP, it should be assigned to the old storage system's IP address to keep the migration as simple as possible.

Once this procedure has been finished, iQ-WEB will automatically use the new storage system as long as the configured paths match the old ones.

In order to keep the downtime of iQ-WEB as low as possible, the following steps should be kept in mind:

1. Start a database integrity check to ensure all entries in database link to an image file.
2. Stop the iQ-WEBX service to prevent receiving new images.
3. Attach the new storage device and configure it to be accessible like the previous device.
4. Once the storage device is configured properly, start the iQ-WEBX service again.
5. Start the migration process and transfer the images from the previous device.
6. Start a database integrity check when migration process is finished to ensure all entries in database link to an image file.

This procedure has the advantage that the server is able to receive images after a short downtime. The drawback is that old images are not accessible as long as they are not physically available on the new system.

8.7 Performing data consistency checks

Database integrity tests should be performed once per quarter. The intention of such consistency checks is to find out whether there are any inconsistencies in the stored image data or any orphan images. iQ-WEB already provides the necessary tools to perform this task:

- Run a full data integrity check. This ensures that the database and stored DICOM data are in a consistent state, that there are no orphaned files and that no DICOM data is missing.
- Resolve duplicate patient ID conflicts. This ensures that demographic data of patients is consistent and makes the integration with other systems much easier.

NOTICE:
Checking data consistency is an important task for preventing data loss. Check your local legal restrictions for additional requirements.

8.8 Investigating the application logs

Investigate the following application logs on a monthly basis in order to recognize early signs of failure.

- Windows Event Viewer → Application log
- iQ-WEB log files (Refer to section 10.7.4 for details.)
- Apache log files (Refer to section 10.7.2 for details.)
- MySQL log files (Refer to section 10.7.3 for details.)

8.9 Protection from virus/malware infection and power loss

Computer viruses and malware hold a considerable risk. A virus/malware infection may potentially lead to data losses and to data inconsistencies. To avoid the risk of a virus infection of the server, all systems should be furnished with anti-virus software that needs to be updated regularly. Updates should be run as soon as they become available, but at least once a day.

Anti-virus/anti-malware checks should also be run regularly on the server where iQ-WEB is installed. It is recommended to run a check after virus definition updates.

⚠ WARNING:

Danger of data loss/inconsistencies or application failures.
Computer viruses hold a considerable risk. A virus infection may potentially lead to data losses and to the unavailability of the iQ-WEB server. To avoid the risk of a virus infection of the devices, from which iQ-WEB itself or the WADO interface is used, and/or on the server, on which iQ-WEB is installed, all systems should be furnished with anti-virus software that needs to be updated regularly.

H-No.: 1.1.1, 1.1.4, 1.1.8, 1.2.3

NOTICE:

Anti-virus software or firewalls may affect the iQ-WEB software or the connection between iQ-WEB and connected stations as they may accidentally block necessary application files or communication (e.g. ports). It is recommended to configure such applications accordingly to ensure the faultless running of iQ-WEB on the system and to establish stable connections between all communication partners (e.g. the modalities or the MIS). A system test should be performed before using it productively.

Potentially occurring fluctuations in the power supply can lead to data losses and data inconsistencies. Therefore, the insertion of an uninterruptible power supply (UPS) might be helpful in case the power supply voltage is not fused.

8.10 Ensuring a proper network/internet connection

A failure or partial loss of the network/internet connection or a low bandwidth within the medical network pose risks when imaging data cannot be made available at the receiving devices, is received only incompletely or is not transmitted fast enough, especially in emergency cases.

Therefore, check daily all network/internet connections going to and from iQ-WEB for their availability and performance, especially where the archive is not located in the same network (WAN), e.g. in cloud scenarios. This check should be done before the first procedure is scheduled at the respective receiving device. Example: If the night shift starts at 8 p.m. and the radiologist is supposed to query iQ-WEB for imaging data for emergency reading, verify the connection at the beginning of the night shift.

Where emergency cases are transmitted across the tested connection(s), the transmission time should be no longer than 15 minutes.

8.11 Keeping the system up-to-date

You should check regularly if your system is still up-to-date and perform necessary updates. Check the following items:

- Install Windows security updates and patches within one week after their release. This also includes optional updates, especially if they concern redistributable packages.
- Check quarterly for new Windows system drivers but update them only after checking back with your local reseller to ensure the compatibility with the currently installed iQ-WEB version.
- Check quarterly if software patches for the currently installed iQ-WEB software are available. If yes, update the system accordingly.
- Check quarterly if a new software version of iQ-WEB is available. Verify that the hardware and software requirements of the new version match the system you are using. Contact your local reseller to discuss updating your system to the new version.
- Check quarterly if software patches for the currently used third-party components (i.e. PHP, Apache and MySQL) are available but update them only after checking back with your local reseller to ensure the compatibility with the currently installed iQ-WEB version.
- Check quarterly if a new software version of iQ-LITE is available, if you use the portable DICOM viewer as external viewer. Contact your local reseller to discuss updating your system to the new version.

NOTICE:

Remember to perform a system acceptance test before putting the system back into productive operation. See section 13.1 for the acceptance test checklist.

8.12 Ensuring the system's state of the art

It is recommended to check annually whether the system hardware is still state-of-the-art.

- Check if the used Windows operating system is still supported by Microsoft. Check how long support will still be granted in order to schedule a necessary OS update on time. (Keep in mind that this may also affect the used iQ-WEB software and other software products connected to iQ-WEB, e.g. iQ-4VIEW.)

- Check the Windows logs for potential hardware errors that may suggest an impending system failure.
- Reboot the computer and measure the startup time. It should be reasonable and not exceed 3 minutes.

8.13 Recording and reporting software malfunctions

Although the iQ-WEB software is subjected to extensive validation and verification procedures by the manufacturer, it is nevertheless possible that unforeseen malfunctions occur during the use of the software.

We recommend to record and count the number at least of severe software errors, such as crashes, throughout the entire software life-cycle and to report such incidents to your local reseller or directly to the manufacturer.

Generally, the following assumptions can be made as reference:

- An up-to-date server system (e.g. Windows Server 2019) with all necessary security patches and current anti-virus/malware software should run 30 days without crashing.
- An up-to-date client system (e.g. Windows 10) with all necessary security patches and current anti-virus/malware software should run 1 week without crashing.

⚠ WARNING:

In case faulty software behavior is observed that may put a patient or the user at risk, the user is asked to immediately contact the manufacturer or local reseller. The manufacturer's contact data is stated in the user documentation (last page of this document) and inside the application itself.

H.-No.: 1.1.1 – 1.3.3

NOTICE:

Also the reporting of minor errors and inconveniences in handling the application can be helpful in order to improve the software in future versions.

9 Folders and registry structure

The following table lists all folders created during the installation process of iQ-WEB that might be important to administrators. The number of sub-folders stated below is limited to those with relevance for the administration of iQ-WEB. The other folders contain application and configuration files that must not be accessed or altered but are needed for the functioning of the application.

The default installation directory of iQ-WEB is: C:\Program Files\iQ-WEB

⚠ WARNING:

Danger of application failures or unavailability.
All modifications to the medical software have to be made by service personnel. The risk of malfunction is relatively high when modifying software. Abnormal termination of the software as well as data losses are possible when improperly administered.
Modifying application folders and or moving files to different locations, deleting or renaming them without considering other parts may cause problems in the functioning of iQ-WEB. Keep the file and folder structure intact and only follow the user documentations' instruction for configuring the application.

H.-No.: 1.1.1, 1.1.4, 1.2.3, 1.2.4

Folder	Description
…\[iQ-WEB installation folder]	iQ-WEB application root folder (by default: iQ-WEBX)
…\iQ-WEBX\Apache\	Contains the Apache web server files
…\iQ-WEBX\Apache\conf	Contains the Apache web server configuration file "httpd.conf"
…\iQ-WEBX\Apache\logs	Contains the Apache web server log files
…\iQ-WEBX\Language	Contains sub-folders with language files for every language provided for the iQ-WEB web GUI; includes one custom translation project (for later added translations)
…\iQ-WEBX\PACS\	Contains the iQ-WEB binaries and the license files of iQ-WEB
…\iQ-WEBX\PACS\export	Default directory for exported studies
…\iQ-WEBX\PACS\FailedLogin	Contains files that store information about failed login attempts
…\iQ-WEBX\PACS\import	Default directory for imported studies
…\iQ-WEBX\PACS\log	Contains all log files created by iQ-WEB
…\iQ-WEBX\PACS\php	Contains the iQ-WEB php files that are necessary to build up the web part and the license files of iQ-WEBX WADO, iQ-WEBX2GO
…\iQ-WEBX\PACS\php\doc	Contains the user documentation

Folder	Description
…\iQ-WEBX\PACS\php\download	Contains all generated download packages of iQ-WEB
…\iQ-WEBX\PACS\php\images	Contains all full size images used for image presentation within iQ-WEB
…\iQ-WEBX\PACS\php\iqcallinstallations	Contains all generated registry files for configuring iQ-VIEW Call
…\iQ-WEBX\PACS\php\iQ-4VIEW	Contains all iQ-4VIEW related files
…\iQ-WEBX\PACS\php\iQ-X	Contains all iQ-X related files
…\iQ-WEBX\PACS\php\locale	Contains all translation files for iQ-WEB
…\iQ-WEBX\PACS\php\thumbnails	Default directory for thumbnails of iQ-WEB used in iQ-X
…\iQ-WEBX\PACS\php\transcript	Contains all generated Word documents generated by transcription feature
…\iQ-WEBX\PACS\php\upload	Contains all uploaded data of iQ-WEB
…\iQ-WEBX\PHP	Contains binaries of the PHP extension and the configuration file "php.ini"
…\iQ-WEBX\WWW_TMP	Contains webserver sessions during runtime

NOTICE:

It is recommended that the archive or database files not be stored in the same folder as iQ-WEB to avoid multiple folder accesses from the different applications.

The following lists all registry keys created during the installation process of iQ-WEB that may be important to administrators. The following list contains key paths in relation to the following base paths:

- [LM_SOFTWARE]: "HKEY_LOCAL_MACHINE\SOFTWARE\"
- [LM_SYSTEM]: "HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet"

Key	Description
[LM_SOFTWARE] \IMAGE Information Systems Ltd.\iQ-WEBX\[AE Title]	Basic registry configuration for iQ-WEB where [AE Title] is replaced by the current iQ-WEB AE Title.
[LM_SOFTWARE]\ImageMagick	Configuration of module for image compression and decompression
[LM_SYSTEM]\services\Apache	Windows Service Configuration of Apache web server
[LM_SYSTEM]\services\iQ-WEBX	Windows Service Configuration of iQ-WEB DICOM server

⚠ WARNING:

Danger of application failures and/or unavailability.
Manually changing the registry setting can cause severe damage to the iQ-WEB application and the operating system. It is strongly recommended that the registry keys be backed up before making changes.

H.-No.: 1.1.1

10 Software administration

10.1 The core configuration

iQ-WEB comes with three components that are necessary to run properly: Apache HTTP Server, PHP and MySQL. The next sections will describe some basic settings for these components.

10.1.1 Apache HTTP server

Apache HTTP Server is a core component of iQ-WEB that is responsible for answering all HTTP requests from the web browsers used by clients. Its configuration file "httpd.conf" can be found under "[iQWEB installation folder]\Apache\conf\". The following basic settings are essential for iQ-WEB:

- **Listen**: This parameter makes it possible to bind the service to a specific port. During the installation the value will be set to the default port 80 or to 443 if a connection via SSL is desired.
- **LoadModule**: This parameter is needed to load modules to extend the default functionality of the web server. iQ-WEB comes with a set of loaded modules, the most important one is PHP using the "php7apache2_4.dll".

The configuration file must not contain syntax errors or the service will not start.
For a detailed description of every setting, refer to the documentation at the official Apache site "https://httpd.apache.org/".

NOTICE:
The Apache HTTP Server must be restarted to adopt any changes made in the configuration. This can be achieved either via the Windows Service control, the Apache Monitor Software or the iQ-WEB interface. (See section 10.3.3 "System" for more information.)

NOTICE:
Before adjusting the file "httpd.conf," it is recommended that a backup of the file be made in case changes need to be reverted.
All current HTTP connections to a server will be closed during the restart process.
HTTP access will be unavailable until the restart process is finished.

10.1.1.1 SSL integration

Due to growing security requirements of web based applications iQ-WEB provides a mechanism to protect communication between client browsers and server using SSL technology (Secure Sockets Layer). This is a common method to encrypt traffic of web application to avoid unintended access to data. To accomplish this capability iQ-WEB requires the OpenSSL module of the Apache web server. iQ-WEB is using the OpenSSL version 1.0.2k.

For detailed reference refer to following sources:

- https://www.openssl.org/
- http://httpd.apache.org/docs/2.4/mod/mod_ssl.html.

To use SSL encryption an SSL certificate is mandatory. iQ-WEB offers the usage of two certificate types:

- Self-signed SSL certificates
- SSL certificates created by official certificate authorities

NOTICE:
Self-signed SSL certificates only provide limited security in comparison to SSL certificates created by official certificate authorities.

This section explains the general configuration process for using SSL encryption.

10.1.1.1.1 Certificate generation

In this section only the creation of self-signed certificates is described because signing authorities use different procedures.

iQ-WEB provides a batch script that helps generating a self-signed certificate. It is located at: "[iQWEB installation folder]\Apache\create_certificate.bat". Executing this script in this folder as a user with administrator access rights will guide the user through the generation process. The following user inputs are required during this procedure:

- Enter the PEM pass phrase twice (password for the private key for the server)

NOTICE:
At least 4 characters are required (at most 20 characters)!

- Enter the country name, e.g. "US"
- Enter the state or providence name, e.g. "New York"
- Enter the location name, e.g. "New York City"
- Enter the organization name, e.g. "ABC Company"
- Enter the organizational unit name, e.g. "IT Department"
- Enter the common name, e.g. "PACS"

NOTE:
The "Common name" must match the computer name that will be used for accessing the web interface of iQ-WEB, e.g. "PACS" or its IP address. If a dynamic DNS service is being used, like DynDNS, use the registered DNS name, e.g. "host.dyndns.org".

- Enter an email address
- Optional: Enter a challenge password
- Optional: Enter an optional company name

- Re-enter the PEM pass phrase entered at the beginning
- Once the certificate creation process has been finished successfully, all necessary files can be found within the folder "[iQWEB installation folder]\Apache\conf\ssl\".

NOTICE:
Self-signed certificates generated with this script are valid for 365 days. The batch file "create_certificate.bat" may be edited to increase the number of days.

NOTICE:
iQ-WEB installer provides an option to prepare SSL configuration and run the "create_certificate.bat" directly after installing iQ-WEB for the first time.

10.1.1.1.2 SSL configuration

In order to apply the created or provided certificates as well as setting up the SSL support, some modifications in the Apache configuration file "httpd.conf" are necessary. Open this file, which should be located at: "[iQWEB installation folder]\Apache\conf\". To configure SSL proceed with the following checklist when editing the configuration file:

- Locate string "Define USE_SSL" in the file and remove all "#" characters in front of it.

```
Define USE_SSL
#Define USE_SSL_ONLY
```

- If the SSL connection will be used solely then also locate string "Define USE_SSL_ONLY" in file and remove all "#" characters in front of it.
- Locate the following section and change the network port number to the one used for the SSL connection to the web server. (Default port is 443)

```
<IfDefine USE_SSL>
   Listen 443
</IfDefine>
```

NOTICE:
Port is not allowed to be used by another application. Apache webserver does not start with such configuration.

- Locate file section beginning with "#SSL Configuration" (e.g. see below)

```
#SSL Configuration
<IfDefine USE_SSL>
    LoadModule ssl_module "${SRVROOT}/modules/mod_ssl.so"
    <IfModule ssl_module>
        SSLRandomSeed startup builtin
        SSLRandomSeed connect builtin
        AddType application/x-x509-ca-cert .crt
        AddType application/x-pkcs7-crl .crl
```

```
        Mutex default
        SSLRandomSeed startup builtin
        SSLSessionCache none
        <VirtualHost *:443>
           ServerName localhost
           DocumentRoot "${DOCROOT}"
           SSLEngine On
           SSLCertificateFile "${SRVROOT}/conf/ssl/iQ-WEB-certificate.crt"
           SSLCertificateKeyFile "${SRVROOT}/conf/ssl/iQ-WEB-certificate.key"
        </VirtualHost>
    </IfModule>
</IfDefine>
```

- Edit the following bold marked strings to match the intended configuration:
  - "VirtualHost *:**443**"
    Change the network port number to the same SSL port used in the "Listen" clause above.
  - "ServerName **localhost**"
    Replace "localhost" with the name or IP address of the server according to the value used during the certificate creation ("Common Name").
  - "SSLCertificateFile" ${SRVROOT}/**conf/ssl/iQ-WEB-certificate.crt**"
    "SSLCertificateKeyFile" ${SRVROOT}/**conf/ssl/iQ-WEB-certificate.key**""
    Verify the paths and file names or replace the full file path to the generated certificate files.

10.1.1.1.3 Access to web interface

After the Apache server has restarted without errors, the SSL secured connection to the web interface of iQ-WEB can be used with a client browser as follows:

https://[Common Name]:443

Replace [Common Name] with the name entered during the certificate creation and include the correct port.

If a security warning appears stating there is a problem with the certificate, there are two explanations:

- A self-signed certificate may have been created by an untrusted authority. Nevertheless, the connection will be secure.
- The server name/address in the URL does not match the value of the "Common Name" defined during the creation of the certificate.

Unless the certificate is changed, this message will appear every time the browser is opened and the web interface of iQ-WEB is accessed. The certificate can be permanently installed (on each client) to avoid this security warning.

10.1.2 PHP

The PHP extension is a core component of iQ-WEB and an extension of the Apache HTTP Server. It is responsible for generating the web interface of iQ-WEB which is then provided to the web browsers used by clients. Its configuration file php.ini can be found under "[iQWEB installation folder]\PHP\".

- **max_execution_time**: This value defines the amount of time a script will run before its execution will be terminated. By default the value is set to 120 seconds. If iQ-WEB must handle a large amount of data, certain scripts may time out. Increasing this value may solve the issue.
- **memory_limit**: This value defines how much memory can be allocated by a single script. By default, the value is set to 4096 MB. If iQ-WEB must handle a large amount of data, certain scripts may reach the memory limit. Increasing this value may solve the issue.
- **upload_max_filesize**: This value defines the maximum size for any uploaded files. If large files need to be uploaded, this value must be increased.
- **post_max_size**: This value defines the maximum size for post data. It must be equal to or larger than the upload_max_filesize value. If large files need to be uploaded, this value must be increased.
- **extension**: This parameter is needed to load extensions into PHP. During the installation, all extensions needed by iQ-WEB are activated. Note that iQ-WEB requires the "php_mysqli.dll" extension that does not work with the "php_mysql.dll".

For a detailed description of the settings in PHP configuration, refer to the documentation of the official site http://www.php.net/docs.php.

NOTICE:

Apache HTTP Server must be restarted to adopt any changes in configuration. This can be done either via the Windows Service control, the Apache Monitor Software or the iQ-WEB interface. Refer to section 10.3.3 "System" for more information.

NOTICE:

Before adjusting the file "php.ini" it is recommended that a backup of the file be made in case changes need to be reverted. All current HTTP connections to a server will be closed during the restart process. HTTP access will be unavailable until the restart process is finished.

NOTICE:

When you update iQ-WEB to a new version, the default php.ini configuration file will be installed, which overwrites your customized php.ini file. However, your previous modifications will be stored in a php.ini backup file in the same folder. You can transfer the changes from this file to the php.ini file after the update.

10.1.3 MySQL

In some cases, the configuration of the MySQL database installation on which iQ-WEB relies may need to be modified. This occurs, especially, in cases where a high volume of data or a high number of simultaneous user logins are expected during operations.

The "my.ini" configuration file is typically found under the "C:\Program Files\[MySQL installation folder]\MySQL Server 5.7" folder.

- **max_connections**: This parameter specifies the maximum amount of concurrent sessions the MySQL server will allow. One of these connections will be reserved for a user with SUPER privileges to allow the administrator to login even if the connection limit has been reached.
- **innodb_buffer_pool_size**: This parameter specifies the size of the buffer pool used by InnoDB to cache both indexes and row data. The higher the value is set, the less disk I/O is needed to access data in tables. This parameter can only be set to up to 80% of the machine's physical memory size on a dedicated database server. When running other applications like Apache HTTP Server and iQ-WEB, reserved memory should be shared equally. If the value is set too high, competition of the physical memory may cause paging in the operating system.

MySQL is a 3rd-party prerequisite for iQ-WEB. The above adjustments must be made manually for each installation and are not configured automatically during the iQ-WEB installation process. For a detailed description of the settings in the MySQL configuration, refer to the documentation of the official site "https://dev.mysql.com/doc/#manual".

NOTICE:

MySQL Server must be restarted to adopt any changes in configuration.
This can either be accomplished via the Windows Service Control or the iQ-WEB interface.
Refer to section 10.3.3 "System".

⚠ WARNING:

Danger of delay of application and data availability.
Before adjusting the "my.ini" file it is recommended that a backup of the file be made in case changes need to be reverted. All current MySQL connections to a server will be closed during the restart process.
MySQL access will be unavailable until the restart process is complete.
No data can be registered in the database during this period.

H.-No.: 1.1.2, 1.1.3

10.2 Using the administrative overviews

This section describes all views that are especially provided for administrative purposes or that provide information of special administrative interest. These views can be accessed via the menu bar of iQ-WEB after successfully logging in. For detailed information about the log-in process, navigation and user accessible views refer to the iQ-WEB instructions for use.

10.2.1 Jobs table – Overseeing the archive's tasks

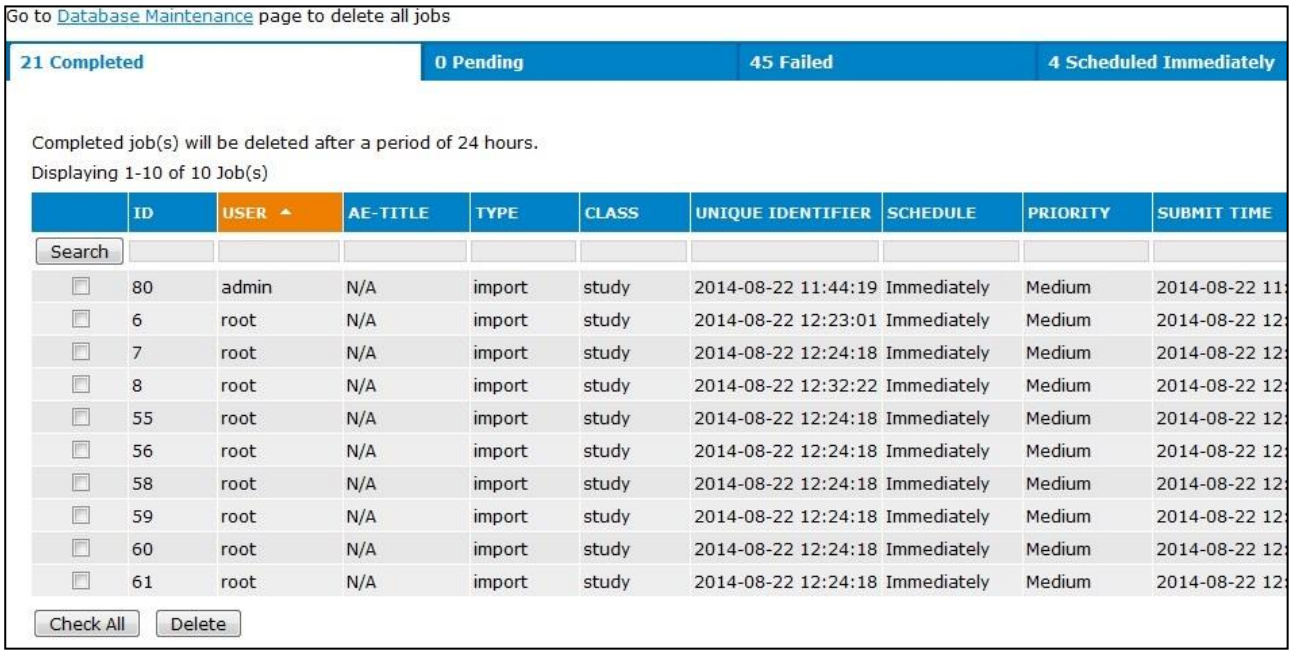


Figure 3 – Job view

The "Jobs" page is structured in the following status-based tabbed views:

- "Completed"
- "Pending"
- "Failed"
- "Scheduled Immediately"
- "Scheduled Later"

The jobs view page in general displays the job status of the currently logged in user. For administrators, this page shows all jobs including other administrators' jobs as well. In contrast, normal users only have access to jobs they triggered. It is possible to search for specific jobs, using the search fields right beneath the table head. Jobs can be deleted or retried by clicking the respective button.

Each job table contains the following information:

- **ID**: Job ID that is generated automatically by the MySQL database
- **User**: The username that created the database job
- **AE Title**: AE title of the destination
- **Type**: Job type, e.g., "Forward", "Print", etc.
- **Class**: Hierarchy level, e.g., "Patient", "Study", "Series", etc.
- **Unique Identifier**: Unique ID in the hierarchy level, e.g., patient ID, study UID, series UID, etc.
- **Schedule**: Displays the scheduling of the job
- **Priority**: Shows the priority level of the job
- **SubmitTime**: Timestamp from when the database job is submitted
- **StartTime**: Timestamp from when the database job starts processing

- **FinishTime**: Timestamp from when the database job finishes processing
- **Status**: Success, failure or percentage value representing the jobs status
- **Retries**: Displays the number of retries the job already has
- **Details**: Any detailed errors if the database job has failed
- **Retry Interval**: Displays the interval between the retries

NOTICE:

In the input fields used here the wildcard characters ("", "?") are supported. Where "*" is a placeholder for any number of characters and "?" is a placeholder for one character.*

10.2.2 Using the "Journal" as activity tracker

The journal view page in general displays the tracked activities performed in an iQ-WEB system. iQ-WEB automatically logs all user activities into the "Journal" database table in a way that meets the HIPAA auditing requirements. This includes user logins, access to studies for viewing, data imports and exports, deletion of data or the creation of WADO links.

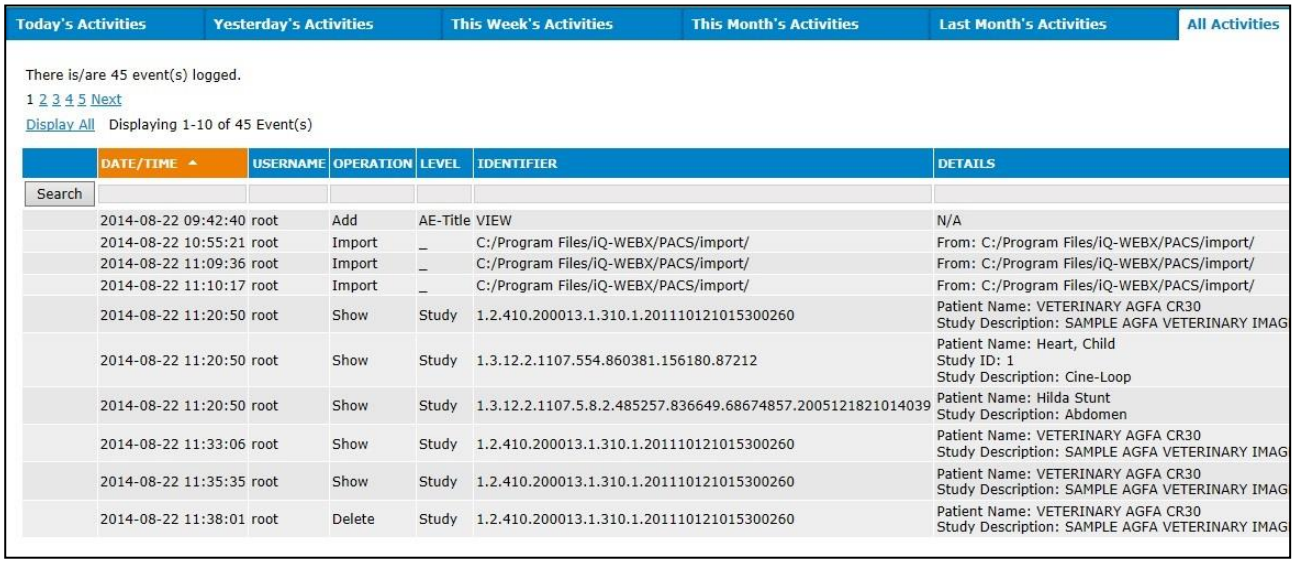


Figure 4 – Journal view

The following information will be displayed:

- **Date/Time**: The date and time when the activity happened
- **Username**: The name of the user that performed the event
- **Operation**: The action that the user executed
- **Level**: The subject level of this event, e.g. patient, study, series, image
- **Identifier**: The unique ID of the item that was involved, e.g. patient ID, study UID
- **Details**: Additional information about the activity

All table views on the "Journal" page include a search bar on top of each table which allows the user to filter the displayed list. This search bar provides fields to filter by the criteria, described above.

NOTICE:

Journal entries are translated into the language configured when the entry is written. If the language has changed in the meantime, the journal entry will not be translated again.

The journal is structured in the following time-based views:

- Today's Activities
- Yesterday's Activities
- This Week's Activities
- This Month's Activities
- Last Month's Activities
- All Activities

On the first day of every month, iQ-WEB will purge events that are older than 60 days. To modify this value, contact the support team.

10.2.2.1 Automatic monthly journal emails

If an SMTP server is configured (see section 10.4.3 "Setting up an SMTP server for email") and an email address for the administrator has been entered (see section 10.4.2.5 "Global settings"), iQ-WEB will send an email on the first day of every month that contains all events of the previous month.

10.3 The "Tools" menu: Managing system maintenance

The tools menu item contains a lot of utilities that enhance working with iQ-WEB. They can be accessed via the menu bar of iQ-WEB after a successful log-in. For detailed information about the log-in process and navigation refer to the iQ-WEB Instructions for Use. The following sub-sections describe the tools that are commonly used by administrators.

10.3.1 Automatic purge storage

This feature allows the administrator to automatically purge older studies by a predefined set of rules or parameters. This feature is useful if the storage resources are limited on the server on which iQ-WEB is installed.

10.3.1.1 General automatic purging rules

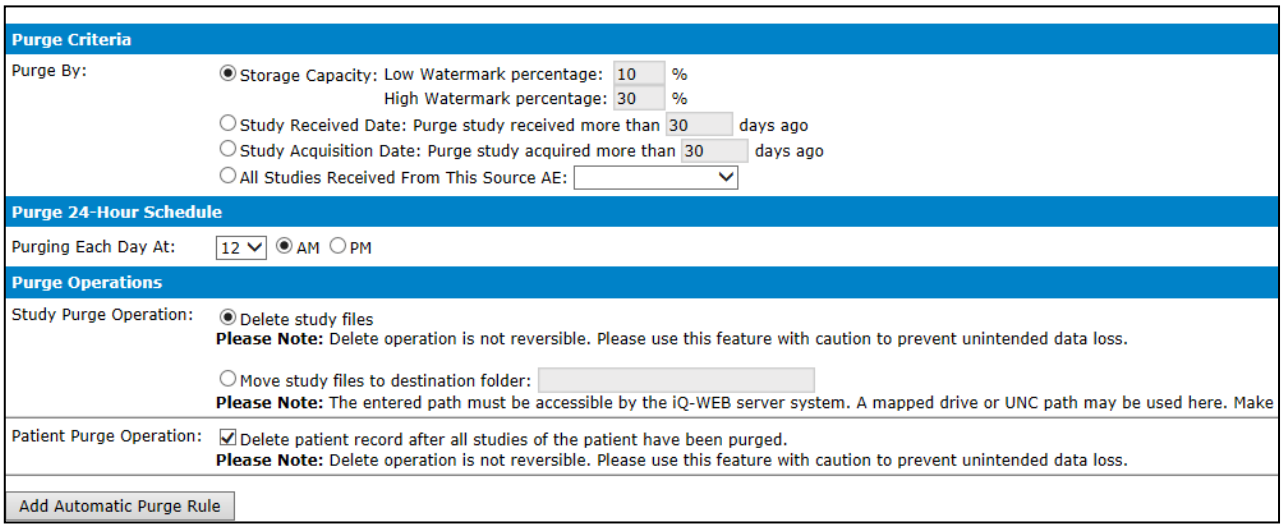


Figure 5 – General purging rule configuration

Every rule is triggered when a defined event occurs. The criteria that can initiate purging are described below:

- **Storage Capacity**:
  - "Low Watermark"
    This field is defined in terms of free disk space percentage ranging from 0 to 100. For each defined archive directory, iQ-WEB will examine the corresponding disk usage information for the disk where the archive directory is located. If the free disk space percentage is lower than this defined Low Water Mark, iQ-WEB will start purging older studies on this disk.
  - "High Watermark"
    This field is defined in terms of free disk space percentage ranging from 0 to 100. The value must be higher than the value defined for the Low Water Mark. When the free disk space percentage drops below the Low Water Mark, iQ-WEB will start to purge older studies stored in the corresponding archive directory. iQ-WEB will sort the list of studies stored in this archive directory by the date the studies were received, with the oldest study on top of the list. iQ-WEB will purge studies in the sorted list (removing the oldest study first) one at a time, until the disk free space percentage rises above the defined High Water Mark. At that point, the automatic purging operation is complete.
- **Date when study was received**: iQ-WEB will purge all older studies that were received more than the defined "n" days ago.
- **Date when study was acquired**: iQ-WEB will purge all studies that have a study date older than the defined "n" days ago.
- **Source AE**: All studies that were received from the specified source AE Title will be purged.

To customize the purging procedure iQ-WEB provides the following options:

- **Scheduling**: iQ-WEB will perform automatic purging only on this scheduled hour of the day, and will not perform another purging for the same rule for the next 24 hours.
- **Purge Operations**: Allows users to control purging behavior on the following 2 levels
  - "Purge Study Operations"

Permanently delete all purged studies from the database and archive storage. The user can choose to move DICOM data files from archive storage to another location before deletion. This option makes sure that study data are still accessible, but do not consume any more online storage resources. For Windows platforms, any shared network path must be entered in the Windows UNC format (e.g. \\RemoteHost\RemotePath) instead of as a mapped drive path (e.g. Z:\Path).

- "Purge Patient Operations"
  Permanently remove patient data from the iQ-WEB database after purging the last study of a patient. If disabled, patient data is left in database for further use.

⚠ WARNING:

Danger of data loss.

Be sure to back up the data before using this feature as deleted data cannot be recovered. You need to make sure that only patient data and images are deleted that are no longer needed. Also consider the legal requirements in your country before using the data purging feature.

H.-No.: 1.2.3

NOTICE:

Using the "Move to destination folder" will create the following folder structure after the purging operation has processed: "[defined purge folder]/[AE Title of the studies]/[StudyUID]/[SeriesUID]/images".

10.3.1.2 Automatic purging rules by DICOM data element filters

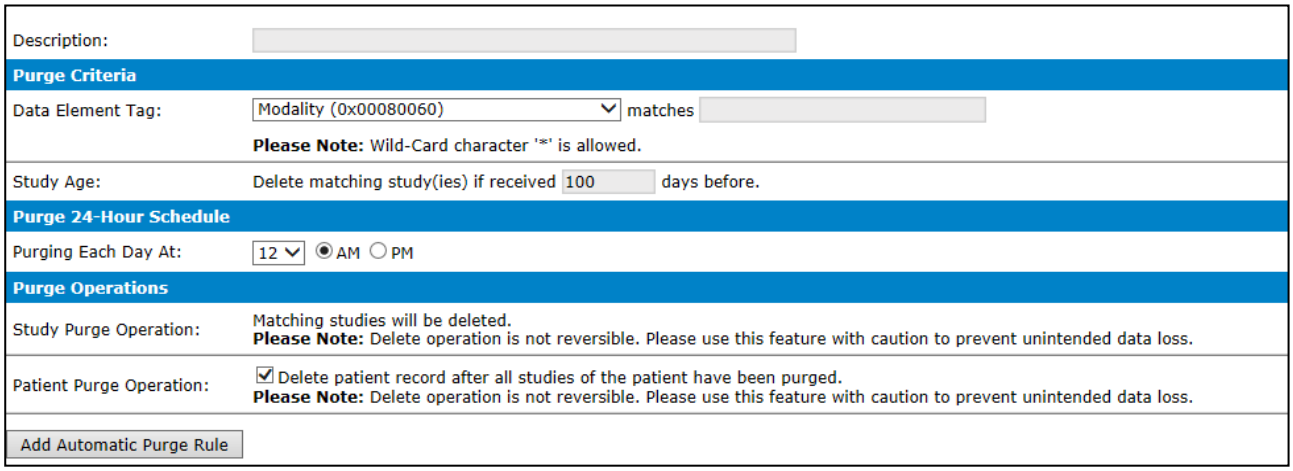


Figure 6 – Purging rules by data element filters

In addition to the general purging procedure you can also define individual DICOM data element filters with wild card patterns, so that iQ-WEB will automatically purge the matching DICOM studies based on the user-defined aging period and schedule.

- **Description**: This field contains a brief description of the defined filter pattern.
- **Data Element Tag**: This field allows the user to choose from the following DICOM tags to build a purging rules logic on:
  - Modality (0008,0060)
  - Institution Name (0008,0080)

- Referring Physician's Name (0008,0090)
- Study Description (0008,1030)
- Reading Physician's Name (0008,1060)
- Patient Name (0010,0010)

The filter patterns should be entered in the field right next to the "Data Element Tag" field. This value will be used to match against the DICOM studies stored in the iQ-WEB database. If the DICOM element contains the "^"character, it must be entered here as well. Wild card characters "*" and "?" are supported.

- **Study Age**: This field contains the age of the study. The time period is given as a number of days. iQ-WEB will purge any matching DICOM study if the study has been received prior to the defined time period. The default value is 100 days.
- **24-Hour Schedule**: The schedule when iQ-WEB should run the automatic purging by the defined DICOM data element filtering rule.
- **Patient Purge Operation**: If the checkbox is marked, the patient record in the database will be deleted if all studies of a patient have been purged.

⚠ WARNING:

Danger of data loss.

Using the purge feature will always delete images. This includes the image file and the database entry. The operation is non-reversible. You need to make sure that only patient data and images are deleted that are no longer needed or backed up otherwise. Also consider the legal requirements in your country before using the data purging feature.

H.-No.: 1.2.3

10.3.2 Database maintenance

This menu contains features that help to maintain the database of iQ-WEB.

10.3.2.1 Integrity check

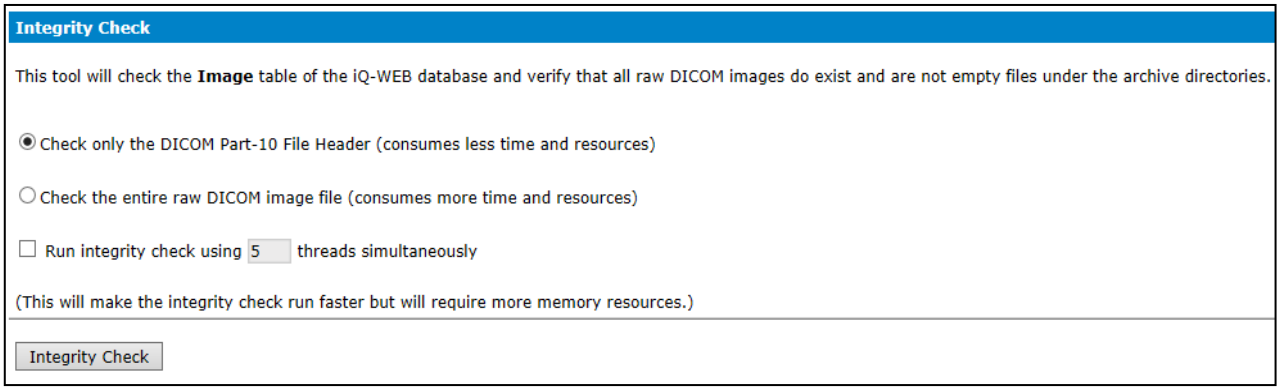


Figure 7 – Integrity check

With this feature iQ-WEB will run an internal database integrity check. It will scan the image table of the database to verify that for each record in the image table the corresponding raw DICOM image file exists and that it is not empty. iQ-WEB will report any missing, empty or

corrupt raw DICOM image file found by the integrity check. This option might be useful to validate the DICOM data before and after a migration or an upgrade process.

The following options allow users to customize the check procedure:

- **Check only the DICOM Part-10 File Header**: This option will only validate the header information of the DICOM files which makes the check less time consuming.
- **Check the entire raw DICOM image file**: This option will check that the image files exist and are not empty or unreadable. This takes more time than just checking the header information
- **Using multiple threads**: This option will increase the speed of the integrity check by using multiple threads simultaneously.

10.3.2.2 Delete all patient/image data

Using this feature will delete all patients in the archive and, as a result, all patient-related data and images will be lost.

⚠ WARNING:

Danger of data loss.

Be sure to back up the data before using this feature as deleted data cannot be recovered. You need to make sure that you only use this feature if none of the patient data and images are needed anymore. Also consider the legal requirements in your country before using this deletion option.

H.-No.: 1.2.3

10.3.2.3 Delete database jobs

This functionality allows the administrator to delete all completed, failed and pending job entries listed at the job page of iQ-WEB.

NOTICE:

All jobs that are deleted may not be triggered again and reoccur. The user may reschedule a job again manually.

10.3.3 System

On this page, the services as well as service-related options can be managed. In addition, the station that should use the iQ-VIEW Call can be entered here.

10.3.3.1 Service maintenance

In this section, iQ-WEB provides status information and control options for all involved services of iQ-WEB.

10.3.3.1.1 Apache

Apache 2.4 is the web server that comes with the installation of iQ-WEB and is responsible for the presentation of iQ-WEB via the web. For the client/server communication, the PHP 7.2 module is used.

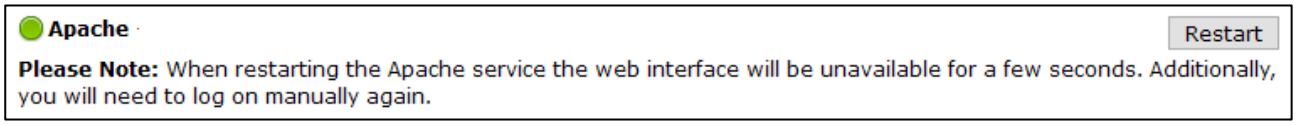


Figure 8 – Apache service

This page contains a detailed overview about the current PHP settings, loaded extensions and their configuration.

- **Restart**: Using this button will restart the Apache web service. This may be necessary if the configuration in the "httpd.conf" or "php.ini" has been changed.

NOTICE:
If there are errors in the "httpd.conf" or "php.ini" file, the service will not be able to start, and the configuration files must be edited. See chapter 9 for their location.

NOTICE:
The web interface will be unavailable during the restart process. In addition, a manual login may be required.

10.3.3.1.2 iQ-WEB

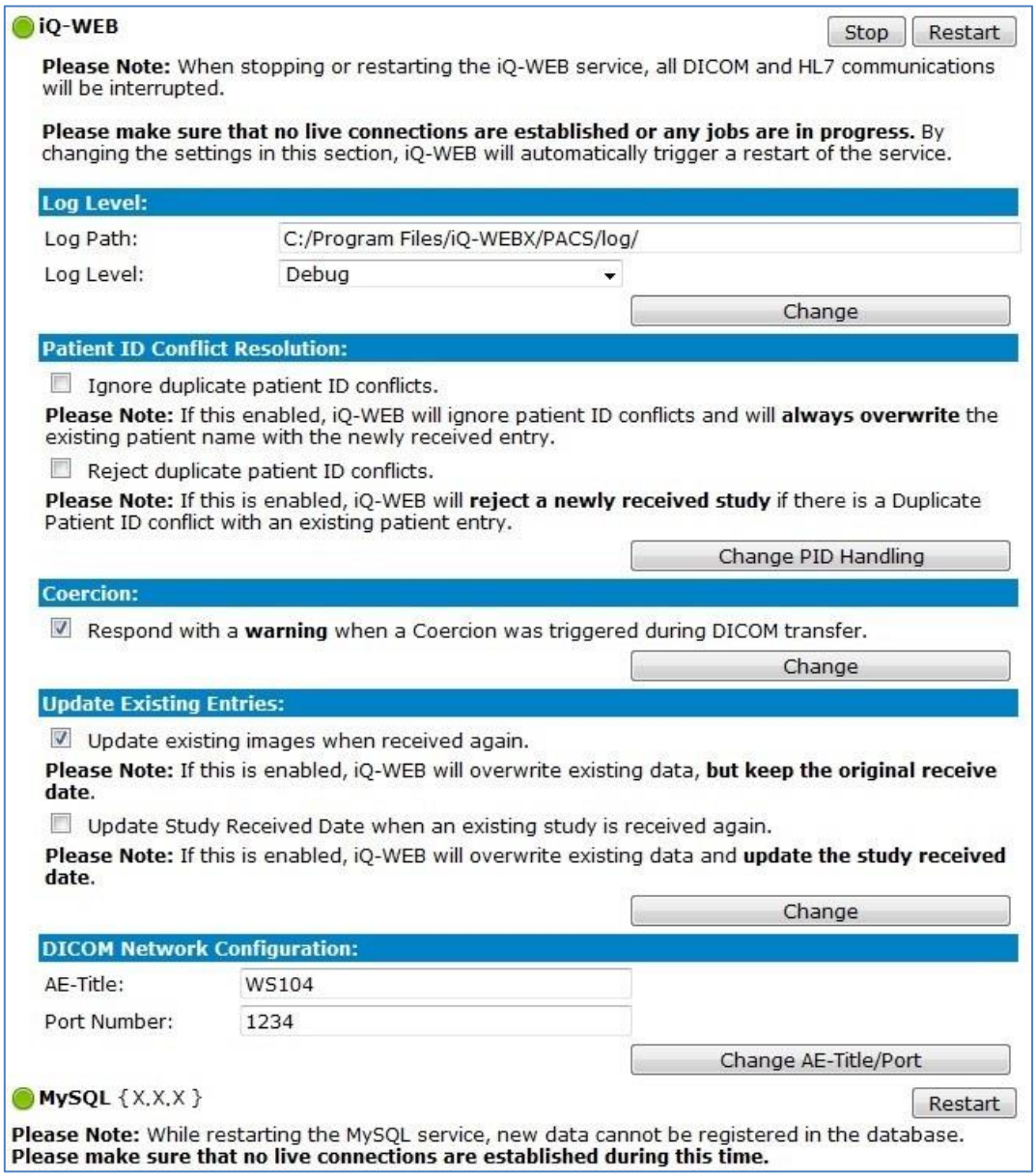


Figure 9 – iQ-WEB service maintenance

The iQ-WEB core is responsible for the DICOM functionality and provides the files for the web interface.

- **Restart**: Using this button will restart the iQ-WEB service.
- **Start/Stop**: Using this button will start or stop the iQ-WEB service. This might be necessary if one of the listed configuration options was changed manually or if there are performance issues.

⚠ WARNING:

Danger of delayed diagnosis due to application unavailability.

During the restart process of the iQ-WEB service and while it is stopped, no DICOM connections or communication can occur. It will not be possible to send patient data to iQ-WEB

or to retrieve data to be used at other stations. Make sure that no urgent jobs need to be performed. Pending jobs will be continued after the restart.

H.-No.: 1.1.2, 1.1.3

- **Log Path**: This specifies the path, where iQ-WEB is storing the DICOM communication log files. By default the location is set to "…\[iQ-WEB installation folder]\PACS\log\" (e.g. "C:\Program Files (x86)\iQ-WEBX\PACS\log\"). This Path can be changed if necessary.

NOTICE:

It is mandatory that the specified path exists and that iQ-WEB has full writing permission in that folder. Otherwise this may lead to errors.

- **Log Level**: By default the log level is set to "Information". Changing it to "Debug" will increase the amount information that will be written into the log file.

⚠ WARNING:

Danger of delayed diagnosis due to application unavailability.
Changing the log level will restart the iQ-WEB service with all its effects. During the restart process of the iQ-WEB service and while it is stopped, no DICOM connections or communication can occur. It will not be possible to send patient data to iQ-WEB or to retrieve data to be used at other stations. Make sure that no urgent jobs need to be performed. Refer to "Start/Stop" section in this section for more information.

H.-No.: 1.1.2, 1.1.3

NOTICE:

It is recommended that the log level be set to "debug" for troubleshooting purposes only due to the fact that the log file will increase in size very fast.

- **Patient ID Conflict Resolution**: By default, if a duplicate patient ID is entered to the iQ-WEB database, it will be tagged with an additional string that contains the Source AE title and a date/time stamp when the study was received. It is also possible to either ignore the duplicate entry, so iQ-WEB will always overwrite the existing patient, or to reject the duplicate entry. In this case, iQ-WEB will reject a newly received study if there is already a study with this patient ID.
  Standard duplicate patient ID resolution is described in iQ-WEB Instructions for Use.
- **Coercion**: Enabling this option will make iQ-WEB respond with a warning if coercion was triggered. Coercion mechanism is described in iQ-WEB Instructions for Use.

NOTICE:

Be aware that certain DICOM applications may abort any communication if there is a warning during the communication.

- **Update Existing Entries**: In this section, overwriting existing studies can be configured if the same study arrives again. Furthermore, updating the study receive date every time the same study is received can be enabled. This is a default behavior of iQ-WEB to ensure that report and post processing workflows are applicable.

- **DICOM Network Configuration**: In this section, the DICOM AE titles as well as the DICOM port of iQ-WEB can be altered. iQ-WEB also protocols changes to AE titles to be able to undo them.

10.3.3.1.3 MySQL

The MySQL database server stores information for iQ-WEB, such as configurations, jobs, user settings, DICOM information, but not the DICOM files itself.

- **Restart**: Using this button will restart the MySQL service. This is necessary if the configuration file "my.ini" has been changed.

NOTICE:

iQ-WEB is able to obtain information from and control a MySQL service instance only if it is installed on the same machine as the Apache and iQ-WEB service.

⚠ WARNING:

Danger of delayed diagnosis due to application unavailability.
During the restart process of the MySQL service and while it is stopped, no DICOM connections or communication can occur. It will not be possible to send patient data to iQ-WEB or to retrieve data to be used at other stations. Make sure that no urgent jobs need to be performed. Pending jobs will be continued after the restart.

H.-No.: 1.1.2, 1.1.3

10.3.3.2 Configure iQ-VIEW Call stations

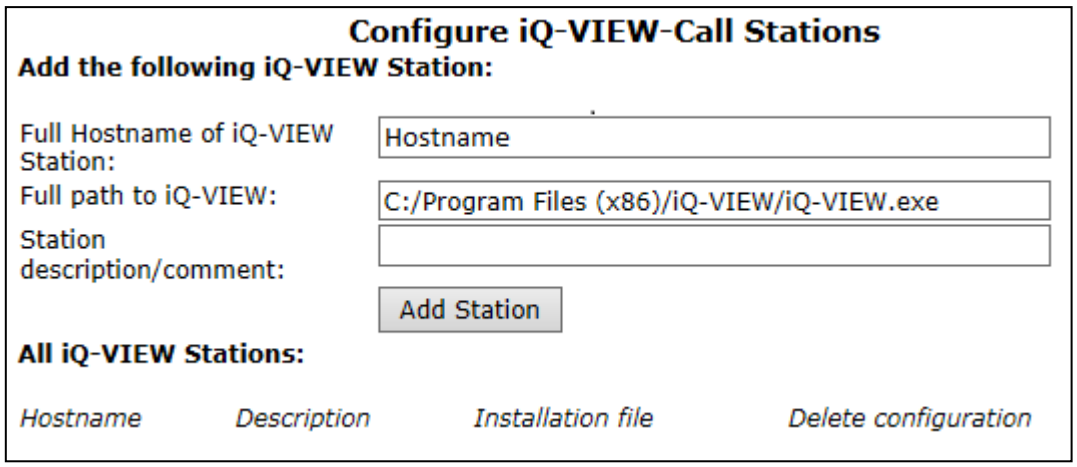


Figure 10 – Configure iQ-VIEW Call stations

This section explains how to configure workstations to use the iQ-VIEW Call feature. The following information about the station and its local iQ-VIEW installation must be entered.

- The fully qualified hostname of the client machine (e.g. "myhostname.mydomain.local")
- The installation path of iQ-VIEW(including iQ-VIEW.exe) on the client machine (e.g. "C:/Program Files (x86)/iQ-VIEW/iQ-VIEW.exe")

- A description text (e.g. "Station 1")

By default, iQ-WEB assists by pre-filling the form with values that match the current configuration of the PC where the web page is currently being accessed. It is recommended that this configuration be done directly on the client workstation where iQ-VIEW will be called and to check the validity of the prefilled values.

If the station's hostname is not already configured to work with the iQ-VIEW Call, an "Add Station" button will appear.

Clicking on the "Add Station" button will add the station to the iQ-WEB configuration and create a registration file. This file must be applied to the client workstation's registry once. iQ-WEB will display instructions of how to do this on the screen.

In the lower part of the section, all configured stations are listed with the option to download their associated installation file again. To enable the iQ-VIEW Call feature globally and take the list of iQ-VIEW Call stations into account, refer to section 10.4.2.5 "Global settings."

NOTICE:
The iQ-VIEW Call uses the accession number of a study to retrieve the images. In order to work properly, the accession number should not contain any spaces.

NOTICE:
For the iQ-VIEW Call to work, all pop-up blockers in the web browser must be disabled for the URL of iQ-WEB. The iQ-VIEW Call has been tested with Internet Explorer 10-11, Google Chrome browser on iQ-VIEW Version 2.8 and later.

10.3.4 Licensing

This section describes the licensing process for the core of iQ-WEB and all its modules. If there are questions about the various licenses, contact your local reseller or the license department of IMAGE Information System Europe GmbH at license@image-systems.biz.

10.3.4.1 iQ-WEB

The first section of the licensing page displays the core version of iQ-WEB. If a valid license is installed, the date of license installation, the expiration date, the AE titles limit and the number of currently used AE titles will be shown here.

For a description of the licensing process for iQ-WEB's core, refer to chapter 6.

10.3.4.2 WADO interface for iQ-WEB

For a description of the licensing process of the optional WADO interface, refer to chapter 6.

10.3.4.3 iQ-4VIEW

The second section of the licensing page displays the module version and the current hardware fingerprint of iQ-4VIEW. If a valid license is installed, the registered name, license type, license key, date of key creation, number of days left until expiration and the number of concurrent users will be shown here. Installing and resetting the license can be done in this section using the respective buttons.

In the appropriate textboxes, enter the registration name and the license key provided by the license team of IMAGE Information Systems Europe GmbH and click "Install license."

To manually install an iQ-4VIEW license, use the command line tool of Windows to execute the "LicGen.exe" program in the "/php/iQ-4VIEWlicgen" folder passing the "registration name" and "key" as parameter.

For example:

```
C:\iQWEB\PACS\php\iQ-4VIEW\licensing\LicGen.exe install <registration name> <key>
```

10.3.4.4 iQ-X, iQ-WEBX report editor

The third section of the licensing page displays the version of iQ-X and the current hardware fingerprint. If a valid license is installed, the registered name, license type, license key, date of key creation, number of days installed and days left until expiration will be shown here. Installing and resetting the license can be done in this section using the respective buttons.

In the appropriate textboxes, enter the registration name and the license key provided by the license team of IMAGE Information Systems Europe GmbH and click "Install license." Licenses that unlock the features of the Report Editor should be installed in this section as well.

To manually install an iQ-X license, use the command line tool of Windows to execute the "LicGen.exe" program in the "php" folder using the "register" parameter.

For example:

```
C:\iQWEB\PACS\php\LicGen.exe register
```

Using this command will open a window that displays the hardware fingerprint. In addition, the name and key given by the license department can be entered and applied here.

10.3.4.5 Order licenses/request support

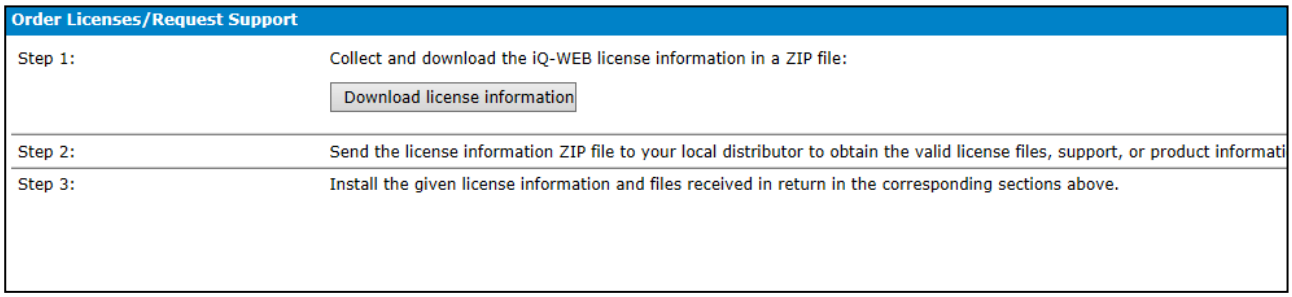


Figure 11 – License ordering

When licenses are requested, certain information is required by the license team to process those licenses for new installations, migrations, or updates. The last area of the licensing page contains information to guide the user through the ordering process. Click the "Download license information" button to create a "LicenseInfo.zip" file. Then send this zip file to your local distributor or the license department of IMAGE Information Systems Europe GmbH to obtain the desired license(s).

10.3.5 Today's log

This page displays the content of the current log file with the most recent event on top refreshing itself every 30 seconds. Using the download button will download the complete log file which is currently in use. Log entries are color coded to enhance readability.

- Black - Information log entries
- Blue - Debug log entries
- Orange - Warning log entries
- Red - Error log entries

The log level can be changed under "Tools" → "System" (see section 10.3.3.1.2). Changing the log level from standard level "Information" to "Debug" can help to find all kinds of issues that may occur during operations of iQ-WEB. The log files are stored in the folder that has been chosen during the configuration of iQ-WEB. By default the path is "[iQ-WEB installation folder]\PACS\log\[AET]".

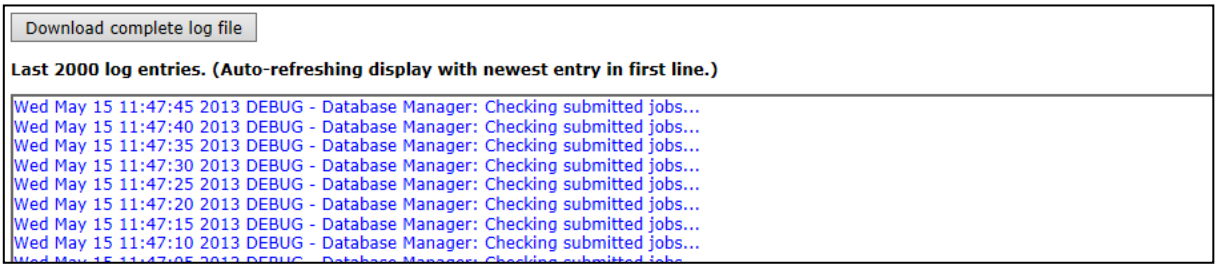
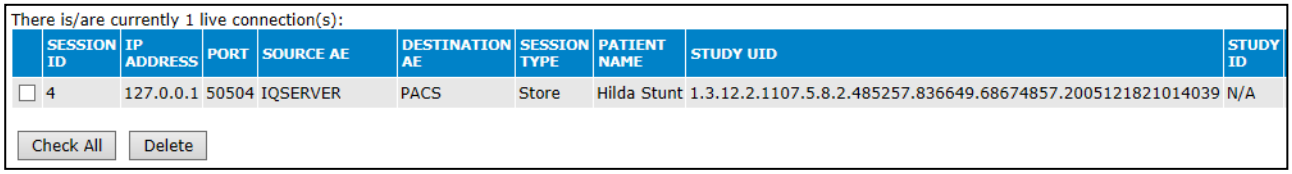


Figure 12 – Today's log

10.3.6 Live monitor

This page displays all active DICOM connections, incoming as well as outgoing. If there are active connections, it is possible to interrupt. This will instantly cancel the action and close the connection.


There is/are currently 1 live connection(s):

	SESSION ID	IP ADDRESS	PORT	SOURCE AE	DESTINATION AE	SESSION TYPE	PATIENT NAME	STUDY UID	STUDY ID
☐	4	127.0.0.1	50504	IQSERVER	PACS	Store	Hilda Stunt	1.3.12.2.1107.5.8.2.485257.836649.68674857.2005121821014039	N/A

Check All Delete

Figure 13 – Live monitor

10.4 The "Settings" menu: configuring the behavior of iQ-WEB

10.4.1 Managing user accounts in iQ-WEB

iQ-WEB comes with an extensive user management system providing user privilege management, user groups and additional administrator user management.

After the successful installation of iQ-WEB, there are already two users in the user database.

The first one is the super-user "root" which is the administrator account that was set up during the MySQL configuration. This account has every access privilege existing in iQ-WEB.

The other is the "dicom" user that has been created during the initial configuration of iQ-WEB. This account is strictly for internal use, and, therefore, it is not possible to use this account to get access to the web interface of iQ-WEB.

10.4.1.1 Privacy attributes

Medical images and reports are sensitive information that should not be accessed by unauthorized people. For that reason, iQ-WEB provides a privacy attribute mechanism to handle the access to patient/study data between different users of the system. For each patient/study the following states can be specified:

- **Public**: If a patient or a study is marked as public, all images within the studies and the corresponding patient can be accessed by any iQ-WEB user account, without requiring any privileges.
- **Private**: If a patient or a study is marked as private, all images within the studies are private as well. To get access to these images, you must either have the global "View" permission, or your last name and first name must match the Referring Physician's Name or the Reading Physician's Name of the patient/study. In addition, members of a user group will have access to private patients/studies when the group description matches the predefined value set in the user group options. Refer to section 10.4.1.4 "Creating user group accounts" for more details.

NOTICE:

The privacy state can be defined on the patient level, which is inherited by all studies of the patient, and on the study level directly. It is represented by a lock icon in the study and patient views. For a detailed description, refer to the Instructions for Use.

10.4.1.2 Creating, modifying and deleting individual user accounts

User accounts can be added, modified or deleted in the "User account" section under menu item "SETTINGS" → "Users" by using the respective buttons. When adding or modifying user accounts, the following information can be specified:

- **User Information (only visible for iQ-WEB users):**
  - "User Name": Assign a unique username (with a maximum length of 32 characters) for the person who needs access to iQ-WEB.
  - "Password": This is the password for the username mentioned above.
  - "Allow user/group to change his password": Unchecking this revokes the user's permission to change his password.

NOTICE:

If you disable this setting, the user cannot renew expired passwords by himself and will need administrative assistance. Check your password expiration settings if disabling this setting.

- **User Information (only visible for LDAP users):**
  - "First Name": First name of the user, limited to 64 characters
  - "Last Name": Last name of the user, limited to 64 characters
  - "Middle Name": Middle name of the user, limited to 64 characters
  - "Email Address": Enter the email address of the user and choose whether or not this user will receive an email notification when a new study has arrived where the user's first and last name match the defined referring physician name in the study. (For this option to work, an email server must be defined in "Settings\Email". See section 10.4.3 "Setting up an SMTP server for email" for more information.)

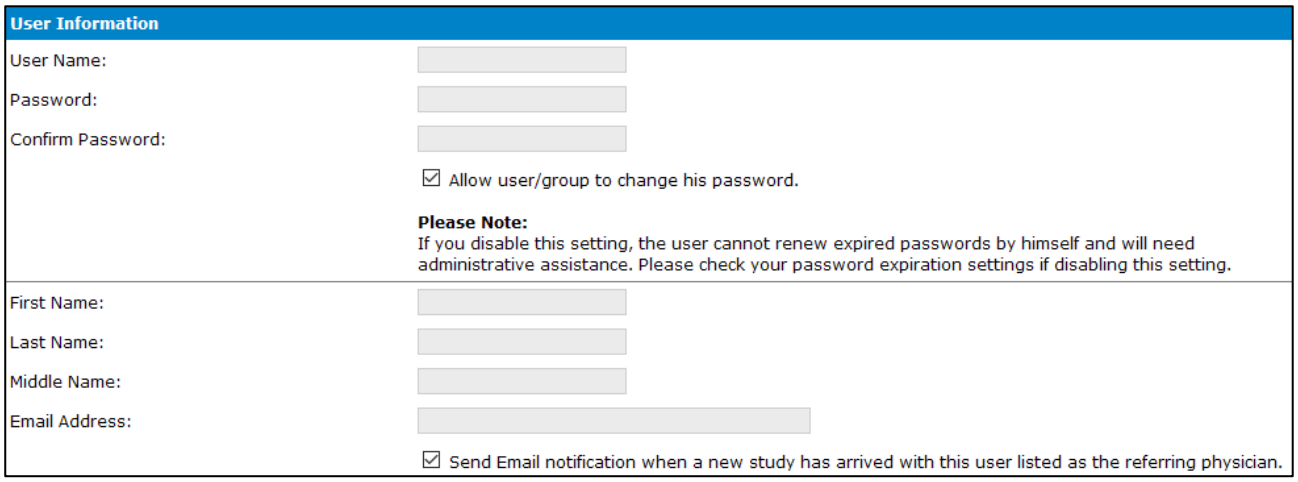


Figure 14 – User information in user accounts

- **Group Membership**: This section defines which user group(s) the user belongs to. A user can be a member of more than one user group at a time.
  - "User Group": Lists all user groups that currently exist in the system. Mark the checkboxes of all groups to which the current user shall belong.
  - "Group Administrator": Is only enabled if the current user belongs to at least one user group. Mark the checkbox if the user shall be a group administrator for all selected groups. This user will then have access to the user administration of all existing users belonging to those groups and will be able to modify the information of existing users. The group administrator will also be able to delete failed login attempts of group members.

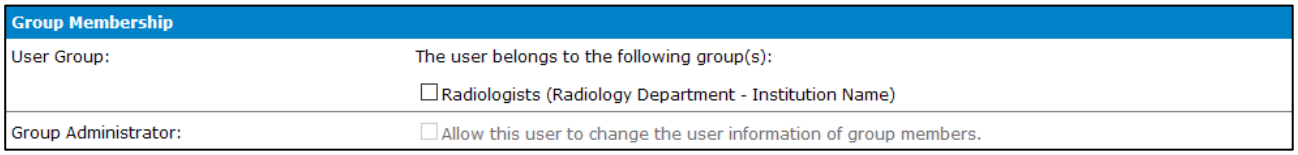
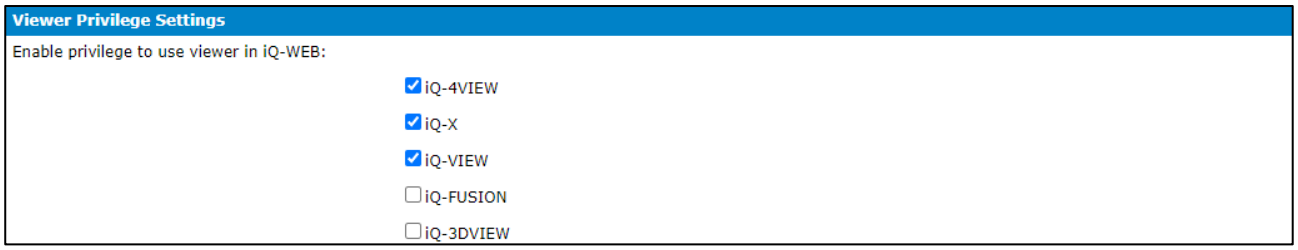


Figure 15 – User group membership in user accounts

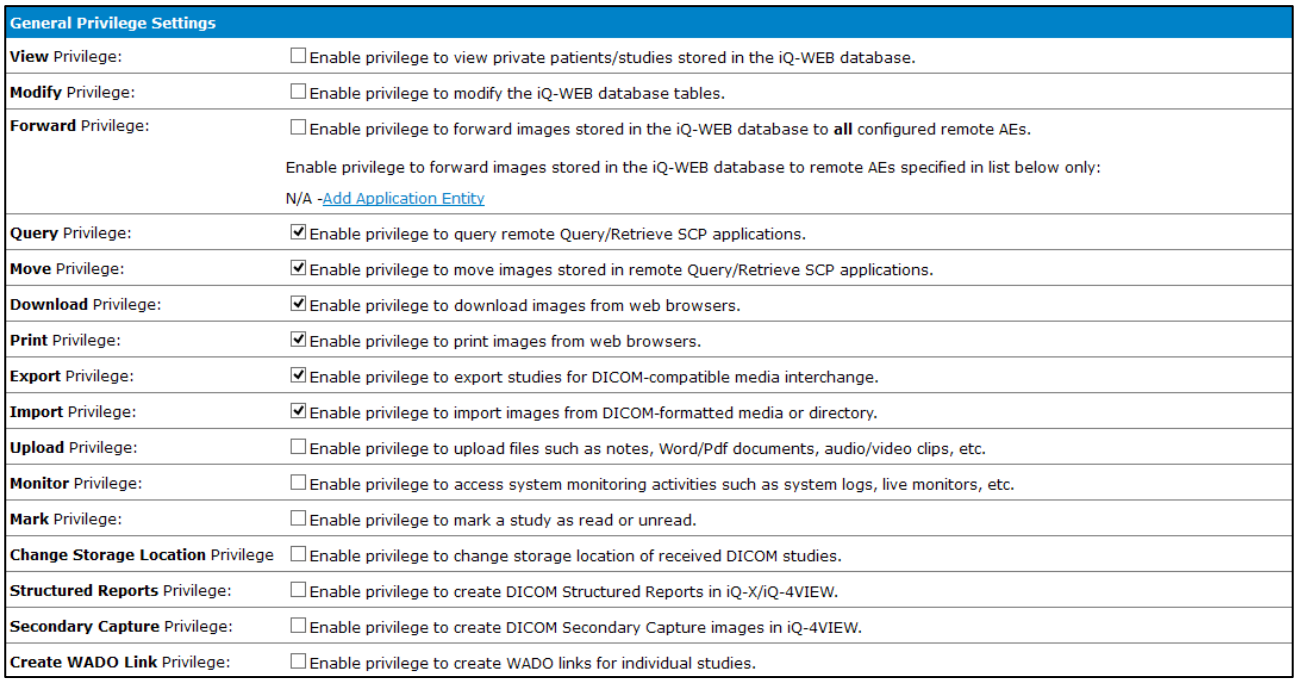
NOTICE:

Only existing groups can be chosen for user group membership.

- **Viewer Privilege Settings**: In this section you can enable privileges to use certain viewers (i.e. iQ-4VIEW, iQ-X, iQ-VIEW, iQ-FUSION and iQ-3DVIEW) in iQ-WEB.



- **General Privilege Settings**: This section defines a list of privileges users have when using iQ-WEB and its additional software options (i.e. iQ-4VIEW and iQ-X).



General Privilege Settings	
View Privilege:	☐ Enable privilege to view private patients/studies stored in the iQ-WEB database.
Modify Privilege:	☐ Enable privilege to modify the iQ-WEB database tables.
Forward Privilege:	☐ Enable privilege to forward images stored in the iQ-WEB database to **all** configured remote AEs. Enable privilege to forward images stored in the iQ-WEB database to remote AEs specified in list below only: N/A -Add Application Entity
Query Privilege:	☑ Enable privilege to query remote Query/Retrieve SCP applications.
Move Privilege:	☑ Enable privilege to move images stored in remote Query/Retrieve SCP applications.
Download Privilege:	☑ Enable privilege to download images from web browsers.
Print Privilege:	☑ Enable privilege to print images from web browsers.
Export Privilege:	☑ Enable privilege to export studies for DICOM-compatible media interchange.
Import Privilege:	☑ Enable privilege to import images from DICOM-formatted media or directory.
Upload Privilege:	☐ Enable privilege to upload files such as notes, Word/Pdf documents, audio/video clips, etc.
Monitor Privilege:	☐ Enable privilege to access system monitoring activities such as system logs, live monitors, etc.
Mark Privilege:	☐ Enable privilege to mark a study as read or unread.
Change Storage Location Privilege	☐ Enable privilege to change storage location of received DICOM studies.
Structured Reports Privilege:	☐ Enable privilege to create DICOM Structured Reports in iQ-X/iQ-4VIEW.
Secondary Capture Privilege:	☐ Enable privilege to create DICOM Secondary Capture images in iQ-4VIEW.
Create WADO Link Privilege:	☐ Enable privilege to create WADO links for individual studies.

Figure 16 – General user privileges

With the permission levels described in the table above, three categories of users can be defined:

Category	Description
Administrative users	These are the user accounts created at "Administrator Accounts" in the Settings → Users page in iQ-WEB. They have access to the same system-level configuration information as the user "root".
Power users	These are the user accounts with the "Modify" and "View" permissions enabled. Such users have access to all public and private patients/studies in the database. They can also modify and delete existing database records.
Regular users	These accounts are usually created for the referring physicians or reading physicians. They do not have the permission to "View" and only have access to the public patients/studies or the private patients/studies, who's Referring/Reading Physician Name matches the Last Name and First Name of the user profile.

For each user the following access privileges can be managed by an administrator account.

Access privilege	Description
View	Required to view private patients/studies
Modify	Required to change database attributes. This includes the ability to set the Reading Physician when using the "Assign study to" button.
Forward	Required to forward images stored in iQ-WEB to a remote AE
Query	Required to query remote Query/Retrieve SCP application entities

Access privilege	Description
Move	Required to retrieve images from remote Query/Retrieve SCP application entities
Download	Required to download iQ-WEB images from a web browser via the "Download Content" button and for downloading DICOM files of selected studies via the "Download DICOM file" button in iQ-4VIEW
Print	Required to print images on DICOM printers
Export	Required to export images stored in local iQ-WEB database to DICOM Standard Part 10 formatted directory and files with DICOMDIR directory information
Import	Required to import external DICOM formatted directory and/or raw image files into iQ-WEB database
Upload	Required to upload text files, PDF/Word documents, audio/video clips, etc. into iQ-WEB database
Monitor	Required to access system monitoring activities such as system logs, live monitors, etc.
Mark	Required to mark a study as either Read or Unread
Change Storage Location	Required to change the storage location of DICOM studies
Structured Reports	Required to create DICOM Structured Reports in iQ-X/iQ-4VIEW
Secondary Capture	Required to create secondary capture images in iQ-4VIEW
Create WADO Link	Required to create WADO links for individual studies

NOTICE:

The super-user "root" has all of the permissions mentioned in the table above and is allowed to maintain MySQL installation.

- **Advanced Privilege Settings**: In the Advanced Privilege Settings section it is also possible to grant more granular access rights to the users. This is accomplished with User Access Filters which allow user the access to patients/studies according to matching DICOM elements. This extends the standard matching mechanism of Referring and Reading Physician Name. This mechanism also allows the combination of matching DICOM elements with a standard logical conjunction.

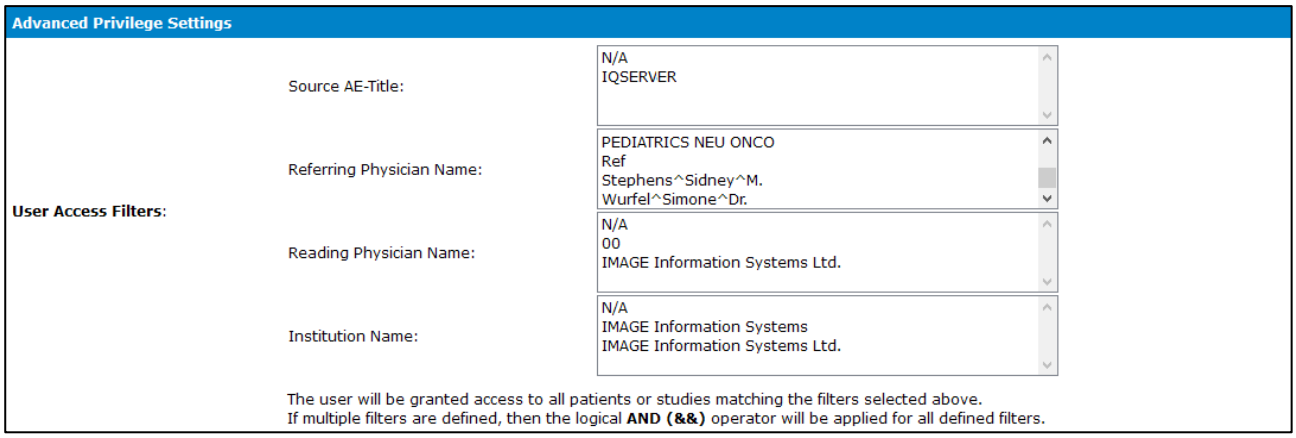


Figure 17 – Advanced user privilege settings

The following elements are supported as filtering attributes:

- "Source AE-Title"
- "Referring Physician Name"
- "Reading Physician Name"
- "Institution Name"

Using more than one filter will combine all criteria with a logical AND (&&).

NOTICE:

It is only possible to choose values for these elements that already exist in the database.

10.4.1.3 Searching for user accounts

This option is not available when using LDAP synchronization. Refer to section 10.4.1.11 for details regarding this feature.

Users can be filtered based on the following criteria:

- Username
- First Name
- Last Name
- Middle Name
- Email

When a search is performed, the system will determine if the search string is contained within the user criteria. The search results will replace the user list. If no results are returned, the list will be empty. To show all existing users again, use the "Back" link.

10.4.1.4 Creating user group accounts

User group accounts are an administrative mechanism to combine iQ-WEB user accounts and make it easier to specify view privileges for all of them at once. It can also be used as a shared user account.

User group accounts can be added, modified or deleted in the "User Group Accounts" section under menu item "SETTINGS" → "Users".

User group accounts are set up like a normal user account, but there are three additional options: Group Description, Group Share and Substring Group Matching.

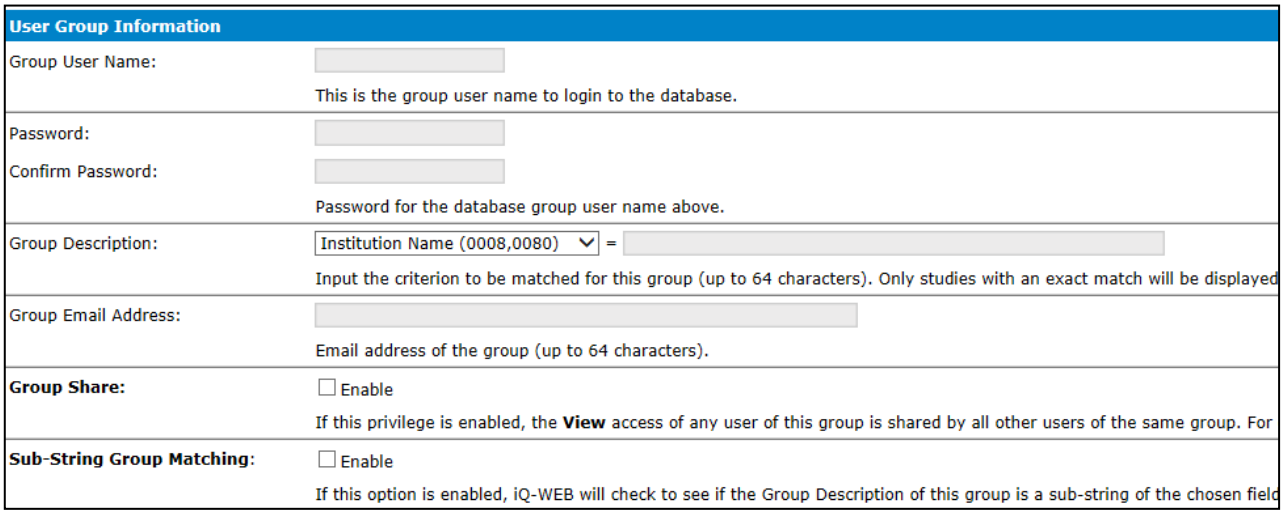


Figure 18 – User group settings

- **Group Description**: This option allows a DICOM attribute to be chosen and a value defined. Every user in the group has access to patients or studies where the defined value matches the value of the DICOM attribute of the patient/study exactly.
  The currently supported DICOM attributes are:
  - "Institution Name (0008,0080)"
  - "Patient ID (0010,0020)"
  - "Other Patient ID (0010,1000)"
  - "Patient Comments (0010,4000)"
  - "Accession Number (0008,0050)"
  - "Source AE (0002,0016)"
  - "Study Description (0008,1030)"
- **Group Share**: If this option is enabled, the "View" access of any user in this group is being shared with all other users of this group. iQ-WEB will check all members of the group to determine whether users of the group can access that private patient/study. If a user of this group has a matching last name/first name with either the Referring or the Reading Physician of a private patient/study, and Group Share is enabled for the group of that user, then all other users of this group will have access to the same private patient/study.
- **Substring Group Matching**: If this option is enabled, iQ-WEB will check whether the value entered in Group Description is a substring of the chosen DICOM attribute of the patient/study, instead of using an "exact-matching" method to allow access to a private patient/study.

10.4.1.5 Creating administrator accounts

Administrators have every access privilege that can be given individually to normal users. In addition, they have the ability to add or modify user accounts. Furthermore, there are functions in iQ-WEB that can only be used and set up by administrator accounts like "Automatic Purging" or the options on the "DICOM" page.

Such accounts can be added, modified or deleted in the "Administrator Accounts" section under menu item "SETTINGS" → "Users".

10.4.1.6 Configuring the behavior for failed login attempts

This option is not available when using LDAP synchronization. Refer to section 10.4.1.11 for details regarding this feature.

Under menu item "SETTINGS" → "Users", the behavior following failed login attempts can be configured in section "Failed Login Attempts".

iQ-WEB records all failed login attempts either caused by using a wrong username or a wrong password. The attempts will be listed in this section. Additionally, the amount of failed attempts will be shown as well as the option to reset/delete the records of failed attempts. After a configured number of failed attempts in a specified time, iQ-WEB will block the user from logging into iQ-WEB (see section 10.4.2.5 "Global settings"). This is a security mechanism to prevent automated intrusion attempts.

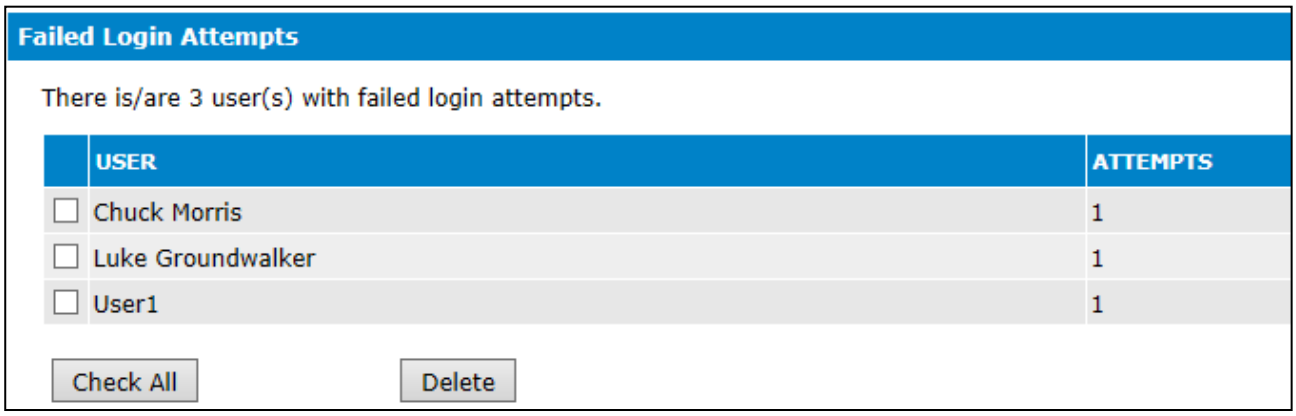


Figure 19 – Failed login attempts

NOTICE:

It is possible to reset the login attempts manually by deleting the respective files under "[iQ-WEB installation folder]\PACS\FailedLogin" (default installation path). To do so, access to the file system with appropriate permissions is needed.

10.4.1.7 Handling user account creation requests

This option is not available when using LDAP synchronization. Refer to section 10.4.1.11 for details regarding this feature.

Users, who wish to access iQ-WEB but do not yet have a user account, can request the creation of such an account by using the "Request account" link on the login page. When such a request is submitted, it will appear under menu item "SETTINGS" → "Users" in the section "User Account Creation Requests".

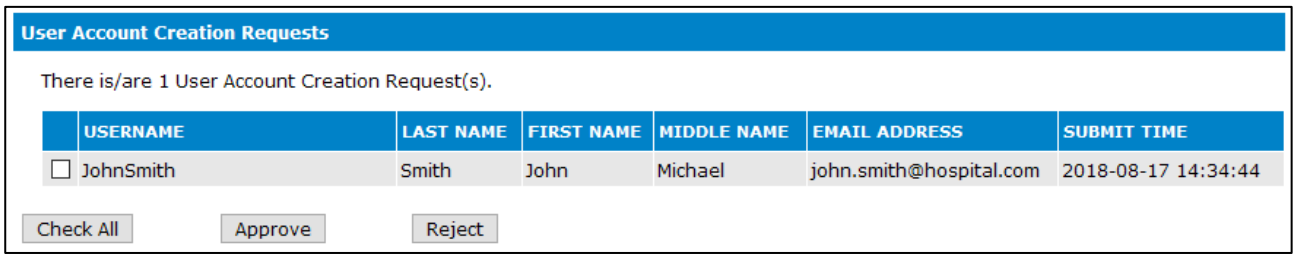


Figure 20 – User account creation requests

The table shows the new requests that were not yet handled.

- **Check All**: Allows you to select all requests at once in order to approve or reject them.
- **Approve**: All currently selected requests are approved. User accounts are created on the basis of the submitted data. The users receive an email notification and can then access iQ-WEB with the submitted user credentials. The requests are deleted from the table.

NOTICE:

iQ-WEB will create a user account with the personal information provided in the request. This account will have no privileges. In order to set the privileges needed for the user or to add the user to a specific user group, you need to configure the user account accordingly. Refer to section 10.4.1.2 for further details.

- **Reject**: All currently selected requests are rejected. The users receive an email notification. The requests are deleted from the table.

10.4.1.8 Upgrading existing database users

This option is not available when using LDAP synchronization. Refer to section 10.4.1.11 for details regarding this feature.

Go to menu item "SETTINGS" → "Users" into section "Upgrade Existing Database User" in order to upgrade user accounts that can only be found in the MySQL database but have no access to the iQ-WEB web interface.

This feature allows administrators to take existing MySQL user accounts, which may exist because of an incorrectly performed upgrade or due to a manipulation of the database, and make them available in iQ-WEB.

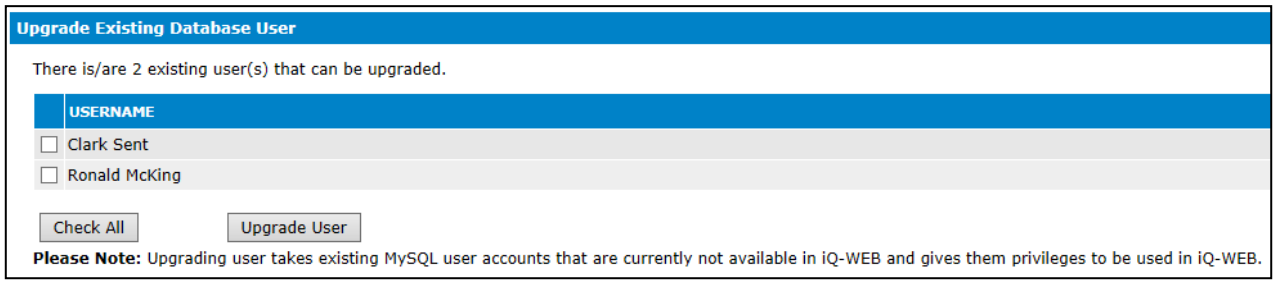


Figure 21 – Upgrade user

Select the user account you wish to upgrade by marking the checkbox in front of the entry and click "Upgrade User". You can use the "Check All" button to perform the upgrade for all found user accounts.

10.4.1.9 Regenerating existing iQ-WEB users

This option is not available when using LDAP synchronization. Refer to section 10.4.1.11 for details regarding this feature.

With this feature, administrators are able to update the database access privileges of existing iQ-WEB users. This might be necessary, because some users originate from old iQ-WEB installations. In that case, they have no access to new database tables or columns and will not be able to use the complete functionality of iQ-WEB.

Under menu item "SETTINGS" → "Users", go to section "Regenerate Existing iQ-WEB User". Click the button "Regenerate All Users Privileges" to get a list of all iQ-WEB users. Select the user whose privileges need to be regenerated and click "Regenerate Privileges". Use the "Check All" button to perform the action on all users.

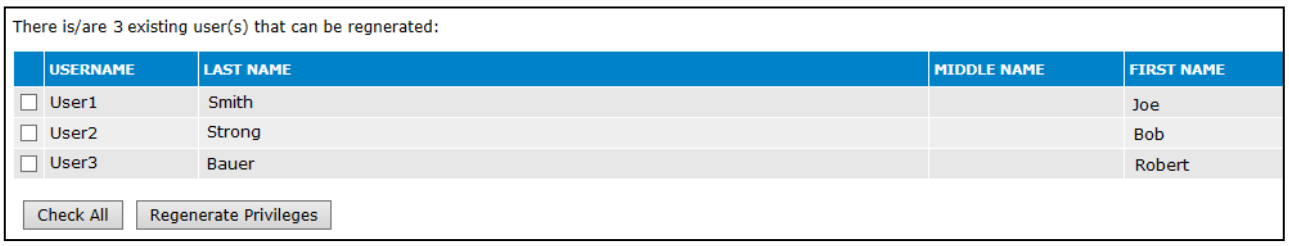


Figure 22 – Regenerate user

10.4.1.10 Set default viewer mode for existing users

iQ-WEB is able to launch different viewers from its web interface, each focusing the needs of different user groups. This feature allows to change the viewer launched for an existing selected user or all existing users. Newly added users will always have the system-wide default value of "browser dependent".

Go to menu item "SETTINGS" → "Users" into section "Set Default Viewer Mode For Existing Users" for a global viewer mode setting.

The available options are:

- **Browser dependent**: Launches iQ-X on Internet Explorer and iQ-4VIEW on all other web browsers
- **iQ-4VIEW**: Always launches iQ-4VIEW
- **iQ-VIEW**: Calls a local iQ-VIEW to receive and display the selected images/studies

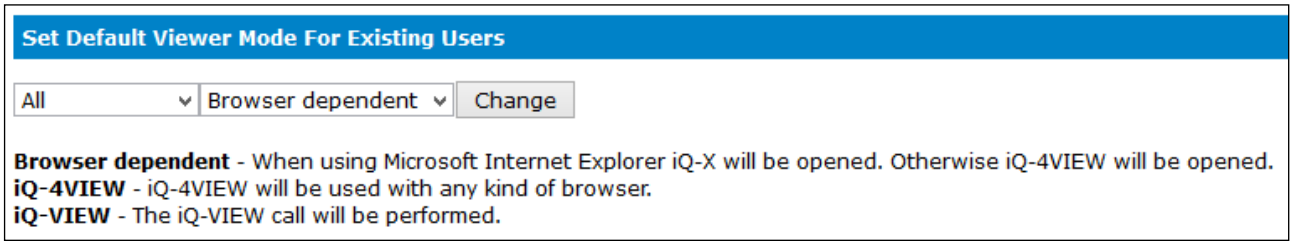


Figure 23 – Default viewer mode for existing users

NOTICE:

Use this feature with great caution, to avoid inaccessible viewers:
The viewer launch still depends on valid licensing for the selected module.
Setting the same viewer for all users is appropriate in special situations only.
The iQ-VIEW option exclusively works for users with configured iQ-VIEW Call and located at a machine with a working iQ-VIEW instance.

10.4.1.11 Integrating the iQ-WEB user account management with a remote LDAP server

If enabled on the configuration page (see Section "System Configuration"), the iQ-WEB server can also integrate with a remote LDAP server and synchronize with all user accounts within the defined user base DN from the LDAP server, so that these users can also access the iQ-WEB interface without a second set of user authentication (user name and password).

To deactivate the LDAP function at any time at a later date, remove the checkmark of the box for "Use LDAP server for user authentication" in the LDAP server settings section.

You find this option under menu item "SETTINGS" → "System". Then go to section "Security".

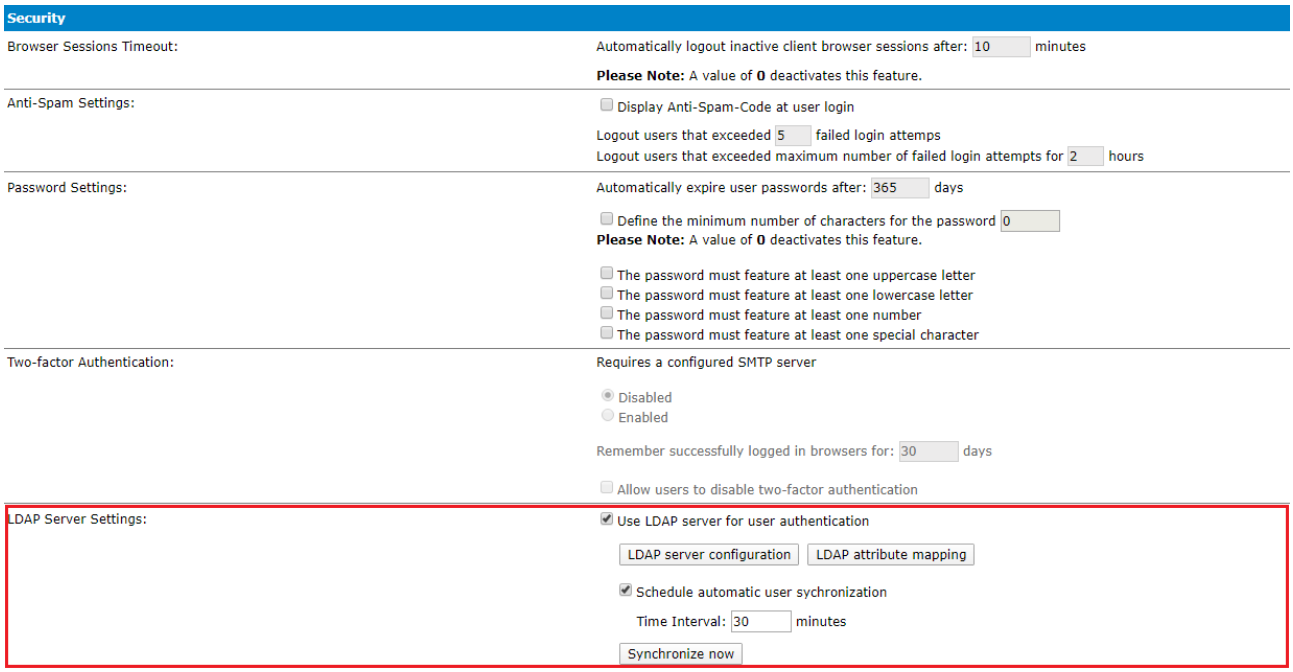


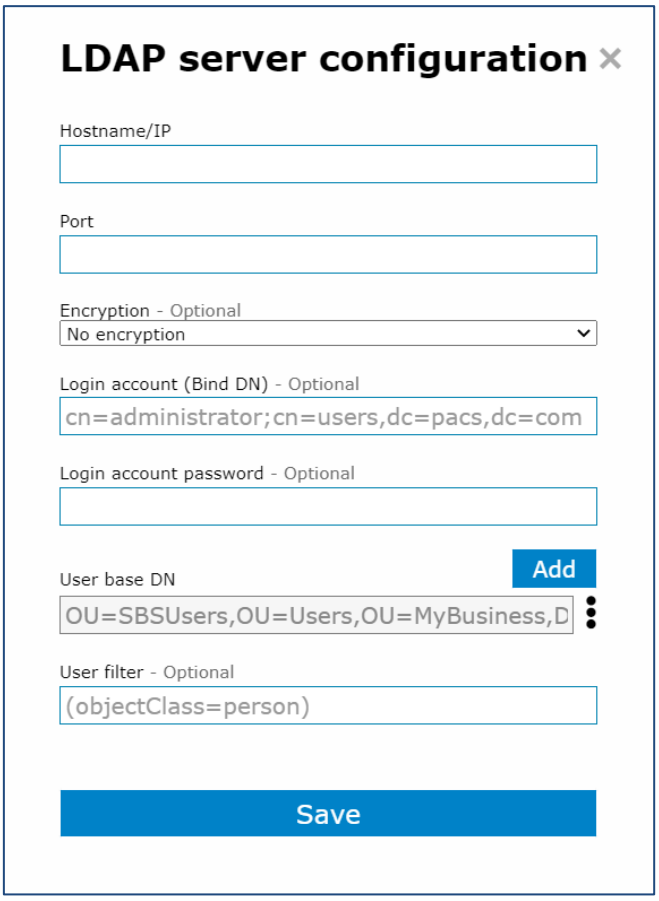
Figure 24 – Setting up LDAP for user authentication

By default, the LDAP server setting is disabled. Select "Use LDAP server for user authentication" to enable it. Then click the button "LDAP server configuration" to enter the hostname or IP address of the LDAP server in your network and its port. The entry fields "Login account (Bind DN)" and "Login account password" are optional in order to use "anonymous bind".

NOTICE:

Not all LDAP servers support "anonymous bind". Some LDAP servers must explicitly be configured to allow this feature.

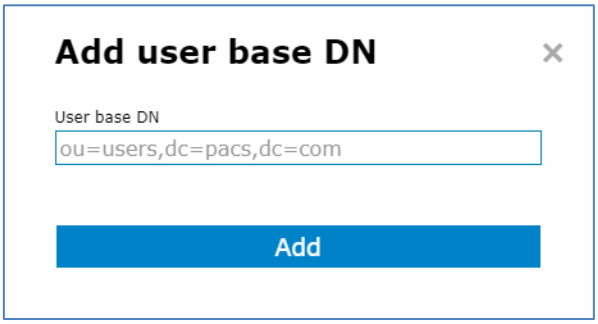
Fill in all required (non-optional) fields of the dialog as described below. Afterwards, click "Save" at the bottom of the LDAP server configuration window.



LDAP server configuration

The "Hostname/IP" and "Port" fields must be filled in as on the "System" page. The LDAP interface supports a secure user synchronization and authentication using SSL/TLS. To activate the encryption, select a method (SSL, STARTTLS) from the "Encryption" drop-down menu.

Enter all other missing details as described in the entry fields of the dialog.
Multiple user base DNs (Distinguished Names) can be configured. Click the "Add" button to add a user base DN. Each DN represents the parent node in the LDAP tree under which user accounts are expected.



Add user base DN

User filters can be used to limit the LDAP objects that are synchronized. Typical filters are:

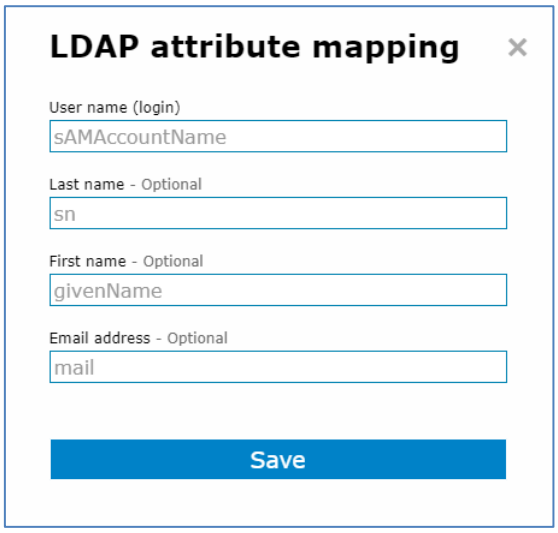
- (objectClass=user)

- (objectClass=person)
- (|(objectClass=person)(objectClass=user))

NOTICE:

*Some LDAP servers, e.g. Microsoft Active Directory or Apache DS, do not support "Extensible matching" (matching of parts of the DN of a LDAP object). A filter like "(&(objectClass=user)(cn=*Marketing*))" will result in 0 matches if the feature is not supported.*

As a next step you need to fill out the LDAP attribute mapping dialog. Click the button "LDAP attribute mapping" and fill in all required (non-optional) fields as described below. Afterwards, click "Save".



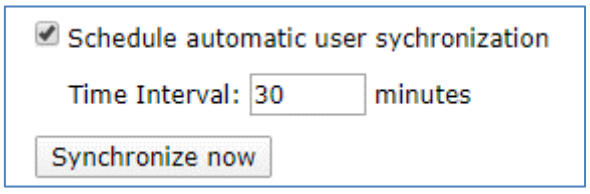
LDAP attribute mapping

In the LDAP attribute mapping dialog you need to enter the matching parameters. Use the parameter as it is defined on your LDAP server, e.g. "Last name" as "sn" or "First name" as "givenName". Afterwards, click the "Save" button.

In order to enable the automatic user synchronization, select "Schedule automatic user synchronization" and define a time interval below.

NOTICE:

All synchronization information and errors are logged to "[iQ-WEB-installfolder]\PACS\log\ldap.log".



Click the "Synchronize now" button to immediately start the user account synchronization between iQ-WEB and the configured LDAP server. You will be notified if the synchronization process was successful or not.

Once the synchronization is complete, the "Users" page will show a list of all available user accounts. You can now configure the privilege settings for every synchronized user account. See section 10.4.1.2 for details on modifying accounts.

NOTICE:

Whenever you enable or disable the options "Use LDAP server for user authentication" or "Schedule automatic user synchronization" in the LDAP server settings, you must click the "Modify Configuration" button at the bottom of the page. Otherwise, the change of settings will not be saved and users may not be able to login.

10.4.2 Configuring global system settings

Under the menu item "SETTINGS", the "System" page allows you to define the global settings for the iQ-WEB server. For easier orientation, the configuration options are sorted by topic.

10.4.2.1 Storage

iQ-WEB stores DICOM data as it is received into folder structures and registers the data into the database. The following storage settings are global and can be overwritten by specific DICOM node configurations. For more details refer to section 10.5.1 "DICOM".

- **Default Short-Term Archive Directory**: This is the directory where all the images received will be stored unless a specific short-term archive directory has been defined for a source AE.

NOTICE:

Paths entered must be accessible by the iQ-WEB server system. A mapped drive or UNC path may be used here. Make sure that the Windows user for both the Apache and the iQ-WEBX service have the required permissions to access and read/write in the directory.

- **Default Long-Term Archive Directory**: This is the location where all images will be moved if automatic aging is configured and executed unless a specific long-term archive directory has been defined for a source AE.
- **Default Archive Directory Format**: This option controls the hierarchy under the designated archive directory.
  - "Flat": Received images are stored under %assigned directory%/YYYY-MM-DD-WEEKDAY/[sub-folders]
  - "Hierarchical": Received images are stored under %assigned directory%/YYYY/MM/DD/WEEKDAY/[sub-folders]
  - "By Study Instance UID": Received images are stored under %assigned directory%/%StudyInstanceUID%/[sub-folders]

NOTICE:

Using the Study Instance UID for folder naming may exceed the 256 characters restriction for Windows filenames very fast since a Study Instance UID already uses 64 characters. The character limitation can be avoided by using UNC paths which can contain 32767 characters on an NTFS formatted system.

NOTICE:

Choose a storage system with the appropriate capacity and read/write performance for the intended use case. The actual amount of storage capacity needed depends on many factors. To determine the appropriate size of the storage system, visit http://www.pacscalculator.com/

10.4.2.2 Automatic aging

Automatic aging is a feature that is intended to help separating most recently stored DICOM data from data which is older. To achieve this, automatic aging moves images form the short-term archive to the defined long-term archive. To enable this feature, enter the amount of days and setup a schedule by defining a weekday and a time. iQ-WEB will move images that were received more than the specified number of days ago according to the schedule given.

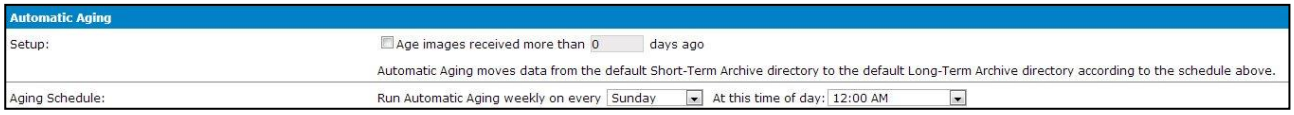


Figure 25 – Automatic aging setup

NOTICE:

iQ-WEB will use the hierarchical directory format for long term archive if the archive directory format is set to Study Instance UID.

Examples:

- **Flat**: On 01/25/2013 all images should be moved to the directory "C:/longterm". There are images that were received on 01/20/2013. During the automatic aging process the images will be moved to the directory "C:/longterm/2013-01-25/2013-01-20/[images]".
- **Hierarchical**: On 01/25/2013 all images should be moved to the directory "C:/longterm". There are images that were received on 01/20/2013. During the automatic aging process the images will be moved to the directory "C:/longterm/2013/01/25/2013/01/20/[images]".
- **By Study Instance UID**: On 02/20/2013 all images should be moved to the directory "C:/longterm". There are images that were received on 01/20/2013. During the automatic aging process the images will be moved to the directory "C:/longterm/2013/02/20/[Study Instance UID]/[images]".

NOTICE:

iQ-WEB uses the "Date modified" value of the Windows file system as reference. This means that every modification of the study, like adding an SR or editing the patient name, will change the value and in result change the time when the study will be aged.

10.4.2.3 Security

This section includes information regarding global security settings.

- **Browser Session Timeout**: This value defines the time that must pass before an inactive browser session on a client machine will be logged out. This is a security feature designed to prevent unintended access to iQ-WEB and its data on a publically available client machine.

NOTICE:
A value of 0 deactivates this feature.

- **Anti-Spam Settings**: You can configure the following settings to prevent outside web bots from spamming the server with automated login attempts.
  - "Display Anti-Spam Code":
    If this setting is enabled an anti-spam security code contained in an image will be generated for each user login. Users must enter this anti-spam code, as well as their password, to log into the system.
    (In previous versions, this function could be modified by using the "antispam.code" file in the "[iQ-WEB installation folder]/PACS/" subfolder of iQ-WEB.)
  - "Maximum login attempts":
    Users will have a defined maximum number of login attempts until they must wait a specified amount of time for their next login.
  - "Waiting time until next login":
    Users that exceeded the maximum number of failed login attempts will have to wait the specified number of hours until they are allowed to login again or an administrator resets their failed login attempts.
- **Password Settings**: You can configure the following settings related to the password security. Available options are:
  - Automatically expire the user password after X days, default 365 days
  - Minimum number of characters for the password, default 8 characters
  - Password must feature at least one uppercase letter
  - Password must feature at least one lowercase letter
  - Password must feature at least one number
  - Password must feature at least one special character

NOTICE:
In compliance with the recommendations of the German Federal Office for Information Security (BSI; https://www.bsi.bund.de/EN/Home/home_node.html), passwords require, by default, a minimum number of 8 characters and will expire after 365 days.

- **Two-factor Authentication**: In order to enhance the system security, improve data protection and protect user accounts from unauthorized access to the PACS by third persons, iQ-WEB offers a two-factor authentication, which can be enabled/disabled by using the appropriate radio button. If this additional security feature is enabled, users will have to authorize access to iQ-WEB with every new browser that they use to log into the web interface. To do so, they will receive a verification code to their email address, which they have to enter within 10 minutes.
  - "Disabled" radio button: Disables the use of the two-factor authentication

- "Enabled" radio button: Enables the use of the two-factor authentication
- "Remember successfully logged in browsers for" a specified number of days: Defines how many days the login after entering a verification code will be valid in a specific browser before a new verification will be requested. Default is 30 days.
- "Allow users to disable two-factor authentication" checkbox: If enabled, the users are allowed to disable this security feature for their own user account on the "Profile" page.

NOTICE:
Make sure to add a valid email address for every user in their user account in order to fully use the two-factor authentication. If there are no email addresses stored in the user accounts (yet), users will be able to access iQ-WEB without a verification code.

- **LDAP Server settings**: Use LDAP server for user authentication: You can decide whether to set up the individual users in iQ-WEB or to synchronize users with an LDAP server. Refer to section 10.4.1.11 for details.

10.4.2.4 Administrative

This section includes information regarding settings addressing especially the administrator.

- **Administrator's Email Address**: Here you can specify one or more email addresses, e.g. the email of the PACS administrator. Email addresses must be separated by a comma, a semicolon or a space to be recognized properly. All system-generated emails, including reports, notifications etc. will be delivered to these email addresses.

NOTICE:
For all email related features, an SMTP server must be configured to send emails. Refer to section 10.4.3 "Setting up an SMTP server for email" for information on how to set up an SMTP server.

- **Statistic Report Emails**: Administrators can subscribe to the following automatically generated statistics sent to the administrator's email address. These reports contain statistic information about received studies in a period of time.
  - Daily statistical report emails
  - Weekly statistical report emails
  - Monthly statistical report emails
  - Monthly journal report emails
- **PHP Runtime Executable**: In this field, the full path of the PHP executable must be entered. By default, the path is "[iQ-WEB installation folder]/PHP/php.exe".
- **Thumbnail Directory**: This path defines the directory for storing converted thumbnail JPEG/GIF images. iQ-WEB will automatically add a "thumbnails" sub-folder to the entered directory. By default, the path is "[iQ-WEB installation folder]/PACS/php".
- **Web Images**: This path defines the directory for storing converted JPEG/GIF web images. iQ-WEB will automatically add an "images" sub-folder to the entered directory. By default, the path is "[iQ-WEB installation folder]/PACS/php".

NOTICE:

Paths entered must be accessible by the iQ-WEB server system. A mapped drive or UNC path may be used here. Make sure that the Windows user for both the Apache and the iQ-WEBX service have the required permissions to access and read/write in the directories.

10.4.2.5 Global settings

This section includes information regarding global settings such as notification, workflow, date/time, and language/character set.

- **Notifications**: You can enable an email notification system that sends an email to registered user's email address about any failed job submitted by that user.
- **Date and Time Formats**: You can switch between the global display format of the date and time:
  - United States format (YYYY-MM-DD HH:MM:SS)
  - European format (DD.MM.YYYY HH:MM:SS)
- **Workflow**: You can configure the following global settings that will influence the user's workflow of iQ-WEB in this section.
  - "Bypass series level and display all images of a study directly"
    This setting disables the series level view when navigating from study level view to the image level view.
  - "Enable automatic conversion of received DICOM images into thumbnail/full-size JPEG/GIF images"
    By default iQ-WEB generates thumbnail/full-size JPEG/GIF images on demand if they are necessary for the web interface display. The setting switches this behavior so that iQ-WEB automatically generates thumbnails when receiving new DICOM data, whether they will actually be needed or not.
  - "Automatically mark studies or patients as read when opening in a viewer"
    iQ-WEB allows to setup a workflow where opening a study in a viewer will mark the study as read to track progress.
  - "Enable Philips ISP call on EasyWEB page"
    This option allows a connection to the Philip's IntelliSpace Portal, if available. Contact support@image-systems.biz for further details.
  - "Limit the displayed studies on EasyWEB page to"
    This options allows to define how many studies the EasyWEB page shall show after logging in. Limiting the number of displayed studies will help speeding up the login process. When set to "0", users initially see a blank EasyWEB page. This may also be used as a security feature, e.g. if the user uses iQ-WEB to show patients their images and want to make sure that they do not accidentally see information of other patients.
    If users want to see more studies than the automatically set number, they must enter search criteria to display more. In previous versions, this function only set a blank page and was modified by using the "easyWebpage.code" file in the "[iQ-WEB installation folder]/PACS/" subfolder of iQ-WEB.
- **Convert received DICOM Video into Web Video Format**: By default, this option is disabled. If you are handling DICOM videos in your institution, you can let iQ-WEB convert these into a supported web video format after reception. The following formats are available:
  - WebM

- MP4
- SWF (for this format a Flash player must be installed on the iQ-WEB client viewing these videos)
- "No": Disables the automatic video conversion.

The field **Conversion Options** allows you to further specify the video conversion, using specific parameters. The use of this feature is optional. You can find a list of possible options at https://ffmpeg.org/ffmpeg.html#Video-Options.

- **Specific Character Set**: This option changes the display of a specific character set in the web interface. When presenting patient names in the web interface especially, this option forces the client web browser to interpret the web interface delivered by the web server using the selected encoding. If "Default" is selected, the browser will try to automatically detect the correct encoding. This depends on consistent DICOM encoding. The following character sets are supported:

Character set	Standard
Latin Alphabet Part 1	ISO-8859-1 / ISO_IR 100
Latin Alphabet Part 2	ISO-8859-2 / ISO_IR 101
Latin Alphabet Part 3	ISO-8859-3 / ISO_IR 109
Latin Alphabet Part 4	ISO-8859-4 / ISO_IR 110
Latin Alphabet Part 5	ISO-8859-9 / ISO_IR 148
Russian	ISO-8859-5 / ISO_IR 144
Arab	ISO-8859-6 / ISO_IR 127
Greek	ISO-8859-7 / ISO_IR 126
Hebrew Logical Order	ISO-8859-8 / ISO_IR 138
Thai	TIS-620 / ISO_IR 166
Japanese JIS X 0201 Katakana	ISO-2022-JP / ISO_IR 13
Japanese JIS X 0201 Romaji	ISO-2022-JP / ISO_IR 14
Latin Alphabet Part 1 with code extension	ISO-8859-1 / ISO 2022 IR 100
Latin Alphabet Part 2 with code extension	ISO-8859-2 / ISO 2022 IR 101
Latin Alphabet Part 3 with code extension	ISO-8859-3 / ISO 2022 IR 109
Latin Alphabet Part 4 with code extension	ISO-8859-4 / ISO 2022 IR 110
Latin Alphabet Part 5 with code extension	ISO-8859-9 / ISO 2022 IR 148
Russian with code extension	ISO-8859-5 / ISO 2022 IR 144
Arab with code extension	ISO-8859-6 / ISO 2022 IR 127
Greek with code extension	ISO-8859-7 / ISO 2022 IR 126
Hebrew Logical Order with code extension	ISO-8859-8 / ISO 2022 IR 138
Thai with code extension	TIS-620 / ISO 2022 IR 166
Japanese JIS X 0201 Katakana with code extension	ISO-2022-JP / ISO 2022 IR 13
Japanese JIS X 0208 Kanji with code extension	ISO-2022-JP / ISO 2022 IR 87

Character set	Standard
Japanese JIS X 0212 Supplementary Kanji with code extension	ISO-2022-JP / ISO 2022 IR 159
Korean with code extension	EUC-KR / ISO 2022 IR 149
Unicode	UTF-8 / ISO _IR 192
Simplified Chinese	GB2312 / GB 18030

Figure 26 – Character sets

NOTICE:

Due to browser limitations, it is not possible to use more than one character set at the same time. The language and regional settings of the operating system used also influence the correct display of character sets. The only way to display characters from different languages at once is by using Unicode.

NOTICE:

If a translation is used for the iQ-WEB user interface, it is mandatory that the character set used in the translation file matches the settings in the iQ-WEB user interface to ensure a comprehensive display.

- **Choose Language**: This setting will change the language of the web interface for all clients. If "Auto" is selected, the individual client browser settings will be taken into account. Most modern browsers allow specifying a priority list of preferred languages.
  iQ-WEB provides a mechanism to translate into custom languages. By default only German, English, Spanish and Russian are included in the installation routines. Administrators can specify a custom language if the language is not included by default. For more details refer to section 10.6 "Translating the iQ-WEB user interface".

NOTICE:

Logging out and in again may be required to fully apply the language settings. If iQ-WEB does not find the appropriate language files to match the setting, it will switch back to the default English language.

10.4.2.6 iQ-4VIEW

- **User Session Timeout**: This option determines the amount of minutes of user inactivity that shall pass before the concurrent user slot will be freed. For details concerning concurrent licensing, refer to iQ-4VIEW's documentation.
- **Image Generation**: By enabling this option, iQ-WEB will initiate the generation of images used by iQ-4VIEW for all received DICOM image data. Furthermore, an amount of days can be defined after which these created images shall be deleted. A value of 0 will deactivate the image deletion.
  The image generation can be additionally defined with the following options.
  - ***Maximum number of parallel image generation processes:*** The default value is 3. You can enter any value between 1 and 99.
  - ***Minimum wait time per series since last instance received (in seconds):*** Wait period to make sure all instances of a series have been received before the image

generation for the series is executed. By default, this value is set to 120 seconds. You can enter any value between 0 and 3600.

- ***Maximum wait time per series for image generation (in seconds):*** Maximum time a process will wait to be executed. If the time is expired, the image generation is canceled for the series and set to status FAILED (3). The default value is 1800. You can enter any value between 0 and 7200.
- ***Time before finished or failed series entries are removed from image generation table (in seconds):*** Minimum wait time before finished (4) or failed (3) series entries are removed from image generation table. The default value is 3600. You can enter any value between 0 and 2592000.
- ***Start image generation process with low priority:*** By default, this option is disabled. If enabled, the image generation process will be started with "low" thread priority. If disabled, the process will be started with "normal" priority.

10.4.2.7 Upload

- **Maximum Upload File Size**: This value defines the maximum amount of Mbytes that can be uploaded using actions like "Upload DICOM Image."

NOTICE:
In order to apply this setting, the corresponding values in the php.ini must also be configured. The values for "upload_max_filesize" and "post_max_size" will need to be modified.

NOTICE:
If the option "Upload Attachments" is set to "Store uploaded attachment into database table directly," the my.ini of the database must be altered. The value for "max_allowed_packet" will need to be modified.

- **Upload Directory**: This is the directory for storing attachments and DICOM images uploaded by users.
- **Storage Option**: This option defines how uploaded attachments should be stored. Either into the database table directly or under the above defined "Upload Directory".

10.4.2.8 Auto-scan import

If this feature is enabled, it allows iQ-WEB to automatically scan a configured directory and import files found with the "*.dcm" filename extension into iQ-WEB.

- **Source Directory**: The path to the directory that should be scanned must be entered here.
- **Destination Folder**: Automatically imported images will be stored in this folder.
- **Scan Interval**: This value defines how often the "Source Directory" should be scanned for new images. The value is entered in seconds.

NOTICE:

Paths entered must be accessible by the iQ-WEB server system. A mapped drive or UNC path may be used here. Make sure that the Windows user for both the Apache and the iQ-WEBX service have the required permissions to access and read/write in the directories.

NOTICE:
To scan files without the extension ".dcm," administrators must add the following registry key to the basic registry configuration of iQ-WEB:*
"AutoScanAnyFile" of type REG_DWORD with the decimal value 1.
(Refer to chapter 9 for information on where the registry key should be entered.)

10.4.2.9 Worklist

Besides the core feature of iQ-WEB to archive DICOM image data it can process DICOM modality worklist data. This section provides global settings for handling this worklist data.

- **Aging Period for Purging**: Worklist records that were received more than the specified number of days ago will be purged automatically.
- **Reconciliation Feature**:
  - "Patient Reconciliation"
    If enabled, iQ-WEB will use the demographic information of patients (Patient ID, Patient Name, and Date of Birth) from the DICOM Modality Worklist data to match these studies with the same information of the received DICOM studies. Patient names in the studies will be corrected automatically if any discrepancy is found.
  - "Study Reconciliation"
    If enabled, iQ-WEB will use study-related information (Referring Physician's Name and Requesting Physician's Name) from the DICOM Modality Worklist data to match these studies with the same information of the received DICOM studies. Referring physician's name and/or requesting physician's name in the studies will be corrected automatically, if any discrepancy is found.
- **Auto-Scan for Worklist Data**: If enabled, iQ-WEB will automatically observe a defined directory for DICOM Modality Worklist files and import the data into the database.
  - "Auto-Scan Source Directory"
    iQ-WEB will scan any text file in this source directory and import the properly formatted worklist data into the database.
  - "Scan Interval"
    This value defines how often the "Source Directory" should be scanned for new images. The value is entered in seconds.

10.4.3 Setting up an SMTP server for email notifications

This section allows an administrator to configure an SMTP server that iQ-WEB will use for sending outgoing emails.

Such emails are:

- Statistic report emails

- Monthly system journal
- Notifications for referring physicians when a new study arrives
- Trial expiration notification
- Sending images in JPEG

Click the "Add" button to open the configuration site that allows you to set up email notifications and contains the following items:

- **Hostname or IP Address of SMTP Server**: In this field, the hostname or the IP address of the SMTP server must be entered.
- **Port Number of SMTP Server**: Represents the TCP port number the SMTP server listens to. Default port is 25. This will change when enabling SSL/TLS.
- **Encryption**: Gives the option to encrypt the email transmission with TLS or SSL.
- **Connection Timeout**: Defines the time period after which the connection attempt will be aborted if there is no response from the SMTP server. Default is 10 seconds.
- **Description of SMTP Server**: Is used to enter a short description of the STMP server. This item is not required.
- **System Email Address**: This is the email address that iQ-WEB uses as sender and that will be displayed in the "From" field in outgoing emails.
- **Sender Name**: This will be the name that used in the "FROM" field of all emails that are sent using this SMTP server.
- **Authentication Type**: Defines the authentication with which the SMTP server is contacted. The following authentication types are possible:
  - None: No other configuration is required.
  - LOGIN, PLAIN, CRAM-MD5: A valid username and a password are required.
  - NTLM: A valid username and a password as well as a hostname of the NTLM workstation are required.

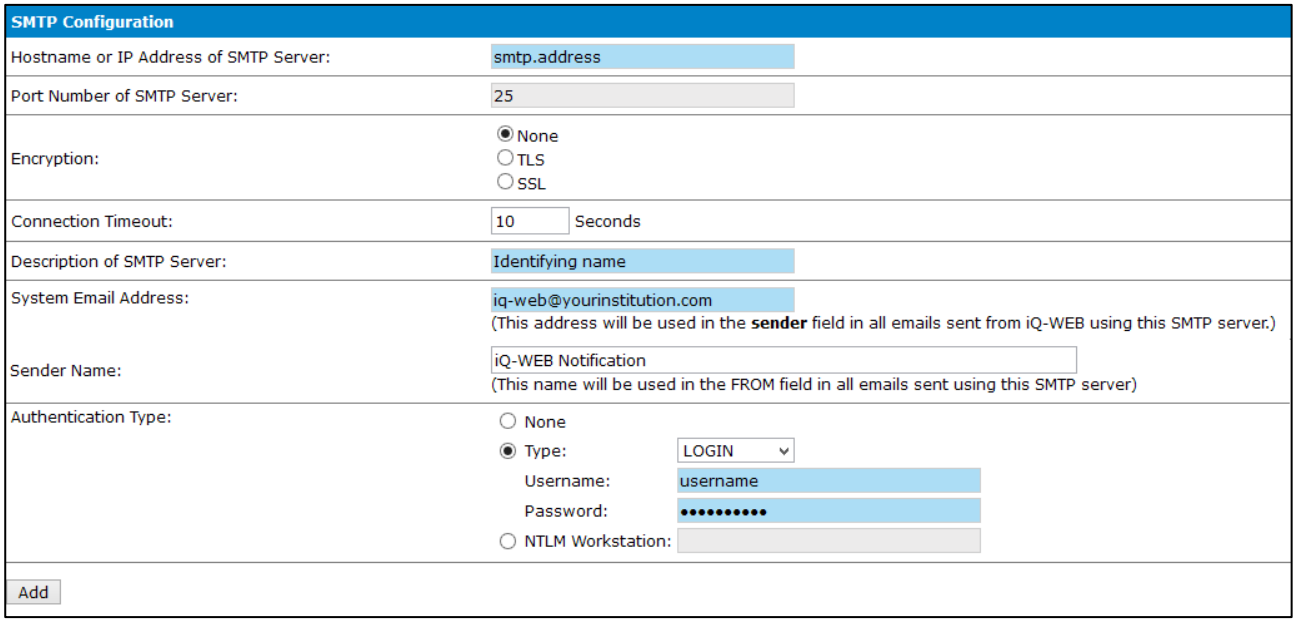


Figure 27 – SMTP configuration

Once an SMTP server is configured and applied, the configuration will be listed. A test email can be sent to a self-determined address in order to verify the connection. Use the "Edit" link to modify the configuration and the "Delete" button to remove a configured SMTP server.

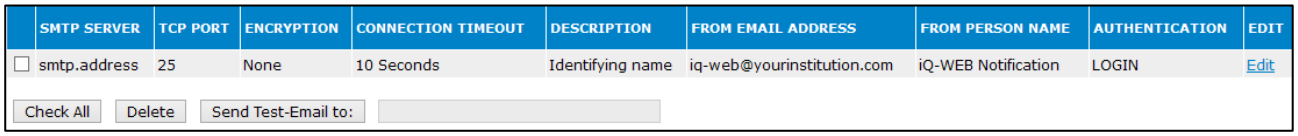


Figure 28 – SMTP server list

10.4.4 Configuring routing of DICOM data

10.4.4.1 Setting up automatic routing of DICOM objects

In addition to forwarding patients, studies, or series manually from the iQ-WEB web user interface, you can define automatic routing table entries to forward images automatically based on the following rules.

Go to the menu item "SETTINGS" and select the entry "Routing" from the sub-menu. Use the "Add" button under the first table "DICOM Routing Entry(ies)" to add a new DICOM routing rule.

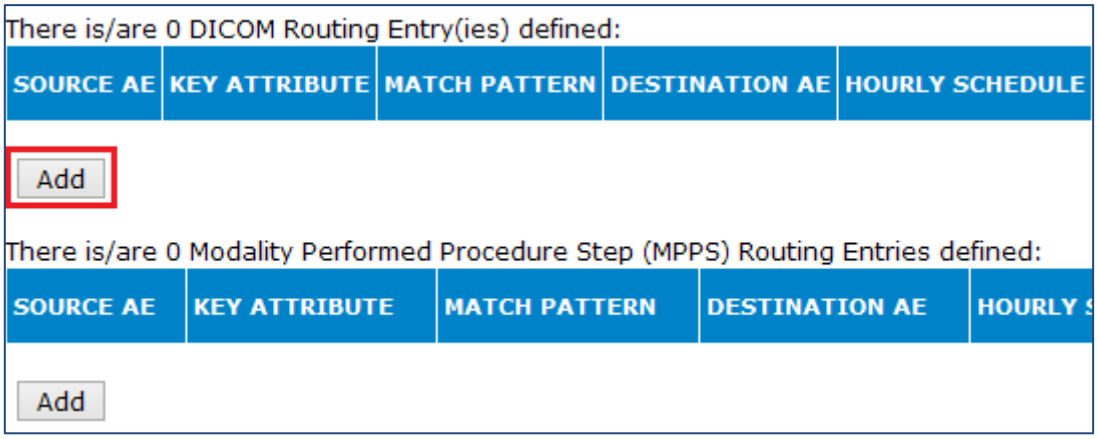


Figure 29 – Adding DICOM routing rules

After one or more rules were added, they will be displayed in the list, where they can also be edited ("Edit" link) or disabled/enabled ("Disable"/ "Enable" link). Use the available buttons under the table to add further rules, to delete selected rules or to disable/enable all rules at once.

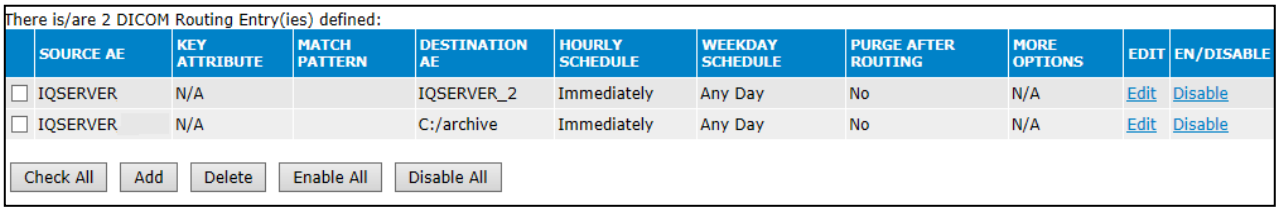


Figure 30 – DICOM routing overview

10.4.4.1.1 Defining the main routing criteria

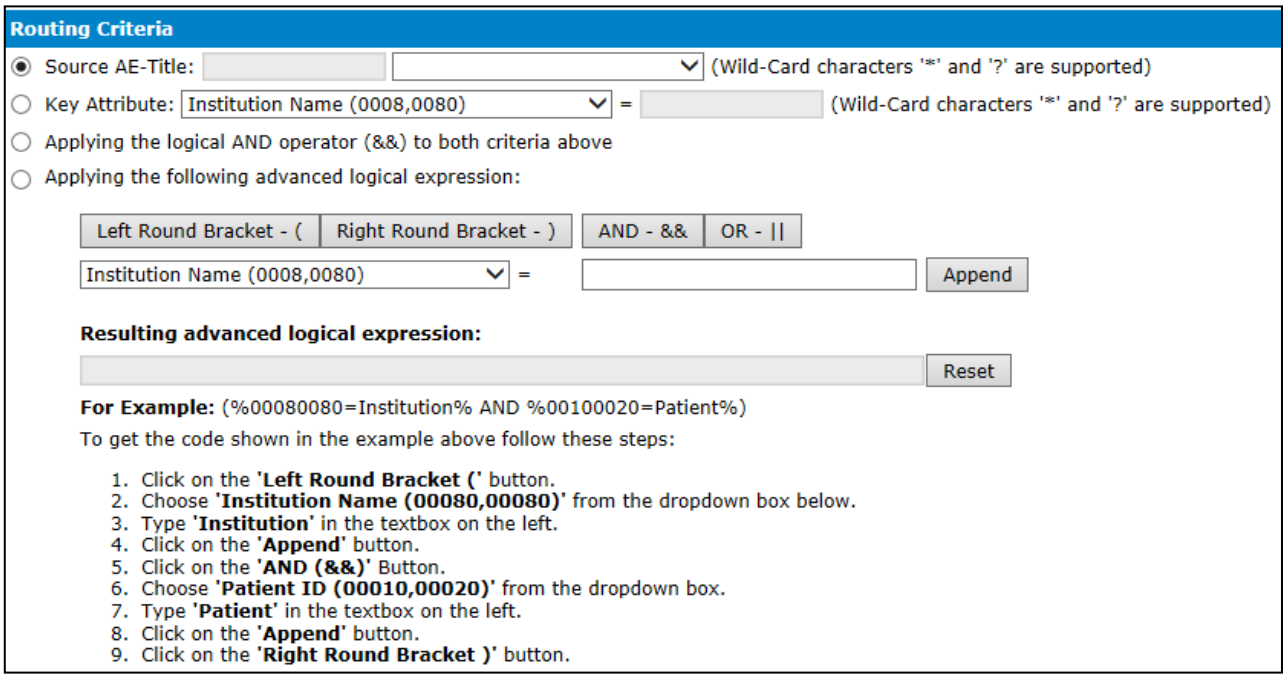


Figure 31 – DICOM routing criteria

- **Source AE Title**: Enter the AE title of the station from which received images shall be routed automatically to a destination. You can use the drop-down list to select from the number of configured AE titles.
- **Key Attribute**: This option is used to define a matching pattern, including wild-card characters "*" and "?", to match against a DICOM attribute tag of a received image. If the pattern string matches the attribute, iQ-WEB will route the received image to the defined destination. Currently the following DICOM attributes are supported:
  - Institution Name (0008,0080)
  - Referring Physician Name (0008,0090)
  - Patient ID (0010,0020)
  - Protocol Name (0018,1030)
  - Performing Physician's Name (0008,1050)
  - Reading Physician's Name (0008,1060)
  - Operator's Name (0008,1070)
  - Study Description (0008,1030)
  - Series Description (0008,103E)
  - Accession Number (0008,0050)
  - Modality (0008 ,0060)
- **Applying the logical AND operator (&&) to both criteria above**: Selecting this criteria will only route images to their destination if both criteria above match their defined pattern.
- **Applying the advanced logical expression**: You can configure an advanced logical expression as an automatic routing rule. This expression can consist of one or more key matching patterns as well as the logical operators AND (&&) and OR (||).

10.4.4.1.2 Setting up the destination station for routing

- **Forward to this destination AE**: Select the AE Title where the images should be sent to. The combo box lists all application entities defined at the "DICOM" page.
- **Copy received images to destination folder**: iQ-WEB will copy the received images into the specified destination folder instead of forwarding them to a destination AE.

NOTICE:

The entered path must be accessible by the iQ-WEB server system. A mapped drive or UNC path may be used here. Make sure that iQ-WEB has the required permissions.

10.4.4.1.3 Defining an hourly schedule for automatic routing

Automatic routing schedules are defined by using the 24-hour clock with four different options to choose.

- **Immediately**: Images will be routed as soon as they were received.
- **From – To**: Images matching the routing criteria and that will be received during the defined time window will be evenly distributed in batches and then routed at every full hour (e.g. 9:00 am, 10:00 am etc.) during the time frame. Images received outside of the schedule window will not be routed. This is useful to avoid peaks in server performance and network usage.
- **Precisely at**: All matching images will be routed during the defined hour. If there are too many images scheduled to forward during these 60 minutes, then the remaining routing jobs will stay in the "submitted" state and will be processed the next day on the same scheduled hour.
- **Immediately, but only during the hourly window**: Unlike the normal "From – To" schedule, this option will not distribute the routing evenly, instead it will route the images as soon as they are received.
- **Delayed until the following hourly window**: With this option, all images received by iQ-WEB will be scheduled for routing, but the routing itself will only take place during the specified time-frame.

10.4.4.1.4 Defining a weekday schedule for automatic routing

The weekday schedule is combined with the hourly schedule above to determine when or if iQ-WEB should forward the received images. Every day in a 7 day week can be chosen.

10.4.4.1.5 Purging original data after automatic routing to a destination

Select whether or not the images should be deleted after the routing. By default, no purging will take place.

10.4.4.1.6 Specifying retries for failed routing jobs

This time interval in hours specifies the time delay iQ-WEB will wait before retrying a failed job again. By default, it is set to 0 which means that there will be no delay.

10.4.4.1.7 Prioritizing the routing jobs

This option allows you to set a priority to every routing rule. This ensures that more important routing jobs are processed faster than those with a lower priority. Enter a value into the available input field. A higher priority value will result in faster processing. Jobs with higher values will be processed before routing jobs with lower priorities.

10.4.4.1.8 Miscellaneous settings

- **Forward existing oldest studies to destination**: If selected, iQ-WEB will forward the "n" existing oldest studies in addition to the newly received study. If a negative number is entered, iQ-WEB will also route the "n" newest study.
- **Wait "n" minutes for all instances of the study to be received, and forward the entire study instead of individual images**: Selecting this checkbox lets iQ-WEB wait for the specified "n" minutes for all images of the study to be received, then forward the entire study via a single DICOM association to the destination.
- **Wait "n" minutes for all instances of the series to be received, and forward the entire series instead of individual images**: Selecting this checkbox lets iQ-WEB wait for the specified "n" minutes for all images of a series (from a study) to be received, then forward the entire series via a single DICOM association to the destination. All series of a study will be handled this way.
- **Do not use the AE-Title assigned to iQ-WEB**: The AE title of the source AE or a user defined AE title can be chosen when sending the images to the destination AE.

NOTICE:

It may be necessary for the user defined AE Title to be recognized by the destination AE. Otherwise, a connection attempt might be rejected.

- **Preferred DICOM Transfer Syntax when sending to destination AE**: This option allows you to define a specific transfer syntax that will be proposed when routing DICOM data from iQ-WEB to the destination station. If accepted by the target station, iQ-WEB will convert the data before sending. Select the transfer syntax you wish to use from the drop-down list.

10.4.4.1.9 Example routing rules

- Route by source AE Title
- Source AE Title: Scanner
- Destination AE Title: IQSERVER
- Hourly schedule: Immediately
- Weekly schedule: every day

- Auto purge: No

With the routing rule given above, all images received from the AE "Scanner" will be automatically routed to AE "IQSERVER" immediately after they are being received. The received images will be kept in the iQ-WEB database after they are routed to the destination AE.

- Route by key attribute
- Key Attribute Tag: Referring Physician's Name (0008, 0090)
- Matching Pattern: John D*
- Destination AE Title: DCMTK
- Hourly Schedule: 1:00 A.M.
- Weekly Schedule: Tuesday
- Auto Purge: Yes

With the above routing rule, all images received with the referring physician names such as "John Doe" or "John David" will be automatically routed to AE "DCMTK" at 1:00 a.m. local time on Tuesdays. (However, received images with referring physician names such as "Dr. John Doe" or "Mr. John David" do not match the defined routing pattern string, and, therefore, will not be routed.) The images received will be purged after they have been routed successfully to the destination AE "DCMTK."

10.4.4.2 Setting up automatic routing of MPPS messages

In addition to forwarding patients, studies, or series manually from the iQ-WEB web user interface, you can define automatic routing table entries to forward images automatically based on the following rules.

Go to the menu item "SETTINGS" and select the entry "Routing" from the sub-menu. Use the "Add" button under the second table "Modality Performed Procedure Step (MPPS) Routing Entries" to add a new MPPS routing rule.

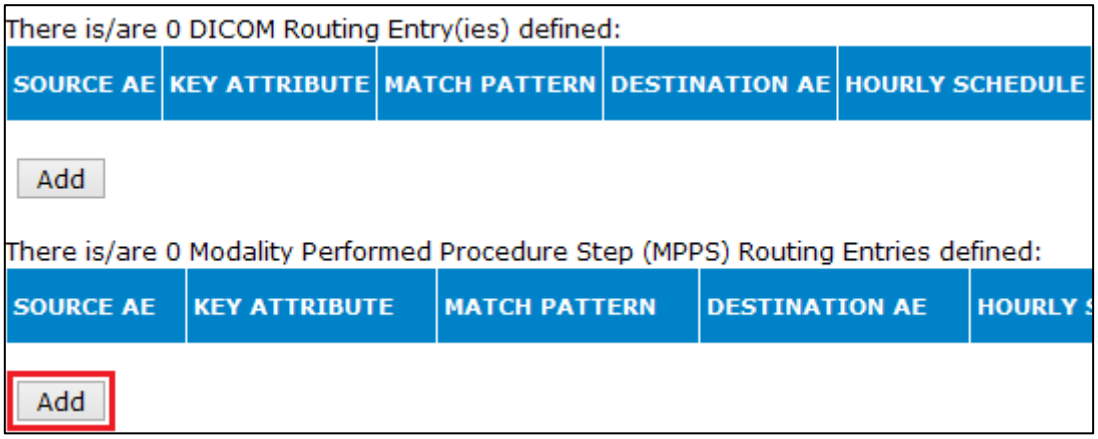
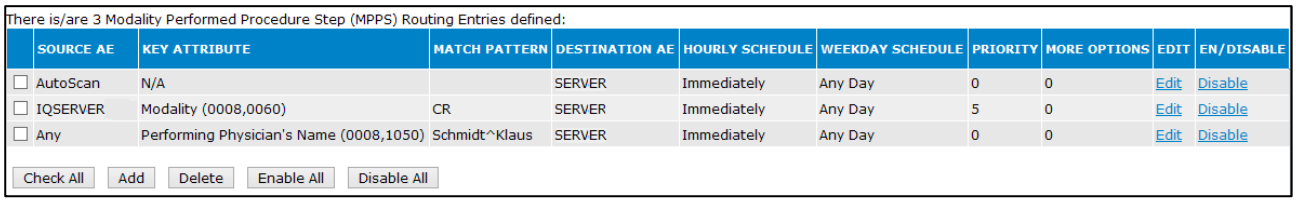


Figure 32 – Adding MPPS routing rules

After one or more rules were added, they will be displayed in the list, where they can also be edited ("Edit" link) or disabled/enabled ("Disable"/ "Enable" link). Use the available buttons

under the table to add further rules, to delete selected rules or to disable/enable all rules at once.


There is/are 3 Modality Performed Procedure Step (MPPS) Routing Entries defined:

	SOURCE AE	KEY ATTRIBUTE	MATCH PATTERN	DESTINATION AE	HOURLY SCHEDULE	WEEKDAY SCHEDULE	PRIORITY	MORE OPTIONS	EDIT	EN/DISABLE
☐	AutoScan	N/A		SERVER	Immediately	Any Day	0	0	Edit	Disable
☐	IQSERVER	Modality (0008,0060)	CR	SERVER	Immediately	Any Day	5	0	Edit	Disable
☐	Any	Performing Physician's Name (0008,1050)	Schmidt^Klaus	SERVER	Immediately	Any Day	0	0	Edit	Disable

Check All | Add | Delete | Enable All | Disable All

Figure 33 – MPPS routing overview

10.4.4.2.1 Defining the main routing criteria

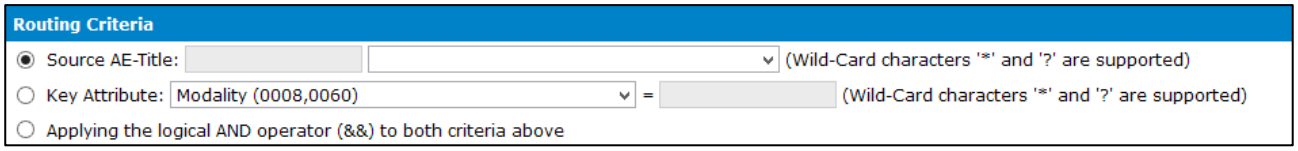


Figure 34 – MPPS routing criteria

- **Source AE Title**: Enter the AE title of the station from which received MPPS messages shall be routed automatically to a destination. You can use the drop-down list to select from the number of configured AE titles.
- **Key Attribute**: This option is used to define a matching pattern, including wild-card characters "*" and "?", to match against a key attribute of a received MPPS message. If the pattern string matches the attribute, iQ-WEB will route the received message to the defined destination. Currently the following key attributes are supported:
  - Modality (0008 ,0060)
  - Accession Number (0008,0050)
  - Study ID (0020,0010)
  - Scheduled Procedure Step ID (0040,0009)
  - Requested Procedure ID (0040,1001)
  - Performed Procedure Step ID (0040,0253)
  - Performed Station Name (0040,0242)
  - Performed Location (0040,0243)
  - Performed Station AE Title (0040,0241)
  - Performed Procedure Step Start Date (0040,0244)
  - Performed Procedure Step Start Time (0040,0245)
  - Performed Procedure Step End Date (0040,0250)
  - Performed Procedure Step End Time (0040,0251)
  - Performed Procedure Step Status (0040,0252)
  - Performing Physician's Name (0008,1050=
- **Applying the logical AND operator (&&) to both criteria above**: Selecting this option will only route MPPS messages to their destination if both criteria above match their defined pattern.

10.4.4.2.2 Setting up the destination station for routing

Here, you have to select the AE Title of the station where the MPPS messages should be sent. The station can be chosen from the drop-down list that contains all currently configured AE titles.

10.4.4.2.3 Defining an hourly schedule for automatic routing

Automatic routing schedules are defined by using the 24-hour clock with four different options to choose.

- **Immediately**: The MPPS messages will be routed as soon as they were received.
- **From – To**: Messages matching the routing criteria and that are received during the defined time window will be evenly distributed in batches and then routed at every full hour (e.g. 9:00 am, 10:00 am etc.) during the time frame. Messages received outside of the schedule window will not be routed. This is useful to avoid peaks in server performance and network usage.
- **Precisely at**: All matching messages will be routed during the defined hour. If there are too many messages scheduled to be forwarded during these 60 minutes, then the remaining routing jobs will stay in the "submitted" state and will be processed the next day on the same scheduled hour.
- **Immediately, but only during the hourly window**: Unlike the normal "From – To" schedule, this option will not distribute the routing evenly, instead it will route the messages as soon as they are received.
- **Delayed until the following hourly window**: With this option, all messages received by iQ-WEB will be scheduled for routing, but the routing itself will only take place during the specified time-frame.

10.4.4.2.4 Defining a weekday schedule for automatic routing

The weekday schedule is combined with the hourly schedule above to determine when or if iQ-WEB should forward the received MPPS messages. Every day in a 7 day week can be chosen.

10.4.4.2.5 Specifying retries for failed routing jobs

This time interval in hours specifies the time delay iQ-WEB will wait before retrying a failed job again. By default, it is set to 0 which means that there will be no delay.

10.4.4.2.6 Prioritizing the routing jobs

This option allows you to set a priority to every routing rule. This ensures that more important routing jobs are processed faster than those with a lower priority. Enter a value into the available input field. A higher priority value will result in faster processing. Jobs with higher values will be processed before routing jobs with lower priorities.

10.4.4.2.7 Miscellaneous settings

- **Do not use the AE-Title assigned to iQ-WEB**: The AE title of the source AE or a user defined AE title can be chosen when sending the messages to the destination AE.

NOTICE:
It may be necessary for the user defined AE Title to be recognized by the destination AE. Otherwise, a connection attempt might be rejected.

10.4.5 Configuring the WADO interface

The WADO interface provides two main use cases:

First of all, the WADO option in iQ-WEB offers a secure web-based interface into other web-based or thick-client-based medical information systems (MIS). Physicians can easily access images and reports via this interface using the login of their existing information system - without having to log in once again. An automatic authentication process ensures the accurate access from the MIS.

Secondly, the WADO interface allows a user to manually create temporary WADO links in order to pass them to another physician for second opinion or to a referring physician. The WADO URL will be created based on the configuration made in the WADO settings and is then displayed in the web interface. From there it can be copied, e.g. into an email.

In order to configure the permanent interface to another medical system, refer to the sub-sections below:

- For general configuration settings, see section 10.4.5.1. In this context, you may ignore the "Create WADO link" part.
- For details concerning the integration with a HIS/RIS, see section 0.

In order to configure the temporary data access using manually created WADO links, refer to the sub-sections below:

- For general configuration settings, see section 10.4.5.1.
- For information on how to grant users permission to manually create WADO links, see section 10.4.5.3.
- The manual creation of WADO links is described in section 10.4.5.4.

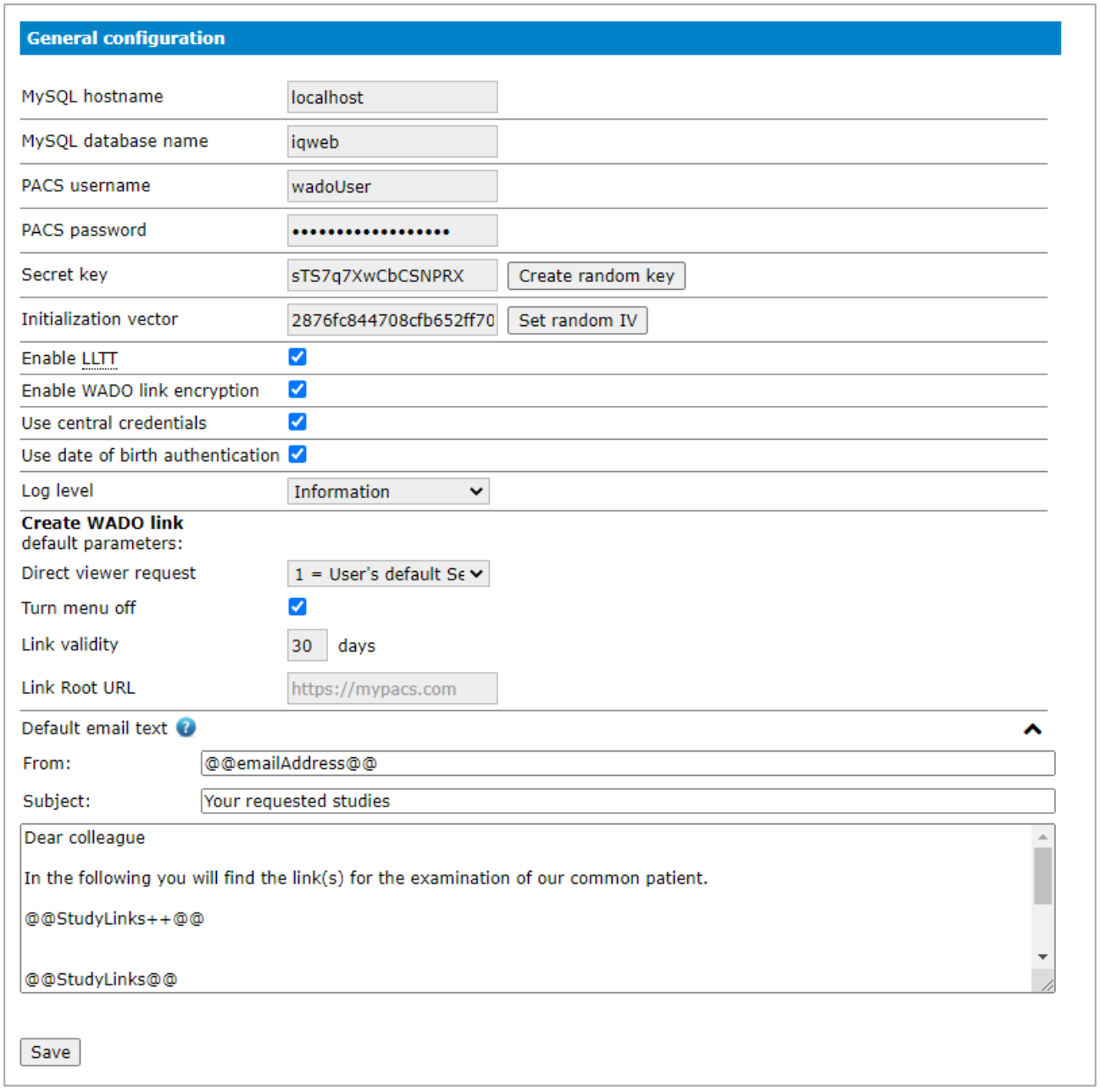
For details on how to test the general WADO link settings, refer to sub-section 10.4.5.2.

10.4.5.1 General configuration

The WADO configuration can be accessed by selecting the menu item "WADO" located in the "SETTINGS" tab of the iQ-WEB web interface. It is used both to provide the configuration for a

permanent interface between the iQ-WEB WADO option and for the configuration of the manual WADO link creation.

On the left hand side of the screen, you find all settings that can be altered by the user. You will have to set up WADO before you can access the PACS with the interface.



General configuration

MySQL hostname
This value represents the hostname of the server on which iQ-WEB is installed. The valid value is “localhost”.

MySQL database name
This value represents the name of the database that iQ-WEB uses.

PACS username
This value represents the user name which is used to access the PACS via the WADO interface. The user you type in here must be a valid iQ-WEB user, i.e. the user must be set up in the iQ-WEB user management under "SETTINGS" → "Users".

PACS password
This value represents the specified user's password and is used to access the PACS via the WADO interface.

NOTICE:
The password may expire over time, as a result of the iQ-WEB security feature "automatic password expiration". If that is the case, the password must be updated manually here.

NOTICE:
It is strongly recommended that the PACS user account that is used for WADO requests is strictly limited to the privileges that are absolutely necessary for viewing the patient data. Using the "root" account is not recommended due to security reasons, because it has full access/change rights.

Secret key
This value represents the key used for the encryption of the limited life time token (LLTT), the individual username and password. The WADO interface secures sensitive data with AES-256 in a cipher block chaining (CBC) mode. AES is a symmetric encryption which uses the same key for encryption and decryption.

The key has a length of 128 bit respectively 16 alpha-numeric characters.

By clicking the button "Create random key", a random secret key of 128 bit length is created and entered in the field next to the button.

Initialization vector
This value represents the initialization vector (IV) used during the AES encryption in a CBC mode. In cryptography, an initialization vector is a fixed-size input to a cryptographic primitive that is typically required to be random or pseudo-random.

Click the button "Set random IV" to create the value. It must have a length of 128 bit displayed as 32 hexadecimal characters.

Enable LLTT
This option activates or deactivates the check of the limited life time token. The limited life time token is a parameter which decides whether the created WADO link is still valid or not. The time-frame can be chosen during the link creation and might be anything from 0 to any desired number of minutes.

Enable WADO link encryption
This option activates or deactivates the encryption of the patient-identifying information within the WADO URL. If disabled, the information identifying the patient, i.e. patient ID, patient name,

accession number as well as the study and series instance UID, are written into the URL in plaintext.

NOTICE:

Using full URL encryption is highly recommended for security reasons. It ensures that the recipient of such a URL will only get access to the intended data.

Use central credentials

This option defines, whether the WADO interface uses the central credentials each time somebody requests data via the interface. In case the option is checked, the WADO interface will use the credentials entered as PACS username and PACS password above, unless separate user credentials are transmitted in the link. This will, in any case, overrule the use of central credentials.

Use date of birth authentication

If checked, WADO links created from the EasyWEB page use the date of birth authentication page before further processing. If unchecked, WADO links created from the EasyWEB page will be processed directly without date of birth authentication.

Log level

This option defines how detailed the log will be written. All messages will be saved in the wado.log located under "[iQ-WEBX installation folder]\PACS\log". The file will be created if it does not yet exist.

Create WADO link

This section configures the way how a regular iQ-WEB interface user can manually create WADO links using the EasyWEB page. See section 10.4.5.3 for information on how to grant users the permission to do that and section 10.4.5.4 for details on how to create URLs manually.

This option comes with default parameters, which can be changed if necessary:

- **Direct viewer request:** Specifies the viewer that shall be used to open the requested image(s). Default is the user's default selection.
- **Turn menu off:** This deactivates the main iQ-WEB menu for WADO calls. As a consequence, the user cannot navigate to other pages of the iQ-WEB web interface. His access is limited to the intended information. Default is enabled.
- **Link validity:** Is used to define how long such a manually created link will be valid. The value is given in days. Default is 30 days.
- **Link Root URL:** iQ-WEB uses the IP/domain from the current URL to create WADO links. For users who are working with iQ-WEB in the intranet, it will not be possible to share working WADO links unless they access the server through its public IP or domain. Here, you can define an IP address or hostname that will then be used when creating such WADO links. The field shows an example as default. Click into the field and type in the URL you want to use.

In addition, the manually created URLs will always use the Study Instance UID as identifying parameter. This means that every manually created URL will give access to only one study.

NOTICE:

When working in a WAN environment it is recommended to only use a request that directly opens either iQ-4VIEW or iQ-X. Requests that do not open a viewer shall only be used in a closed network (e.g. LAN, VPN). This is to avoid possible URL alteration after a performed WADO request.

Default email text
If the user wants to send the patient's studies via email, it can be helpful if the email contains a predefined standard text in addition to the email address of the sender and the subject line. Here you can edit the text. You can also use the following placeholders, which will be replaced later in the email text by the corresponding actual content:

- @@StudyLinks++@@ → displays all selected WADO links and all patient information

NOTICE

Keep in mind that the information sent by email is not encrypted. In particular, if you use @@StudyLinks++@@ as a placeholder, you should ensure beforehand that the sending of information in this way is compliant with data protection laws in your area.

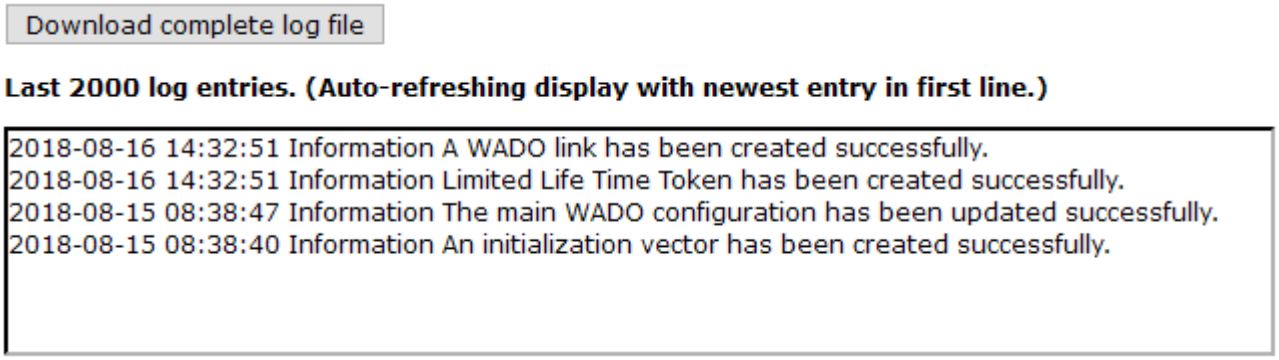
- @@StudyLinks+@@ → displays all selected WADO links and all patient information except the patient name
- @@StudyLinks@@ → displays all selected WADO links without any additional information
- @@date@@ → current date
- @@sender@@ → name of the logged-in user (first name, last name)
- @@emailAddress@@ → email address of the logged-in user
- @@linkValidity@@ → validity period of the link

You can also see a list of the available placeholders and their function when you move the mouse pointer over the question mark.

Save
By clicking this button, you will save any changes made in the configuration.

Download complete log file
Allows to download the complete WADO log file as a ZIP archive.

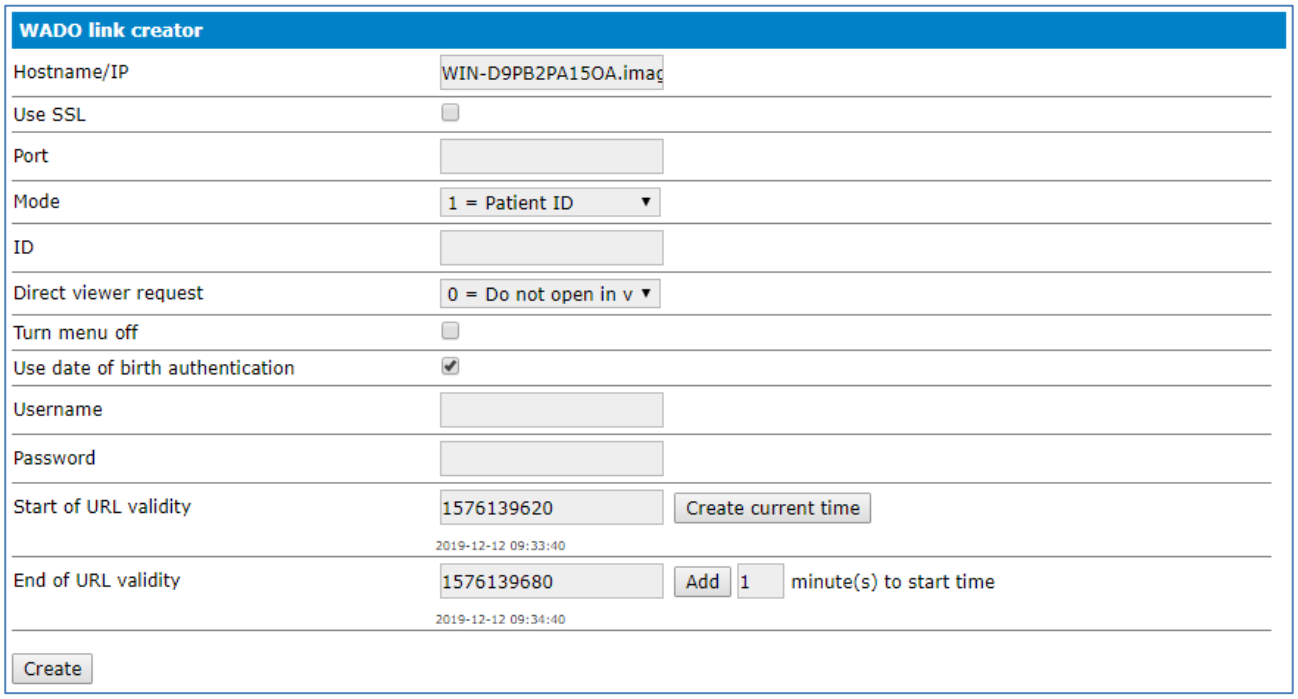
Last 2000 log entries
Shows the most current entries of the log information related to WADO actions.



Example of WADO log file

10.4.5.2 Using the link creator to test the WADO configuration

The WADO link creator is an easy way to create valid WADO URLs by using all supported parameters of the interface. It can be used to create URLs for test purposes and to verify the configuration. Once all parameters are entered, click the "Create" button and the link appears in the WADO status box beneath the link creator and the configuration.



Link creator

Hostname/IP
Is used for the name or the IP address of the server on which iQ-WEB is installed. Dynamic DNS names such as the ones provided by dyndns.com or other providers are accepted as well.

Use SSL
Determines whether the HTTP or HTTPS protocol is used in the URL. If checked, HTTPS is used.

Port
Specifies the port of the web server that iQ-WEB is listening on. If you use port 80, you can leave this field empty.

Mode
This specifies the kind of identifier you want to use to search for specific imaging data. Supported are on the following options:

- 1 = Patient ID
  When used, a patient ID is passed in the WADO URL and all studies of a patient matching this patient ID are displayed or opened in the specified viewer.

- 2 = Study Instance UID
  When used, a study instance UID is passed in the WADO URL and the requested study is displayed or opened in the specified viewer.

- 3 = Series Instance UID
  When used, a series instance UID is passed in the WADO URL and only the requested series belonging to a study is displayed or opened in the specified viewer.

NOTICE:
If mode 3 (Series Instance UID) is used, always the entire study of a patient will be opened when iQ-FUSION is selected as a viewer.

- 4 = Accession Number
  When used, an accession number is passed in the WADO URL and all studies matching this number are displayed or opened in the specified viewer.

- 5 = Patient name
  When used, a patient name is passed in the WADO URL and all studies for that particular patient are displayed or opened in the specified viewer.

- 6 = Other Patient ID
  When used, the other patient ID is passed in the WADO URL and all studies matching this other patient ID are displayed or opened in the specified viewer.

ID
Specifies the identifier you want to use as search parameter. The "*", as a wildcard, is supported at the end or at the beginning of the identifier string.

Direct viewer request
Specifies the viewer used to open the requested image(s).

Turn menu off
This deactivates the main iQ-WEB menu for WADO calls. As a consequence, users cannot navigate to other pages of the iQ-WEB web interface. Their access is limited to the intended information.

Use date of birth authentication

If checked, WADO links created from the EasyWEB page use the date of birth authentication page before allowing the user to access the image data. If unchecked, WADO links created from the EasyWEB page will be processed directly without date of birth authentication.

Username
This specifies an individual username you can use for the automatic login procedure. It will be used even if the option "Use central credentials" is turned on in the WADO configuration. The user entered here must be a valid iQ-WEB user, i.e. the user must be set up in the iQ-WEB user management under "SETTINGS" → "Users".

Password
This specifies the password for the above mentioned user.

Start of URL validity
This specifies the start date and validity time of the created URL. You can create the current timestamp by clicking the button "Create current time". The timestamp is given in the UNIX timestamp format.

End of URL validity
This specifies the end date and validity time of the created URL. You can easily add minutes by using the "Add" button and by choosing the requested amount of minutes. The timestamp is given in the UNIX timestamp format.

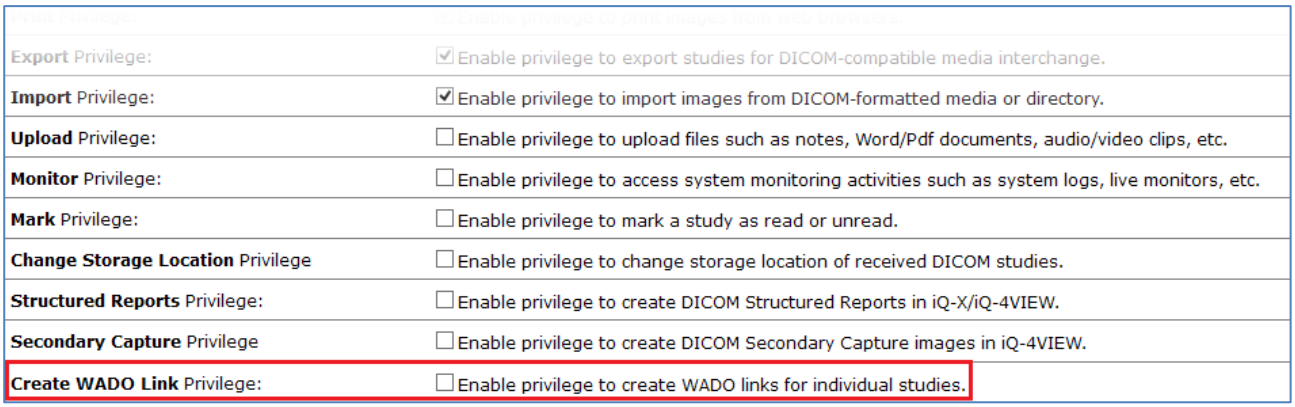
Create
Click this button to create a WADO link according to the defined settings.

10.4.5.3 Granting users permission to manually create WADO links

The WADO interface allows a user to manually create WADO links in order to pass them to another physician for second opinion or to a referring physician. The WADO URL will be created based on the configuration made in the WADO settings (see section 10.4.5.1) and be displayed in the web interface, from where it can be copied, e.g. into an email.

However, a user must be granted permission to access this function by the PACS administrator who handles the iQ-WEB user management.

Log into the iQ-WEB web interface with an administrator account and access the user management under "SETTINGS" → "Users". Select the user you wish to grant permission and click the "Edit" link. In section "General Privilege Settings" enable the checkbox "**Create WADO Link** Privilege" and then scroll to the end of the page and click "Modify User" in order to apply the changes.



Export Privilege:	Enable privilege to export studies for DICOM-compatible media interchange.
Import Privilege:	Enable privilege to import images from DICOM-formatted media or directory.
Upload Privilege:	Enable privilege to upload files such as notes, Word/Pdf documents, audio/video clips, etc.
Monitor Privilege:	Enable privilege to access system monitoring activities such as system logs, live monitors, etc.
Mark Privilege:	Enable privilege to mark a study as read or unread.
Change Storage Location Privilege	Enable privilege to change storage location of received DICOM studies.
Structured Reports Privilege:	Enable privilege to create DICOM Structured Reports in iQ-X/iQ-4VIEW.
Secondary Capture Privilege	Enable privilege to create DICOM Secondary Capture images in iQ-4VIEW.
Create WADO Link Privilege:	Enable privilege to create WADO links for individual studies.

"General Privilege Settings" section on "Modify User" page

10.4.5.4 Creating WADO links manually

Creating a WADO link manually via the iQ-WEB web interface is only possible on the EasyWEB page.

In order to create such a link the user has to select one or more studies on the EasyWEB page and click the "WADO Link" button.

Clicking the right part of the button () immediately copies the WADO link(s) of the selected study or studies into the clipboard from where they can be inserted into another document or into an email.

NOTICE:

This option is not available when using Internet Explorer 11 as web browser. You need to use one of the other supported internet browsers to use the "Copy to clipboard" shortcut. Refer to section 2.2 for details on supported browsers.

Clicking the left part of the button (with the label "WADO Link") will open a new page that shows important patient (name, sex, DOB, patient ID) and study information (e.g. accession number, modality, study description) for every selected study and a time stamp until which the provided WADO link will be valid.

On the WADO link page, the user can then view the created link, can copy them either manually or directly into the clipboard and can show and print the link encoded in QR codes.

For more details, refer to the respective section in the Instructions for Use document.

10.4.5.5 Integration with a HIS/RIS

The interface is controlled with URLs that must be opened in a web browser. All parameters must be written in lower cases. The manufacturer of the MIS has to implement a function that creates the URL according to the specification above. Below, you will find some example URLs:

`http://localhost/pacs/wado.php?mode=1&id_1=123456`
This URL searches for the patient ID "123456".

`http://localhost/pacs/wado.php?mode=1&id_1=*123456*`
This URL searches for all patients containing the string "123456" in their patient ID.

`http://localhost/pacs/wado.php?mode=4&id_1=AB12G`
This URL searches for all studies containing the accession number "AB12G".

`http://localhost/pacs/wado.php?mode=1&id_1=123456&viewer=2&header_off=1`
This URL searches for all patients with the ID "123456" and presents the results directly in iQ-4VIEW, while the main iQ-WEB menu is deactivated.

`http://test.com:8080/pacs/wado.php?mode=1&id_1=123456&viewer=2&header_off=1&username=27046f519d22049f2a89d221c4575382c23e97cc3cdb73751dae3e0209d37dd2&password=e36c7652a4700b369617a3399da9c47da5d78112f7262bf43a21405e2d500b3a&lltt=71976cfb306153ccab8ea1e160eebb9da6c05f8f49e2da966729326c68e412f4`

This URL does the following:

- Searches for the patient ID "123456".
- Displays the results directly in the iQ-4VIEW viewer.
- Turns off the iQ-WEB menu.
- Uses an individual username and password for the automatic login procedure.
- Uses the limited life time token to limit the validity of the URL.

The following URL does exactly the same as the one above. Only it also encrypts the patient ID as well as all selected options (viewer access, turned-off menu etc.) so that nothing but the root URL of the archive can be read:

`http://test.com:8080/pacs/wado.php?66c3bfb30d8061f0502faade77606216c966cc9d7601157ebb5ab7ad05ecc329480f763e2bfaa93eb5a7d858cb4f18636b4316353a12d7bd453e46f68784d208dfee011848d13a4db162ea4054a8788ee4948929004725035 02bb3f18b07c1c30e1ddf5bb7da68979cd2a9b7d35e8b10349dc80f1b76ce59cdbea5a69787cdf5d5f2bd49a06da59cfc8c3460f4c58f341bb110b27755dfdc55af11c7a0a16ad0c841ea509d7c0a17aa8726c1a6dbfe8c144fb4478023128e4d68e395841f5f818acf38b539366f40fb5f5fcd981361f6`

NOTICE:
Using full URL encryption is highly recommended for security reasons. It ensures that the recipient of such a URL will only get access to the intended data.

10.4.5.5.1 Interface configuration

To allow the WADO interface access to iQ-WEB, you must set up a user account that will be used. Any user account that has been created by iQ-WEB is usable for the interface.

NOTICE:
It is strongly recommended that the PACS user account that is used for WADO requests is strictly limited to the privileges that are absolutely necessary for viewing the patient data. Using the "root" account is not recommended due to security reasons, because it has full access/change rights.

NOTICE:
When working in a WAN environment it is recommended to only use a request that directly opens either iQ-4VIEW or iQ-X. Requests that do not open a viewer shall only be used in a closed network (e.g. LAN, VPN). This is to avoid possible URL alteration after a performed WADO request.

10.4.5.5.2 URL design

Working with WADO requires a functioning URL with a number of parameters delimited by a "&". The most important thing is that all necessary parameters have to be passed in their correct form.

NOTICE:
The order of these parameters is irrelevant so they can be interchanged in their sequence.

In general, a valid URL must contain the following parameters as minimum:

- The hostname,
- The port (only if it differs from 80),
- The mode that defines which patient-identifying information shall be looked for (e.g. patient ID or accession number) and
- The specific search value or values (i.e. IDs).

For example:

```
http://localhost/pacs/wado.php?mode=1&id_1=123456
```

This URL defines "localhost" as hostname; port "80" is used, which means that it must not explicitly be stated; patient ID is defined as search parameter and it is specifically looked for patient ID "123456".

The URL can include further parameters, such as:

- A viewer that shall be opened with the requested image data
- The disabling of the iQ-WEB menu
- Specific user data (username and password)
- A limited life time token that allows the use of the URL only for a specific time period

In case all features are enabled, the URL includes all parameters. Such a URL looks as follows:

```
http://test.com:8080/pacs/wado.php?mode=1&id_1=123456&viewer=2&header_off=1&user
name=27046f519d22049f2a89d221c4575382c23e97cc3cdb73751dae3e0209d37dd2&password=e
36c7652a4700b369617a3399da9c47da5d78112f7262bf43a21405e2d500b3a&lltt=71976cfb306
153ccab8ea1e160eebb9da6c05f8f49e2da966729326c68e412f4
```

In addition, the patient-identifying parameter may be encrypted as well.

10.4.5.5.3 Interface usage

The interface is controlled with URLs that must be opened in a web browser. The following sections describe the different parts of the URL and how they can be combined.

10.4.5.5.3.1 Interface root file

```
wado.php
```

Part one of a generated URL always consists of the main interface file. Every URL starts with:

```
http://localhost/pacs/wado.php
```

It is possible to replace "localhost" with any other DNS name or IP address from a computer where iQ-WEB is installed. If you have changed the alias directive for your PACS installation, you have to adapt the part "/pacs" as well.

10.4.5.5.3.2 Interface mode

```
mode = [1-6]
```

This parameter indicates how the "id" parameter should be interpreted. The following modes are available:

1 – Searches for patient ID
2 – Searches for study instance UID
3 – Searches for series instance UID
4 – Searches for accession number
5 – Searches for patient name
6 – Searches for other patient ID

Example: If mode=1, the id_1 and following is interpreted as patient ID search parameters.

NOTICE:
If mode 3 (Series Instance UID) is used, always the entire study of a patient will be opened when iQ-FUSION is selected as a viewer.

10.4.5.5.3.3 ID

```
id_[n] = [actual ID] or
id_[n] = [encrypted actual ID]
```

This parameter specifies the ID to search for according to the mode that was selected (see section 10.4.5.5.3.2). The "n" displays the number of the ID within the URL, so the first "id" parameter is "id_1" the second "id_2" etc.

In reference to RFC 3986, a space character has to be encoded to "%20". This might be necessary if you want to transmit a patient name. It is also possible to use the "^" character.

You can pass multiple IDs within the URL to open multiple entities in the viewer. If multiple IDs are passed and the viewer mode is disabled, WADO will search only for the first ID and list it on the web page.

In addition, the passed IDs can be encrypted with AES-256 as additional data protection measure (see section 10.4.5.5.3.9).

10.4.5.5.3.4 Viewer mode

```
viewer = [0-6]
```

This parameter determines the viewer to be opened. The following options are possible:

0 – Opens only the respective web view in iQ-WEB (patient, series or study page)
1 – The viewer selected in the user's profile is opened
2 – iQ-4VIEW is opened
3 – iQ-X is opened if the Internet Explorer is being used, otherwise iQ-4VIEW
4 – The viewer call is forwarded to the local iQ-VIEW installation
5 – Opens the JPEG version of the requested image(s) in the web browser
6 – iQ-FUSION

If the parameter is "0", it can be omitted.

NOTICE:
For downward compatibility, the iq_x parameter can still be used. It behaves as described above.

10.4.5.5.3.5 Hiding the iQ-WEB menu bar

```
header_off = [0 | 1]
```

If this parameter is set to "1", the iQ-WEB menu bar (navigation pane) is invisible. Otherwise, it is enabled. If the parameter is "0", it can be omitted.

10.4.5.5.3.6 Username

```
username = [encrypted username]
```

This parameter contains the encrypted username. The used algorithm is AES-256 (see section 10.4.5.5.3.9). If the option "Use central credentials" is enabled, this parameter can be omitted.

10.4.5.5.3.7 Password

```
password = [encrypted password]
```

This parameter contains the encrypted password. The used algorithm is AES-256 (see section 10.4.5.5.3.9). If the option "Use central credentials" is enabled, this parameter can be omitted.

10.4.5.5.3.8 Limited life time token

```
lltt = [encrypted lltt]
```

This parameter contains the start and end time of URL validity as UNIX timestamp (see 10.4.5.5.3.10) separated by a colon (UNIXtimestamp:UNIXtimestamp). In addition, this string is encrypted with AES-256 (see section 10.4.5.5.3.9). If the option "Enable LLTT" is disabled, this parameter can be omitted.

10.4.5.5.3.9 AES-256

The Advanced Encryption Standard (AES) defines a crypto system and was published by the National Institute of Standards and Technology (NIST). The standard as well as the algorithm are free to be used and can be downloaded from the homepage of NIST.

AES-256 defines the Rijndael algorithm in a Cipher Block Chaining mode. The block size is 256 bit and the key size as well as the initialization vector size is 128 bit.

In the WADO interface, the secret key is given as an alphanumeric string with 16 characters. A single character has a size of 8 bit, so 16 characters have 128 bit.

The initialization vector contains 32 characters interpreted as hexadecimal values. Two characters are one hexadecimal number with a size of 8 bit, summed up this makes 16 hexadecimal numbers with a total size of 128 bit.

10.4.5.5.3.10 Unix time

The UNIX time is defined as the number of seconds that have elapsed since January 1, 1970 00:00:00 UTC winter time without counting the leap seconds. To generate a UNIX timestamp from your local time, you have to keep in mind that your time might have a summertime offset and is located in a different time zone than UTC.

10.4.5.5.4 iQ-WEBX WADO HL7

The additionally available product iQ-WEBX WADO HL7 is an interface for providing information between PACS and EMR, RIS or HIS. The main feature of this product is the transmission of a specific WADO link to external systems via a HL7 message. This enables users to view and work straightforward with images stored in iQ-WEB. iQ-WEBX WADO HL7 is a combined product composed of iQ-WEB incl. the WADO interface and iQ-WORKLIST.

For detailed information and description of the product refer to the iQ-WEBX WADO HL7 Administration Guide.

NOTICE:
The WADO interface of iQ-WEB 6.7.3 requires at least version 1.2.0 of iQ-WEBX WADO HL7.

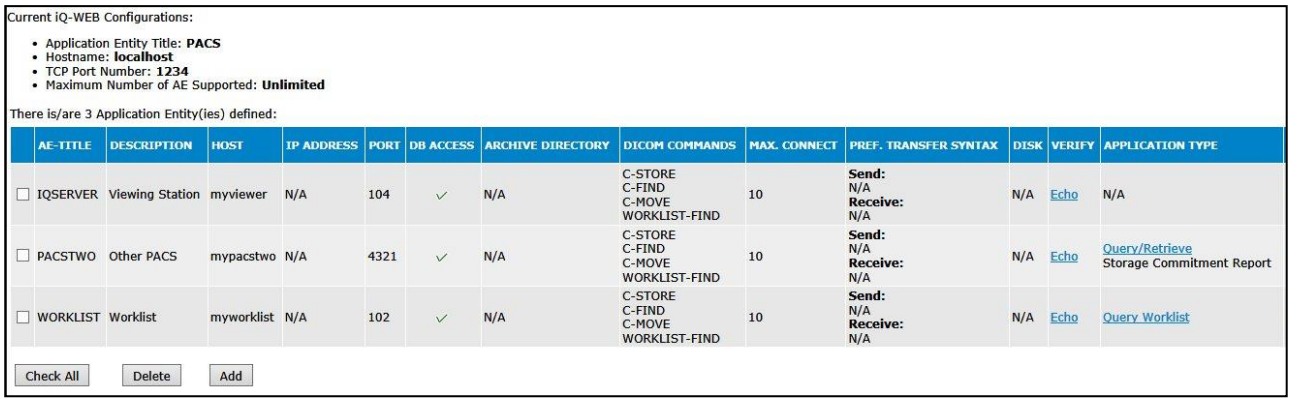
10.4.5.6 Troubleshooting

In case of errors or failures when using the WADO interface, it is recommended to first check the interface's log file.

The log file is named "wado.log" and can be found under "[iQ-WEB installation folder]\PACS\log". It logs all relevant events concerning the activities of the WADO interface. In addition, the log entries can be viewed on the WADO configuration page in the web interface.

10.5 Setting up DICOM communication

10.5.1 DICOM


Current iQ-WEB Configurations:

- Application Entity Title: **PACS**
- Hostname: **localhost**
- TCP Port Number: **1234**
- Maximum Number of AE Supported: **Unlimited**

There is/are 3 Application Entity(ies) defined:

	AE-TITLE	DESCRIPTION	HOST	IP ADDRESS	PORT	DB ACCESS	ARCHIVE DIRECTORY	DICOM COMMANDS	MAX. CONNECT	PREF. TRANSFER SYNTAX	DISK	VERIFY	APPLICATION TYPE
☐	IQSERVER	Viewing Station	myviewer	N/A	104	✓	N/A	C-STORE C-FIND C-MOVE WORKLIST-FIND	10	**Send:** N/A **Receive:** N/A	N/A	Echo	N/A
☐	PACSTWO	Other PACS	mypacstwo	N/A	4321	✓	N/A	C-STORE C-FIND C-MOVE WORKLIST-FIND	10	**Send:** N/A **Receive:** N/A	N/A	Echo	Query/Retrieve Storage Commitment Report
☐	WORKLIST	Worklist	myworklist	N/A	102	✓	N/A	C-STORE C-FIND C-MOVE WORKLIST-FIND	10	**Send:** N/A **Receive:** N/A	N/A	Echo	Query Worklist

Check All Delete Add

Figure 35 – DICOM overview

On this page, the configuration of the DICOM nodes can be done. At the top of the page iQ-WEB's own DICOM information is listed consisting of the AE Title, the port number and the hostname. In addition, the maximum number of supported application entity nodes, restricted by the license, is shown.

NOTICE:

For security reasons iQ-WEB rejects DICOM traffic of source DICOM AEs which are not listed on this site.

In general iQ-WEB can act as STORE SCU/SCP, STORAGE COMMITMENT SCU/SCP, Q/R SCU/SCP, WORKLIST SCU/SCP and PRINT SCU in DICOM communication contexts. For a detailed overview about the supported DICOM transactions, refer to the DICOM Conformance Statement of the current version of iQ-WEB.

10.5.1.1 Add or modify a DICOM node

10.5.1.1.1 Global settings

For establishing a working DICOM network connection it is necessary to identify a station and specifying its network address parameters. This section allows specifying the basic parameters iQ-WEB need to address a station for a DICOM network connection.

- **Description**: This field is for a short description of the DICOM node.
- **Application Entity Title**: The AE title of the remote application must be entered here.
- **Hostname**: The hostname of the remote AE must be entered here if no IP address is defined.
- **IP Address**: This field is for the IP address of the remote AE.
- **Port Number**: TCP port number of the remote AE is defined here.
- **Database Access**: If access is disabled, iQ-WEB will reject any association requests with the specified application entity title.

10.5.1.1.2 Storage

Beside the global storage settings, it is possible to configure the storage location of the incoming files for every single DICOM node.

- **Short-Term Archive Directory**: This is the directory where all the received images of this DICOM AE will be stored.
- **Default Long-term Archive Directory**: This is the location where all images of this DICOM AE will move to if automatic aging is configured and executed.
- **Default Archive Directory Format**: This option controls the hierarchy under the designated archive directory.
  - "Flat"
    Received images are stored under %assigned directory%/YYYY-MM-DD-WEEKDAY/[sub-folders of the archive]
  - "Hierarchical"
    Received images are stored under %assigned directory%/YYYY/MM/DD/WEEKDAY/[sub-folders of the archive]
  - "Study Instance UID"
    Received images are stored under %assigned directory%/%StudyInstanceUID%/[sub-folders]
- **Automatic Aging**: Automatic aging moves images from the short-term archive to the defined long-term archive. To enable this feature, enter the amount of days of how old an image could be. The scheduling of the aging is the same as defined on the "Configuration" page.

10.5.1.1.3 DICOM transfer

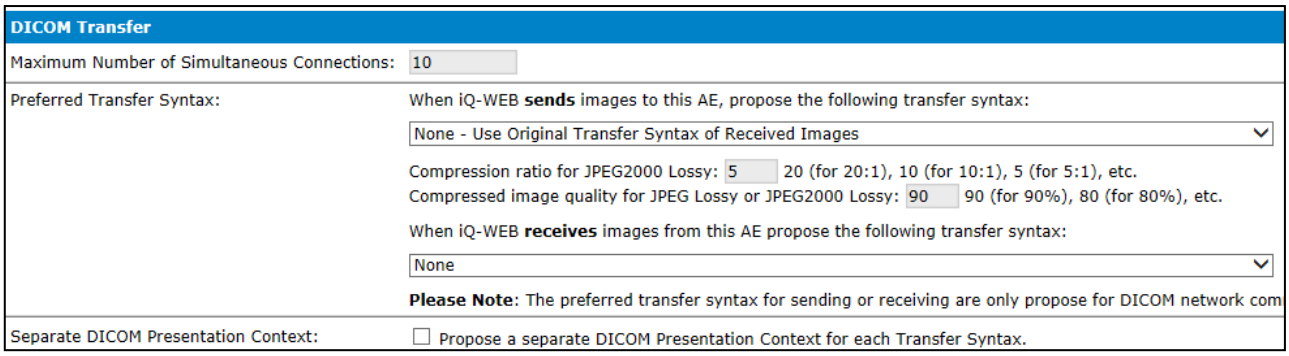


Figure 36 – DICOM transfer settings

- **Maximum Number of Simultaneous Connections**: This value defines the maximum number of simultaneous outgoing connections the iQ-WEB server will establish to the remote AE.
- **Preferred Transfer Syntax**: This section defines the preferred transfer syntax (TS) when iQ-WEB sends images to this AE or receives images. A compression ratio or compression quality value can be specified for lossy compression algorithms to specify data compression to a level where visual quality of image data is not influenced.

⚠ WARNING

Danger of misdiagnosis due to the use of lossy image compression.
Excessive compression levels can cause compression artifacts that might reduce the image quality to non-diagnostic level. These images may no longer have diagnostic quality! Make sure to use a data compression method and ratio which is compliant with all local rules and

regulations. For further details, refer to the IMAGE Data Compression Guidelines or contact your local reseller if you have any questions.

H.-No.: 1.1.5, 1.1.9

There are three major differences between transfer syntaxes. Some use no compression and handle images as they are. Some use a lossy compression while others use a lossless compression. Using a lossless transfer syntax (TS) will most likely not alter the image quality, but could save time and disk space (faster transmission and smaller file size). Using a lossy TS can influence image quality if the ratio or percentage is too high to be considered diagnostic.

Refer to the DICOM Conformance Statement of iQ-WEB that comes with the installation for a detailed list of supported transfer syntaxes.

- **Separate DICOM Presentation Context**: If this option is activated, iQ-WEB uses a new presentation context for each transfer syntax. This context contains only one transfer syntax and the default transfer syntax "Little Endian Implicit".

10.5.1.1.4 DICOM command settings

iQ-WEB can be configured so that it allows defined DICOM actions of AEs only if an attribute value matches the defined filter value. These filters can be set up for the DICOM actions C-MOVE, C-STORE, and C-FIND and, in addition, WORKLIST-FIND. Currently, the supported filters work differently on certain DICOM levels (patient, study, series, and image). See the following tables for a detailed list.

Query/retrieve level: Patient			
Command	Institution Name	Referring Physician	Reading Physician
C-STORE	✓	✓	✓
C-FIND	✓	×	×
C-MOVE	✓	×	×

Query/retrieve level: Study			
Command	Institution Name	Referring Physician	Reading Physician
C-STORE	✓	✓	✓
C-FIND	✓	✓	✓
C-MOVE	✓	✓	✓

Query/retrieve level: Series			
Command	Institution Name	Referring Physician	Reading Physician
C-STORE	✓	✓	✓
C-FIND	×	×	×
C-MOVE	×	×	×

Query/retrieve level: Image			
Command	Institution Name	Referring Physician	Reading Physician
C-STORE	✓	✓	✓
C-FIND	×	×	×
C-MOVE	×	×	×

Multiple filter keywords can be entered for the DICOM attributes and multiple DICOM attributes can be used as filters. The character "*" can be used for wildcard strings. See the following filter examples below:

C-FIND:
Institution Name: Springfield General ; Capital City

Referring Physician: Schmidt^James^^^

If the DICOM application uses a C-FIND on iQ-WEB, iQ-WEB will only show studies that contain "Springfield General" or "Capital City" in their institution name and having "Schmidt, James" as referring physician.

10.5.1.1.5 Application type

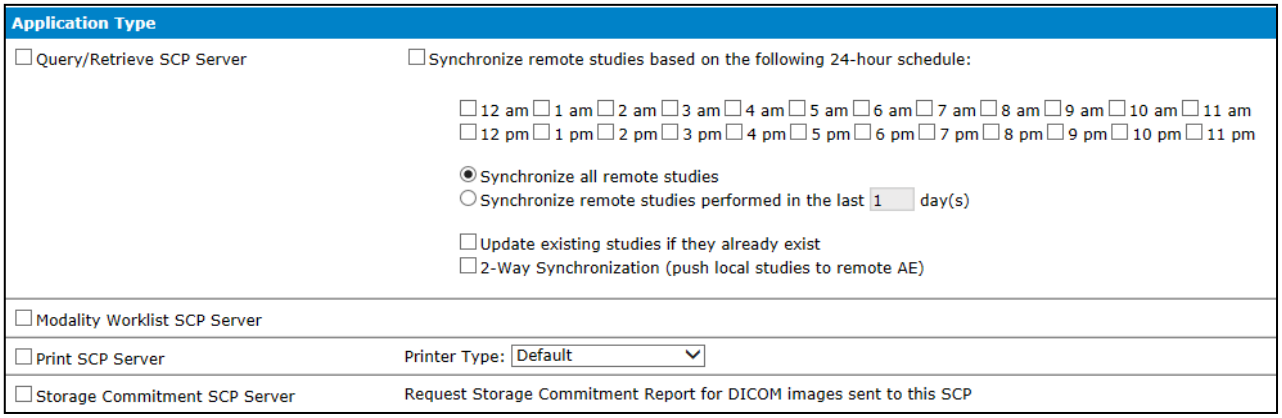


Figure 37 – DICOM application type

- **Query/Retrieve SCP Server**: If checked, this AE Title can be queried directly from iQ-WEB.
  - "Synchronization"
    If this option is enabled, iQ-WEB will synchronize itself with the AE at the defined schedule on a 24 hour basis. Below are the following detailed settings for synchronization:
    - Synchronize all studies from the remote AE to iQ-WEB database.
    - Synchronize only the studies performed during the last "n" days from the remote AE to iQ-WEB database.
    - Update already existing studies in the local iQ-WEB database to match remote ones. This is useful if the studies have been updated or edited on the remote station.
    - Push all iQ-WEB local studies to the remote AE during the synchronization process.

⚠ WARNING:

Danger of delayed diagnosis due to application unavailability.
The synchronization feature of iQ-WEB may impact the performance of the network and the iQ-WEB system itself, especially when scheduling frequent synchronizations and when both storage systems contain a huge amount of data. This can lead to delays in performing regular tasks, such as sending or retrieving images to or from iQ-WEB. It is advised that synchronizations be carefully planned. A good practice is to plan synchronizations for time periods when the workload is very low or near zero.

H.-No.: 1.1.2, 1.1.3

NOTICE:

Study notes as well as image notes will not be synchronized with other stations.

- **Modality Worklist SCP Server**: This option defines whether the AE is a Modality Worklist SCP Server. If enabled, worklist information can be retrieved from this AE. This can be done

by using the "Query Worklist" link that appears in the Application Type column on the DICOM page. iQ-WEB also tries to get worklist information automatically by polling the Modality Worklist SCP server every 10 minutes.

This polling interval can be configured by adding or changing the following registry setting: *"[LM_SOFTWARE]\IMAGE Information Systems Ltd.\iQ-WEBX\[AE Title]\WorklistPollInterval"* of type RegDWORD 32 bit where the decimal number value represents the interval in minutes.

Additionally, if iQ-WEB receives DICOM N-EVENT-REPORT Study Scheduled event notifications from remote Detached Study Management SCP applications, iQ-WEB will query any defined Modality Worklist SCP application entity(s) for the relevant study information contained in the Study Scheduled event report notification

By default, iQ-WEB queries the remote Worklist SCP with a Scheduled Procedure Start Date filter of today's Date. iQ-WEB can be configured to also query for procedures scheduled for the last n days as well by adding or changing the following registry setting:

"[LM_SOFTWARE]\IMAGE Information Systems Ltd.\iQ-WEBX\[AE Title]\WorklistPollPeriod" of type RegDWORD 32 bit where the decimal number value represents the last n days to query. Value of "-1" can be set to order iQ-WEB to query all scheduled worklist data.

When iQ-WEB retrieves worklist information for a scheduled patient and the scheduled AE station is defined in the list of DICOM Application Entities, then iQ-WEB will automatically push any pre-existing studies of this patient containing the same modality information to the scheduled AE station. This way, the scheduled AE station doesn't have to fetch any prior studies manually from iQ-WEB. This Pre-Fetching feature is enabled by default. To disable it, the following registry setting must be defined:

"[LM_SOFTWARE]\IMAGE Information Systems Ltd.\iQ-WEBX\[AE Title]\PrefetchStudiesFromWorklist" of type RegDWORD 32 bit where the decimal number value represents two states. "0" disables prefetching and "1" enables it.

NOTICE:

If the network infrastructure is limited, it is advised that the prefetching feature be disabled.

⚠ WARNING:

Danger of delayed diagnosis due to application unavailability.
To apply registry settings changes, the iQ-WEB service must be restarted. While the service is restarting or is stopped, no DICOM connections or communication can occur. It will not be possible to send patient data to iQ-WEB or to retrieve data to be used at other stations. Make sure that no urgent jobs need to be performed. Pending jobs will be continued after the restart.

H.-No.: 1.1.2, 1.1.3

NOTICE:

The possibility to use iQ-WEB as a DICOM Modalitiy Worklist Server is a customer specific feature and is not intended for public use. Due to necessary advanced administrative tasks, it

is recommended that the Support team be contacted at support@image-systems.biz for workflow analysis and administrative advice on using the iQ-WEB Worklist Server feature.

- **Print SCP Server**: Activating this option, makes it possible to use this AE as a DICOM print server. It is mandatory that this machine acts as standard DICOM PRINT SCP in the network.
- **Storage Commitment SCP Server**: If this option is enabled, iQ-WEB requests a Storage Commitment Report for any image sent to this AE.

NOTICE:

iQ-WEB is also able to deliver a DICOM Storage Commitment Report if requested by a station that stores DICOM data in the iQ-WEB database. For detailed information about DICOM features of iQ-WEB, refer to the "DICOM Conformance Statement" of the current version of iQ-WEB.

10.5.1.1.6 Receiving options

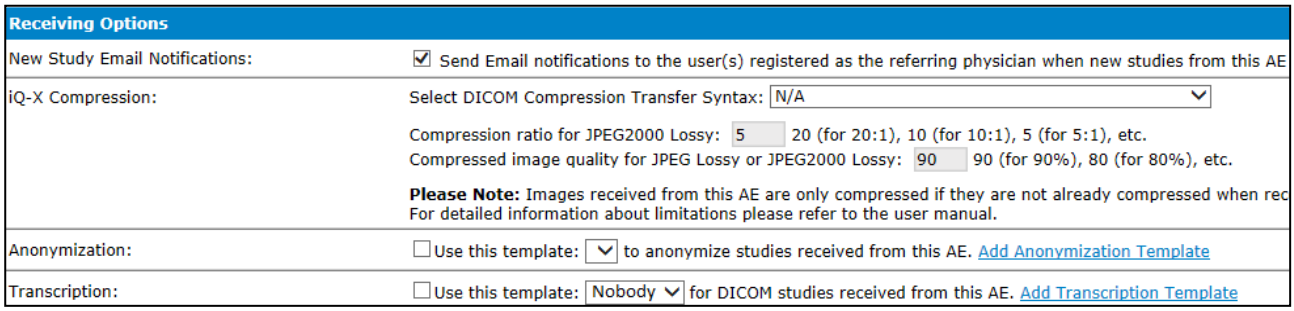


Figure 38 – DICOM receiving options

- **New Study Email Notification**: If this option is activated, iQ-WEB will send a notification via email to users in case a study is received with this user registered as the referring physician.

NOTICE:

This feature requires you to set up an SMTP server to send emails. (Refer to section 10.4.3 "Setting up an SMTP server for email notifications" for details.)

- **iQ-X Compression**: When delivering DICOM images to a remote web browser for the iQ-X ActiveX plug-in, especially via a WAN connection, users often find the need for speeding up the image transfer between the iQ-WEB and the remote browsers. In this case, administrators can enable the iQ-X compression feature of iQ-WEB for each source AE, by selecting one of the DICOM compression transfer syntaxes listed below:
  - "JPEG Lossless Transfer Syntax"
    If this value is selected, iQ-WEB will compress any received image using the DICOM "JPEG Lossless Compression (Selection Value 1, Process 14)" transfer syntax (UID 1.2.840.10008.1.2.4.70), and will save the compression image with the ".ls" filename extension.
  - "JPEG Lossy Transfer Syntax"
    If this value is selected, iQ-WEB will compress any received image using the DICOM "JPEG Baseline Lossy Compression" transfer syntax (UID 1.2.840.10008.1.2.4.50) for 8-bit

images, and the DICOM "JPEG Extended Lossy Compression" transfer syntax (UID 1.2.840.10008.1.2.4.51) for 12-bit images. Both types of compressed images will be saved with the ".ly" filename extension.

- "Runtime Length Encoding (RLE) Transfer Syntax"
  If this value is selected, iQ-WEB will compress any received image using the DICOM "RLE compression" transfer syntax (UID 1.2.840.10008.1.2.5), and will save the compression image with the ".rle" filename extension.
- "JPEG2000 Part-1 Lossless Only Transfer Syntax"
  If this value is selected, iQ-WEB will compress any received image using the DICOM "JPEG2000 Part-1 Lossless Only" transfer syntax (UID 1.2.840.10008.1.2.4.90), and will save the compression image with the ".j2k" filename extension.
- "JPEG2000 Part-1 Lossless Or Lossy Transfer Syntax"
  If this value is selected, iQ-WEB will compress any received image using the DICOM "JPEG2000 Part-1 Lossless or Lossy" transfer syntax (UID 1.2.840.10008.1.2.4.91), and will save the compression image with the ".j2k" filename extension. The compression ratio or image quality of the JPEG2000 Lossy compression is controlled for each source AE if this transfer syntax is selected.

With the above iQ-X compression feature enabled, iQ-WEB will first check if any of the compressed images is available when delivering DICOM images to the web browsers. It will prefer the compressed images over the original images when transferring the images to the remote browsers. In this section a compression ratio or compression quality value also can be specified for lossy compression algorithms to limit data compression to level where visual quality of image data is not influenced. For detailed information about best compression depending to the use cases refer to the Medical Image Data Compression Guide Flyer.

- **Anonymization**: Studies received by this AE will be anonymized with the rules given by the selected anonymization template.
- **Transcription**: If this option is enabled and a transcription template is selected, users can download Microsoft Word templates with DICOM information automatically filled in.

10.5.1.1.7 Delivery options

- **Job Queue Priority**: This field defines the job queue priority when processing database jobs with this destination AE. Database jobs with a higher priority destination AE will be processed before those jobs with a lower priority.

10.5.1.1.8 Miscellaneous

- **Mark Studies as Read**: Activating this option lets iQ-WEB mark every study received from this AE as read.
- **Assign Received Studies to Web Users**: This option allows the administrator to select one or more iQ-WEB users to be given access to all patients, studies, series, or images received from this AE. This is effective even if the assigned users have no "View" permission to access private studies, or their last and first names do not match the "Referring Physician's Name" or the "Reading Physician's Name" in the DICOM study received.

10.5.1.2 Remove a DICOM node

DICOM nodes can be removed by marking them on the DICOM page and clicking the “Delete” button.

10.5.1.3 How to test DICOM communication

There are three simple steps to ensure that iQ-WEB is able to communicate with a remote DICOM station.

1. **Network ping the remote station**
   To ensure there is a network connection between the stations needing DICOM communication, the following steps can be performed:

   - Open a command line console in Windows
   - Enter the command "ping [IPADDRESS/HOSTNAME]" where "IPADDRESS" is the IP address and "HOSTNAME" is the hostname of the remote station.
   - Execute the command

   If there is no reply from the station, check the network setup of both stations, and retry the command after making any changes. If the command is successful, continue with step 2.

2. **C-ECHO to the remote station**
   If the remote station is entered in the DICOM list of iQ-WEB, a DICOM C-ECHO can be performed using the "Echo" link. If the C-ECHO fails, check the AE Title, IP address/hostname, and port entered for the DICOM entry. In addition, check the firewalls of both stations to see if the appropriate ports are open. After making any changes, retry the C-ECHO. When the C-ECHO is successful, continue to step 3.

3. **Send a Study via DICOM**
   The last step is to send a study from the remote station to iQ-WEB and vice versa. If the sending fails, set the logs to the highest available level and then try sending again. Check the logs afterwards for any hints. Be sure to set the logs back to "Information" when troubleshooting is finished.

10.6 Translating the iQ-WEB user interface

The default language of iQ-WEB is English. As mentioned in section 10.4.2.5 "Global settings," the administrator can customize the translation of iQ-WEB. If the bundled languages English, German, Spanish and Russian are not appropriate for the use case, administrators can specify a custom language. These sections will describe the customization procedure and the toolsets for the two following scenarios.

1. Adapt the existing bundled language files and change some entries.
2. Create a completely new language file to support a not bundled language.

10.6.1 Translation toolset

The translation mechanism of iQ-WEB is based on the PHP extension named "getText". All translatable strings of iQ-WEB will be extracted out of the source by this extension. A translation

project file with "*.po" file extension will be created which a translator can use to translate. Find more details about translation projects in the following section.

To start a translation, the following prerequisite software is needed to open and edit translation projects and create translations for iQ-WEB:

- **PHP extension "getText"**: This extension must be enabled in the PHP configuration to make iQ-WEB translation possible. This is done by default installation process.
- **Poedit**: Tool for editing "*.po" translation project files and generating "*.mo" translation files for iQ-WEB.

NOTICE:

Poedit is a 3rd-party freeware software and is not included in the installation package of iQ-WEB. It can be downloaded at: http://www.poedit.net/.

Figure 39 shows an overview of the Poedit GUI for explaining the terms used in the following sections. The GUI consists of 5 parts:

1. Menu bar
2. Toolbar
3. Overview table
4. Translation input
5. Status bar

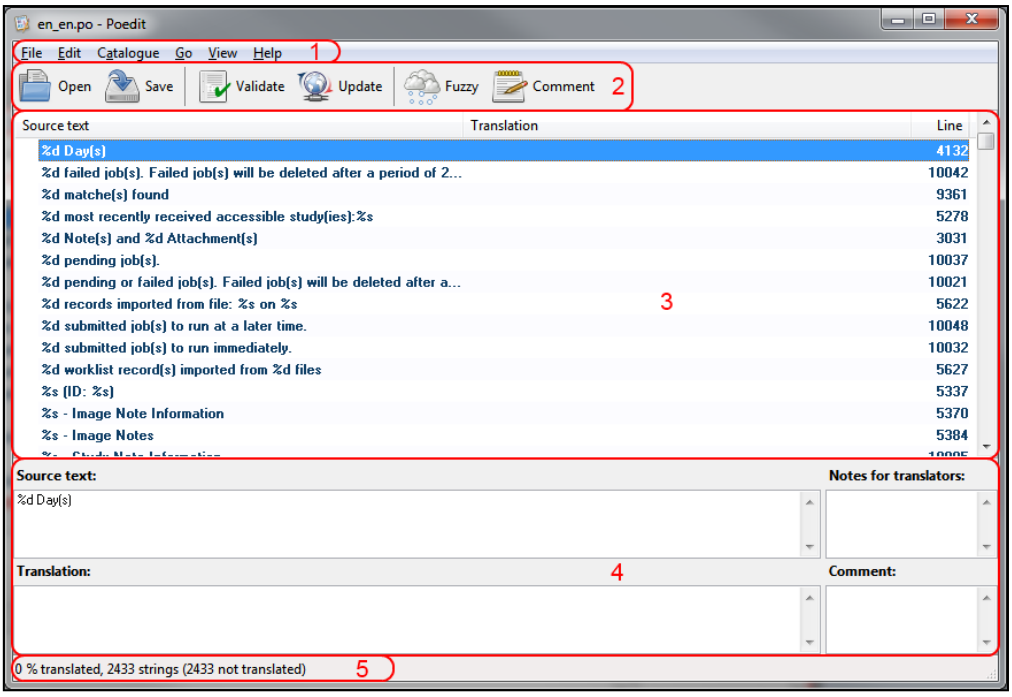


Figure 39 – Poedit GUI overview

10.6.2 Translation projects

iQ-WEB is bundled with a set of translation projects to give the administrator the opportunity to customize the translation. These translation projects contain all translatable strings of iQ-WEB, iQ-WEB2GO (iQ-WEB on mobile devices), iQ-WEBX WADO. iQ-X provides no translation options and is limited to an English user interface. (Refer to the iQ-X Administration Guide for details.)

iQ-WEB translation projects with the file extension "*.po" are located in iQ-WEB installation folder. The subfolder is named "Language" and contains the following translation projects:

- **Custom**: This translation project is for realizing custom translations which are not bundled with iQ-WEB.
- **Empty**: This translation project is a reference project with no translation for backup purpose.
- **German**: This translation project is for customization of bundled German translation.
- **Russian**: This translation project is for customization of bundled Russian translation.
- **Spanish**: This translation project is for customization of bundled Spanish translation.

Further translation projects are handled in the same way with a dedicated folder for every language.

NOTICE:

Translation projects of iQ-WEB version 6.7.3 include all translatable strings of iQ-WEB2GO and iQ-WEBX WADO, and are not fully compatible with prior versions. If translation files are applied that are not compatible with the targeted version, the translation may not be comprehensive.

10.6.3 Translation workflow

This section explains how to create a custom translation for iQ-WEB. The starting point of the example workflow is the bundled "Custom" translation project. The same procedure can be applied when customizing other bundled translation projects for modifying bundled translations.

1. Choose a language into which iQ-WEB should be translated, e.g. Italian.
2. Open the "Custom" translation project in Poedit.
3. Set up the Catalog properties to values matching the chosen language.
4. This setting can be entered in Poedit via the menu bar entry called "Catalogue."
   As shown in Figure 40, the following values can be changed where the numbered ones are essential for a correct and working iQ-WEB translation:
   - **Project name and version**: This value can be changed but it is recommended that an appropriate value be chosen to identify the version and project of the translation.
   - **Team**: This value can be changed and is intended to identify the translation team.
   - **Team's e-mail address**: This value can be changed and is intended to identify the translation team contact.
   - **Language**: The value must be of the following structure: [2 digit language code according to ISO 639]–[2 digit country code according to ISO 3166] (E.g. it-it, po-br)
   - **Charset**: The value must be a charset that is capable of representing the chosen language. It also must match the charset configuration of iQ-WEB. (Refer to section 10.4.2.5 "Global settings")

- **Source code charset**: The value must always be UTF-8.

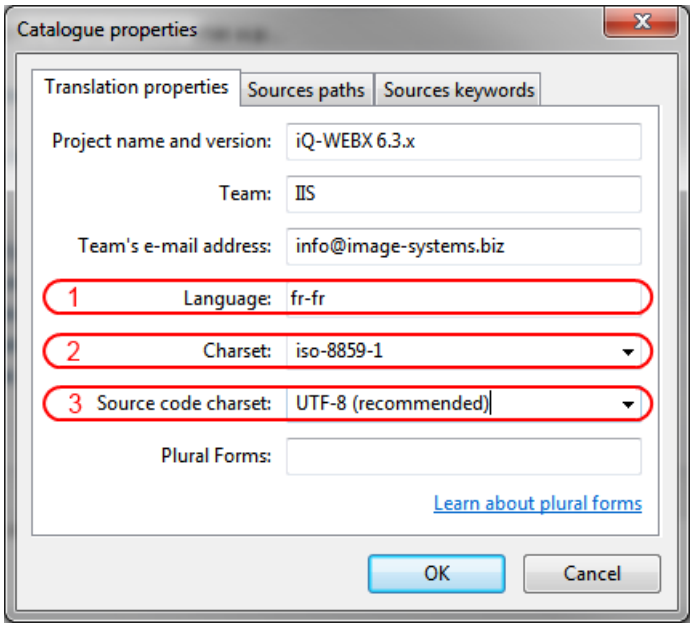


Figure 40 – Poedit catalogue properties

5. Translate all phrases listed in the overview table by selecting each of them and entering a translation for the currently selected source text in the translation input. The status bar will provide an overall status of the translation. Translating personnel can also provide explanations in comments for each entry if needed.

NOTICE:
The following special symbols in the source text must be preserved in the translation:
%s, %d, %08x, \", ', \\', ^
The position of special symbols can be changed, but the order of multiple occurrences must be preserved.

NOTICE:
Translations that are marked as fuzzy are not included in the generated translation file and will remain in the original English language.

NOTICE:
Empty translation entries will remain in the original English language.

NOTICE:
Do not use the "Update from sources" function in the toolbar and menu bar of Poedit. Because some parts of the PHP files of iQ-WEB are encrypted, Poedit is not able to find all translatable texts. Some translatable text may be lost when this action is performed.

6. Save the translation project with the translation. To save, use the corresponding menu bar or toolbar item in Poedit. Poedit is configured by default to generate language files with "*.mo" file extensions automatically when saving project files. These are located in the same folder where the project files are stored.

7. Copy the generated language file to the corresponding location in the iQ-WEB installation folder.
   - "custom.mo" to [iQ-WEB installation]\PACS\php\locale\custom\LC_MESSAGES
   - "de_de.mo" to [iQ-WEB installation]\PACS\php\locale\de_de\LC_MESSAGES
   - "ru_ru.mo" to [iQ-WEB installation]\PACS\php\locale\ru_ru\LC_MESSAGES
   - "es_es.mo" to [iQ-WEB installation]\PACS\php\locale\es_es\LC_MESSAGES
   - "en_en.mo" to [iQ-WEB installation]\PACS\php\locale\en_en\LC_MESSAGES
8. Configure the corresponding language in the iQ-WEB web interface while logged in as an administrator. Refer to section 10.4.2.5.
9. Verify the completeness and correctness of the translation by using a user account.

10.7 Troubleshooting

These sections explain administrative tasks that may need to be resolved during the normal operations of iQ-WEB.

⚠ WARNING:

Danger of patient mix.

The following tasks and procedures are only allowed to be performed by qualified administrative personnel to ensure valid patient information. If there are any questions or uncertainties contact your local distributor or info@image-systems.biz.

A unique patient ID must always be used for each patient. While one patient may have more than one patient ID, one specific patient ID should never be applied to more than one patient. Otherwise, data from several patients may be merged.

H.-No.: 1.1.6

10.7.1 Patient ID conflict resolution

A patient ID conflict happens if there are two patient IDs for a certain patient or different dictions of the patient name for a certain patient ID in different studies. Reasons may be typos, different syntaxes or dictions used for patient names by devices, or untrained staff entering data.

iQ-WEB offers three automatic and four manual options for the system administrator to resolve conflicts of patient identities.

10.7.1.1 Automatic options

The three automatic options only update the iQ-WEB database, without modifying DICOM data.

10.7.1.1.1 Ignore duplicate patient ID conflicts

iQ-WEB offers to have an incoming study with a Patient ID conflict overwrite the existing patient demographics with the new demographics from the DICOM header of the new study in the database, only. This procedure can be used only in a RIS/PACS environment using a DICOM

modality worklist to all devices without unidentified patients (where the patient identity might change during the stay), e.g. in imaging centers. The advantage of this approach is that patient ID conflicts can be easily avoided and patient name changes can be updated automatically in the PACS database. This way is robust against different dictions of a patient. The risk of this approach is that patient data may become unavailable by database search for name or date of birth if there are typos in the patient ID. In the latter case, lost studies can be found e.g. via searches for the study date and modality.

10.7.1.1.2 Patient reconciliation

This automatic conflict resolution based on patient ID and date of birth of queried DICOM modality worklist data can be used for sites that have a completely automatic workflow of patient demographics and use a DICOM modality worklist with all devices which might have unidentified patients or patients with changed identities during the stay, e.g. hospitals, emergency units, urgent care centers. The advantage of this approach is that it can manage different patient name codings, typos, and it allows the automatic reconciliation of patient names (e.g. for marriage or changed identity). The risk is that incorrect patient IDs in the master system will be applied to the PACS database automatically. Some devices use non-standardized date formats where this approach might not work.

10.7.1.1.3 Reject duplicate patient ID conflicts

This option of iQ-WEB offers an automatic rejection of incoming studies with a Patient ID conflict. It is not recommended that this option be used for regular patient services as it might cause data loss.

10.7.1.2 Manual options

iQ-WEB offers four options to manually resolve conflicts of patient identities by the system administrator. All manual options update both the PACS database and the DICOM objects. Manual patient ID conflict resolutions will be applied to the database and the DICOM objects after midnight. The main risk of manual conflict resolution is that conflict studies might temporarily not be found via patient ID queries (e.g. for RIS/EMR/HIS PACS integrations) until the conflict is resolved manually.

10.7.1.2.1 Keep existing patient ID: XXXXX and use this patient name

There are two options under this heading:

- **Option 1**: When a study is received by iQ-WEB showing a different name than the one currently registered in the database for the given patient ID, iQ-WEB will overwrite the previously registered patient name and date of birth with the information from the incoming study. This workflow can be used if both the database and the DICOM objects shall be manually updated with new patient demographics.

- **Option 2**: The second option causes iQ-WEB to keep the existing patient information over the incoming study information. It is recommended that this workflow be used if the patient demographics in the iQ-WEB database are consistent and inconsistent data, including typos, is received without worklist matching. The risk is that actual name changes, e.g. due to marriage, are not updated in the database.

10.7.1.2.2 Save duplicate using a new patient ID

The system administrator assigns a new patient ID to the incoming study. This default conflict resolution can be used at sites where patient data are entered manually into devices and DICOM modality worklists are not used. This scenario can usually be found at smaller sites. The risk of this approach is that manual misidentifications might make datasets unavailable.

10.7.1.2.3 Keep existing patient ID: XXXXX and overwrite the patient name and date of birth with data from modality worklist record

iQ-WEB will query the DICOM modality worklist for the patient ID. It will then overwrite the previously registered patient name and date of birth in iQ-WEB as well as the incoming DICOM study with the information from the worklist. This conflict resolution can be used at sites with a completely automatic workflow using a DICOM modality worklist (including temporarily unidentified patients, e.g. in urgent care). The advantage of this approach is that it can manage different patient name encodings and typos, allowing the automatic change of patient names during the patient's stay. It further updates DICOM objects as well. The risk of this option is that incorrect patient IDs in the master system will be applied to the PACS database.

NOTICE:

All manual patient ID conflict resolutions apply to both the database and the DICOM objects. If there are any questions about dealing with patient ID conflict resolution, do not hesitate to contact your authorized iQ-SYSTEM PACS reseller or IMAGE Information Systems Europe GmbH.

10.7.2 Webserver debugging

During the operation or configuration of iQ-WEB, the following issues may need to be resolved in the Apache webserver and its PHP extension:

- An invalid configuration results in the Apache service not starting
- The web interface is not accessible for client browsers

The following actions may help locate the origin of the issue and pinpoint a specific support request.

1. Increase the level of the log output

- Locate the "LogLevel" string in the httpd.conf and set it to a higher level of error reporting. Possible values include: "debug," "info," "notice," "warn," "error," "crit," "alert," and "emerg" where "debug" represents the maximum level of output into the log file.
- Locate the "error_reporting" string in the php.ini and set it to a higher level of error reporting. Possible values are explained in the comments section of the file where "E_ALL | E_STRICT" represents the maximum level of output into the log file.

2. Restart the Apache webserver after saving the changes to the Apache and PHP configurations.
3. Try to reproduce the issue to ensure that it is documented in the log files.
4. Locate and examine the following log files:
   - **Apache Accesslog**: Documents all requests to the webserver and its resulting state.
     Located in: [iQ-WEB installation folder]\Apache\logs\access.YYYY-MM-DD.log
   - **Apache ErrorLog**: Documents all operational status information of the webserver and its modules based on the configured log level.
     Located in: [iQ-WEB installation folder]\Apache\logs\errors.YYYY-MM-DD.log
   - **PHP ErrorLog**: Documents all PHP runtime errors that occur based on the configured log level.
     Located in: [iQ-WEB installation folder]\Apache\logs\php_errors.log

NOTICE:
Apache log files are created on a daily basis.

NOTICE:
Logging data at higher levels can result in a large amount of data, especially when logging is enabled for a long period of time. It is strongly recommended that the log level be decreased or that logging is disabled after the troubleshooting process.

10.7.3 Database debugging

During the operation or configuration of iQ-WEB, the following issues may need to be resolved in MySQL:

- An invalid configuration results in the MySQL service not starting
- iQ-WEB states that a connection to the MySQL database cannot be established
- The MySQL service consumes a lot of resources and processing time during operations
- iQ-WEB slows down due to long MySQL response times

The following actions may help locate the origin of the issue and pinpoint a specific support request.

1. Enable the different logging stages of MySQL
   - Add the following options to the "mysqld" section in the "my.ini" file and set the appropriate values based on the descriptions below.

```
log-output=FILE
log-error="MySQL_error.log"
general-log=1
general_log_file="MySQL.log"
```

```
slow-query-log=1
slow_query_log_file="MySQL_slow.log"
long_query_time=10
```

- The "Error Logging" section allows a filename to be specified where MySQL will log status messages about errors, warnings, and notices.
- The section starting with "general-log" allows the MySQL general query log to be enabled by setting its value to 1 and specifying a filename for the "general_log_file." The resulting log will contain all queries made in all database connections to the server.
- The section starting with "slow-query-log" allows the user to enable the slow query log of MySQL by setting its value to 1 and specifying a filename for the "slow_query_log_file". The resulting log contains all slow queries made in all database connections to the server if the response time of the system exceeds the "long_query_time" value (seconds).

2. Restart the MySQL service after saving the changes to the MySQL configuration file.

3. Try to reproduce the issue to ensure that it is documented in the log files.
   - Locate and examine the log files named in the MySQL configuration. These will be located in the MySQL data directory.

For a detailed description of the logging settings in the MySQL configuration, refer to the documentation at the official MySQL site "http://dev.mysql.com/doc/#manual."

NOTICE:

Detailed logging of MySQL operations can result in a large amount of data, especially when logging is enabled for a long period of time. It also decreases the overall performance of the server per operation. Therefore, it is strongly recommended that the log level be decreased or that logging is disabled after the troubleshooting process.

10.7.4 iQ-WEB debugging

During the operation or configuration of iQ-WEB, the following issues may need to be resolved:

- An invalid configuration results in iQ-WEB not starting
- DICOM communication is interrupted because of failures
- General application errors occur
- iQ-WEB license errors occur.

The following actions may help locate the origin of the issue and pinpoint a specific support request.

1. Increase the level of the log output
   - Log into iQ-WEB as an administrator.
   - Go to the "Tools" page and locate the "System" tab in the iQ-WEB web interface and switch the log level to "Debug" as shown in section 10.3.3.1.2.

2. Try to reproduce the issue to ensure that it is documented in the log files.

3. View the log in the iQ-WEB web interface ("Tools\Today's Log") or locate and examine the current day's log file(s) at the configured log path for iQ-WEB. This is typically found in C:\Program Files (x86)\iQ-WEBX\PACS\log\[AETitle] where "[AETitle]" matches the name of the AE Title for iQ-WEB. This daily log contains operational state information about iQ-WEB and information about DICOM communication. The log file names use the following naming convention: iQ-WEBX-[Weekday].log. The log folder also contains several other extra log files for special purposes like email notifications, purging, and auto conversion of information.

NOTICE:

iQ-WEB log files are created daily and are split if they exceed the default 100 MB size limit. If the log exceeds this limit, new numbered files will be created to continue logging for the day

NOTICE:

Logging data can result in a large amount of data especially when logging is enabled for a long period of time. It is strongly recommended that the log level be decreased or that logging be disabled after the troubleshooting process.

10.7.5 DICOM debugging

This section contains a checklist for tracking DICOM connection issues using iQ-WEB as a participant.

1. To exclude any general networking issue as the origin of a DICOM issue, follow the advice in section 10.7.12.
2. Verify that a valid license is installed for iQ-WEB.
3. Verify that all network adaptors used for communication are running and correctly installed.
4. If wired connections are used, verify the correct connection of the cables.
5. Verify the correctness of all AE Title and port configurations of all participating nodes used and send a DICOM ECHO in all communication directions.

For details about the DICOM compliance of iQ-WEB, refer to the DICOM Conformance Statement contained in the iQ-WEB installation.

10.7.6 Integration

10.7.6.1 Transcription

Setup transcription feature of iQ-WEB requires a few prerequisite steps to take to ensure full functionality.

1. A licensed copy of Microsoft Word Version 2003 or above must be installed on the machine iQ-WEB is installed on with COM/OLE automation feature enabled.

2. The PHP extension "com_dotnet" must be enabled in the PHP configuration. To achieve this, follow the steps below:

- Open the "php.ini" configuration file and locate the last call similar to the pattern "extension=".
- Add line "extension=php_com_dotnet.dll" below the last entry, if not already exists. By default iQ-WEB already adds this line.
- Add following lines to configure the extension correctly, if not already exists.

```
[COM]
...
com.allow_dcom = true
...
com.autoregister_typelib = true
```

Due to the fact that the iQ-WEB server is using Microsoft Word by default in "System" user context and the user rights management some machines may show up the following issue:

- If the transcription feature is used by clients several Word processes are started and left open.

To solve this issue it is necessary to log into the Windows server as an administrator and create a "Desktop" named folder in the following Microsoft Windows system folders:

- %WINDOWS%\System32\config\systemprofile
- %WINDOWS%\SysWOW64\config\systemprofile

10.7.6.2 Data consistency

To ensure data consistency of DICOM data delivered to iQ-WEB from various sources, there are several options for correcting the data:

NOTICE:

To effectively achieve data consistency in a PACS like iQ-WEB, it is best to configure the DICOM modalities and other DICOM application entities in a consistent manner. Then test the configuration with sample data similar to the actual data that will be used.

1. Receiving DICOM data that does not contain a tag or contains an empty tag Patient ID (0010,0020) can lead to some empty views in iQ-WEB. To solve this issue iQ-WEB offers an advanced configuration. Add the following registry key to iQ-WEB registry structure.
   [LM_SOFTWARE]\IMAGE Information Systems Ltd.\iQ-WEBX\[AE Title]
   "ReplaceNullPatientId" with value 1(Type: RegDWORD 32 bit)
   This replaces the empty or missing tag with the value of the tag Study Instance UID (0020,000D) which is mandatory according to the DICOM standard. Refer to chapter 9 for more details about the registry structure of iQ-WEB.

2. iQ-WEB also offers the coercion feature to correct DICOM data according to configured rules. For detailed information about how to use the coercion feature refer to the iQ-WEB Instructions for Use.

3. Another way of correcting patient and study metadata is the Patient- and Study-reconciliation feature. It corrects the data in comparison to a DICOM modality worklist. For detailed information refer to section 10.4.2.9 "Worklist" and the iQ-WEB Instructions for Use.

4. The most flexible and performant way to correct DICOM data according to configured rules is the product iQ-ROUTER which can be set up to act as an intermediate link between sending DICOM station and iQ-WEB.

NOTICE:
iQ-WEB also offers a tool to examine the raw header data of DICOM data sets. Users can navigate to the images view in the web interface and inspect an overview or detailed header dump of the selected DICOM dataset. This is a powerful tool to verify the consistency of DICOM data.

10.7.6.3 Network

This section contains suggestions for integrating iQ-WEB into a network environment and advice on debugging specific issues.

1. To identify any networking issues, refer to the logs of all DICOM software involved in the workflow. For usage of the iQ-WEB log, refer to sections 10.7.2, 10.7.3, and 10.7.4. Set the logs to the highest available level to receive more detailed information.

2. To check the network configuration of all participating machines, use the Windows command line tool "ipconfig." Using this tool, the hostname, IP, and subnet configurations can be validated to match the iQ-WEB configuration.

3. It is recommended that the Windows command line tools "ping" and "telnet" be used to check the accuracy of the IP, hostname and Port configuration, and to ensure that no intermediate network node is interrupting network communication.

NOTICE:
A fully reliable and stable network infrastructure is essential to attain all the benefits of iQ-WEB.

4. It is recommended that the server's firewall configuration be checked to ensure smooth network communication. The following rules are recommended on the iQ-WEB server:

   - Allow incoming and outgoing TCP connection for the configured DICOM Port (default: 1234)
   - Allow incoming and outgoing TCP connection for the configured web interface Port (default http: 80 or default https: 443)
   - Allow incoming and outgoing TCP connection for the MySQL Port
     This is only necessary if the database is installed on a separate machine. (default: 3306)

NOTICE:

The only incoming and outgoing TCP connection allowed on client machines should be the web interface port.

5. If hostnames are used instead of fixed IP addresses throughout the iQ-WEB configuration, ensure that the DNS server response times are low and the response is always accurate. Otherwise, an optimal iQ-WEB performance cannot be guaranteed.

6. If IPv4 or hybrid IPv6/IPv4 networks are used, there may be delays when accessing the web interface directly on the server where iQ-WEB is installed. If this issue occurs, it may be solved by changing the Windows host file configuration of the server to directly map IP address 127.0.0.1 to the "localhost" hostname. The host file configuration can be found by default in c:\Windows\System32\drivers\etc\hosts.

For detailed instructions, contact your local IT administrative personnel.

10.7.7 Virtualization environment and distributed systems

Modern operating systems offer the capability to work in a virtualized environment. This can make maintenance and backup tasks more reliable and easy to achieve. iQ-WEB itself can have its tasks distributed across multiple servers. (E.g. put the iQ-WEB installation and DICOM storage on two separate machines.) In this section, the advantages and disadvantages of running iQ-WEB in a virtual environment are discussed and general advice is given.

The main advantage of virtual machines (VMs) is the independence of the physical environment. Linux may serve as the host's main operating system while Windows runs in a virtual environment on the same server. Windows is required to be the operating system on the virtual machine running iQ-WEB. Working with a cluster of servers as the host, the virtual environment is even more reliable, and hardware changes are possible with virtually no PACS downtime. With the ability to create snapshots of virtual machines, these systems offer an integrated backup solution.

Keep in mind that the host system for the virtual machine must be more powerful than a dedicated server since at least two operating systems will be running on the same hardware. They share resources such as disk-space, IO times, RAM, CPU time, and network capacity. This becomes even more critical in cases where multiple virtual machines share the same physical hardware. It is also important to keep in mind that if components like the database, storage, and the iQ-WEB installation are distributed over multiple VMs, the work load on the network infrastructure between them will be elevated, in addition to the normal traffic on the network serving the clients.

Because of hardware sharing, the use of virtual machines is not recommended for installations with lots of DICOM traffic, unless the host is powerful enough to serve all storage and retrieve requests within a reasonable time.

10.7.8 Thumbnail and image generation

iQ-WEB modules extracts thumbnails and full resolution images out of the raw DICOM files in a format convenient for web interfaces. These images are used in the following places:

- iQ-WEB image view, online image processing view, image matrix view (Refer to the iQ-WEB Instructions for Use)
- iQ-X thumbnail bar (Refer to the iQ-X Instructions for Use)
- iQ-WEB's series page and image page on mobile devices (Refer to the iQ-WEB Instructions for Use)

Due to a large variety of DICOM image compression formats, iQ-WEB may not be able to extract the data due to compatibly issues with the data storage algorithms used. The following steps show how to identify and help debug this issue.

When navigating to the specific image view, an error sign will appear instead of the preview image.

To get information about the error generated, move the mouse over the image and a text will appear that displays the error description.

NOTICE:

This method of identifying the issue also works if the iQ-X module does not show the correct images in the thumbnail bar and the mobile iQ-WEB interface does not show images on its pages.

If the error is related to the image and compression format, refer to the "Medical Image Data Compression Guide" for detailed information.

10.7.9 Accessing iQ-WEB without using the mobile interface

Administrators may want to access the iQ-WEB interface to perform maintenance or configuration tasks from everywhere, including on mobile devices. However, accessing the interface from mobile devices usually opens the mobile GUI that does not cover all menu items available in the usual iQ-WEB web interface.

As a consequence, administrators may need to avoid the mobile interface.

On mobile devices the mobile web interface of iQ-WEB will be activated by default in case the user agent of the used browser contains one of the following strings:

- "iPhone"
- "Android"
- "webOS"
- "BlackBerry"
- "Nokia"
- "SonyEricsson"
- "iPod"
- "iPad"
- "Mobile"
- "Windows Phone"
- "PlayBook"
- "Kindle"

This implies that for administrative tasks on mobile devices the user agent of the used browser has to be changed. In general that can be achieved by using a browser plugin or by using 3rd party browsers.

10.7.10 Accessing iQ-WEB from mobile device does not start the mobile interface

In some cases it may happen that accessing iQ-WEB via a mobile device does not start the mobile interface. This might be caused by different reasons.

- Missing license for iQ-WEB
  Ensure that the license was installed correctly. Refer to section 6.2 in this administration guide for instructions on how to activate the product.

- Wrong user agent string
  It might be possible that a user agent switcher is active and a "non-mobile device" user agent is used. The mobile interface will only be used if the user agent of the used browser contains one of strings listed in section 10.7.9.

10.7.11 License troubleshooting

This section describes how to identify issues with the licenses of iQ-WEB and its modules.

10.7.11.1 Core license

An invalid iQ-WEB core license can be recognized by the following events and states:

- The Application Log in Windows Event Viewer contains an error after (re)starting the iQ-WEBX service - "Invalid license information or license has expired."
- Windows process manager (in Task Manager) shows fewer processes containing the name "iQ-WEBX" than expected. With a valid license, the following processes should be visible:
  - "iQ-WEBXSrv.exe"
  - "iQ-WEBX.exe"
- No DICOM connection can be established from or to iQ-WEB (except C-ECHO).
- The iQ-WEB webpage footer contains an expiration warning.

NOTICE:
If an administrative email address and an SMTP server are set up correctly, iQ-WEB will send license expiration warnings.
(Refer to sections 10.4.2.5 "Global settings" and 10.4.3 "Setting up an SMTP server for email" for configuration.)

Reasons for an invalid iQ-WEB core license are as follows:

- License exceeds its limitations

- Time limitation (if Trial, Demo or time-limited full license)
- Number of images (if Trial)
- Number of AE titles
- Number of installed instances (default: 1)

- License file was not installed correctly
- Wrong type of license was ordered
- Too many hardware components on the machine changed
- The network configuration of the machine changed
- The time or date of the machine was changed

For detailed instructions or help on licensing issues, contact your local reseller or license@image-systems.biz.

10.7.11.2 iQ-X license

An invalid iQ-X license can be recognized by the following events and states:

- The "EasyWEB" page and other "Views" do not display the "Show" button as enabled
- The "EasyWEB" page does not display the "👁" icon for each study
- iQ-X REPORT EDITOR cannot be opened in iQ-X
- After navigating the iQ-WEB web interface to the "License" tab of the "Tools" page, the corresponding section of that page contains information about a license expiration.

NOTICE:

If iQ-X is used with concurrent licensing, users may not be able to log in if the number of current active users exceeds the number of concurrent users in the license. This does not invalidate the license! As soon as the number of active users drops below the limit, logging in will be possible again. For extending the number of concurrent users, contact your local reseller or license@image-systems.biz.

Reasons for an invalidated iQ-X license are as follows:

- License exceeds its limitations: Time limitation (if Trial, Demo or time-limited full license)
- License file was not installed correctly
- Wrong type of license was ordered
- Too many hardware components on the machine changed
- The time or date of the machine was changed

For detailed instructions or help on licensing issues, contact your local reseller or license@image-systems.biz.

10.7.11.3 WADO interface licenses

An invalid license for the optional WADO interface can be recognized by the following events and states:

- If a user tries to access the following feature pages, a white page or error message appears:
  - The WADO link generator of iQ-WEB WADO interface is not accessible.
  - WADO calls to iQ-WEB lead to the above described behavior.
- After navigating the iQ-WEB web interface to the "License" tab of the "Tools" page, the corresponding section of that page contains information about a license expiration.

Reasons for an invalid WADO license can be:

- License exceeds its limitations
  - Time limitation (if Trial, Demo or time-limited full license)
- License file was not installed correctly
- The PHP configuration does not include the required SourceGuardian extension

NOTICE:

To prove that the SourceGuardian configuration is working correctly, navigate to "Tools" → "System" and access the link next to the Apache status display. This will display an informational page that lists various settings used by Apache.
(Refer to section 10.3.3.1.1 for details.)

- Too many hardware components on the machine changed
- The network configuration of the machine changed
- The time or date of the machine was changed

For detailed instructions or help on licensing issues, contact your local reseller or license@image-systems.biz.

10.7.12 Network troubleshooting

iQ-WEB and its components strongly rely on the underlying network infrastructure. For this reason, inconsistently configured or undersized network configurations may lead to delays when using iQ-WEB and its components and modules. This section will specify techniques to identify and fix common issues found in certain network architectures.

10.7.12.1 Hostname resolution

iQ-WEB strongly relies on a complete hostname resolution within the network in which it is running. This applies to both the server and the client and is especially important in hostname based features like using the iQ-VIEW call. Inconsistent DNS configuration can result in delays when using iQ-WEB. To identify such issues, follow the instructions below and contact the local IT administrators.

- Open a windows command line interface on a client machine that is experiencing delays.
- Retrieve the hostname by executing the following command:
  `"hostname"`
- Test resolving the IP address of this host by typing the following command where "MY_CLIENT_HOSTNAME" is the hostname of the client. Measure the response time:

"nslookup MY_CLIENT_HOSTNAME"

If the response time equals the same delay of iQ-WEB, there is a timeout issue with the local DNS service.

- Repeat the same command using the hostname of the server and measure the response time.

  "nslookup MY_SERVER_HOSTNAME"

  If the response time equals the same delay of iQ-WEB, there is a timeout issue with the local DNS service.
- Compare the response times of executing the ping command to the iQ-WEB server using the Hostname and then the IP address of the server.

  "ping MY_SERVER_HOSTNAME"

  "ping MY_SERVER_IP"

  If there is a time difference between both ping response times similar to the experienced delay, there is a timeout issue with the local DNS service.

10.7.12.2 IPv6 compatibility

Currently iQ-WEB and its components are not fully IPv6 compliant. For this reason, a working IPv4 configuration is mandatory to use iQ-WEB. Due to the fact that modern operating systems prepare IPv6 as primary network interface, iQ-WEB instances installed on such systems may experience delays or slowness when accessing the web interface pages in a browser.

To solve these delays, follow the steps below on the iQ-WEB server where MySQL is installed:

- Stop the Apache, iQ-WEBX, and MySQL services in this order.
- Locate the MySQL configuration file named "my.ini". The default location of "my.ini" in 64 bit installations of MySQL is: C:\Program Files\[MySQL installation folder]\MySQL Server 5.7).
- Open the file in a text editor (like Notepad) and locate the "Server Section" marked with the following string:

  "[mysqld]"
- Below this section, add the following option in a new line. (Don't include the quotes.):

  "bind-address=::"
- Save and close the file.
- Restart the MySQL, iQ-WEBX, and Apache services in this order.
- Verify the working state of iQ-WEB by logging into the web interface and checking the current log display.

10.7.13 Changing the default 256 character path limitation in Windows 10

In rare cases images may not be received, sent or opened in the viewer. In this case, if the log file contains a note indicating that the maximum path length is exceeded, you should follow the steps below.

⚠ WARNING:

Problems caused by improperly editing the Windows registry can make your computer operating system unusable. Microsoft provides a wealth of important information in the

Microsoft Knowledge Base that you need to know about the registry. Keep in mind that you use Microsoft Registry Editor only at your own risk. Make sure that you have backed up the registry before. You can find additional information about the registry in the Help topics in the Microsoft Registry Editor.

H.-No.: 1.1.1 - 1.1.4, 1.2.1, 1.2.3

1. Log in to the system with Administrator privileges.
2. Go to Windows Start and type REGEDIT.
3. Choose the Registry Editor.
4. In the Registry Editor, navigate to the following location: `HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\FileSystem`.
5. Select the entry named: *LongPathsEnabled*.

   Note: If the registry key does not exist, you can add the entry by doing the following:

   1. With the FileSystem folder selected, right-click in the empty space of the *Name* column where the registry keys are located.
   2. Select *New*.
   3. Choose the *DWORD (32-bit) Value*.
   4. Right-click the newly added key and choose *Rename*.
   5. Name the key *LongPathsEnabled*.
   6. Press *Enter*.

6. Double-click on the *LongPathsEnabled* entry to open the key.
7. In the *Value* data field, enter a value of 1. This will enable to long paths option.

The registry key's value will be cached by the system (per process) after the first call to an affected Win32 file or directory function. In order for all applications on the system to recognize the value of the key, it is recommended to restart your computer as some processes may have started before the key was set.

Furthermore, you control the registry key via the Group Policy in Computer Configuration → Administrative Templates → System → Filesystem → Enable NTFS long paths.

10.7.14 Low PACS performance

A smooth PACS performance is always dependent on an optimal configuration. Therefore, it is necessary that you keep an eye on the core configuration, including PHP and MySQL, described in section 10.1.
Possible causes for performance issues:

1. The default size of the MySQL memory is too small. Check the memory size in the MySQL settings. The recommended innodb_buffer_pool_size is 80% of the machine's physical memory size on a dedicated database server. Find more details in section 10.1.3 under *innodb_buffer_pool_size*.
2. The default value of the memory_limit and the post_max_size in the PHP settings is too low for your demands. For more information on how to increase these values, see section 10.1.2.

11 Abbreviations and acronyms

Abbreviation	Meaning
AE	Application Entity
AES	Advanced Encryption Standard
AET	Application Entity Title
ANSI	American National Standards Institute
ASCII	American Standard Code for Information Interchange
C-ECHO	DICOM command for verifying the DICOM connection between devices
C-FIND	DICOM command for search of studies
C-MOVE	DICOM command for move of studies
CBC	Cipher Block Chaining
COM	Component Object Model, is a binary-interface standard for software by Microsoft
CPU	Central Processing Unit
DHCP	Dynamic Host Configuration Protocol
DICOM	Digital Imaging and Communication in Medicine
DNS	Domain Name System
EEA	European Economic Area
EEC	European Economic Community
GUI	Graphical User Interface
HIMSS	Healthcare Information and Management Systems Society
HIPAA	Health Insurance Portability and Accountability Act
HIS	Hospital Information System
HTML	Hyper-Text Mark-up Language
HTTP	Hyper Text Transfer Protocol
HTTPS	Hyper Text Transfer Protocol Secure
ID	Identifier
IO	Input-Output
IP	Internet Protocol
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
ISO	International Standards Organization
IV	Initialization Vector
JPEG	Joint Photographic Experts Group
LDAP	Lightweight Directory Access Protocol

Abbreviation	Meaning
LDAP CN	Lightweight Directory Access Protocol Common Name
LDAP DN	Lightweight Directory Access Protocol Distinguished Name
LDAP RDN	Lightweight Directory Access Protocol Relative Distinguished Name
LLTT	Limited Life Time Token
MIS	Medical Information System
MOVE SCU	C-Move as Service Class User
NEMA	National Electrical Manufacturers Association
OLE	Is an inter-process communication mechanism created by Microsoft
PACS	Picture Archiving and Communication System
PHP	PHP: Hypertext Preprocessor
Q/R SCP	Query/Retrieve as Service Class Provider
Q/R SCU	Query/Retrieve as Service Class User
RAM	Random Access Memory
RIS	Radiology Information System
SCP	Service Class Provider
SCU	Service Class User
SSL	Secure Sockets Layer
STORE SCP	DICOM store as Service Class Provider
STORE SCU	DICOM store as Service Class User
STORAGE COMMITMENT SCP	DICOM store as Service Class Provider
STORE COMMITMENT SCU	DICOM store as Service Class User
TCP	Transmission Control Protocol
UI	Graphical User Interface
UID	Unique identifier
WADO	Web Access to DICOM Persistent Objects

12 List of shortcuts

Not applicable.

13 Annex

13.1 Acceptance tests – Checklist

In order to ensure the faultless running of iQ-WEB, it is necessary to perform system acceptance tests before using the system productively.

Such acceptance tests should be performed:

1. Before placing the system into operation for the first time, i.e. after installing and configuring iQ-WEB.
2. After every substantial configuration change, e.g. hardware or software changes, when a new DICOM node is added, the license is changed or renewed, data storages are extended or moved etc.
3. Every quarter, unless the national regulations in your country require more frequent intervals.
4. After power supply failures.
5. After disaster recoveries.

In the following you find a checklist with the recommended iQ-WEB acceptance tests. You may use this checklist to document your performed acceptance tests. Print out the checklist and fill in your results.

Checklist:

#	Test (description)	Person respon-sible	Test result		
			Passed	Failed	Skipped
License checks					
1.	The iQ-WEB software license has not expired. The license will expire on: _____	Admin	☐	☐	☐
2.	The license covers the number of DICOM nodes (AE titles) that need to be connected to iQ-WEB. Number of AE titles allowed: _____	Admin	☐	☐	☐
3.	If WADO interface is required for the intended workflow: The WADO license has not expired. The license will expire on: _____	Admin	☐	☐	☐
System configuration checks					
4.	The hard disk, on which the iQ-WEB databases are stored, is encrypted.	Admin	☐	☐	☐
5.	All storage devices, on which the image and report data will be stored, are encrypted.	Admin	☐	☐	☐
6.	The following exceptions are set in the antivirus program installed on the iQ-WEB server (if possible):				
	▪ Exception for the iQ-WEBX installation folder.	Admin	☐	☐	☐
	▪ Exceptions for the short-term and long-term archive folders.	Admin	☐	☐	☐
	▪ Exceptions for the following processes: iQ-WEBX.exe, iQ-WEBXSrv.exe and LicGen.exe.	Admin	☐	☐	☐
7.	Automatic daily backups of the image data on all data storage devices are arranged.	Admin	☐	☐	☐
8.	Automatic daily backups of the iQ-WEB databases (MySQL) are arranged. (Where not possible, a procedure to manually perform monthly backups should be in place.)	Admin	☐	☐	☐
User management checks					
9.	Every user has his/her own user account.	Admin	☐	☐	☐
10.	The permissions granted to all user accounts correspond with the institution's requirements of the respective user role.	Admin	☐	☐	☐
11.	Every user can perform all required actions and access all allocated data with his/her user account. (Perform at least random tests.)	Admin	☐	☐	☐

#	Test (description)	Person respon-sible	Test result		
			Passed	Failed	Skipped
Performance checks					
12.	MySQL and PHP configuration was done according to your requirements. See chapter 3, installing the software.	Admin	☐	☐	☐
13.	Transmit a typical study from every sending modality to iQ-WEB. The data is received completely and stored in the intended storage.	Admin	☐	☐	☐
14.	Log in to the iQ-WEB web interface. The time until the next user interaction is possible is ≤ 3 sec.	Admin	☐	☐	☐
15.	Search for today's list of studies on the EasyWEB page. The results are shown within 3 sec.	Admin	☐	☐	☐
16.	Query iQ-WEB from every receiving DICOM node (e.g. workstation) and retrieve data.				
	It takes ≤ 10 sec to retrieve 1.000 frames in multi-frame objects (within the LAN).	Admin	☐	☐	☐
	It takes ≤ 30 sec to retrieve 1.000 single-frame images (within the LAN).	Admin	☐	☐	☐
17.	The image quality of the retrieved images is sufficient to allow for diagnostic reading (e.g. images not cut off, no artifacts or limitations in number of gray-scale shades).	Physician	☐	☐	☐

Remarks:

Date of acceptance test: _____

Reason for acceptance test: _____

_____

After evaluating the results of the acceptance test, the iQ-WEB 6.7.3 system is:

☐ Approved for productive use ☐ Not approved for productive use

Signed by: _____ _____

Name: Physician

Name: PACS/IT Administrator

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