

IMAGE Information Systems Ltd.

For a Better View in Diagnostics!

DICOMReader



Manual

V 2.1 Rev. 2R

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0. CE Conformance Statement

IMAGE Information Systems Ltd. does not accept liability for the wrong or unprofessional use of the described software (see the End User License Agreement).

DICOMReader is certificated as a medical product according to the medical device regulations DIN EN ISO 13485:2003.



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We are dedicated to improving and enhancing this software. Consequently, the information in this manual is subject to change without notice. Current information about product improving can be received from the DICOMReader homepage: <u>http://www.dicomreader.com</u> or IMAGE Information Systems Home Page <u>www.image-systems.biz</u>.

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1. Introduction

The DICOMReader is a software tool that scans any removable data carrier (e.g. CD-ROM) inserted into your computer automatically for images. All contained files will be checked, DICOM images will be analyzed and if necessary converted, and afterwards valid DICOM images will be transmitted via DICOM STORE to your viewer or PACS.

The DICOMReader is a DICOM 3.0 compliant software application that acts as a DICOM service class user (SCU) and runs on all modern Windows platforms. It allows parallel processing (multi-threading) of multiple media at the same time as well as adaptation of external data to your local range of patient ID and accession numbers.

This software features:

- automatic media scan using the Windows "auto-run" function
- an intuitive and powerful user interface
- multiple DICOM destinations configuration
- automatic DICOM destination selection by using the image header information and a predefined rule set
- automatic sending to a standard destination
- easy switching between configured DICOM destinations to function as standard destination
- a file extension filter for uncommon image files types (e.g. exe, pdf, ...)
- minimization of screen usage by working as icon in the system tray bar
- support of JPEG Lossy, JPEG Lossless and RLE compressed encoding
- automatic conversion to non-compressed images
- anonymization of DICOM patient data for usage in multi-center studies
- password protection for sensible configuration parameter

1.1 System Requirements

DICOMReader Software is running on Intel-compatible computers and runs at least on a Microsoft Windows 2000 Operating System (or higher versions). There has to exist a network device configured for the usage of the TCP/IP network protocol.

For a connection over insecure networks, like dial-in points, a VPN is recommended to use.

Minimal system requirements are:

- Windows 2000/XP/2003
- Pentium III or IV CPU > 512 MHz
- minimum 128 MB main memory
- minimum 5 GB hard disk (for program files and the volume of the data to be saved temporarily)

2. Installation

DICOMReader Software is shipped or downloaded with an installation routine.

2.1 Installation from CD

The DICOMReader software CD includes all installation files.

Please make the installation by following the instructions given here:

- 1. Insert the DICOMReader Installation CD into the CD drive of your PC.
- 2. Use the Windows Explorer to execute the installation file *setup.exe*, which is located on the CD.
- 3. Follow the instructions given by the installation wizard to finish the installation of the DICOMReader software on your hard disk.

2.2 Installation after Download

The DICOMReader software download includes all installation files.

To install DICOMReader on your hard disk, please follow the instructions given here:

- 1. Download the DICOMReader software into a directory of your choice.
- 2. Locate the directory using the Windows Explorer and execute the installation file *setup.exe*.
- 3. Follow the instructions given by the installation wizard to finish the installation of the DICOMReader software on your hard disk.

After finishing the installation process you should see the following file structure in your chosen installation folder:

١

DICOMReader.exe config.dat filters.dat rules.dat stations.dat (the application) (configuration file) (filter list file) (rules list file) (station list file)

\help

help_files.txt

(help files)

To re-/uninstall DICOMReader Software use the software manager of your operating system.

3. Configuration

The DICOMReader Software has to be configured in the options and configuration dialog of the application. Here you can set options for the application itself and for the DICOM transfer as well as add, modify or delete the DICOM stations that may be used as destination for sending DICOM images and configure the DICOMReader's DICOM options.



Img1 DICOMReader main window

To enter the configuration dialog, click on the $\cancel{2}$ icon in the DICOMReader's main window to open the "Options" window. This is the main user interface for configuration.

| DICOMReader - Security | × |
|--|---|
| Security question | |
| Please enter the configuration password: | |
| | |
| ОК | |

IMPORTANT: For security reasons some configuration dialogs are password protected. Use "DICOMREADER" (case sensitive!) as password to receive full access to all dialogs. The password can not be changed by the user.

Note: You may also refer to the help pages accessible by clicking on the "?" icon to receive valuable information.

3.1 Options Settings

Open the "Options" dialog by clicking on the 2^{2} icon in the DICOMReader's main window or right-click on the DICOMReader's system tray icon and select "Options".

This is the main user interface for configurations.

| DICOMReader - Options | | | |
|---|-----------------------------------|----------------------|--|
| Application | | | |
| Temporary directory for DICOM send jobs | | | |
| | C:\temp | | |
| | use file extension filter | edit filter list | |
| | start application minimized (as t | ray icon) | |
| | open media tray after reading (| (automatically) | |
| | show window "stays on top" | | |
| | verbose (shows error informati | on in status window) | |
| | send to a standard destination | (automatically) | |
| | use forward rules | edit rules | |
| | anonymize patient data | edit parameter | |
| | ask for new patient data | | |
| | do not allow transfer of compre | essed images | |
| NOTE: compressed images will allways be converted | | | |
| | DICOM stations D | ICOM options | |
| | ОК | | |

Img2 "Options" dialog

The "Options" dialog allows the definition and modification of the following specifications:

- 1. for the DICOMReader application:
 - "Temporary directory for DICOM send jobs": You can choose the folder on the hard disc to temporarily copy the DICOM files to. If the folder does not exist, it will be created. The content of the folder will be deleted after the scan/send job of a CD is finished or after a job process is cancelled. This is done to save hard disk space.
 - "use file extension filter": If enabled, files matching with the extension list will be excluded from being processed during the scanning of the media.

| DIC Fil | COMReade | r - Filter List 🛛 🏆 🔀 |
|------------|---|---|
| | Extension .bmp .cab .css .dll .exe .gif .htm .html .jar .jpg .js | Description Bitmap image cabinet file CSS style sheets program library applications GIF image internet files internet files java applet JPEG image Java script files |
| | Add | Edit Delete |
| | | ОК |

"edit filter list" allows to modify the list of filters.

Img3 Filter list dialog

• "start application minimized (as tray icon)": If enabled the application will start without opening the main window and will instead show only an icon in the system tray.



However, the application has still full functionality. (see section 4.1 for more information)

- "open media tray after reading (automatically)": This will open the media tray (e.g. CD or DVD drive) automatically after the scanning process is completed.
- "show window 'stays on top'": If enabled the application window is always shown in the foreground, even if minimized and if you are working with other applications. This way the "auto-run" function to start a scanning process will not be hindered by other applications.
- "verbose (shows error information in status window)": If enabled the status of each job is given in more detail and also contains DICOM information. It allows for potential error analyses.
- 2. for the DICOM transfer of scanned images:
 - "send to a standard destination (automatically)": If enabled all data (images) will be sent to the chosen DICOM station. Select the DICOM station from the drop-down menu. Use "DICOM stations" to configure the destinations. (see section 3.2 for more information)

• "use forward rules": If enabled the DICOM header will be used to find the appropriate destination. To do this, the DICOM header will be checked for matches with defined rules and be sent to the respective destination. Use "edit rules" to define the rules.

| ICOMRead | er - Rules | : List | 7 🛛 |
|----------|------------|---------------|----------------|
| Tag Gr | Tag Ele | Compare Value | Destination |
| 8 | 60 | ст | iQ-VIEW Statio |
| 8 | 90 | Dr. Schiwago | iQ-VIEW Statio |
| | | | |
| | Add | Edit Delete | 2 |
| | | ОК | |

Img4 Rules list dialog with examples

Note: There has to be at least on defined station to be able to configure forward rules.

Common DICOM Tags:

| Тад | Description | Sample value(s) |
|------------------|----------------------------|--------------------|
| (Group, Element) | | |
| | | |
| (0008,0020) | Study date | 20040404 |
| (0008,0022) | Acquisition date | 20040404 |
| (0008,0030) | Study time | 110522.000 |
| (0008,0032) | Acquisition time | 110740.850 |
| (0008,0050) | Accession number | 1234 |
| (0008,0060) | Modality | CT, MR, US, SC, OT |
| (0008,0070) | Manufacturer | TOSHIBA |
| (0008,0080) | Institution name | Hospital XYZ |
| (0008,0090) | Referring physicians name | Dr. Schiwago |
| (0008,1010) | Station name | INT3 |
| (0008,1040) | Institutional Depart. name | DN1 |
| | | |
| (0010,0010) | Patients name | John Doe, 1332 |
| (0010,0020) | Patient ID | 80126679 |
| (0010,0030) | Patients Birth date | 19770415 |
| (0010,0040) | Patients sex | M,F,U |
| (0010,4000) | Patient comments | any comment |
| | | |
| (0020,0010) | Study ID | 4245 |
| (0020,4000) | Image comments | any comment |

- "anonymize patient data": If enabled all sensible patient related data, like patient name and patient comment, will either be changed or deleted. The patient ID will be used to fill needed fields.
 - **Note:** The anonymize option will be ignored if "ask for new patient id / accession number" is enabled in the options dialog.

Use "edit parameter" to define which data shall be anonymized.

| DICC |)MReader - Edit Anonymize Data 🛛 🕅 🔀 | | | | |
|---|---|--|--|--|--|
| Anonymize patient ID & accession number | | | | | |
| | 00000001 | | | | |
| This option will be ignored if 'ask for new patient id / accession number' is enabled in the option dialog. | | | | | |
| | Different patients on the media will also cause to increment the anonymized ID/accession number automatically to avoid patient merging. | | | | |
| | Be sure the patient ID/accession number is not existing on your target system to avoid merging of patient data. | | | | |
| | Anonymize patients name (use patient ID) | | | | |
| | Anonymize all physicians data | | | | |
| | Physicians name: Anonymized | | | | |
| | Anonymize all institution data | | | | |
| | Institution name: Anonymized | | | | |
| | Anonymize comments and descriptions (for patient, study, series and image) | | | | |
| | Change birthday to January, 1st | | | | |
| | Set all dates to current date | | | | |
| | | | | | |
| ОК | | | | | |

Img5 Edit Anonymized Data dialog

In case that more than one patient is on the scanned media, a different anonymized ID / accession number will automatically be applied to each patient to avoid patient merging.

- **Note:** Make sure that the patient ID does not already exist on the target destination. The use of the same patient ID will lead to the merging of patient data.
- "ask for new patient data": If enabled the user will be prompted to enter new patient data during the scan process. Changes will be made to all images of this patient. If the prompted dialog is refused by the user (click "x" in the dialog), no changes will be applied to that patient.

Images of the same patient but from a different modality will also allow entering new data.

• "do not allow transfer of compressed images": If enabled only sending of uncompressed data is allowed. All compressed data (JPEG, RLE) will be converted before the sending process is started.

Note: JPEG2000 is not yet supported.

3.2 DICOM Stations Configuration

Choose the button "DICOM stations" in the options dialog to open the configuration dialog and to add, modify or delete the destinations for DICOM transmissions.

It is recommended that only the system administrator modifies the specifications in this dialog.

| Alias | AE-Title | Host | Port |
|-------------------------|--------------------|------------------------|-------------|
| EasyPACS iQ-VIEW Sta | EASYPACS IQVIEW | localhost localhost | 4006 104 |
| | | | |
| | | | |
| | | | |
| | | | |
| • | | | |
| | Add Edit | Delete | [|

Img6 "DICOM station list" dialog

To be able to transmit previously scanned images to a DICOM destination, it is necessary to configure the DICOM stations that shall be used as such target destinations.

A valid host configuration contains:

- 1. "Alias" = a free chosen name for the station entry. The name can be the AE title and is only used internally by the DICOMReader.
- 2. "AE-Title" = the application entity title of the DICOM application entity. It is a unique identifier for a DICOM device. Multiple usage of the same AE-Title within the same configuration file will end in a not working environment.

- 3. "Host" = the hostname or IP network address is used to address the DICOM device in the used network. If a hostname is used, be sure that the local DNS service in the network is able to translate this hostname.
- 4. "Port" = the TCP network port of the host

Known DICOM standard AE titles and ports:

| Application/Machine name | Standard AE-Title | Standard TCP-port: |
|--------------------------|-------------------|--------------------|
| | · | |
| iQ-VIEW / iQ-VIEW PRO | IQSERVER | 104 |
| EasyPACS Viewer | EASYPACS | 104 |
| K-PACS, | | 111 |
| E-Film, | | 104 |
| Conquest Server | | 5678 |
| Hipax Viewer | HIPAX | 104 |
| RADWORKS 5.x | | 104 |
| EasyVision | | 3010 |

3.3 DICOMReader Configuration

Choose the button "DICOM options" in the options dialog to open the configuration dialog and to configure special DICOM options for the DICOMReader.

It is recommended that only the system administrator modifies the specifications in this dialog.

| DICOMReader - DICOM options 🛛 😰 | | | |
|---------------------------------|--|--|--|
| DICOM | | | |
| AE Title | DICOMREADER | | |
| Max. PDU size | 16384 | | |
| Time out (ms) | 1000 | | |
| Silently correct | space-padded UIDs equired presentation contexts | | |
| | ок | | |

Img7 "DICOM options" dialog

The following configurations may be modified:

- "AE Title" = the application entity title of the DICOMReader application. It is recommended to choose different AE titles for each DICOMReader if you connect more than 1 DICOMReader to one PACS Archive or Viewing Station.
- "Max. PDU size" = the maximum size of a "packet data unit" for transmission

- 3. "Time out (ms)" = time-out for associations in milliseconds
- "Silently correct space-padded UIDs" = If enabled it corrects the UID in the DICOM dataset header automatically. This option can help solving problems with some DICOM stations.
- 5. "Propose only required presentation contexts" = If enabled DICOMReader only proposes the dataset related and required presentation contexts. This option can help solving problems with some DICOM stations.

4. Usage of the Software Application

4.1 DICOMReader Open Window Mode

After starting the DICOMReader application out of the Windows Explorer or by clicking on the Desktop icon, the main window will open (unless you have enabled the "start application minimized" option).



Img8 DICOMReader main window

Main window features:

- = Minimizes the application; it will still run in the tray bar of the computer.
- \mathscr{P} = Opens the "Options" dialog. (see section 3)

Lets you choose manually any CD-ROM or DVD drive for reading media.

| DICOMReader | |
|---------------------------------------|--|
| Select a media to start reading from. | |
| Drive | |
| E:\ | |
| OK | |

Img10 Select media dialog

The pull-down menu shows all CD-R and DVD drives of the computer. Simply select the one from which you wish to read in a medium.

 \bigotimes = Opens the status information:

| D | | M 景 |
|--------|------------|----------|
| | Files | Errors |
| Scan 🔿 |) 75 | · 🗙 |
| Send 🔘 |) 75 | · 🔀 |
| Status | | |
| Media | Patients | |
| 1 | CT Example | 9, MR Ex |
| | | 0 8 |

Img11 Main window with status display

The status display states the number of media that were scanned together with the patients (name) contained on each medium. Click on an entry to open a window displaying detailed status information of the scanning / sending process of the respective medium.

| # 🚺 🐴 👫 statu | s Finished | | |
|---|--------------|--------|--|
| temp folder | | | |
| C:\temp\20051214105318 | | | |
| Patient | PatientID | Images | |
| CT Example | 100902898 | 10 | |
| MR Example | RSNA2 | 4 | |
| RF Example | HS12345 | 2 | |
| Test PixelSpacing | 62354PQGRRST | 5 | |
| Carly, A. | P0110 | 23 | |
| Branson, S. | P0221 | 31 | |
| ERROR: Not a valid dicom file [autorun.inf] ERROR: Not a valid dicom file [custom.ini] Start sending: 'C:\temp\20051214105318' to IQVIEW INFO: File 'C:\temp\20051214105318\I00001' sended to IQVIEW INFO: C:\temp\20051214105318\I00001.10' converted [JPEGLossless:Non-hierari INFO: File 'C:\temp\20051214105318\I00001.10' sended to IQVIEW INFO: File 'C:\temp\20051214105318\I00001.2' sended to IQVIEW | | | |
| INFO: File 'C:\temp\20051214105318\I00001.5' sended to IQVIEW INFO: File 'C:\temp\20051214105318\I00001.5' sended to IQVIEW INFO: File 'C:\temp\20051214105318\I00001.6' sended to IQVIEW | | | |
| | | | |

Img12 Example for status information

You can scroll through the different media, using the \uparrow and \downarrow arrows.

The status is given: Either "Finished" when the scan/send job was finished, or "Stopped" if either the scan or send job was cancelled.

The directory path is given as well as patient information (name, ID, number of images). The "LogStatus" gives details regarding the processing of the media as well as error information.

The LogStatus will automatically be updated every 5 seconds during job processing, even if the window is open.

The "AutoScroll" box is always automatically activated when the window is opened. It makes the cursor jump to the last line of the status report. If you wish to remain in a different line of the report, simply deactivate the checkbox.

4.2 DICOMReader Hidden Window Mode

If you have selected the "start application minimized" option, the DICOMReader will run as an icon in the system tray bar of your computer.



Double-clicking on the icon will re-open the main window.

Right-clicking on the tray bar icon will open a dialog window from which you can:

| ✓ iQ-VIEW Station | Standard Destination |
|-------------------|---|
| EasyPACS | Info Start reading a media manually Options |
| | Open |
| | Exit |
| | EN « |

- exit the DICOMReader,
- open the application's main window,
- open the options dialog,
- choose a CD-ROM or DVD drive to read-in images, or
- change the standard destination for transmitting images.

4.3 Scanning and Sending of Images

To read in a CD-R or DVD, select **at first** your standard destination. After the scanning process started, it is no longer possible to change the standard destination by right-clicking on the system tray bar and selecting "Standard destination". The area will be grayed-out.

Then, insert your CD or DVD.

The Windows "auto-run" function will automatically start the scanning process.

Note: In case you have disabled the "show window 'stays on top'" function in the options dialog, the auto-run function may not work if another application overlays the DICOMReader application.

Scanning / sending in open window mode:



When the scanning process starts, the LED indicator next to "Scan" will turn green. The files will be temporarily saved to the selected folder.

The number of scanned-in DICOM files is counted during the process as well as the number of potential errors.

To stop the sending process, click on the "x". The LED indicator turns yellow; the "x" can no longer be activated.

If you have enabled the "ask for new patient data" option the following dialog will open during the scanning process:

| DICOMReader Change Patient ID / Acc | ession Number / Patients Name | ? 🛛 |
|--|-------------------------------|-----|
| Current data | | |
| Patient ID: | 100902898 | 4P |
| Accession number: | 11152075 | ÷ |
| Patients name: | CT Example | |
| Birthdate: | 06/03/1919 | |
| Modality: | СТ | |
| New data | | |
| Patient ID: | | |
| Accession number: | | |
| Patients name: | | |
| | ОК | |

Img13 Change patient ID / accession number / patients name dialog

In the upper part of the display you are shown the current patient data as given in the DICOM header. The new data can be entered in the area at the bottom.

Using the \downarrow arrows next to the "Patient ID", "Accession number" and "Patients name" fields you can transfer the ID / number / name directly to the respective fields in the "new data" area, in case you do not want to change them.

Note: The entry of a patient ID is <u>mandatory</u> for the process to be continued according to the DICOM Standard. The entry of an accession number and patient name is optional.

In case that the prompted dialog is refused by the user (by clicking the "x" in the dialog) no changes will be applied to that patient. Images of the same patient but from a different modality will also allow entering new data.

After the scanning is completed, the CD-R or DVD drive will automatically eject the medium (unless you have disabled this option in the options dialog).



Then the sending process will start during which the DICOMReader transmits the images to the pre-assigned destination. The LED indicator next to "Send" will turn green.

The number of sent DICOM files is counted during the process as well as the number of potential errors.

LED indicator turns yellow; the "x" can no longer be activated.

Note: If you have not chosen a standard destination for the transmission of the images, DICOMReader will execute the scanning process and then show the following dialog, prompting you to choose a destination (already defined or newly to be configured:

| DICOMReader - No station selected |
|-----------------------------------|
| definded station |
| |
| C manual configuration |
| AE Title: |
| Address: |
| Port: 0 |
| ОК |

Img14 No station selected dialog

If the destination you have chosen is not available, you will receive the following error message:

| DICOMRe | eader 🔀 |
|---------|--|
| 8 | DICOM ERROR: The Request of the association to 'EASYPACS' failed. Perhaps the destination is not reachable at the moment. Do you want to retry? |
| | Yes No |
| | |

Img15 Sending error message



The LED indicator next to "Send" will turn yellow to indicate the error.

Make sure that you have chosen a sending destination and that the SCP of that application (e.g. your viewer) is active.

Afterwards restart the sending process.

Scanning / sending in hidden window mode:



If minimized the running of the scanning / sending process is only indicated by a color change to red of the system tray icon.

However, the window for the change of patient data / accession number (if enabled) is shown as well as potential error messages.

To see the status information you will have to open the main window of the DICOMReader.

4.4 Frequently Asked Questions

This section will give answers to some frequently asked questions and provide trouble-shooting.

Note: Basically, if an error occurs, you should copy and paste the respective LogStatus report into an email and send it to us at <u>support@image-systems.biz</u>. This will help us reconstructing the error.

1. The DICOMReader is unable to send DICOM data to your viewer.

This can have several reasons:

- Make sure that you have chosen a destination where to send the data.
- The destination is not reachable. => The SCP of the target destination (e.g. a viewing station) must be active; you may also check whether the AE-Title, hostname / IP address and Port number are valid for the respective destination (click on the "DICOM stations" button in the "Options" dialog to open the "DICOM station list").
- It was caused by routing problems within a network.
- A firewall impedes access to the destination.

2. The DICOMReader does not recognize TIFF, JPEG or BMP images.

Images in the TIFF, JPEG or BMP format are not DICOM images. Therefore, they can not be read-in by the DICOMReader. Please use the import function of our iQ-VIEW / iQ-VIEW PRO Viewing Station to import JPEG or BMP images. The import of TIFF images will be integrated, soon.

3. There are DICOM files on the CD-ROM but the viewer is unable to convert them.

At first make sure that the function "do not allow transfer of compressed images" in the "Options" dialog is not disabled. If the box is not checked, enable this function and try again.

If you still have problems to view the images in your viewer, send the name and version of your viewer including some files to:

IMAGE Information Systems Ltd. 483 Green Lanes London, United Kingdom Or by Email: <u>support@dicomreader.com</u>

We will try to process them.

4. You have problems reading STENTOR files.

There is currently no way of reading STENTOR files with the DICOMReader. Stentor unfortunately does not publish it's iSite data structure. But Stentor's new iSite V3.5 released in QI/2006 will be DICOM-ready!

5. The viewing application hangs or crashes when opening images that were converted by the DICOMReader.

In this case, please send example images (those who caused the hang-up / crash) to:

IMAGE Information Systems Ltd. 483 Green Lanes London, United Kingdom Or by Email: <u>support@dicomreader.com</u>

Please also give us information about which version of the DICOMReader and viewer (incl. version number) you use.

To find out the version number of the DICOMReader, simply click on the DICOMReader logo in the main window or right-click on the icon in the system tray bar and choose "Info".

5. List of Abbreviations

| AET | Application Entity Title |
|-----------|---|
| C-Find | – DICOM command for search of studies |
| C-Move | – DICOM command for move of studies |
| CR | Computed Radiography |
| СТ | Computed Tomography |
| DICOM | Digital Imaging and Communication in Medicine |
| DNS | – Domain Name System |
| DR | Direct Radiography X-Ray Systems |
| DX | - Direct X-Ray Systems, e.g. Angiography or Fluoroscopy |
| GUI | Graphical User Interface |
| IP | – Internet Protocol |
| Move SCU | C-Move as service class User |
| MR | Magnetic Resonance Imaging |
| NM | – Nuclear Medicine |
| ОТ | other title (other DICOM storage class) |
| Q/R SCU | Query/Retrieve as service class User |
| RF | Radiographic Fluoroscopy |
| SC | – Secondary Capture |
| SCP | - Service Class Provider |
| SCU | - Service Class User |
| STORE SCP | – DICOM store as service class Provider |
| STORE SCU | – DICOM store as service class User |
| US | – Ultrasound |
| VR | Volume Rendered, Volume Rendering |

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A

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|---------------------------------------|
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