

Inobitec Web DICOM Viewer Version 2.4

# USER'S MANUAL

**OD**

Examination parameters: G, TOP, Pulsar, White/White, Pulsar  
 Refraction, lens (S/C/A), pupil: -, -, 4.8 mm

False Positives/Negatives: 0% (0/4), 0% (0/3)  
 Duration, questions/repetitions: 02:35, 69/1  
 Fixation control: Off

Grayscale (CO) Defect Curve

Comparisons Probabilities

Reliability and indices:  
 MD: [src]: 2.7 (p < 10%)  
 sLV: [src]: 6.5 (p < 5%)  
 DD: [src]: -0.5 (p > 10%)  
 LD: [src]: 4.4 (p < 5%)

Stimulus: White, Pulsar, Pulsar, 200 asb, 500 ms  
 Background: White 100 asb  
 Grayscale (CO): Defect % of normal  
 Comparisons & Corrected Comparisons = Defect < 5 [src] Absolute defect  
 Probabilities & Corrected Probabilities = p > 5% (p < 5%) = p < 2% (p < 1%) = p < 0.5%



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# About this Manual

This User Manual describes the functionality of «Inobitec Web DICOM Viewer» (version 2.4) and provides instructions on how to use this software product.

## Accepted Conventions

Names of program interface elements, key names and important notes are printed in **bold**.  
Image captions are printed in *italics*.

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# Technical Support

Technical support of «Inobitec Web DICOM Viewer» users is provided by the Inobitec, LLC team. If you apply for technical support, please include the following information in your message:

- your computer OS name, version and bitness (you can get this information from your system administrator);
- ypu operating system version from which a client connects to the server (you can get this information from your system administrator);
- product version.

To apply for technical support, or if you have any further questions or comments, please email us at [support@inobitec.com](mailto:support@inobitec.com)

# About the Product

The «Inobitec Web DICOM Viewer» is a client-server software. A web browser can be used as a client. Since all resource-intensive operations are performed on the server, the system requirements on which the client is installed are rather low. The «Inobitec Web DICOM Viewer» is intended for use in an infrastructure that uses one or more powerful servers and workstations whose resources are sufficient for the full functioning of modern web browsers.

The «Inobitec Web DICOM Viewer» software product is intended for viewing, analyzing and printing medical data obtained from various DICOM equipment (modality). The product is deployed on diagnostic workstations and integrated with DICOM servers. The Web DICOM Viewer propels the capabilities of diagnostics to a new level and makes it possible to detect pathological conditions timely and efficiently, predict their development and plan their elimination.

The «Inobitec Web DICOM Viewer» software product and installer does not:

- collect and transfer confidential user information;
- intercept network traffic;
- show ads;
- send spam;
- show messages not related to work;
- automatically update itself without notifying the user.

After uninstalling you do not need to restore your operating system and browser settings. Uninstalling is free of charge. Uninstalling does not adversely affect the operation of the computer and installed software. Files not related to the Web DICOM Viewer are not removed and changed after uninstalling. The Web DICOM Viewer functionality, installing, uninstalling, licensing are fully described in this User Manual on the website [inobitec.com](http://inobitec.com). License Agreement is available from the link [inobitec.com/eng/about/webviewerLic/](http://inobitec.com/eng/about/webviewerLic/).

«Inobitec Web DICOM Viewer» consists of the five microservices:

1. **Control Node** — This is the main node with which the user interacts. It provides static data (html-pages) to the user, provides authorization and authentication of the user, and is a gateway when performing operations with the research repository and rendering servers.
2. **Storage Node** responsible for the storage of DICOM research. It requires a database (PostgreSQL) and hard disk space to store user research. Depending on the configured configuration, Storage Node can provide both independent research storage and use Inobitec DICOM Pacs for this.



3. **Render Node** provides data visualization. The minimum system requirements for the server on which this microservice is deployed are indicated in the section **System Requirements**.
4. **User Node** provides storage of user settings. Only a database (PostgreSQL) is needed for its operation.
5. **DICOM PACS Adapter** provides interoperability with external systems that support the DICOM network protocol. Through the microservice, you can search for studies, series and images, download files from and to DICOM servers More in the section **Integration with the DICOM Server**.

Each of these microservices performs a specific function. Deployment of microservices can occur both on one server, and on different.

## Web DICOM Viewer Functionality

### INOBITEC Products Comparison Table

Function	Lite	Pro	Web
View flat images with the following options:	✓	✓	✓
rotate, pan, zoom, mirror	✓	✓	✓
change window width and level	✓	✓	✓
view several images or a series of images simultaneously, and synchronize scrolling automatically	✓	✓	✓
automatic filling tab windows with the series	✓	✓	
calibrate image size	✓	✓	✓
show image scout lines on other series images	✓	✓	✓
measure length, angles	✓	✓	✓
play series images subsequently as a movie	✓	✓	✓
choose image resampling filter in the Flat Images View window	✓	✓	
add comments, labels and various graphic elements on images	✓	✓	✓
measure Cobb angles and intensity at a certain point or in a certain area	✓	✓	✓
export images to a graphic file	✓	✓	
export images to a new series of DICOM images	✓	✓	✓
DSA (Digital Subtraction Angiography)	✓	✓	
Cerebral Perfusion	✓	✓	
edit CLUTs	✓	✓	

Function	Lite	Pro	Web
browse DICOM image tags	✓	✓	✓
Diffusion Tensor Imaging (DTI) support		✓	
calcium scoring		✓	
View three-dimensional tissue reconstruction with the following options:	✓	✓	✓
rotate, pan and zoom the model	✓	✓	✓
view scaled-down multiplanar reconstruction of the series simultaneously (with automatic synchronization)	✓	✓	
remove bone tissue	✓	✓	
cut the outside and inside parts of the model	✓	✓	✓
MIP (Maximum Intensity Projection)	✓	✓	
measure length, angles	✓	✓	
export the model to a graphic file	✓	✓	
export the model to a new series of DICOM images	✓	✓	✓
export of several images obtained by rotating the model to a graphic file	✓	✓	
export of several images obtained by rotating the model to a new series of DICOM images	✓	✓	
switching projection	✓	✓	
add markers and line markers		✓	
build the surface by the model		✓	
segmentation		✓	
View multiplanar reconstruction with the following options:	✓	✓	✓
view axial, frontal and sagittal sections of tissue	✓	✓	✓
rotate cutting planes in space	✓	✓	✓
3D view	✓	✓	✓
measure length, angles	✓	✓	✓
build a section of a spatial model by a random surface		✓	
export sections of any of the planes with a selectable increment to a series		✓	
add markers and line markers		✓	
segmentation		✓	

Function	Lite	Pro	Web
mixed RGB colors Fusion		✓	
Virtual endoscopy (viewing the inner surfaces of cavities in tissues) with the following options:		✓	
automatically and manually navigate the inside a cavity		✓	
build cavity surfaces		✓	
view scaled-down multiplanar reconstruction of the series simultaneously (with automatic synchronization)		✓	
Merge series with the following options:		✓	
remove bone tissue for DualScan and DualEnergy studies		✓	
build three-dimensional models based on multiple series of images of the same tissue in different modes		✓	
quickly switch to a full-scale view of three-dimensional reconstruction, multiplanar reconstruction and virtual endoscopy of the model built by merging series		✓	
stitch images		✓	
View electrocardiogram with the following options:	✓	✓	
measure time intervals and values on graphs	✓	✓	✓
using filters		✓	✓
export images to a new series of DICOM images		✓	✓
Print images on paper or film using a DICOM printer with the following options:	✓	✓	
adding reference images	✓	✓	
exporting pages to the PACS server for printing	✓	✓	
adding logo	✓	✓	
The opportunity to view several types of data in one window simultaneously: flat images, volume reconstructions, MPR, ECG, video, PDF documents and structured reports			✓
Synchronization of windows of the same study by window level and width, move, rotation and zoom			✓
Open studies by dragging and dropping on the program icon	✓	✓	
Transformation indicators in the series window with an opportunity to undo the transformations			✓
Open/save file using Native OS dialogs	✓	✓	

Function	Lite	Pro	Web
Set up the interface and the Web DICOM Viewer functionality with the capability to export and import the settings configuration	✓	✓	
Tool control with the left, the right and the middle mouse buttons	✓	✓	✓
High resolution monitor support	✓	✓	✓
View DICOM tags in a separate window	✓	✓	✓
Viewing DICOM tags in a window next to the series window with flip synchronization			✓
DICOM data support and presentation in PDF files			✓
Structured reports support and presentation			✓
Minimize application window to system tray	✓	✓	
Integrated help system	✓	✓	
Create series display templates for various modalities	✓	✓	
Write data to CD, DVD and flash cards	✓	✓	
Integration with PACS servers	✓	✓	✓
Store data in a local storage	✓	✓	✓
Work as a PACS server, support C-FIND and C-MOVE	✓	✓	
Save studies to the folder	✓	✓	
Edit patient name and study description on the Local Storage	✓	✓	
Anonymize studies and series	✓	✓	
PLY format surface import		✓	
Embedded WebViewer		✓	
Register images		✓	
Record video from viewing windows (only available on 64-bit builds)		✓	
Support and presentation of video in DICOM files			✓

«Pro» and «Lite» are the Inobitec DICOM Viewer editions. This is another product. More information can be found in the [Products](#) and [Downloads](#) pages.

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# Installing, Uninstalling and Launching the Program

## System Requirements

### Minimum System Requirements for Server:

**Operating system:**

- Windows version not lower than Windows 7 x64;
- Ubuntu 20 x64;

**DBMS:** PostgreSQL 9.6;

**RAM:** 16 Gb;

**free space on the disk:** 100 Mb (without space for the storage);

**processor:** clock frequency of 2,5 GHz;

**network card.**

### Minimum System Requirements for Client:

**RAM:** 2 Gb;

**processor:** clock frequency of 1,5 GHz;

**video card:** without hardware acceleration support;

**keyboard:** standard;

**mouse:** two-button with a scroll wheel;

**display:** resolution 1024x768;

**network card.**

## Installing and Uninstalling the Program on Linux

For correct operation of the software system, the **Control Node** microservice must have continuous access to the Internet.

### Preparation for the Installation

#### Dependencies installation

You must to install the following packages:

- **postgresql**
- **qt5-default**
- **openssl**
- **dcmtk**
- **libopenjp2-7**
- **libqt5sql5-psql**
- **webp**

To install the packages on Ubuntu, proceed as follows:

```
sudo apt install postgresql qt5-default openssl dcmtk libopenjp2-7 libqt5sql5-psql webp
```

### PostgreSQL DBMS Setting

After installation, set PostgreSQL DBMS. Open the terminal and launch the psql console utility for **postgres** users:

```
sudo -u postgres psql postgres
```

Provide a password to the **postgres** user:

```
ALTER USER postgres PASSWORD '<password>';
```

### Installation of one server with automatic deployment scripts

1. Set the following parameters in the */scripts/init.sh* file:

- **POSTGRES\_USER**: login for PostgreSQL DBMS (must be **postgres**);
- **POSTGRES\_PASS**: password for PostgreSQL (the password provided to the **postgres** user in [PostgreSQL DBMS Settings](#));

The parameters listed below may be applied by default.

- **POSTGRES\_HOST**: the IP address or the name of the PC on which the DBMS has been installed;
- **POSTGRES\_PORT**: the DBMS port;
- **DEST\_DIR**: the directory for Web DICOM Viewer installation;
- **LOG\_PATH**: the folder for keeping the log;
- **STORAGE\_PATH**: the folder for the local DICOM files storage;
- **CONTROL\_POSTGRES\_USER**: the login used by the Control Node microservice for access to the DBMS. The login is created automatically;
- **CONTROL\_POSTGRES\_PASS**: the password for the user specified in **CONTROL\_POSTGRES\_USER**;
- **CONTROL\_PORT**: the port used by the Control Node microservice;

- **STORAGE\_POSTGRES\_USER**: the login used by the Storage Node microservice for access to the DBMS. The login in the DBMS is created automatically;
  - **STORAGE\_POSTGRES\_PASS**: the password for the user specified in `STORAGE_POSTGRES_USER`;
  - **STORAGE\_PORT**: the Storage Node microservice port;
  - **RENDER\_PORT**: the Render Node microservice port;
  - **USERNODE\_POSTGRES\_USER**: the login used by the User Node microservice for access to the DBMS. The login in the DBMS is created automatically;
  - **USERNODE\_POSTGRES\_PASS**: the password for the user specified in `USERNODE_POSTGRES_USER`;
  - **USERNODE\_PORT**: the User Node microservice port.
2. Run the `/script/deploy_webviewer.sh` script as `sudo`. After successful installation, a message is displayed: "Installing WebViewer completed".

## Manual Installation on One Server

### Database Settings

1. Connect to the database:

```
sudo -u postgres psql postgres
```

2. Create users for the microservices and assign a password to each user:

```
CREATE USER control WITH PASSWORD '<password>';
CREATE USER storage WITH PASSWORD '<password>';
CREATE USER usernode WITH PASSWORD '<password>';
```

3. Create three databases for microservices and name them **control** (for **Control Node**), **storage** (for **Storage Node**) and **user\_node** (for **User Node**).

```
CREATE DATABASE control;
CREATE DATABASE storage;
CREATE DATABASE user_node;
```

4. Allocate database access rights to the users:

```
GRANT ALL PRIVILEGES ON DATABASE control TO control;
GRANT ALL PRIVILEGES ON DATABASE storage TO storage;
GRANT ALL PRIVILEGES ON DATABASE user_node TO usernode;
```

Disconnect from the DBMS by executing:

```
\q
```

### 5. Deploy databases:

```
psql -d control -f "sql/control_scheme.sql" -h 127.0.0.1 -p 5432 -U control -W
psql -d storage -f "sql/control_scheme.sql" -h 127.0.0.1 -p 5432 -U storage -W
psql -d user_node -f "sql/usernode_scheme.sql" -h 127.0.0.1 -p 5432 -U usernode -W
psql -d user_node -f "sql/usernode_data.sql" -h 127.0.0.1 -p 5432 -U usernode -W
```

## Server Deployment

Place the program files in an arbitrary folder, e.g.  
`/opt/inobitec/web-viewer/`.

1. After the program has been installed, the catalogue must contain the following files:

```
html/
ControlNode
StorageNode
RenderNode
DicomPacsAdapter
UserNode
controlnodeconfig.xml
storagenodeconfig.xml
rendernodeconfig.xml
dicompacsadapterconfig.xml
usernodeconfig.xml
vt_config.xml
font.ttf
```

If there are no configuration files, they must be created (see the [Configuration Files](#) section).

2. Create a system user, e.g. **webviewer**, to launch microservices.
3. Edit the **controlnodeconfig.xml**, **storagenodeconfig.xml** and **usernodeconfig.xml** configuration files by stating the parameters for the connection to the deployed database. The connection parameters must be specified in the **database** section.

You will find a detailed description of the configuration files in the [Configuration Files](#) section.

4. Provide a port for the system control node used by the Web DICOM Viewer users. The port is specified in the **port** section of the **controlnodeconfig.xml** file. Port 8090 is used by default.
5. Create a **storage** catalogue for the **Storage Node** microservice to store study files, e.g. `/var/opt/web-viewer/storage/`. The **webviewer** system user must have write permission to the catalogue created. In the **STORAGE\_DEVICE** table, provide the path to the catalogue in the **storage** database:

```
psql storage -h 127.0.0.1 -p 5432 -U postgres -W
```



```
insert into STORAGE_DEVICE( PATH, ENABLED, TYPE) values('/var/opt/web-viewer/storage/', TRUE, 1);
```

6. Create a catalogue for storing log files, e.g. `/var/log/web-viewer/`. The **webviewer** system user must have write permission to the catalogue created. Add the directory path to the configuration files for the nodes (**controlnodeconfig.xml**, **storagenodeconfig.xml**, **rendernodeconfig.xml**, **usernodeconfig.xml**) to the **logPath** parameter.

You will find a detailed description of the configuration files in the [Configuration Files](#) section.

## Launching the Server

To launch the server, launch all the microservices in the following order:

1. **StorageNode**
2. **RenderNode**
3. **UserNode**
4. **DicomPacsAdapter**
5. **ControlNode**

It is recommended to run applications in the background:

```
nohup /opt/inobitec/web-viewer/StorageNode &
nohup /opt/inobitec/web-viewer/RenderNode &
nohup /opt/inobitec/web-viewer/UserNode &
nohup /opt/inobitec/web-viewer/DicomPacsAdapter &
nohup /opt/inobitec/web-viewer/ControlNode &
```

## Installing and Uninstalling the Program on Linux as a Service

Attention! To use the method described, you need to install **systemd** as the system manager (included by default in most modern distribution kits).

1. Generate the service files by executing the **control\_node.sh**, **render\_node.sh**, **storage\_node.sh**, **user\_node.sh** dcripts from the **service** directory.

```
./control_node.sh > control-node.service
./render_node.sh > render-node.service
./storage_node.sh > storage-node.service
./user_node.sh > user-node.service
```

2. Set the path in the (fields **WorkingDirectory** and **ExecStart**) parameters (for the **control-node.service**, **storage-node.service**, **render-node.service** and **user-node.service** files). Set the user which starts the services (the **User** and **Group** fields).
3. Copy the **control-node.service**, **storage-node.service**, **render-node.service** and **user-node.service** files to the `/etc/systemd/system/` folder.

```
cp /opt/inobitec/web-viewer/control-node.service,storage-node.service,user-node.service,render-node.service /etc/systemd/system/
```

#### 4. Activate the copied services through **systemctl**:

```
sudo systemctl enable storage-node.service
sudo systemctl enable render-node.service
sudo systemctl enable user-node.service
sudo systemctl enable control-node.service
```

#### 5. To start the Web DICOM Viewer start **Control Node**, which will start the rest of the microservices:

```
sudo systemctl start control-node.service
```

## Performance Check

Check the status of the microservices through **systemctl**, by performing:

```
sudo systemctl status control-node.service
sudo systemctl status storage-node.service
sudo systemctl status user-node.service
sudo systemctl status render-node.service
```

## Stopping Microservices

To stop microservices through **systemctl**, execute the following:

```
sudo systemctl stop control-node.service
sudo systemctl stop storage-node.service
sudo systemctl stop user-node.service
sudo systemctl stop render-node.service
```

## Viewing Microservices Logs

There are two ways to view microservice logs:

1. Open **controlnode.log**, **rendernode.log** and **storage-node.log** files. The paths to the folders with the log files are provided in the configuration files, e.g. `/var/log/web-viewer/`.
2. With the help of standard Linux distribution software, with **systemd** through **journalctl**:

```
journalctl -u storage-node.service
journalctl -u render-node.service
journalctl -u user-node.service
journalctl -u control-node.service
```

## Installing and Uninstalling the Program on Windows

For correct operation of the software system, the **Control Node** microservice must have continuous access to the Internet.

## Preparation for the Installation

1. Install PostgreSQL on your PC and provide a login and a password to the DBMS administrator.
2. Make sure that the path to the **bin** folder, PostgreSQL DBMS, has been added to the **path** system environment variables.

## Installation on One Server with Automatic Deployment Scripts

1. Set the following parameters in the */scripts/init.bat* file:

- **POSTGRES\_USER**: login for PostgreSQL DBMS (must be **postgres**);
- **POSTGRES\_PASS**: password for PostgreSQL (the password provided to the **postgres** user in **PostgreSQL DBMS Settings**);

The parameters listed below may be applied by default.

- **POSTGRES\_HOST**: the IP address or the name of the PC on which the DBMS has been installed;
  - **POSTGRES\_PORT**: the DBMS port;
  - **DEST\_DIR**: the directory for Web DICOM Viewer installation;
  - **LOG\_PATH**: the folder for keeping the log;
  - **STORAGE\_PATH**: the folder for the local DICOM files storage;
  - **CONTROL\_POSTGRES\_USER**: the login used by the Control Node microservice for access to the DBMS. The login is created automatically;
  - **CONTROL\_POSTGRES\_PASS**: the password for the user specified in **CONTROL\_POSTGRES\_USER**;
  - **CONTROL\_PORT**: the port used by the Control Node microservice;
  - **STORAGE\_POSTGRES\_USER**: the login used by the Storage Node microservice for access to the DBMS. The login in the DBMS is created automatically;
  - **STORAGE\_POSTGRES\_PASS**: the password for the user specified in **STORAGE\_POSTGRES\_USER**;
  - **STORAGE\_PORT**: the Storage Node microservice port;
  - **RENDER\_PORT**: the Render Node microservice port;
  - **USERNODE\_POSTGRES\_USER**: the login used by the User Node microservice for access to the DBMS. The login in the DBMS is created automatically;
  - **USERNODE\_POSTGRES\_PASS**: the password for the user specified in **USERNODE\_POSTGRES\_USER**;
  - **USERNODE\_PORT**: the User Node microservice port.
2. Run the */script/deploy\_webviewer.bat* script as administrator. After successful installation, a message is displayed: "Installing WebViewer completed".
  3. Set the dependence of the launch of microservices on the DBMS. In the console as administrator, run the commands:
 

```
sc config ControlNode depend=postgresql-x64-12
sc config StorageNode depend=postgresql-x64-12
```

```
sc config UserNode depend=postgresql-x64-12
```

Example for the DBMS service **postgresql-x64-12**.

This sequence of actions provides an opportunity to avoid the situations when Web DICOM Viewer is launched before PostgreSQL server and stops operation as the database is unavailable. To check the version of the **postgresql** service installed on your PC, open the **Services** tab in the Task Manager.

4. Reboot the computer.

## Launching the Program

Open the administrator console by the link

```
http://<ip address>:8090/admin/index.html
```

where **port** is the port with the Control Node. By default, it is port 8090.

The following credentials are used by default:

User name: admin

Password: admin

Open the user console by the link

```
http://<ip address>:8090
```

where **port** is the port with the Control Node. By default, it is port 8090.

The following credentials are used by default:

User name: user

Password: user

## Integration with the DICOM Server

The Web DICOM Viewer software system can be integrated with DICOM servers. A special service, DICOM PACS Adapter, is used for this purpose. It adapts the DICOM Server interface to the Web DICOM Viewer interface. One DICOM Server is paired with only one PACS Adapter. If there are several DICOM Servers in the system, the same number of PACS Adapters must be provided. The connection settings for the DICOM Server are provided in configuration xml files (see the **Configuration Files** section). PACS adapters can be added to the system with the help of scripts or manually.

### Adding PACS Adapters on Linux

#### Adding PACS Adapters with the Help of Automatic Deployment Scripts

1. Set the following parameters in the `/scripts/init_pacs.sh`:

- **USER\_FRIENDLY\_NAME**: the DICOM server name displayed for the user;
- **PACS\_ADAPTER\_PORT**: the port for data transfer between the PACS Adapter and the Control Node microservice;
- **CONNECTION\_MODE**: the method of DICOM files transfer (C-GET or C-MOVE);
- **RECEIVE\_PORT**: the port for data transfer from the DICOM Server to the PACS Adapter;
- **PACS\_SCP**: the DICOM Server AE Title;

- **PACS\_IP\_ADDRESS**: the DICOM Server IP address;
- **PACS\_PORT**: the port for data transfer from the PACS Adapter to the DICOM Server;
- **PACS\_CHARSET**: the character encoding standard.

\* To obtain files by C-MOVE method, the DicomPacsAdapter port must be registered at the DICOM Server.

2. In the name of the root, execute the script `/scripts/append_pacs.sh`.

```
sudo ./append_pacs.sh
```

After successful installation, the following message is displayed: “Installing DICOM Pacs Adapter completed”.

### Adding PACS adapters manually

1. Create a configuration file for the new PACS adapter node. In **dicompacsadapterconfig.xml** configuration file (see the [Configuration Files](#) section), specify the parameters of the DICOM PACS Adapter connection to the DICOM Server.
2. Create a service file from the executable file by analogy with the creation of services for other microservices.
3. Enter the administrative console (see the [Launching the Program](#) section). On the **Nodes** page, add a new node with the parameters provided in the configuration file.

## Adding PACS Adapters on Windows

### Adding PACS Adapters with the Help of Scripts

1. Set the following parameters in the `/scripts/init_pacs.bat`:
  - **USER\_FRIENDLY\_NAME**: the DICOM server name displayed for the user;
  - **PACS\_ADAPTER\_PORT**: the port for data transfer between the PACS Adapter and the Control Node microservice;
  - **CONNECTION\_MODE**: the method of DICOM files transfer (C-GET or C-MOVE);
  - **RECEIVE\_PORT**: the port for data transfer from the DICOM Server to the PACS Adapter;
  - **PACS\_SCP**: the DICOM Server AE Title;
  - **PACS\_IP\_ADDRESS**: the DICOM Server IP address;
  - **PACS\_PORT**: the port for data transfer from the PACS Adapter to the DICOM Server;
  - **PACS\_CHARSET**: the character encoding standard.
2. Run the `/scripts/append_pacs.bat` script as administrator. After successful installation, the following message is displayed: “Installing DICOM Pacs Adapter completed”.
3. Reboot the computer.
4. Enter the administrative console (see the [Launching the Program](#) section). On the **Nodes** page, add a new node with the parameters provided in the configuration file.

## Configuration Files

### «controlnodeconfig.xml»

```
xml
<?xml version="1.0" encoding="UTF-8"?>
<config>
  <port>8090</port> <!--the port where the microservice was
activated-->
  <documents>html</documents> <!--the catalogue with the web
interface files-->
  <defaultDocument>/index.html</defaultDocument> <!--the web
interface boot file-->
  <logPath>logs</logPath> <!--the catalogue for storing logs-->
  <sessionTimeout>600</sessionTimeout> <!--the time after which the
session is interrupted automatically-->
  <database>
    <driver>QPSQL</driver> <!--the database driver-->
    <name>control</name> <!--the database name-->
    <host>localhost</host> <!--the IP address of the server with
the database-->
    <user>postgres</user> <!--the name of the database user-->
    <password>123456</password> <!--the password for the database-->
    <port>5432</port> <!--the database port-->
    <options></options> <!--additional connection parameters-->
  </database>
</config>
```

### «storagenodeconfig.xml»

```
xml
<?xml version="1.0" encoding="UTF-8"?>
<config>
  <id>1</id> <!--the Storage Node number-->
  <port>8081</port> <!--the port where the microservice was
activated-->
  <logPath>logs</logPath> <!--the catalogue for storing logs-->
  <makeSeriesFragmentation>0</makeSeriesFragmentation> <!--service
parameter-->
  <database>
    <driver>QPSQL</driver> <!--the database driver-->
    <name>storage</name> <!--the database name-->
    <host>localhost</host> <!--the IP address of the server with the
database-->
    <user>postgres</user> <!--the name of the database user-->
    <password>123456</password> <!--the password for the database-->
    <port>5432</port> <!--the database port-->
    <options></options> <!--additional connection parameters-->
  </database>
</config>
```

### «rendernodeconfig.xml»

```
xml
<?xml version="1.0" encoding="UTF-8"?>
<config>
```

```

    <id>1</id> <!--the Render Node number-->
    <port>8080</port> <!--the port where the microservice was
activated-->
    <logPath>logs</logPath> <!--the catalogue for storing logs-->
    <lookupTablesFile>vt_config.xml</lookupTablesFile> <!--the path to
the file with the description of the lookup tables used-->
    <fontPath>/opt/inobitec/web-viewer/font.ttf</fontPath> <!--the path
to the font file-->
    <interpolationMethod>Lanczos5</interpolationMethod> <!--the image
interpolation method (permitted values: Bilinear, Bicubic, Lanczos3,
Lanczos5)-->
    <imageFormat>jpeg</imageFormat> <!--the image format used by
default when the images are sent to the client (permitted values:
jpeg, png, bmp, webp)-->
</config>

```

#### «usernodeconfig.xml»

```

xml
<?xml version='1.0' encoding='UTF-8'?>
<config>
    <port>8083</port> <!--the port where the microservice was
activated-->
    <database>
        <driver>postgres</driver> <!--the database driver-->
        <name>user_node</name> <!--the database name-->
        <host>127.0.0.1</host> <!--the IP address of the server with
the database-->
        <user>postgres</user> <!--the name of the database user-->
        <password>123456</password> <!--the password for the
database-->
        <port>5432</port> <!--the database port-->
    </database>
</config>

```

#### «dicompacsadapterconfig.xml»

```

xml
<?xml version="1.0" encoding="UTF-8"?>
<config>
    <id>1</id>
    <port>8082</port>
    <logPath>logs</logPath>
    <pacs>
        <scp>PACS_Inobitec</scp> <!--the PACS identifier for the DICOM
network-->
        <host>192.168.1.2</host> <!--the IP address of the server where
the PACS was deployed-->
        <port>3000</port> <!--he port where the PACS was deployed-->
        <charset>UTF-8</charset> <!--the character set for finding
studies and series in the PACS-->
        <!--Obtaining DICOM files-->
        <receive>
            <mode>C-MOVE</mode> <!--the method used for files exchange
with the PACS. C-GET and C-MOVE are supported-->

```

```
    <port>11115</port> <!--the DicomPacsAdapter port which is
used for obtaining files by C-MOVE method*-->
    </receive>
  </pacs>
</config>
```

\* To obtain files by C-MOVE method, the DicomPacsAdapter port must be registered at the DICOM Server.




---

# Chapter 1

## Administrator Web Console

Administrator Web Console is available by the `http://<ip address>:8090/admin/index.html` link.


To change the interface language and theme, click the  **Settings** button.

### 1.1 Server settings

In this tab the product key is displayed and you can enter the license key.


### 1.2 User settings

In this tab you can manage users.

To add a user, click the  **Add user** button. Type the login and the password for this user. To enable/disable this user, check/uncheck the **Status** box. To apply settings, click the **Apply** button. Enter the user's license key and click the **Activate** button. You can see the available functions list below. To change the access rights for a particular user, change the license key and press **Activate**.

### 1.3 User sessions

In this tab you can manage user sessions.

To stop the session. To rake the session, click the  **Brake session** button.

To update the information, click the  **Update** button.


### 1.4 Hotkeys


In this tab you can set the defaul hotkeys.

## 1.5 Nodes

In this tab you can set connections to DICOM Servers.

To add a connection:

1. Click the  **Add node** button.
2. Set the ip address, name, port and server type.
3. Click **Apply**, to apply changes or **Cancel** to cancel.

To remove the connection, click the  **Delete node** button.

## 1.6 Security

In this tab you can change the administrator's password.

---

# Chapter 2

## Program Window Elements

### 2.1 Login

After opening the page, the login form will be displayed (Fig. 2.1). When a field is empty, its name is displayed in it. To type data in a field, place the cursor in it with a left-click. To move to the next field, press the **Tab** key on the keyboard or use the left mouse button to position the cursor. To go to the previous field, press the keys **Ctrl + Tab**.

The image shows a login form for INOBITEC. At the top, the company name 'INOBITEC' is displayed in a blue, stylized font. Below the name are two input fields: 'User name' and 'Password'. The 'User name' field is on top, and the 'Password' field is below it. Both fields are white with a light gray border. Below the input fields is a blue button with the text 'Sign in' in white.

*Figure 2.1: Login Form*

Type the following data:


- type user name to the **User name** field;
- type password to the **Password** field.

You can get this information from the program administrator. All fields are required.

Click the **Sign in** button.

In case of an error, a message appears in the lower right corner.

To escape the program, press the button with the user's initial in the top right-hand corner.

E.g., the button for a user named «**User**» will be displayed as  . Choose **Exit** in the button menu (pic. 2.2).

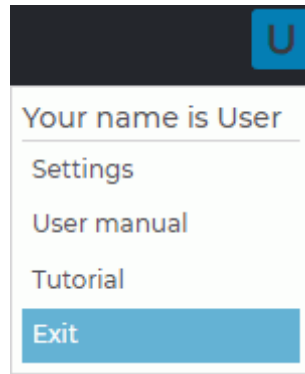


Figure 2.2: Escape the program

## 2.2 Tutorial and Usermanual

When the user first logs in, the window shown in Fig. 2.3 will be displayed.

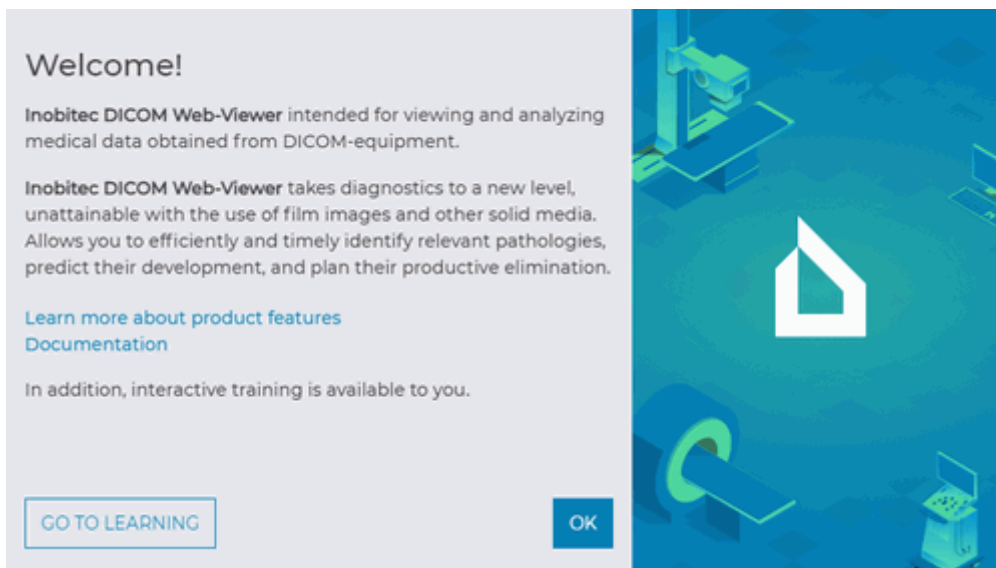



Figure 2.3: Welcome Window

To view the program features, click the **Learn more about product features** link, to open usermanual (pdf file) click the **Documentation** link. To view the tutorial click the **GO TO LEARNING** button. To start learning, click the button with the first wibr of the user name (e.g.  for **User**) and select the **Tutorial** item.

## 2.3 Toolbar

The **Toolbar** is shown in Fig. 2.4 (highlighted in red).

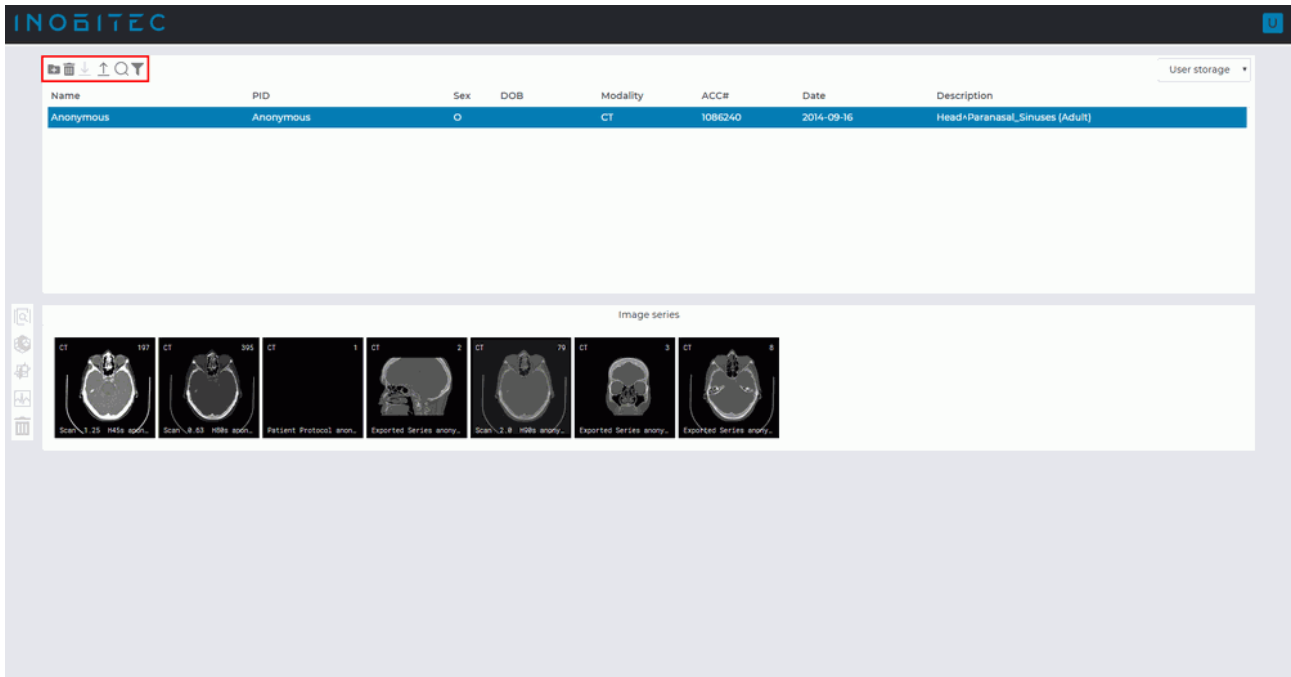


Figure 2.4: Toolbar location in the Web DICOM Viewer window

Buttons on the toolbar:













	The <b>Load to storage</b> button loads data to the storage.
	The <b>Remove</b> button removes data from the storage.
	The <b>Download from Server</b> button downloads data to a server.
	The <b>Upload to Server</b> button uploads data to a server.
	The <b>Search</b> button searches data in the storage.
	The <b>Search Filter</b> opens the search filter.

Image view buttons on the toolbar:

	The <b>Image viewer</b> button opens images in the flat image view window.
	The <b>Volume Reconstruction</b> button opens images in the volume reconstruction window.

	The <b>Multiplanar Reconstruction</b> button opens images in the multiplanar reconstruction window.
	The <b>ECG Viewer</b> button opens images in the ECG view window.
	The <b>Show tags</b> button opens a window for viewing the tags of the series.
	The button removes the selected series from the storage.

If the action corresponding to a button is not available, the button looks pale and cannot be pressed (inactive). In Fig. 2.5 the only **ECG Viewer** button is inactive.



Figure 2.5: The Image Viewer button is active

## 2.4 Select Data Source

To open studies stored on a DICOM Server or in a local folder, select the source from the drop-down list (Fig. 2.6).

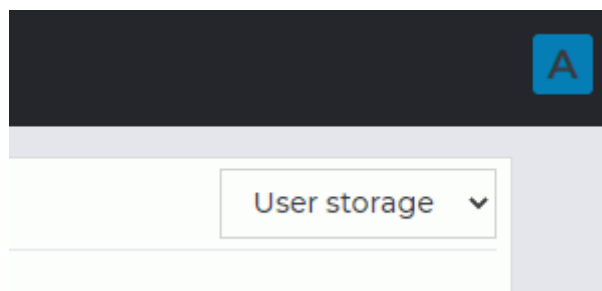

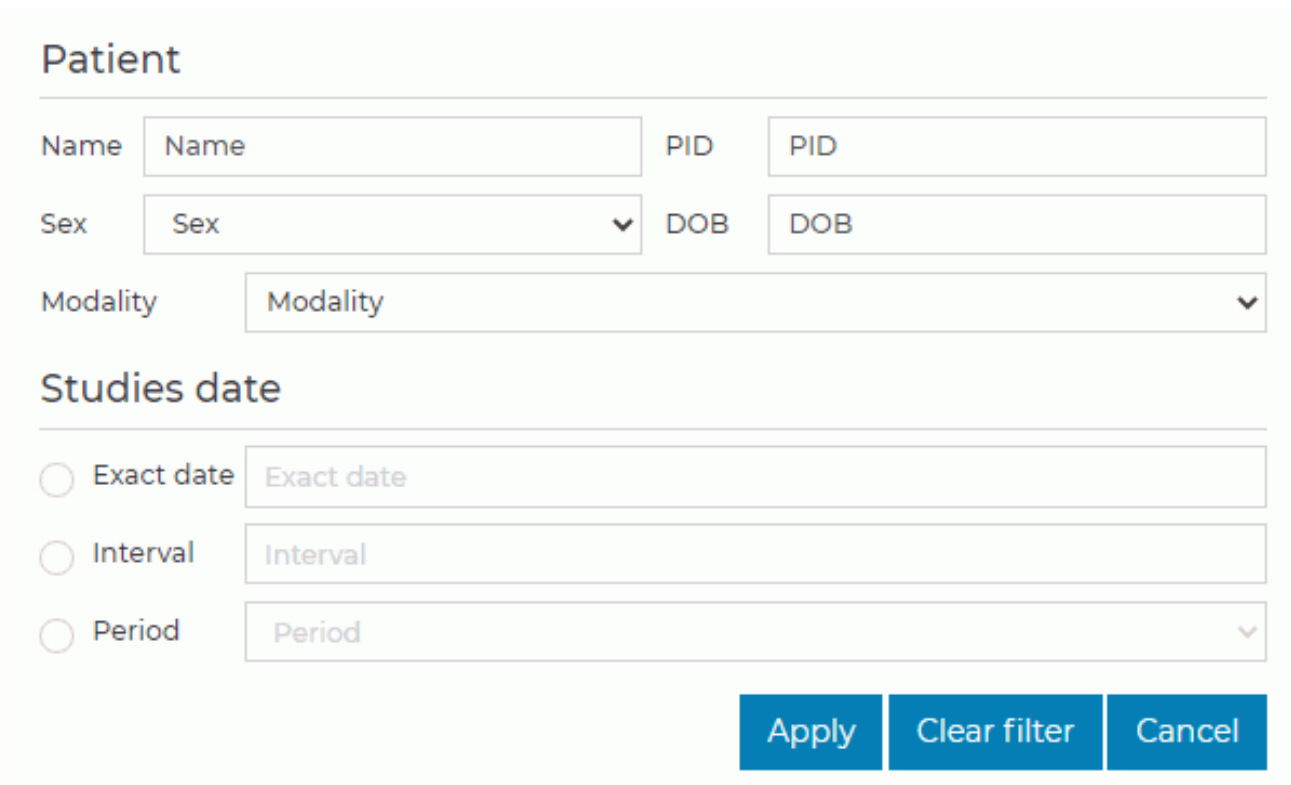


Figure 2.6: Data source panel

## 2.5 Search filter

To open the panel, click the  button on the toolbar. The search panel is shown in Fig. 2.7.



**Patient**

Name  PID

Sex   DOB

Modality

**Studies date**

Exact date

Interval

Period

*Figure 2.7: Search panel*

The search can be performed by the following parameters:

- **patient name;**
- **patient sex** (select from the list);
- **patient ID;**
- **date of birth;**
- **modality;**
- **study date.** You can search by exact date, date interval, or select a period from the list.

Click **Apply** to apply parameters, click **Clear** to clear the filter or **Cancel** to cancel.

## 2.6 Study Panel

The study panel is shown in Fig. 2.8 (highlighted in red).

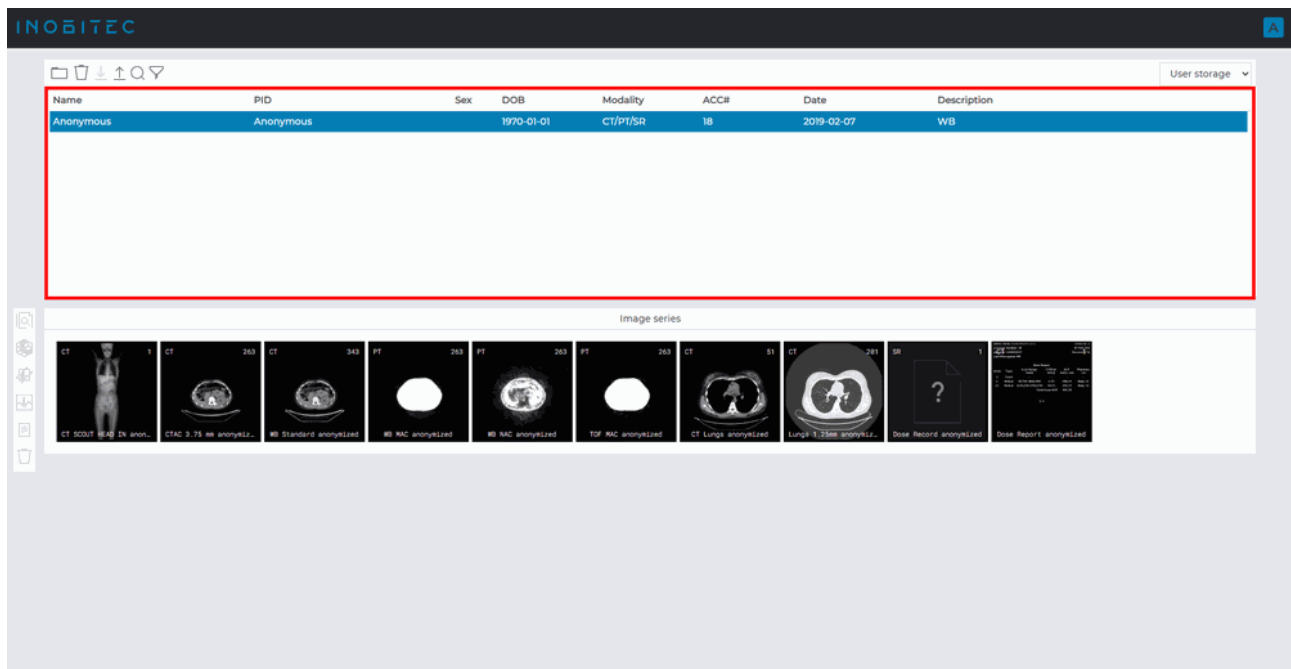


Figure 2.8: Study panel in the Web DICOM Viewer window

The study panel displays the list of studies stored in the selected location (local storage or PACS server).

### 2.6.1 Sort Studies

If two or more studies are displayed, they can be sorted by a certain parameter. To do this, click on the header of the column the parameter is located in. For instance, to sort by date, click on the area highlighted in red in Fig. 2.9.

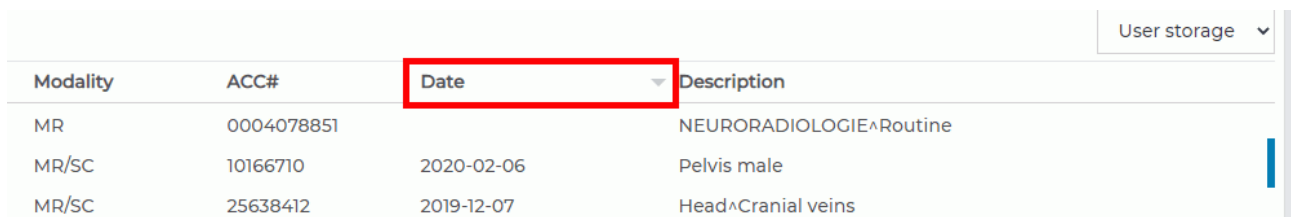


Figure 2.9: Date column header

Next to the column name, there is an arrow showing the sorting order (down arrow — descending, up arrow — ascending). To change the sorting order, click on the column header again. Studies can be sorted only by one parameter at a time.

### 2.7 Series Panel

The panel is shown in Fig. 2.10 (highlighted in red). Select the study from the study panel to see the list of series for it.



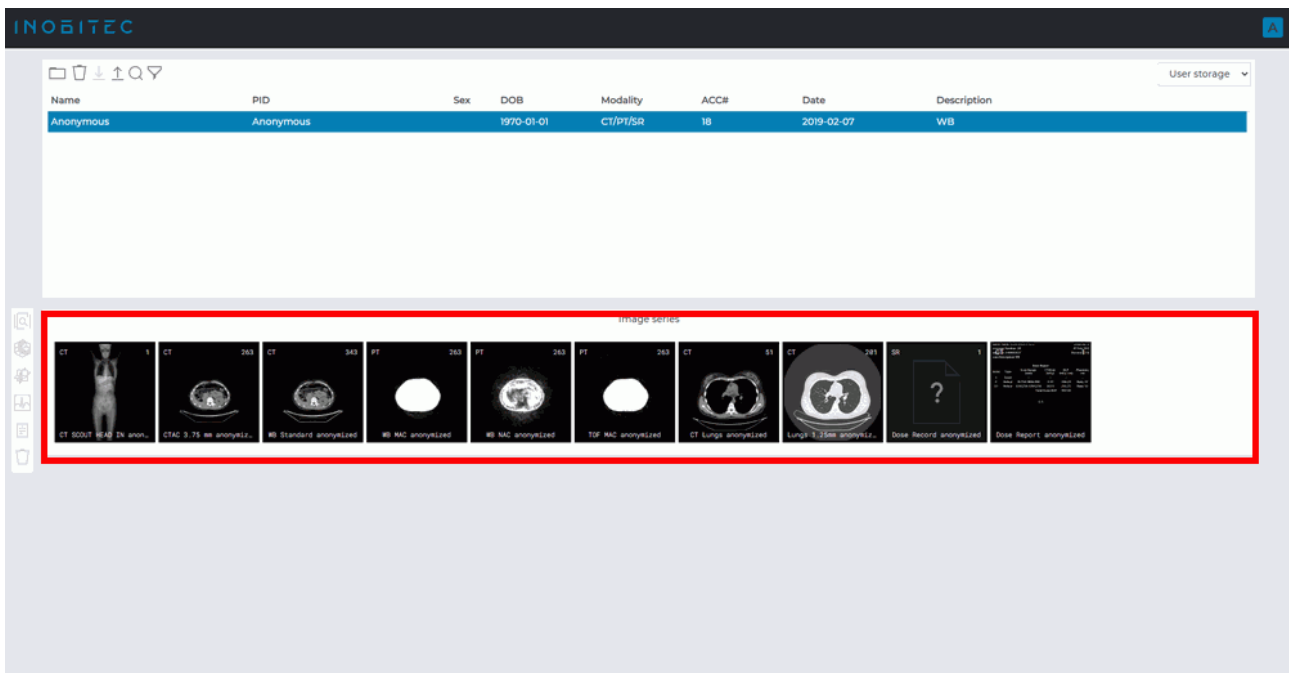







Figure 2.10: Series panel in the Web DICOM Viewer window

## 2.8 View Images

The Web DICOM Viewer allows you to open a series of one or different studies in all available viewing modes in one tab.

You can open series in the desired mode in 4 ways:

- Click one of the  **Image Viewer**,  **Volume Reconstruction**,  **MPR Reconstruction**,  **ECG Viewer**,  **Show tags** on the left toolbar.
- Right-click on the study and select one of the **Open in new tab** (the series will be opened in a new tab) or **Open in tab -> desired tab** (the series will be opened in the selected tab).
- Right-click on the series and select one of the **Open in 2D**, **Open in 3D**, **Open in MPR**, **Open tags** (the series will be opened in a new tab) or **Open in tab -> desired tab** (the study is added to the series panel of the chosen tab).

The series panel will be displayed on the left. It displays thumbnails of the series of the studies opened in this tab.



Figure 2.11: Series panel

## 2.9 View Multiple Series

There are several modes for positioning series windows in the study window. The selected mode is saved when the Web DICOM Viewer is closed.

When you open a new tab, automatic mode is always selected.

If when opening a new series of free cells to accommodate the images is not enough, then the automatic arrangement mode is activated and the required number of cells is added. For example, if only one cell is free, then two more cells are added to open the series in the MPR mode.

### 2.9.1 Auto Mode

This mode is active by default. If two or more series are open, they will be located in the window and scaled automatically, occupying the entire window. Three series are displayed in Fig. 2.12.

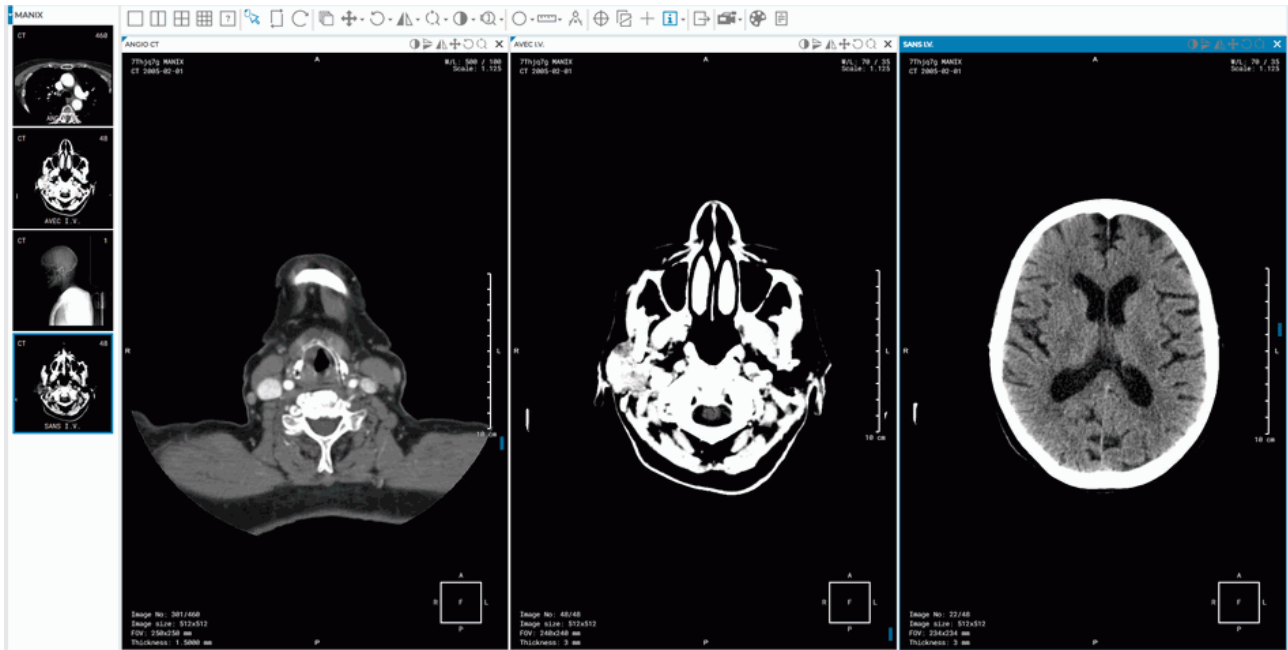


Figure 2.12: Auto Arrangement Mode

## 2.9.2 Stacked Mode

This tool allows you to receive only left-hand cell in the study window. In this case, the Web DICOM Viewer will request confirmation for closing the current series. If you try to open another series, the Auto Mode will be activated.

To activate this mode, click the  button.

## 2.9.3 Grid Mode

In this mode the study window is split into parts, and a series window can be opened in each of them.

If all cells in the grid are filled, then auto mode will be activated.

A grid may have from 1 to 25 cells. The maximum number of rows and columns is 5.

Fig. 2.13 illustrates a 2\*4 grid with three cells filled.

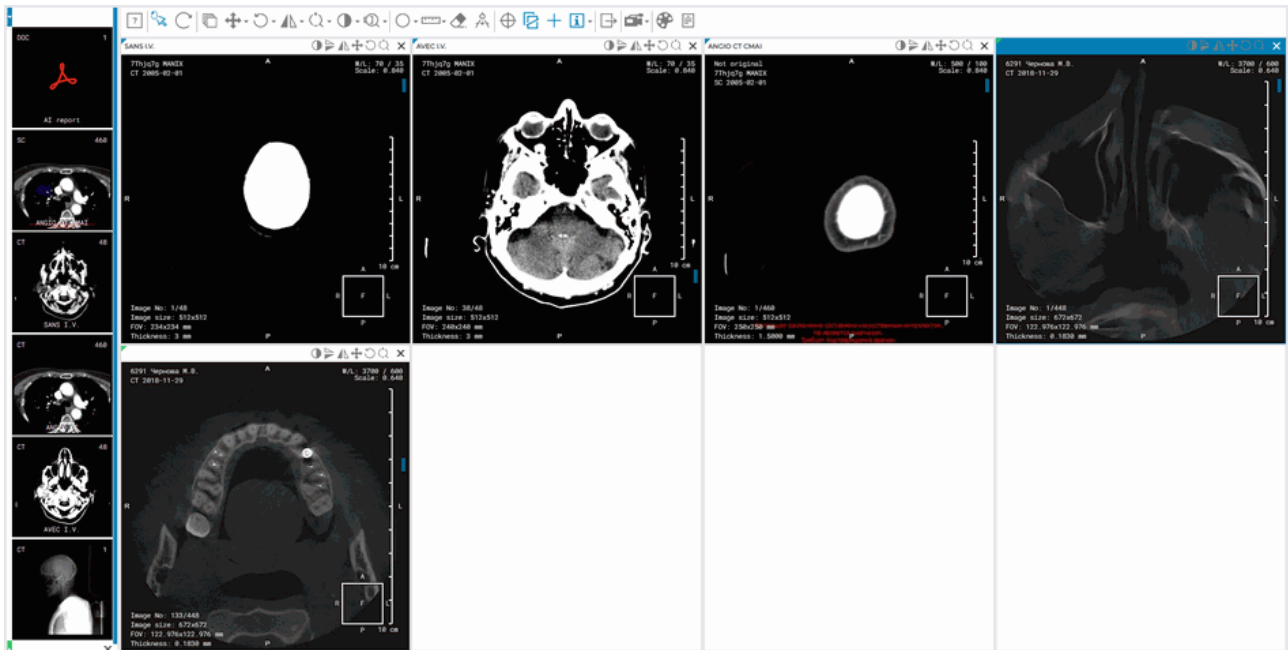






Figure 2.13: Displaying series in a 2\*4 grid

To set up a 1x2, 2x2 or 3x3 grid, use the  ,  ,  buttons on the toolbar.

To define your own grid configuration, click the  button. drag the cursor over the panel that opens and select the desired row and column counts (1 to 5). Click the left button in the desired cell to apply the configuration.

If the number of already open windows in the tab exceeds the number of cells in the selected configuration, a warning **Are you sure you want to do it? (The number of open series more than the number of cells you want to display)** appears.

To apply a configuration, click **Yes**, to cancel, click **Cancel**. If the number of cells is less than the number of open windows, then windows that do not fit will close. If at least one of the three MPR windows is not enough space, then all three windows for this series will be closed. If the tab has a sufficient number of unoccupied cells, then the newly opened series are reshared in them.

If a configuration from one cell is selected, this is equivalent to activation of the automatic mode.

## 2.10 Cancel Tool Actions

In the title of each window there are pictograms of the tools available for this window (Fig. 2.14). After the tool is applied to this series, its icon is highlighted in yellow (Fig. 2.15). To undo the tool action, left-click on its icon.

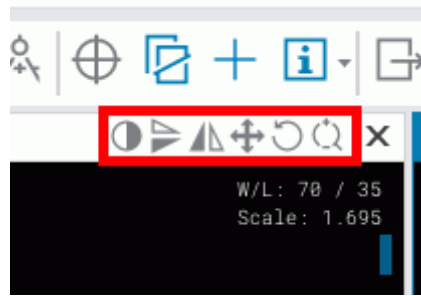


Figure 2.14: Available tools



Figure 2.15: Move and rotate tools are applied

## 2.11 Tool Control Buttons

Starting with the version 2.1, you can use the left, the right and the middle mouse button, which allows you to activate up to three tools at the same time. To activate a tool, click on the left-hand side of the button with the mouse button. There are two ways to deactivate a tool:

1. Activate another tool with the same button or
2. Click on the left-hand side of the tool button with the same mouse button.

On the tool button, you will see a symbol representing the mouse with the respective button selected (see Fig. 2.16).



Figure 2.16: The tools activated with the left, the middle and the right mouse button respectively (from left to right)

If a limited number of clicks is needed to create a graphic object (e.g. three clicks for corner measurements), then the creation process will be completed after these clicks. If you need an unlimited number of points to create a graphic object (e.g. a polygon or an MPR curve), you have to double-click the button with which the tool was activated to complete the creation process.

Whether the tool is active or not, the graphic objects created with this tool can be edited with any mouse button, and the right button click invokes the context menu.

# Chapter 3


## View Flat Images

The Lankosh filter is used for interpolation.


### 3.1 View Images in a Series

When a series is opened, its first image is displayed in the series window.


There are three ways to switch to other images:

- Roll the mouse wheel up to switch to the previous image or down to go to the next one. One click of the wheel changes the position by one image.
- Use the scroll bar on the right-hand side of the series window. Move the slider along the bar to go to the image required.
- Use the **Scrolling** tool. Activate the tool by choosing the  button with the left, right, or middle mouse button. While holding this mouse button, move the cursor down to go to the next image or up — to go to the previous image. You will find the details concerning the use of the tools in [Section 2.11](#).

### 3.2 Play images

The Web DICOM Viewer allows you to automatically play back images of a series at a certain speed. To set up playback, click on the right part of the **Play**  and choose parameters.



1. Select the speed (5, 10, 15, 20, or 25 frames per second).
2. If you want to play images cyclically, select the **Replay** item. The item will be marked with a flag. To disable the cyclic playback, select this command again. The flag will be removed.

To play the images click on the left side of the  button on the toolbar with the left/right/middle mouse button. To continue work with this tool, use the button with which the tool was activated. To learn more about tool control, see [Section 2.11](#). To end playback, click on the left side of the button again.


## 3.3 Zoom. Move. Rotation

### 3.3.1 Zoom

To zoom an image, you can choose one of the following options:


1. Roll the mouse wheel while holding down the Ctrl key. To enlarge the image, roll the wheel forward; to shrink it, roll the wheel backward. The center of the zoomed image will be in the point where the cursor is placed.
2. Use the **Zoom**  tool on the toolbar. Press the arrow on the right-hand side of the **Zoom** button and choose one of the following options from the drop-down list:
  - a fixed zoom level: 0.5x, x1, x2, x3, or x4;
  - **Custom zoom**. For this, you need to provide the zoom level from 0 to 1,000,000 in the dialog box. If the value entered is less than 1, the image will be shrunk. If the value is larger than 1, the image will be enlarged;
  - **Reset zoom** to fit the image to the screen;
  - for simultaneous zooming of all the images in the open windows of the tab, choose **Zooming synchronization**. The icon representing the active tool will be highlighted in blue. When zooming is completed, press the **Zooming synchronization** button again to deactivate the tool.
3. Activate the **Zoom**, tool by pressing the left-hand side of the  button with the left, right, or middle mouse button. To work with this tool, use the button with which it was activated. You will find the details concerning the use of the tools in Section 2.11. To zoom the image, move the cursor up or down while holding the mouse button with which the tool was activated. In the window, you will see the point that is the center of the zoomed image. The current zoom level is displayed next to the cursor. When zooming has been completed, press the **Zoom**, button again to deactivate the tool.


### 3.3.2 Move

To pan an image, activate the **Move** tool by clicking on the  button and drag the image with the mouse, holding the left button.


### 3.3.3 Rotation

To rotate an image, you can choose one of the following options:

1. Use the **Rotation**  tool on the toolbar. Press the arrow on the right-hand side of the **Rotation** button and choose one of the following options from the drop-down list:
  - a fixed rotation angle (a multiple of 90°): 90° clockwise, 180°, or 90° counterclockwise;
  - **Custom rotation**. For this, you need to provide the rotation angle from -1,000° to 1,000° in the dialog box;
  - **Reset rotation** to restore the initial position of the image;

- for simultaneous rotation of all the images in the open windows of the tab, choose **Rotation synchronization**. The icon representing the active tool will be highlighted in blue. When rotation is completed, press the **Rotation synchronization** button again to deactivate the tool.
2. To rotate an image by an arbitrary angle, press the left-hand side of the **Rotation**  button with the left, right, or middle mouse button. To work with this tool, use the button with which it was activated. You will find the details concerning the use of the tools in Section 2.11. To rotate the image, move the mouse while holding the button with which the tool was activated. The image is rotated about the center of the window. While the image is being rotated, the current rotation angle is displayed. When rotation is completed, press the **Rotation** button again to deactivate the tool.


### 3.4 Set Window Level and Width

To change the parameters, activate the **Change W/L**  tool on the toolbar with the left/right/middle mouse button. To continue work with this tool, use the button with which the tool was activated. To learn more about tool control, see Section 2.11. Move the mouse in the study window, holding the right mouse button

- to increase the window level — up;
- to reduce the window level — down;
- to reduce the window width — left;
- to increase the window width — right.

The terms «window width» and «window level» in digital images commonly refer to «contrast» and «brightness» respectively on your computer.

The current window level and width values are displayed in the top right-hand corner of the window.

The contains predefined width and level values for some specific tissues. To select them, click on the left side of the **Change W/L**  button. The following modes will be available in the newly opened window:

- to view abdomen tissues;
- to view bone tissues;
- to view brain tissues;
- to view lung tissues;
- to view chest tissues;
- to view headneck tissues;
- custom mode. The values defined by the user can be edited;
- **Reset W/L** to set optimal default values;
- **W/L synchronization** for changing the level and width of all the open windows of the tab simultaneously. The icon representing the active tool will be highlighted in blue. When you have changed the level and width, press the **W/L synchronization** button again to deactivate the tool.



You cannot edit the values predefined for specific tissues.

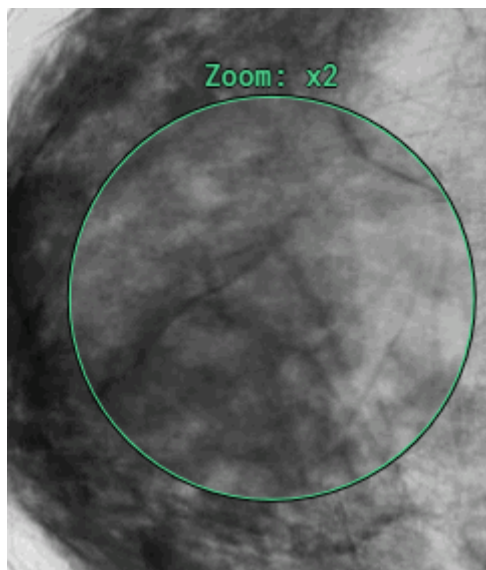


## 3.5 Magnifier

This tool allows you to increase the tissue with a zoom increment of 2 to 100 (Fig. 3.1).

To magnify the tissue:

1. Activate the **Magnifier** tool by clicking the  button.
2. Move the cursor to the area you want to make out.
3. The radius and the zoom increment of the tool are set in the context menu of the tool. To set these parameters, click on the arrow on the right side of the button .











*Figure 3.1: Tool Magnifier*

## 3.6 Measurements

The following tools are used to measure various parameters: **Distance measurement ruler**, **Polyline for measuring distances**, **Angle measurement**, **Point ROI measurement**, **ROI measurement in a rectangular area**, **ROI measurement in a elliptical area**, **ROI measurement in a polygonal area**, **Kobb angle**. To select one of these tools, click on the arrow on the right


side of the tool selection button. The button will look different depending on the selected tool:

	<b>Distance measurement ruler</b>
	<b>Polyline for measuring distances</b>
	<b>Angle measurement</b>
	<b>Point ROI measurement</b>
	<b>ROI measurement in a elliptical area</b>
	<b>ROI measurement in a rectangular area</b>
	<b>ROI measurement in a polygonal area</b>
	<b>Cobb Angle</b>

To activate or deactivate the tool that is currently selected, just click on the left side of the tool selection button with the left/right/middle mouse button. To continue work with this tool, use the button with which the tool was activated. To learn more about tool control, see Section 2.11. If some tool is activated, the button is highlighted. The drawn objects will be displayed in the window while it is open, and you can pan, zoom or rotate them together with the image.


### 3.6.1 Distance measurement ruler

To measure distance in an image:

1. Activate the **Ruler**  tool on the toolbar by clicking the left mouse button.
2. Press the mouse button on the image to mark the first point and hold down the button.
3. Move the cursor over the screen. The distance from the first point to the current point will be displayed next to the line.
4. Release the mouse button to fix the current point.
5. To cancel an incomplete measurement, press **Esc**.

### 3.6.2 Polyline for measuring distances

To perform polygonal linear measurements:

1. Activate the **Polygonal ruler**  tool by clicking the mouse button.
2. Mark the first point on the toolbar by clicking the mouse button.


3. Drag the cursor over the screen. The distance from the first point to the current point will be displayed beside the line.
4. To fix the current point, click the mouse button.
5. Repeat Steps 3 and 4 until the last but one point is fixed.
6. Fix the last point by double-clicking the mouse.
7. To cancel an incomplete measurement, press **Esc**.

To move the polygonal measurement point:

1. Activate any measurement tool.
2. Locate the cursor on the point to be moved.
3. Drag the point, holding the mouse button.
4. Release the mouse button.


### 3.6.3 Angle measurement

To measure an angle:

1. Activate the **Angle measurement**  tool from the toolbar by clicking the mouse button.
2. Put two points on the image, clicking the mouse button. The second point is the angle apex.
3. Move the cursor over the screen to set the other side of the angle.
4. Click the mouse button to fix the second side of the angle.
5. To cancel an incomplete measurement, press **Esc**.

### 3.6.4 Point ROI measurement




To measure intensity at some point:

1. Activate the **Point ROI measurement**  on the toolbar.
2. Click on the target point.

The point will be highlighted at the image, and the intensity value will be displayed next to it.

### 3.6.5 Measure the Intensity Average and Standard Deviation in an Area

To measure the average intensity value and standard deviation in a particular area:


1. Activate one of the **ROI** tools (rectangle  , ellipse  , or polygon  ) from the toolbar by clicking the left/right/middle mouse button.
2. To draw a rectangle, press the mouse button in its top left-hand and release on right-hand corners.
3. To draw an ellipse, just draw the rectangle the ellipse is inscribed in.
4. To draw a polygon, click the mouse button to mark each apex and then double-click the mouse to finish.
5. To cancel an incomplete measurement, press **Esc**.

The following parameters will be displayed next to the highlighted area:

- minimum intensity value;
- maximum intensity value;
- average intensity value;
- standard deviation;
- area perimeter;
- area space.

### 3.6.6 Cobb angle meter

To measure a Cobb angle:

1. Activate the **Cobb angle**  tool from the toolbar.
2. Draw a line that runs along the border of one of the vertebrae. To do this, click the mouse button to set two points through which the line must pass.
3. Likewise, construct a line for the second vertebra.
4. To cancel an incomplete measurement, press **Esc**.

### 3.6.7 Drawing Parameters

To set the default drawing parameters for measurement tools:

1. Click on the arrow on the right side of the measurement tool selection button.
2. Select the item **Measurement tool settings**.
3. In the dialog box that appears, set the color, line thickness and the font size.
4. Set length and area units (millimetres or centimetres).
5. To apply the settings, click **Yes**. To cancel the settings, click **Cancel**.

To edit the drawing parameters of an existing measurement:

1. Locate the cursor on the measurement to highlight a line or a point.
2. Right-click the mouse.
3. Select the **Set render params...** item from the context menu.
4. In the dialog box that appears, set the parameters in the same way as the default drawing parameters.

### 3.6.8 Move Measurements

To move a measurement:

1. Activate any measurement tool.
2. Locate the cursor on the measurement to highlight the line or point or to magnify the cross, marking the angular point. Do not locate the cursor on angle points.
3. Move the measurement, holding the mouse button.

### 3.6.9 Moving the measurement data

The measurement data and other text information is provided next to lines, indices and highlighted areas. Sometimes the text is illegible; it may overlap the important parts of the image or other text.

In Web DICOM Viewer, you can move the texts placed next to graphics.


To move the text, activate any measuring or drawing tool. Mouse over the text you need to move. You will see a dotted frame round the text, and the text itself will be in bold. Press the mouse button with which the tool was activated and move it to another spot. For the user's convenience, the text is bound to the graphic element or to the respective image area with a dotted line.

When you move a measurement, the text area is also moved.

### 3.6.10 Delete Measurements

To delete measurement:

1. Locate the cursor on the measurement to highlight a line or a point.
2. Right-click the mouse.
3. Select the **Delete** item from the context menu.

To delete all annotations and measurements, click the **Delete all user overlay**  button on the toolbar. In the dialog box that appears, Click **Yes** to delete or **Cancel** to cancel. **Please note that all other graphic objects created manually will be deleted as well.**

## 3.7 Graphic Label Tools

### 3.7.1 General


This tool allows you to create graphic labels (as arrows, ellipses, polygons and text fields) on an image. The labels will be applied during the entire session of working with the series. The labels are attached to specific points on the image and panned, scaled or rotated together with the image.

The button design depends on the selected tool.


To activate/deactivate the selected tool, click on the left side of the graphic label tool selection button with the left/right/middle mouse button. To continue work with this tool, use the button with which the tool was activated. To learn more about tool control, see Section 2.11. To select and activate one of the tools, click on the right side of the tool selection button and select the tool.

### 3.7.2 Graphic Label Tool


To create a label on an image:

1. Activate the **Pointer** tool. The button will look as follows:  .
2. Press the mouse button at the location the arrow should point to and hold it down.
3. Release the mouse where the opposite end of the arrow should be. The pointer will be displayed.
4. To cancel an incomplete creation, press **Esc**.


To create a text label on an image:

1. Activate the **Text** tool. The button will look as follows:  .
2. Click the mouse button where the text should be located.
3. Enter text in the field that appears.
4. Click outside the field.

To create a polygon on an image:

1. Activate the **Polygon** tool. The button will look as follows:  .
2. Click the mouse button where the first point of the polygon should be located.
3. Move the cursor to the location of the next point. The lines connecting the points of the polygon will be displayed on the screen.
4. Click the mouse button to save the point.
5. Repeat Steps 3 and 4 until the last but one point is set.
6. Double-click the mouse to create the last point. The polygon is complete.
7. To cancel an incomplete creation, press **Esc**.

To create an ellipse on an image:


1. Activate the **Ellipse** tool by clicking the left mouse button. The button will look as follows:  .
2. To build an ellipse, just build the rectangle the ellipse is inscribed into. Press the mouse button where the first angle of the rectangle should be located and hold it down.
3. Move the cursor to the location of the opposite angle. The ellipse will be displayed on the screen.
4. Release the mouse button to fix the opposite angle. The ellipse is complete.
5. To cancel an incomplete creation, press **Esc**.

### 3.7.3 Actions with Labels

To edit annotations, activate any annotation tool. The Web DICOM Viewer allows you to perform the following actions with labels:


- **Drag.** Locate the cursor on the figure line or text and drag the object, holding the left mouse button.
- **Drag a point** (an apex for an arrow or polygon and a rectangle apex for an ellipse). Locate the cursor on a point and drag the point, holding the left mouse button.
- **Delete.** Locate the cursor on the label border, right-click the mouse and select the **Remove object** item from the context menu.
- **Set render params.** Locate the cursor on the label border, right-click the mouse and select the **Set render params...** item from the context menu. In the dialog box that appears, set the line color, thickness for a figure and size for text. Click **Yes** to apply the changes or **Cancel** to cancel the actions.

To set the default render parameters, click on the right side of the button and select the **Paint tool settings** command. In the dialog box that appears, set the line color, thickness for a figure and size for text. Click **Yes** to apply the changes or **Cancel** to cancel the actions.




To delete all annotations and measurements, click the **Delete all user overlay**  button on the toolbar. In the dialog box that appears, Click **Yes** to delete or **Cancel** to cancel. **Please note that all other graphic objects created manually will be deleted as well.**

## 3.8 Synchronize Images

Synchronization is applied if two or more series are opened for the same study. This function allows you to scroll images in several series synchronously. By default the option is disabled.

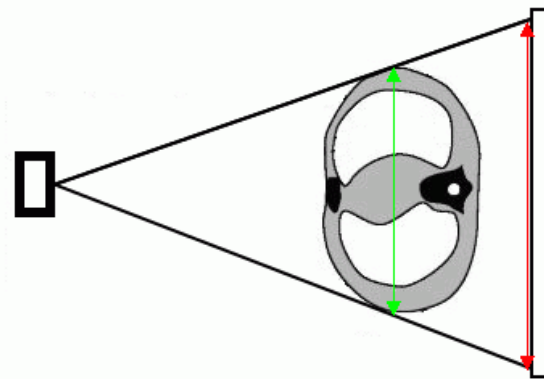
To enable/disable synchronization, click the **Sync series scroll**  button on the toolbar.

## 3.9 Mirror Image Horizontally/Vertically

To flip image horizontally, click the  button. To flip image vertically, click on the arrow on the right side of the  button and select the  **Flip vertically** command. If several series are opened in the view window, the mirroring is activated for each series independently.


### 3.10 Calibration sizes

X-ray image sizes are increased as compared with the real size of the tissues (Fig. 3.2).



*Figure 3.2: The green arrow shows the actual size of the tissues and red arrow shows the size of the image*

Hence, the size determined by X-ray modality may be incorrect. If a picture contains an object whose size is known (e.g., a catheter), it is possible to calibrate the image size. To calibrate the size:


1. Click the  **Calibration** button on the toolbar with the left/right/middle mouse button. To continue work with this tool, use the button with which the tool was activated. To learn more about tool control, see Section 2.11.
2. Mark the first point on the picture by pressing the mouse button and holding it down.
3. Drag the cursor over the screen. The calibration interval and its length will be displayed.
4. To set the second point, release the mouse button.
5. In the dialog box that appears, type the real length of the interval constructed. To calibrate the size, click **Yes**, to cancel, click **Cancel**.

If you cancel the calibration, the calibration interval remains in the image.


Calibration is factored in for measurements that depend on linear dimensions. After calibration, previously made measurements are automatically adjusted.

Calibration is maintained until the window containing the current series is open.

### 3.11 Visualize Images

Select the CLUT (colour look-up table) by clicking the  **CLUTs** button.

### 3.12 Scout Lines

The  **Show scout lines** tool is used if two or more series are opened for a particular study. The tool allows you to display the series image scout lines in images from other series if they are synchronized.



The current image scout line is highlighted in green, and the boundary scout lines are highlighted in yellow (Fig. 3.3).

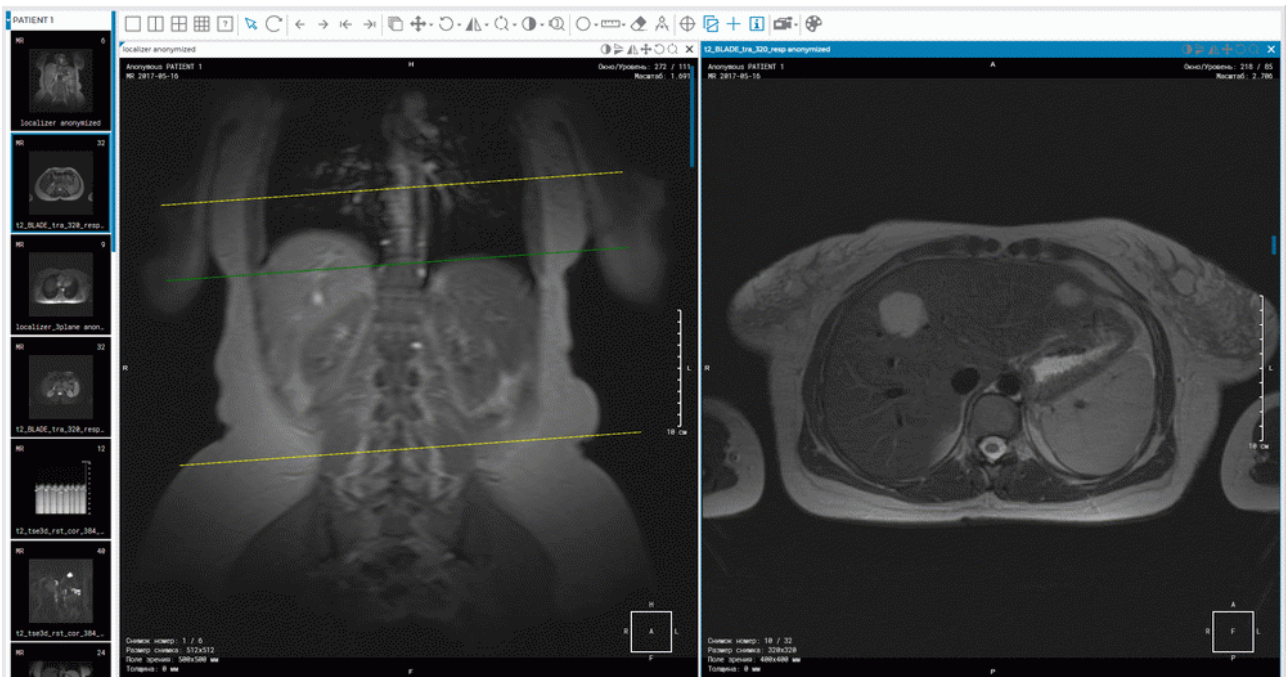




Figure 3.3: The left-hand image scout line is displayed in the right-hand image

### 3.13 Set Up Viewer Workspace

The **Show/hide annotations** tool allows you to display or hide the information about an image in the series windows. The settings are applied to all the series opened in the current tab. By default, the tool is active. To activate/deactivate the tool, click the **Show labels**  button on the toolbar.

You can adjust the visibility of:

1. Orientation cube;
2. Orientation letters;
3. Render annotations;
4. Tag values.
5. Rulers.

To customize the Annotations text size, click the arrow on the right side of the **Show/hide annotations**  button, select the **Label settings...** command and in the dialog that opens, enter a value. Click **Yes** to apply the changes or **Cancel** to cancel.

### 3.13.1 Orientation Cube

The **Orientation Cube** is located in the bottom right-hand corner (Fig. 3.4). The markers on the cube show the side the image is viewed from:

A — Anterior

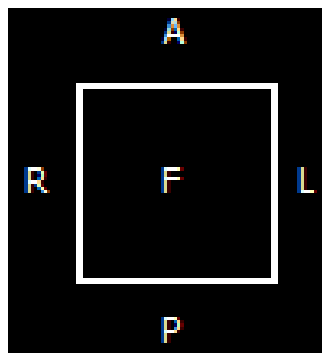
R — Right

L — Left

P — Posterior

F — Foot

H — Head.



*Figure 3.4: Orientation cube*

If «F» is written on the cube face, it means that the image is viewed from below; if «R» is written beside a rib, it means that the patient's right side is on this side of the image.

### 3.13.2 Scale

A graduated scale is displayed on the right side of the window.

### 3.13.3 Image Information

The image information is displayed in the bottom left-hand corner. It may include the following parameters, depending on the study type:

- **Image No** — current image number in the series/total number of images in the series;
- **Image size** — image size (pixels);
- **FOV (field of vision)** — image size (millimeters);
- **Thickness** — interval between slices.


### 3.13.4 Patient Information

The information about the patient is displayed in the top left-hand corner.

## 3.14 Viewing PDF documents

Web DICOM Viewer has several modes for viewing PDF documents.


To print a document or copy the text to a text editor, open a PDF document as a text. There are three methods to do that:

1. Double-click with the left mouse button on the document thumbnail on the series panel. By default, the document will be opened in a new window as a text.
2. Select the PDF document thumbnail on the series panel and press the  **Image viewer** button.
3. Open the context menu by right-clicking on the PDF document thumbnail, and choose **Open PDF as text**.

It is more convenient to view PDF documents containing graphs, charts, and pictures as images. If you open a PDF document as an image, you can use **Zoom**, **Move** and **Rotation** tool (see Section 3.3).

To open a PDF document as an image, open the context menu by right-clicking on the PDF document thumbnail, and choose **Open PDF as image**.

There are two ways to view the tags of the series containing a PDF document:

1. Select the PDF document thumbnail on the series panel and press the  **Show tags** button.
2. Open the context menu by right-clicking on the PDF document thumbnail, and choose **Open tags**.

If you choose **Open in tab** -> **desired tab** in the context menu, the study will be added to the series panel in the tab you have selected.

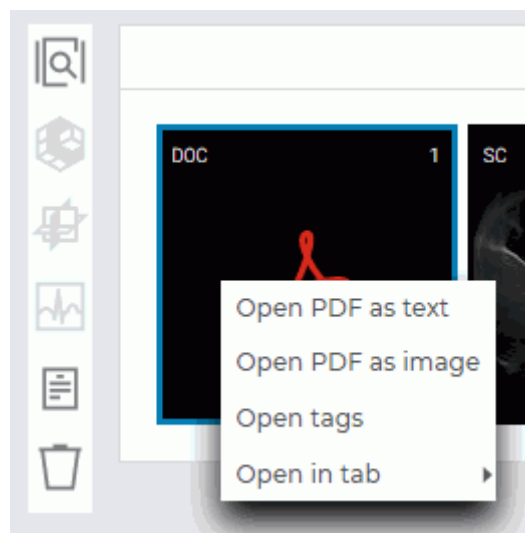


Figure 3.5: Context menu

Figure 3.6 shows a PDF document opened as an image/as a text and the DICOM tags of the series in the Web DICOM Viewer tab.

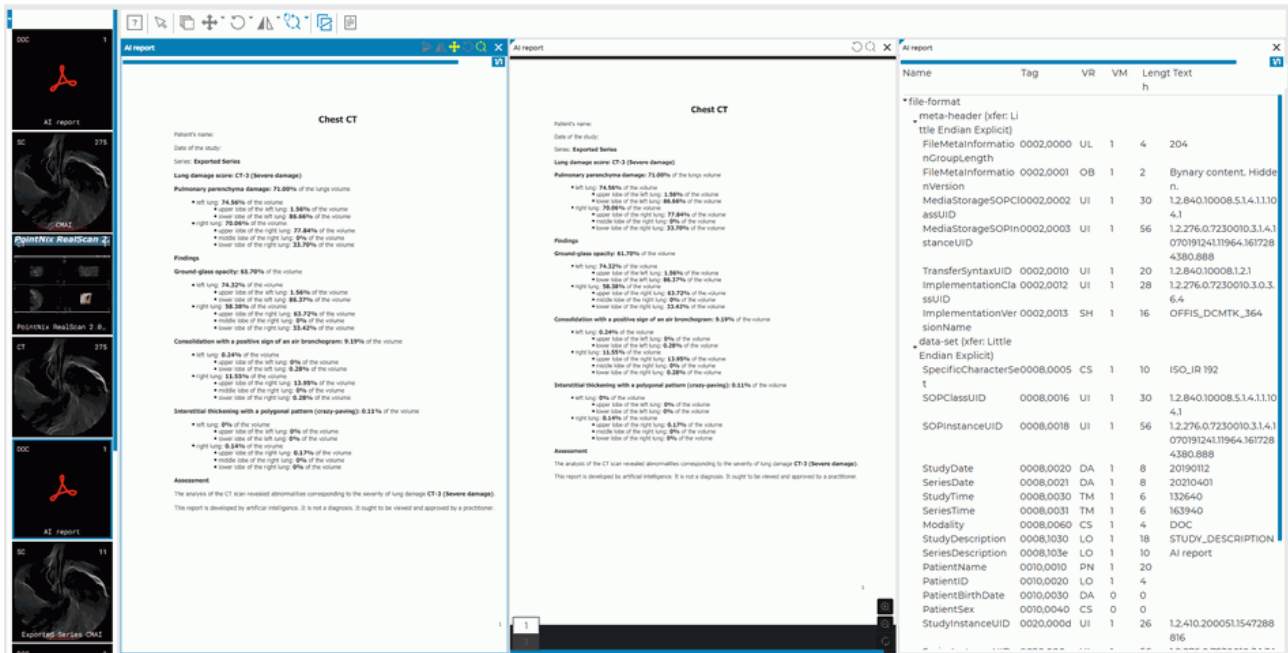



Figure 3.6: Tab Web DICOM Viewer with an open PDF document

### 3.15 View DICOM Tags

### 3.16 Export series

When exporting, the image is stored in the local storage in a new series of the same study. To export, click the  **Export** button.


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# Chapter 4


## Volume Reconstruction

### 4.1 Model Positioning Tools

To activate/deactivate the tool click the tool button with the left/right/middle mouse button. To continue work with this tool, use the button with which the tool was activated. To learn more about tool control, see Section 2.11.

The **Move** tool allows you to model holding down the mouse button. To activate/deactivate tool click the  button on the toolbar.

The **Rotation** tool allows you to model holding down the mouse button. To activate/deactivate tool click the  button on the toolbar. Note that the initial point of the cursor does not affect the rotation. If the cursor is moved vertically, the image is rotated round the horizontal axis. If the cursor is moved horizontally, the image is rotated round the vertical axis. That is, the image follows the cursor. If the cursor moves along a slanting line, the image slants the same way.

The **Zoom** tool allows you to model holding down the mouse button. To activate/deactivate tool click the  button on the toolbar.

### 4.2 Model Playing

The Web DICOM Viewer allows you to automatically rotate a volume model around one of the vertical axes relative to the center. The tool is described in Section 3.2.

### 4.3 Cutting Tools

There are cutting tools on the side panel. To activate/deactivate the tool click the tool button with the left/right/middle mouse button. To continue work with this tool, use the button with which the tool was activated. To learn more about tool control, see Section 2.11.

#### 4.3.1 Polygonal Cut

The tool allows you to build a polygon or an area with smooth borders that the cut area is projected on.

To build a polygon:

1. Activate the **Polygonal Cut** tool.
2. Click the mouse button to set the apices of the polygon marking the figure to be cut, except the last point.
3. Fix the last point by double-clicking the mouse.
4. To cancel an incomplete building, press **Esc**.

The part of the model to be projected on the area will be cut.

### 4.3.2 Inverse Polygonal Cut

The tool is similar to the previous one, except that the part of the model not to be projected on the area will be cut. To activate/deactivate the tool, click on the arrow on the right side of

the  button and select the  **Inverse Polygonal Cut** command.

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# Chapter 5

## Multiplanar Reconstruction (MPR)

### 5.1 View Images

View images in the mpr windows is similar to view flat images. To move to the another image, rotate the mouse wheel or use the scroll bar on the right side of the window.


### 5.2 Reconstruction Modes. Slice Thickness

#### 5.2.1 Render Modes


To switch between modes, the **Switch render mode MPR** button on the toolbar is used. Four render modes are available:

1. The **MPR** mode. Sections are available for viewing. Set by default.
2. The **MIP** mode . A slice of a particular thickness is viewed instead of a section. A point with maximum intensity in the slice is projected on each point in the image. For details on how to set the thickness, see the next section.
3. The **mIP** mode . Similar to the previous mode, but points with minimum intensity are projected on the image.
4. The **AIP** mode. Similar to the previous mode, but the intensity of each point equals the average intensity of the points projected on this point in the image.

#### 5.2.2 Slice Thickness

In the **MIP**, **mIP** and **AIP** render modes, the slice thickness is set using the **Thickness**  button on the toolbar. Click the button and type the value or move the slider to change the value. In the projection window, the slice borders are marked by dotted lines.

### 5.3 Working with Orthogonal Planes

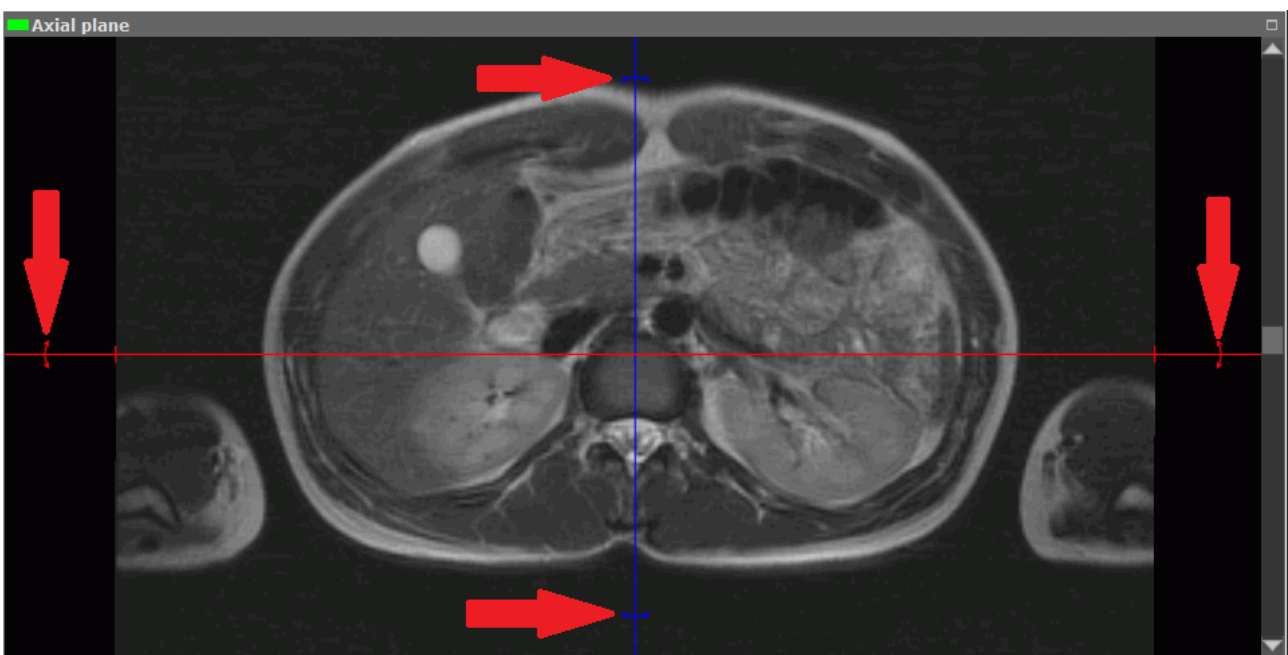
Activate the **Cursor**  tool with the left/right/middle mouse button. To continue work with this tool, use the button with which the tool was activated. To learn more about tool

control, see Section 2.11. By default the tool is activated by the left button. To move the cutting planes to the target place, click on this place or move the cursor holding down the left button.

To rotate a plane while maintaining orthogonality:

1. Locate the cursor on the radial bidirectional arrow on the plane line (see red arrows in Fig. 5.1). The bidirectional arrow will be highlighted.
2. Move the cursor, holding the mouse button to rotate the plane by the required angle. The images on the other planes will change.
3. Release the mouse button to fix the current position of the plane.

To undo the rotation of all planes, click the **Undo rotation** button on the toolbar  .



*Figure 5.1: Rotate an orthogonal plane*



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# Chapter 6

## ECG Viewer

### 6.1 View Graphs

If the graphs do not fit on the screen, then:

- pan them horizontally with the mouse, holding the left button;
- pan them vertically by rolling the mouse wheel.

### 6.2 Toolbar

The toolbar is at the top of the tab (Fig. 6.1).



Figure 6.1: Toolbar

#### 6.2.1 ECG Speed

Two speed values are available: 25 and 50 millimeters per second. The default speed is 50 millimeters per second. The required value can be set using the «**Horizontal scale ECG**» button.

#### 6.2.2 Scale

Two scale values are available: 10 and 20 millimeters per millivolt. The default scale is 10 millimeters per millivolt. The required value can be set using the «**Vertical scale ECG**» button.

#### 6.2.3 Length Interval

To select a length interval:

1. Activate the **Horizontal measurement**  $\longleftrightarrow$  tool on the toolbar with the left/right/middle mouse button. To continue work with this tool, use the button with which the tool was activated. To learn more about tool control, see Section 2.11.
2. Move the mouse along the graph to find the point to start with (it does not matter if the point is located on the left or on the right).
3. Click the mouse button to fix the point.
4. Move the mouse along the graph to locate the second point. The interval length value will be displayed against the interval background.
5. Click the mouse button to fix the point.

To move the interval, locate the cursor on it and drag it holding the left mouse button.

Only one interval can be built at a time.

To hide the interval, deactivate the **Horizontal measurement** tool.

### 6.2.4 Value Interval

To select a value interval:

1. Activate the **Vertical measurement** tool on the toolbar with the left/right/middle mouse button. To continue work with this tool, use the button with which the tool was activated. To learn more about tool control, see Section 2.11.
2. Move the mouse over the graph to locate the point to start with (it does not matter if the point is located at the top or at the bottom).
3. Click the mouse button to fix the point.
4. Move the mouse over the graph to locate the second point. The value matching the interval will be displayed against the interval background.
5. Click the mouse button to fix the point.



To move the interval, locate the cursor on it and drag it, holding the mouse button.


Only one interval can be built at a time.


To hide the interval, deactivate the **Vertical measurement** tool.

## 6.3 Frequency Filters

If an ECG is recorded with distortions, use filters to correct the graphs.

These filters remove the components those frequency is higher than 35 Hz (the  **Low pass filter 35 Hz** button) or 75 Hz (the  **Low pass filter 35 Hz** button). To apply the filter, click the corresponding button. To cancel filtering, click the corresponding button again. Only one filter can be applied at a time.

To remove power line interference from the ECG signal, use the Notch filter. To apply the filter, click the  **Notch filter 50 Hz** button. To cancel filtering, click the button again.


To remove the walks of the baseline of the graph, use a High pass filter. To apply the filter, click the  **High pass filter** button. To cancel filtering, click the button again.

## 6.4 Export series

When exporting, a series is saved in the filtered form. The series is stored in the local storage in the same study. To export, click the  **Export** button.

# Chapter 7

## Web DICOM Viewer Settings

To change settings click the button with the first wibr of the user name (e.g.  for **User**) and select the **Settings** item. The window shown in the Fig. 7.1 will be opened.

To apply parameters, click **Apply**, to cancel, click **Cancel**. Always click **Apply** when you change a tab.

### 7.1 Common settings

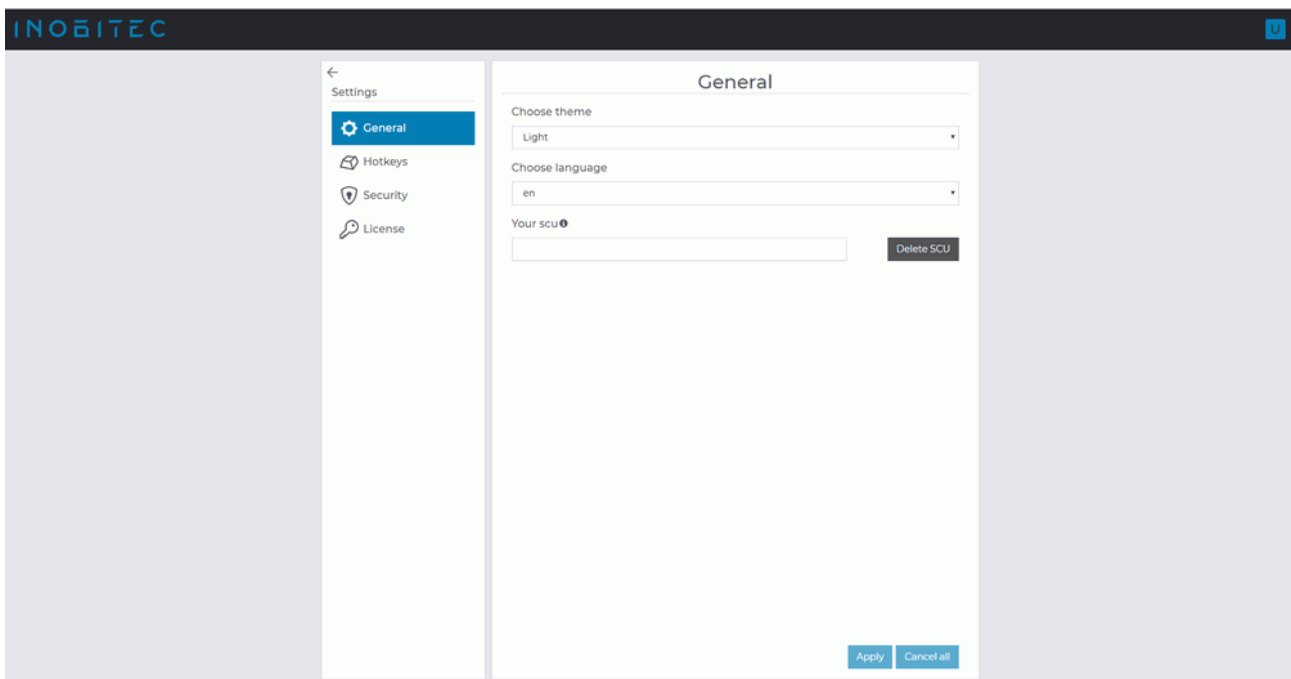


Figure 7.1: Common settings

The following parameters are set up in this tab:

- interface theme (light and dark);
- interface language (Russian and English);
- SCU to connect to DICOM Server.

## 7.2 Hotkeys

In this tab, you can specify hotkeys to perform different actions.

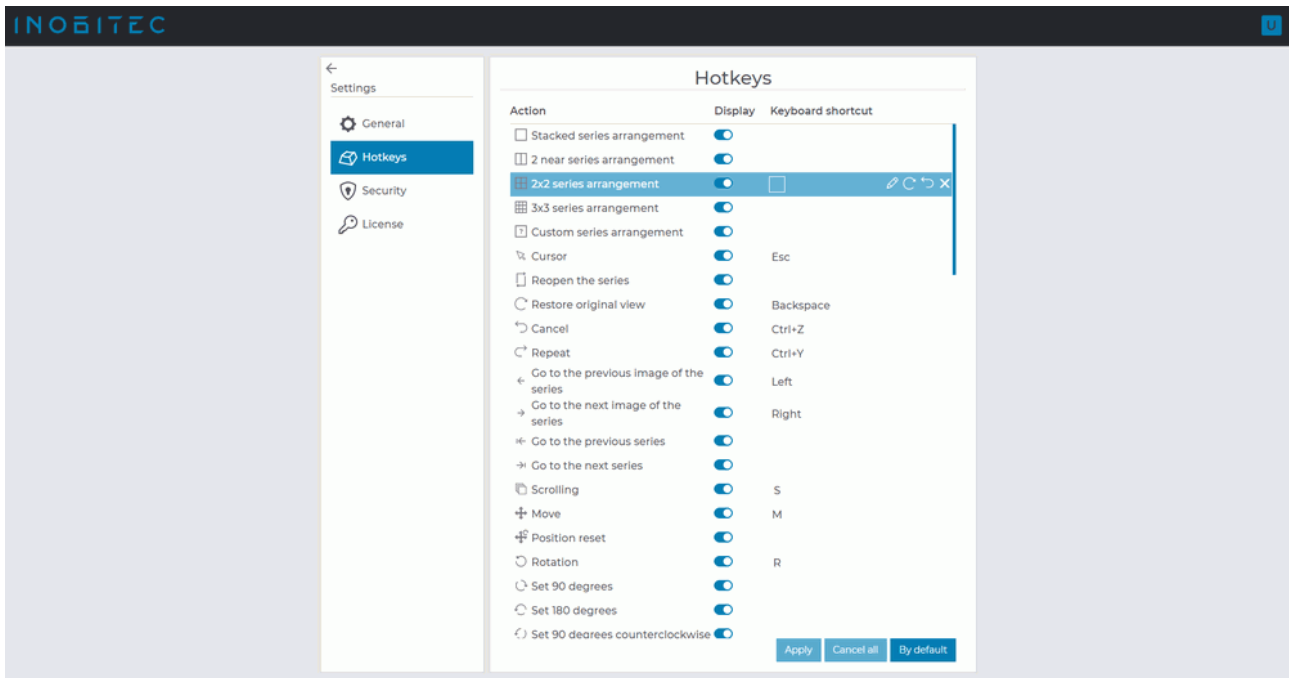


Figure 7.2: Hotkeys

## 7.3 Security

To change the password, type an old password to the **Old password** field, next type the new password to the **New password Confirm new password**.

## 7.4 License

In this tab, you can type you license key and to see available features for this key.

# Chapter 8

## Licensing

### 8.1 Named User Licenses

A named user license is registered in the user's account on the **User settings** (see [Section 1.3](#)).

The license key activated for a certain user creates one personalized connection providing for continuous access to the system. The user with a named license has constant access to the system.

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Thanks for selecting our product! The Inobitec, LLC team is constantly working to improve it. We will be grateful for any feedback, comments and suggestions how to enhance the product functionality, user-friendliness and visualization quality.

**We wish you success in your work!**