

::dicominator

User Guide

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version 1.2.21

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Introduction

‘You’re DICOMinated’ is a phrase we often hear from Sarah Gabelman these days as she wrestles nettlesome DICOMs to the ground. Dicominator is a tool that intends to help PACS administrators better service the DICOM and HL7 cleaning, normalization and transformation requests of the medical imaging research community. As AI rises, requests like:

- Send these 10,000 MRIs to my Azure store de-identified by next Tuesday and oh, make sure to block any slices thicker than 4mm
- For this clinical trial, de-identify the following 112 tags, get rid of any PHI burned into the pixels, transcode all the files to JPEG Lossless, Nonhierarchical, First- Order Prediction (Processes 14 [Selection Value 1]): Default Transfer Syntax for Lossless JPEG Image Compression, and write in the relevant group 12 tag values

are made all the time and sound easy enough (maybe that second one does not sound so easy), but if you have spent any time working in the DICOM trenches, you know that fulfilling the above requests is hard. We built Dicominator to make it easier for PACS admins to fulfill such requests from within the comfort of their PACS environment.

Dicominator is a local, Windows workflow engine that is simple to use and customizable via a simple UI. Here are a few highlights:

- Tag de-id search and remove functionality (i.e. search all tags for the value in the 0010,0010 tag (patient name) and remove it where found in other tags before removing the 0010,0010 tag value)
- Clinical trial auto subject and visit description coding to the relevant group 12 tags using a .csv reference file that is easy for the Clinical Research Coordinators to maintain. Our visit description coding includes time based tolerances.
- Our simulator feature to help keep your blood pressure low. After building a workflow, you can run a DICOM through and see at the SOP tag level what is going to happen (before and after). We do the same for pixel masking.
- Write to and receive from all the places DICOMs are stored (object storage, file paths, DICOM) using all the protocols that are used (C-STORE, C-FIND and C-MOVE, dropbox).

And a whole lot more. This user guide is a comprehensive description of Dicominator’s capabilities. We are just getting started, and so you can expect this guide to grow over time. We hope that someday soon you too start saying ‘You’re DICOMinated!’ to DICOM files. We promise the data can hear you and is scared.

Application Overview

Dicominator is a flexible DICOM and HL7 cleaning, normalization, and transformation tool that enables robust data manipulation, transcoding, tag data de-id and pixel data de-id. Dicominator is a Windows application that can optionally be run as a Windows service. It should be installed within the network of the hospital or organization. In this context, 'in the network' means on a Windows machine inside the organization's network, within the hospital's DMZ, or within the hospital's cloud footprint (e.g. AWS, Azure, or GCP). The machine that Dicominator is installed on must have a static ip, network line of sight to the hospital's PACS, and the ability to write the data to a cloud storage mechanism (e.g. s3, blob, or GCS), to a PACS if DICOM, to an HL7 destination if an HL7 message, or to a file path.

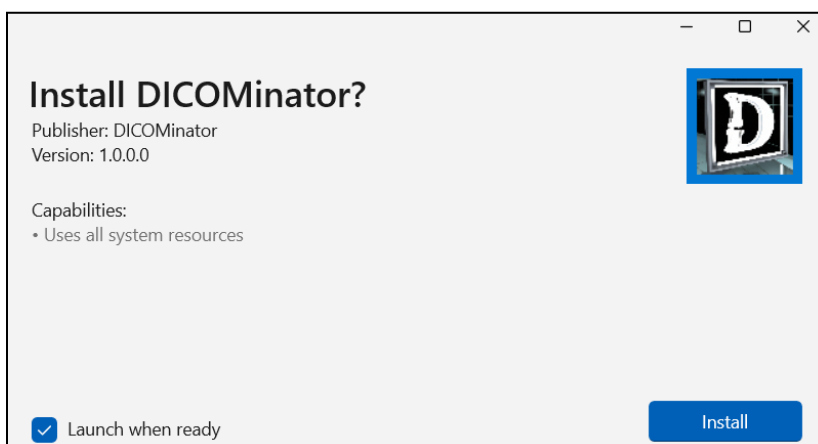
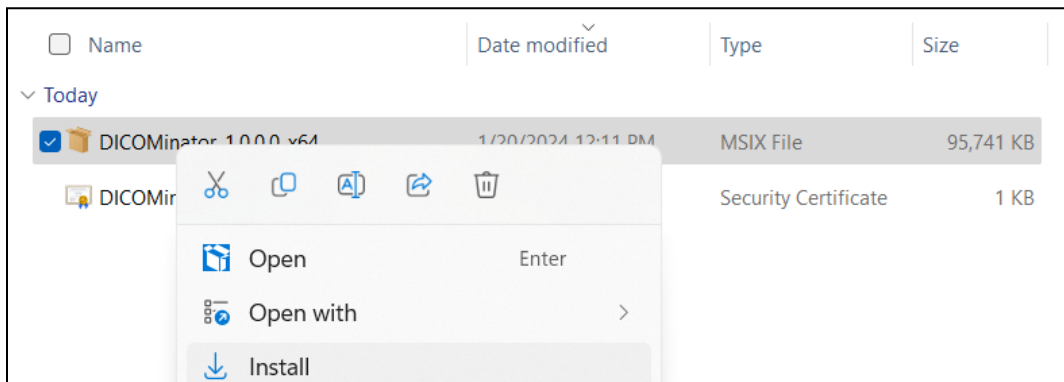
Dicominator is written in C#. We use an SQLite db, and we use FO-DICOM for our DICOM library.

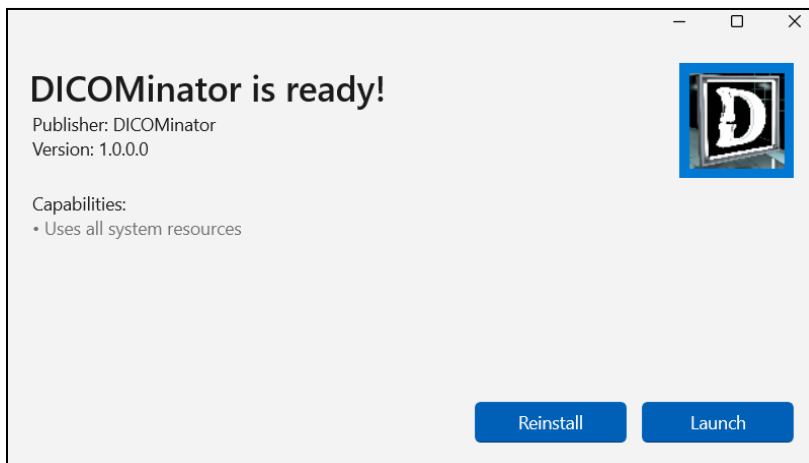
Installing Dicominator

The Dicominator install package is an MSIX file stored in our Google Drive. MSIX is not supported automatically on all versions of Windows. Please follow the installation steps that correspond with the operating system you are using.

To install Dicominator as an application on Windows desktop:

1. Begin the installation process by clicking the “Download” button on our Home page at www.dicominator.com. Click the link in step 1 to access the Dicominator installation package stored in our Google Drive.
2. The MSIX is too large for Google Drive to scan. Click “Download anyway” when Google Drive asks “Would you still like to download this file?” to download the install package.
3. Navigate to your local Downloads folder. Double click the Dicominator MSIX file or right click and select “Install”. Click the "Install" button to complete the installation. Leave the "Launch when ready" checkbox enabled to automatically open Dicominator once the installation process is finished. If you uncheck the “Launch when ready” checkbox, click the “Launch” button to open Dicominator.

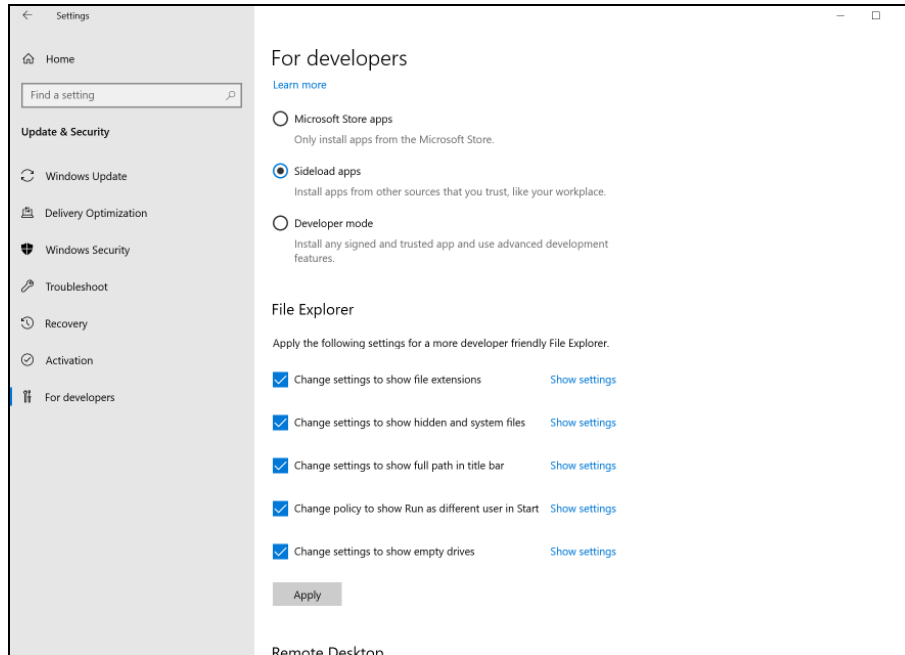




Steps for installing Dicominator as an application on Windows Server/Enterprise 2019 or later:

1. Begin the installation process by clicking the "Download" button on our Home page at www.dicominator.com. Click the link in step 1 to access the Dicominator installation package stored in our Google Drive.
2. The MSIX is too large for Google Drive to scan. Click "Download anyway" when Google Drive asks "Would you still like to download this file?" to download the install package.
3. Download the WindowsAppRuntimeInstall.exe file from our Google Drive by clicking the link in step 2. It is an executable, so Google Drive is unable to scan and you will be prompted to click "Download anyway" again. Please note that it may take a moment for the "Download anyway" button to display.
4. Navigate to your local Downloads folder. Double-click the WindowsAppRuntimeInstall.exe file to install.
5. If using Windows Server 2019, you must enable side-loading before installing Dicominator via Powershell (if using Windows Server 2022, move to step 6). To do this, open Settings, Update and Security, For Developers and click "Sideload apps". By default, Windows Server 2019 requires all apps to be from the Microsoft Store.
6. Open Powershell in admin mode.
7. Run this command:
`Add-AppxPackage -Path "C:\Path\To\DICOMinator_1.1.3.0_x64.msix"` where "`\Path\To\`" is the path the MSIX file was downloaded to.

Dicominator is installed! Please note that there is no icon on the desktop automatically. Search for "Dicominator" in the search bar and you'll see it. Also note that Dicominator may take several seconds to open the first time you launch it, and then once it's running you can create a desktop icon and/or pin it to the taskbar.



To install Dicominator as a service on Windows:

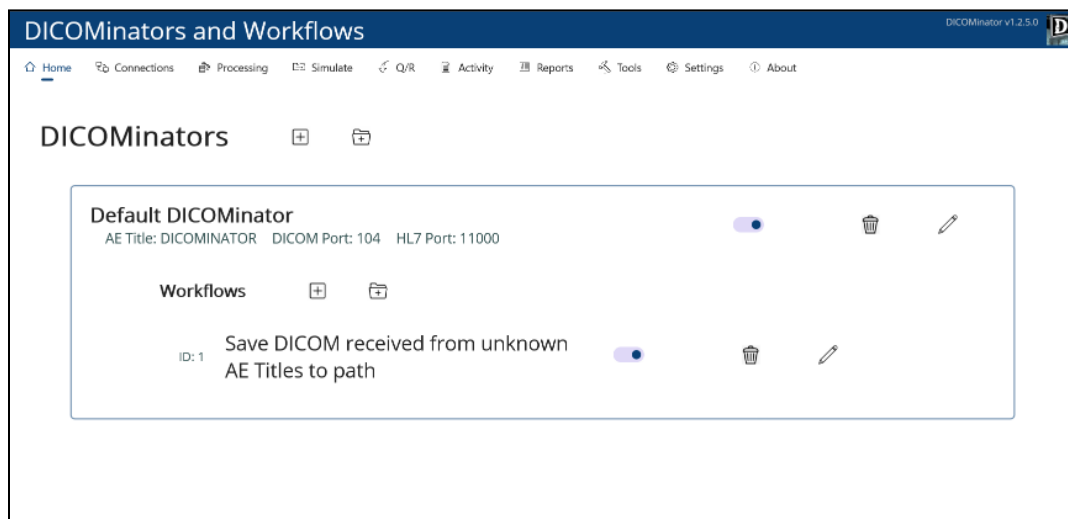
1. Download the Dicominator service .zip file provided by Dicominator support.
2. Unzip the .zip file in the desired service installation folder. For example, "C:\Program Files\Dicominator.service\"
3. Open Powershell **as an administrator**.
4. Run the command: "New-Service -Name "Dicominator" -BinaryPathName "C:\Program Files\Dicominator.service\Dicominator.Service.exe" -DisplayName "Dicominator Service" -Description "Runs Dicominator as a service." -StartupType Automatic"
5. Dicominator is now installed as a service and can be started/stopped via the Windows Services panel.
6. Note by default that the Dicominator service data, including logs, is stored in "C:\Dicominator.Service\ServiceData\"
7. To uninstall the Dicominator service, open a command prompt **as an administrator** and run the command: "sc delete Dicominator". Note that uninstalling does not remove the service data files, so a new version of the Dicominator service can then be installed which maintains the data files.

Dicominator Configurations

Once Dicominator is launched, several tabs display across the top. The Home, Connections and Processing tabs are for configuring Dicominator, the entities that it communicates with, and the data manipulations that it will perform, respectively.

Home Tab

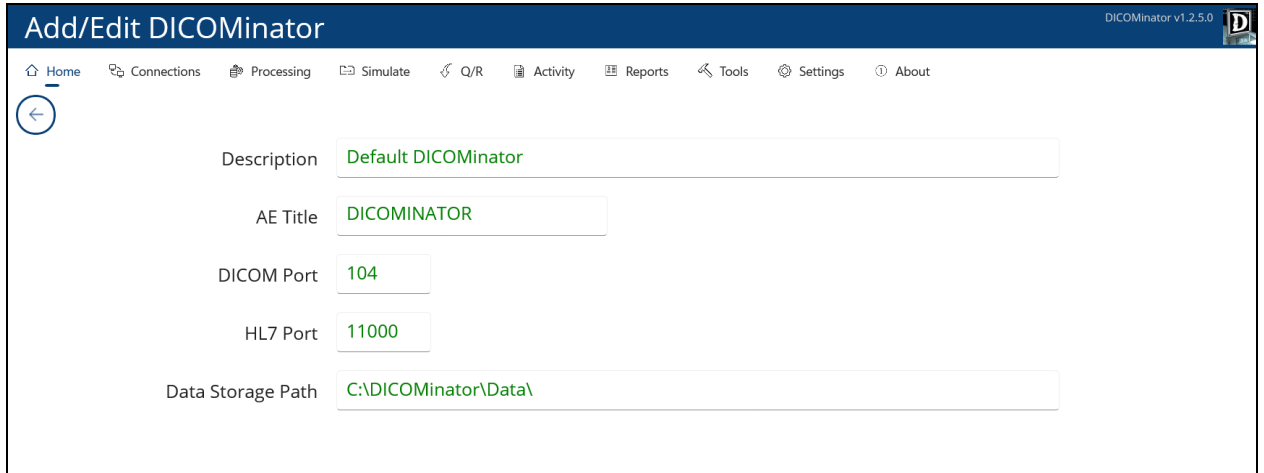
The Home tab is where you create, configure, and enable/disable your Dicominator instance(s) and any associated workflows. Each Dicominator instance has its own unique AE title, DICOM port, HL7 port, and data storage path.



Dicominators section:

The Dicominators section is where you can add, edit or delete your Dicominator(s) and enable/disable them. A hospital will typically only need one configured Dicominator. The settings are:

- Description, AE Title, DICOM Port, HL7 Port and Data Storage Path (all required fields). The Data Storage Path defines a local path where temporary, in-process data will be stored by this Dicominator.



The screenshot shows the 'Add/Edit DICOMinator' window with a dark blue header and a navigation bar. The main content area contains five configuration fields, each with a label and a text input box. The fields are: Description (Default DICOMinator), AE Title (DICOMINATOR), DICOM Port (104), HL7 Port (11000), and Data Storage Path (C:\DICOMinator\Data\). A blue circular icon with a left arrow is located on the left side of the form.

Workflows section:

The Workflows section is where you configure DICOM and HL7 workflows. Each workflow defines a specific flow of data coming into this Dicominator from a configured connection, processing the data according to configured processing rules, and sending the data out to a configured connection. Click the “+” icon to create a new workflow. Existing workflows display in the list. Each workflow can be enabled or disabled from the workflows list. The settings are:

- Workflow ID. This value is automatically assigned and is a unique identifier for each workflow.
- Description (required field). This is a text field that displays in the Workflows list within the Dicominator. Our best practice recommendation is to enter a value here that describes the specific action being performed by this workflow. For example, “De-identify DICOMs from the dropbox and send to PACS”.
- Inbound Connection. This is a dropdown menu of connections that are configured to support inbound actions in the Connections tab.
- Outbound Connection. This is a dropdown menu of connections that are configured to support outbound actions in the Connections tab.
- Priority. This is a dropdown for selecting the priority of the workflow between 1 (highest) and 9 (lowest). This enables prioritizing some data workflows over others. The default for DICOM data workflows is 7. Internally, HL7 data workflows default to 4, but can be set to a higher priority, if desired.
- Processing Rules (set to NONE by default). Click the “+” icon to configure the processing rules. Two settings display:

- IF. This is a dropdown menu. There are sample options available by default to apply for DICOM or HL7 data. To configure additional DICOM Processing Conditions and HL7 Processing Conditions, navigate to the Processing tab.
- THEN. This is a dropdown menu. There are sample options available by default to apply for DICOM or HL7 data. To configure additional DICOM Processing Actions and HL7 Processing Actions, navigate to the Processing tab.
- Multiple processing rules can be added. They are evaluated sequentially until a processing condition is met. Once a condition is met, the corresponding action is executed and the data is sent to the outbound connection. Any other processing rules are not evaluated/executed. If no condition is met, the data is sent to the outbound connection as-is. If you desire the data to not be sent outbound if no condition is met, use the BLOCK SEND action in the final processing rule.

Add/Edit Workflow

DICOMinator v1.2.5.0

[Home](#)
[Connections](#)
[Processing](#)
[Simulate](#)
[Q/R](#)
[Activity](#)
[Reports](#)
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[Settings](#)
[About](#)

←

Editing Workflow for DICOMinator instance 'Default DICOMinator'

Workflow ID

1

Description

Save DICOM received from unknown AE Titles to path

Inbound Connection

DICOM: Incoming DICOM from all non-configured AE Titles

Outbound Connection

DICOM: Default save DICOM data to file path

Processing Rules

+

IF:

DICOM Condition: No condition - Apply action to all DICOM data

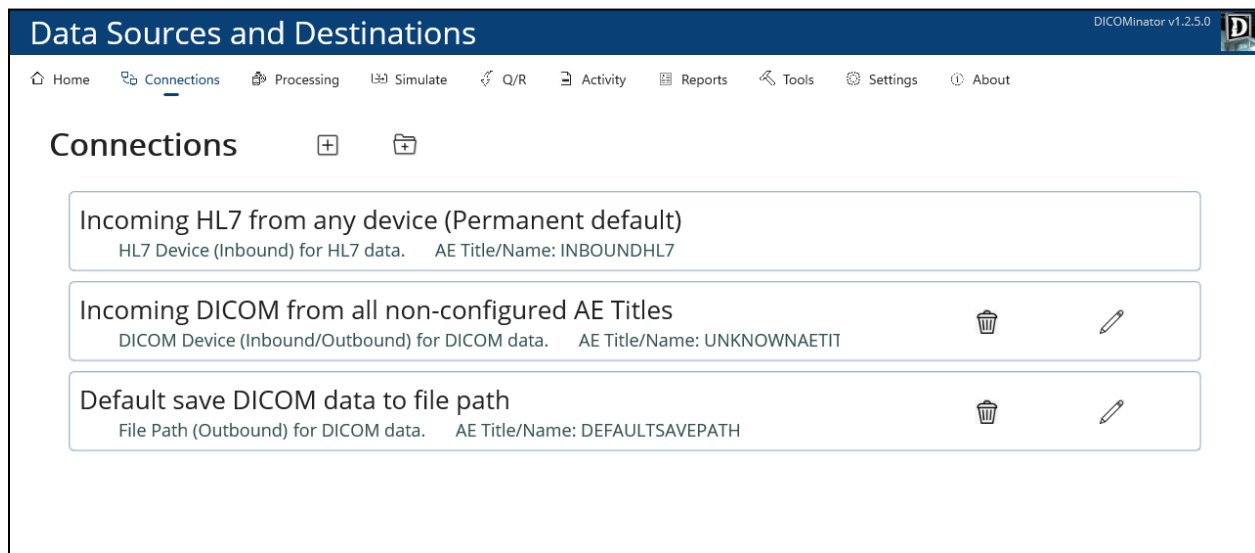
THEN:

DICOM Action: DICOM Sample - Set patient names to 3 character:

🗑️

Connections Tab

The Connections tab is where you can configure connecting inbound and outbound DICOM or HL7 devices, as well as cloud providers and file paths, to communicate with Dicominator. New connections can be added here and existing connections can be edited or deleted from this page.



Supported types of connections are:

- DICOM Device (Inbound/Outbound)

Select this option when connecting to another device that supports DICOM protocol for sending and receiving DICOM imaging. The data type for a DICOM device is always DICOM. The settings are:

- Description, AE Title, Port, and IP Address (required fields).
- C-STORE SCP LEVEL and C-STORE SCU LEVEL default to the value STUDY. SERIES, IMAGE, and NONE are also options. Selecting NONE disables the feature.
- C-FIND SCP Delay (seconds). A numerical value that determines the minimum number of seconds between query requests being sent to this device. The default value is 0 seconds.

- C-MOVE SCP Delay (seconds). A numerical value that determines the minimum number of seconds between retrieve requests being sent to the AE Title and port specified by the CSV migration configuration. The default value is 5 seconds.
- C-FIND Filter. This setting is disabled by default. Click the checkbox to apply filter conditions for queries performed to this connection. Once enabled, a dropdown menu displays all conditions that have been created in the DICOM Processing Conditions section of the Processing tab. This filter is applied to incoming query results and if the condition is not met, the results are filtered out. This feature allows you to perform query retrieves using filters that are more granular than most DICOM devices support.

Add/Edit Connection DICOMinator v1.2.21.0

Home Connections Processing Simulate Q/R Activity Reports Tools Settings About

←

Description: PACS

Type: DICOM Device (Inbound/Outbound) ▼

Data Type: DICOM

AE Title: PACS

Port: 104

IP Address: 127.0.0.1 Verify via C-ECHO

C-STORE SCP Level: STUDY ▼

C-STORE SCU Level: STUDY ▼

C-FIND SCP Delay (seconds): 0

C-MOVE SCP Delay (seconds): 5

C-FIND Filter: ☒ DICOM Condition: CTs with slice thickness less than 1mm ▼

- Remote Connection (Inbound/Outbound)

Select this option when ingesting data from (by DICOM send or query retrieve) or sending data to another Dicominator installation in a remote network. This feature is disabled by default but can be enabled in the Settings tab. When enabled, DICOM or HL7 data is sent from one Dicominator to the configured AWS S3 bucket in the connected AWS account, and then sent to the second

Dicominator and deleted from the AWS account once successfully received. The default AWS account's SQS is used for messaging. Both Remote Connections on the two Dicominator instances must be configured with the same AWS settings, including the keys. Since the AWS account is owned by one of the users, the users maintain total control of their data at all times. Dicominator, Inc never has access to any data.

- The settings are:
 - Description, Data Type (DICOM or HL7), Name, Remote Connection UUID, AWS Account ID, AWS Region, Bucket Name, SQS Prefix, Access Key, and Secret Key (required fields).
 - Query/Retrieve Enabled. This is a checkbox setting to enable or disable remote connections to query/retrieve from this connection. This setting is enabled by default.
 - C-FIND SCP Delay (seconds). A numerical value that determines the minimum number of seconds between query requests being sent to this connection. The default value is 0 seconds.
 - C-MOVE SCP Delay (seconds). A numerical value that determines the minimum number of seconds between retrieve requests being sent to the AE Title and port specified by the CSV migration configuration. The default value is 5 seconds.
- In order to use the Remote Connection option, the Remote Connections on each Dicominator must be configured with the UUID of the Remote Connection configured on the other Dicominator you are connecting with. Both Dicominators must have the remote option enabled on the Settings page. Also, both Dicominators must have at least one workflow configured to enable the connection, and at least one of these workflows must be enabled on each Dicominator.
 - For example, if Site A wants to send data from their PACS to the PACS at Site B, the user at Site A would configure a workflow with an inbound connection (ie Site A PACS) and the outbound connection set to its configured Remote Connection. The user at Site B would then configure a workflow with the inbound connection set to its Remote Connection and a configured outbound connection (ie Site B PACS).
- Note that data is not uploaded to the S3 bucket until it has been confirmed that both Dicominators have been configured correctly to enable the transfer. The data is deleted by Dicominator immediately after

being downloaded. Therefore, the data storage in S3 is very transient and should not accumulate significant charges, depending on volume. SQS usage is unlikely to exceed the free tier.

- Although the users maintain full control of their data at all times, even while in their AWS account, Dicominator strongly recommends using access control policies strictly limiting Dicominator's access. The access key and private key should then be generated from this policy. To do this, you would configure your Remote Connections with Bucket Name "remote-dicominator-my-org" (for example) and SQS Prefix "dicominator". Then the AWS account owner would go to your AWS Console, IAM, Policies and create a new policy with the following json, which gives Dicominator access to only the "remote-dicominator-my-org" S3 bucket and SQS queues starting with prefix "dicominator":

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": "s3:*",
      "Resource": [
        "arn:aws:s3:::remote-dicominator-my-org",
        "arn:aws:s3:::remote-dicominator-my-org/*"
      ]
    },
    {
      "Effect": "Allow",
      "Action": "sqs:*",
      "Resource": "arn:aws:sqs:*:*:dicominator*"
    }
  ]
}
```

The screenshot shows the 'Add/Edit Connection' interface of DICOMinator v1.2.5.0. The top navigation bar includes links for Home, Connections, Processing, Simulate, Q/R, Activity, Reports, Tools, Settings, and About. The main form area contains the following fields:

- Description:** Incoming DICOM from all non-configured AE Titles
- Type:** Remote Connection (Inbound/Outbound)
- Data Type:** DICOM
- Name:** UNKNOWNNAETITLES
- Remote Connection UUID:** Required
- AWS Account ID:** Required
- AWS Region:** me-central-1
- Bucket Name:** remote-dicominator-my-org
- SQS Prefix:** dicominator
- Access Key:** Required
- Secret Key:** Required

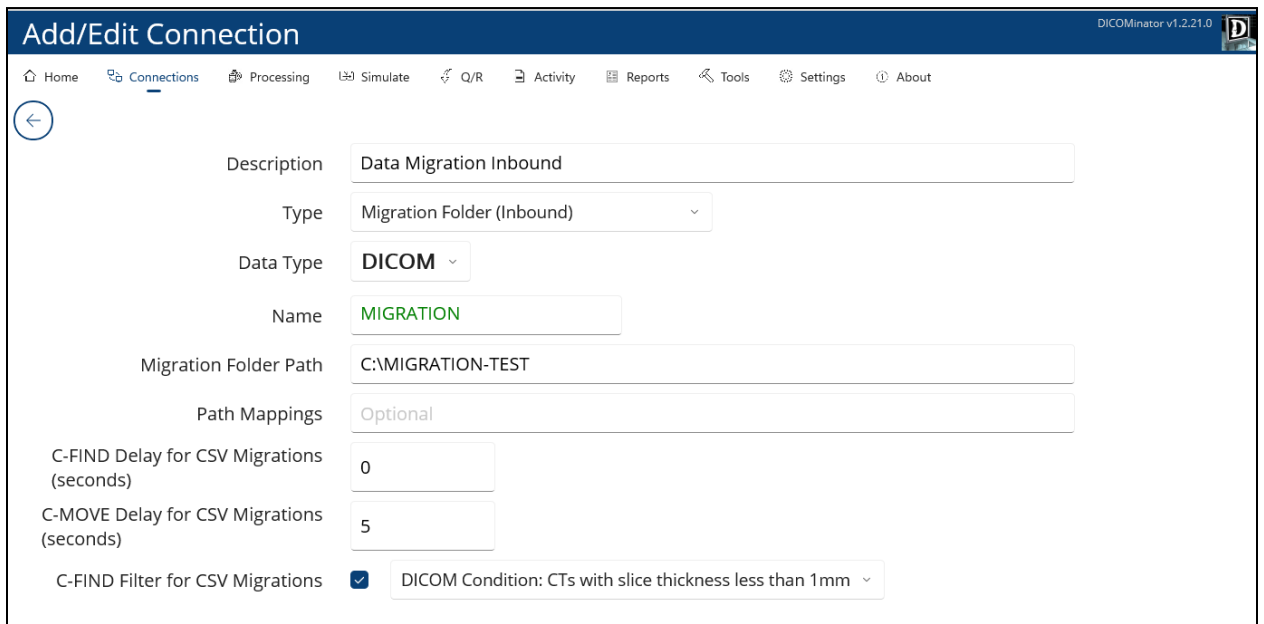
- Migration Folder (Inbound)

Select this option when ingesting data into this Dicominator from an existing path. The existing data is not deleted after ingestion, and ingested data is tracked such that it is only ingested once unless the data is modified, in which case it is re-ingested. The data type for a migration folder can be set to either DICOM (default) or HL7. The settings are:

- Description, Name, and Migration Folder Path (required fields).
- The Path Mappings field is optional and is used to map parts of the file names in the Migration Folder to tags in the DICOM data (or fields in the HL7 data). The file name components can be manipulated in several ways, including via regular expressions, before being written to the specified tag(s) or field(s).
- C-FIND Delay for .CSV Migrations (seconds). A numerical value that determines the minimum number of seconds between query requests being sent to the AE Title and port specified by the CSV migration configuration. The default value is 0 seconds.
- C-MOVE Delay for .CSV Migrations (seconds). A numerical value that determines the minimum number of seconds between retrieve requests

being sent to the AE Title and port specified by the CSV migration configuration. The default value is 5 seconds.

- C-FIND Filter for .CSV Migrations. This setting is disabled by default. Click the checkbox to apply filter conditions for queries performed to this connection. Once enabled, a dropdown menu displays all conditions that have been created in the DICOM Processing Conditions section of the Processing tab. This filter is applied to incoming query results from the AE Title and port specified by the CSV migration configuration and if the condition is not met, the results are filtered out and not retrieved. This feature allows you to perform migration query retrieves using filters that are more granular than most DICOM devices support.



Add/Edit Connection DICOMinator v1.2.21.0

Home Connections Processing Simulate Q/R Activity Reports Tools Settings About

←

Description: Data Migration Inbound

Type: Migration Folder (Inbound) ▼

Data Type: DICOM ▼

Name: MIGRATION

Migration Folder Path: C:\MIGRATION-TEST

Path Mappings: Optional

C-FIND Delay for CSV Migrations (seconds): 0

C-MOVE Delay for CSV Migrations (seconds): 5

C-FIND Filter for CSV Migrations: ☒ DICOM Condition: CTs with slice thickness less than 1mm ▼

- **Dropbox Folder (Inbound)**

Select this option when ingesting data into Dicominator from a specified path where data is copied to. The data is deleted from the Dropbox folder after ingestion. The data type for a dropbox folder can be set to either DICOM (default) or HL7. The settings are:

- Description, Name, and Dropbox Root Path (required fields).
- The Path Mappings field is optional and is used to map parts of the file names in the Dropbox Folder to tags in the DICOM data (or fields in the HL7 data). The file name components can be manipulated in several ways,

including via regular expressions, before being written to the specified tag(s) or field(s).

- The Delete Empty Folders setting is enabled by default for “Dropbox Folder (Inbound)” connection types.

The screenshot shows the 'Add/Edit Connection' window in DICOMinator v1.2.5.0. The window has a dark blue header with the title 'Add/Edit Connection' and a navigation bar with icons for Home, Connections, Processing, Simulate, Q/R, Activity, Reports, Tools, Settings, and About. A back arrow icon is in the top left corner. The main form contains the following fields:

- Description:** A text input field containing 'DICOM Dropbox Inbound'.
- Type:** A dropdown menu showing 'Dropbox Folder (Inbound)'.
- Data Type:** A dropdown menu showing 'DICOM'.
- Name:** A text input field containing 'DICOM_Dropbox'.
- Dropbox Root Path:** A text input field containing 'C:\Dropboxtest'.
- Path Mappings:** A text input field containing a complex regular expression: 'J120050\00100010&00080090\00080020<REGEX> ~&~ (\d{8}) ~&~ \$1 ~&~ </REGEX>\00081030'.
- Delete Empty Folders:** A checkbox that is checked.

- Cloud Provider (Inbound)

Select this option when downloading data into the Dicominator from a cloud provider such as Amazon S3, Box, Google Cloud Platform, or Microsoft Azure. The existing data is not deleted or modified after being downloaded, and downloaded data is tracked such that it is only downloaded once unless the data is modified, in which case it is re-downloaded. The data type when downloading from a cloud provider can be set to either DICOM (default) or HL7. The settings are:

- Description and Name (required fields).
- Cloud provider, selected from the dropdown
 - For Amazon S3, the settings are:
 - AWS Region, selected from the dropdown.
 - Bucket Name, Access Key, and Secret Key (required fields).
For security, an IAM permissions policy is recommended for your user or group when creating the Access Key in the AWS Console.

- Object Prefix is an optional field used to filter the files that will be downloaded. For example, setting it to “Sample data/2022” will result in only objects in the bucket starting with “Sample data/2022” to be downloaded to the Dicominator.
- Object Key Mappings is an optional field used to map parts of the object key to tags in the DICOM data (or fields in the HL7 data). The object key components can be manipulated in several ways, including via regular expressions, before being written to the specified tag(s) or field(s).

←

Add/Edit Connection

DICOMinator v1.2.5.0

HomeConnectionsProcessingSimulateQ/RActivityReportsToolsSettingsAbout

DescriptionCloud Inbound

TypeCloud Provider (Inbound)

Data TypeDICOM

NameCLOUDIN

Provider NameAmazon S3

AWS Regionus-east-1

Bucket Namemy-unique-bucket-name

Object PrefixSample data/2022

Access Key

Secret Key

Object Key Mappings/00100010<REGEX> ~&~ ^(.{3}).*\$ ~&~ \$1 ~&~ </REGEX>

- Cloud Provider (Outbound)

Select this option when uploading data from Dicominator to a cloud provider such as Amazon S3, Box, Google Cloud Platform, or Microsoft Azure. The data type when uploading to a cloud provider can be set to either DICOM (default) or HL7. The settings are:

- Description and Name (required fields).
- Cloud provider, selected from the dropdown

- For Amazon S3, the settings are:
 - AWS Region, selected from the dropdown.
 - Bucket Name, Access Key, and Secret Key (required fields). For security, an IAM permissions policy is recommended for your user or group when creating the Access Key in the AWS Console.
 - Object Key Mappings is an optional field used to map DICOM tag data (or HL7 field data) to the object key being saved in the S3 bucket. The DICOM tag (or HL7 field) data can be manipulated in several ways, including via regular expressions, before being written to the object key.

Add/Edit Connection DICOMinator v1.2.5.0

Home Connections Processing Simulate Q/R Activity Reports Tools Settings About

←

Description: Cloud Outbound

Type: Cloud Provider (Outbound) ▼

Data Type: DICOM ▼

Name: CLOUDOUT

Provider Name: Amazon S3 ▼

AWS Region: us-east-1 ▼

Bucket Name: my-unique-bucket-name

Access Key:

Secret Key:

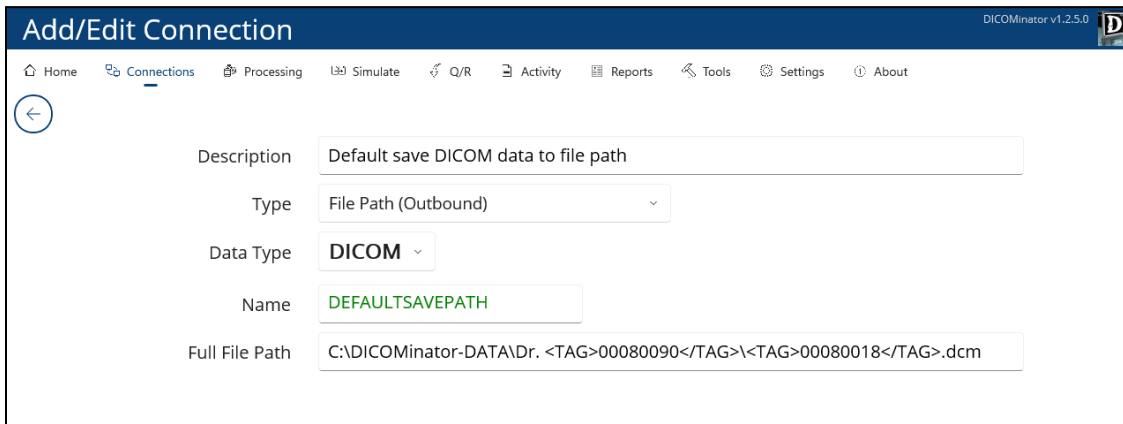
Object Key Mappings: DICOMINATOR-DATA/DR. <TAG>00080090</TAG>/<TAG>00080018</TAG>.dcm

- File Path (Outbound)

Select this option when saving data from the Dicominator to a file path. The data type when saving to a file path can be set to either DICOM (default) or HL7. The settings are:

- Description, Name and Full File Path (required fields). Full File Path specifies the exact file name, including path, where the data will be saved. The file name components can be manipulated in several ways

using DICOM tag (or HL7 field) data in the file, including via regular expressions, to create specific, unique file names. Ending Full File Path with a backslash signifies that only a folder path is being specified and the default file name (SOP Instance UID for DICOM or random guid for HL7) will be used. Otherwise, text after the last backslash specifies the file name. When specifying the file name, default or custom formatting (such as <TAG>00100020</TAG> for DICOM or <FIELD>PID-3</FIELD> to specify patient ID) is strongly advised to avoid overwriting due to duplicate file names. Custom formatting in the path, the file name, or both is supported.



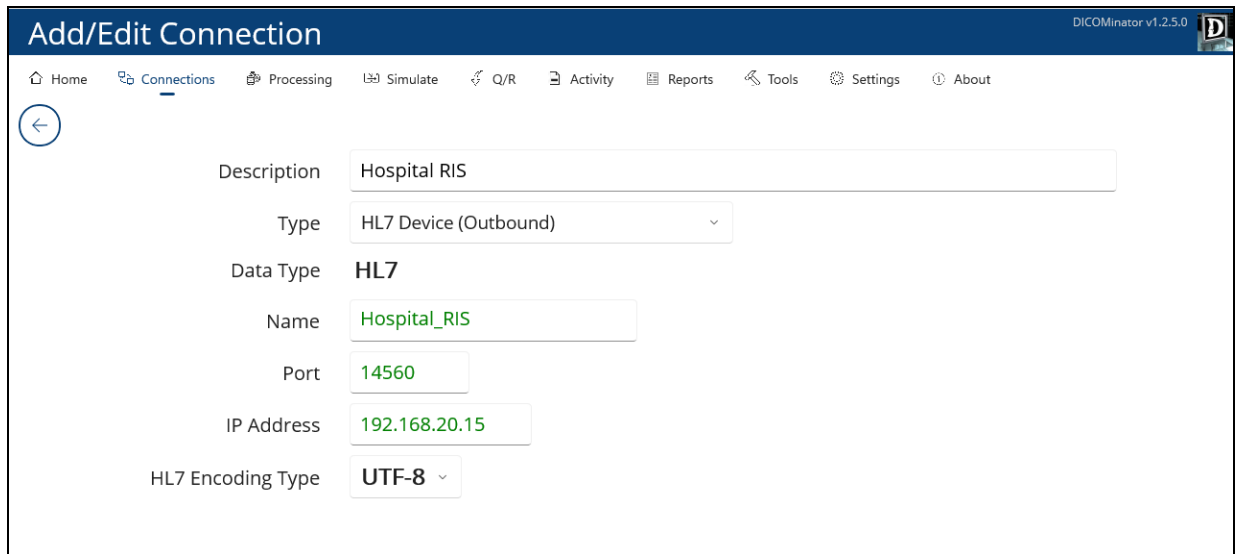
The screenshot shows the 'Add/Edit Connection' window in DICOMinator v1.2.5.0. The window has a navigation bar with icons for Home, Connections, Processing, Simulate, Q/R, Activity, Reports, Tools, Settings, and About. The 'Connections' tab is active. On the left, there is a back arrow icon. The main form contains the following fields:

- Description:** Default save DICOM data to file path
- Type:** File Path (Outbound) (dropdown menu)
- Data Type:** DICOM (dropdown menu)
- Name:** DEFAULTSAVEPATH
- Full File Path:** C:\DICOMinator-DATA\Dr. <TAG>00080090</TAG>\<TAG>00080018</TAG>.dcm

- HL7 Device (Outbound)

Select this option when sending HL7 data to another device that supports receiving HL7 messages. The data type for an HL7 device is always HL7. The settings are:

- Description, Name, Port and IP Address (required fields).



Add/Edit Connection DICOMinator v1.2.5.0

Home Connections **Processing** Simulate Q/R Activity Reports Tools Settings About

←

Description: Hospital RIS

Type: HL7 Device (Outbound) ▼

Data Type: HL7

Name: Hospital_RIS

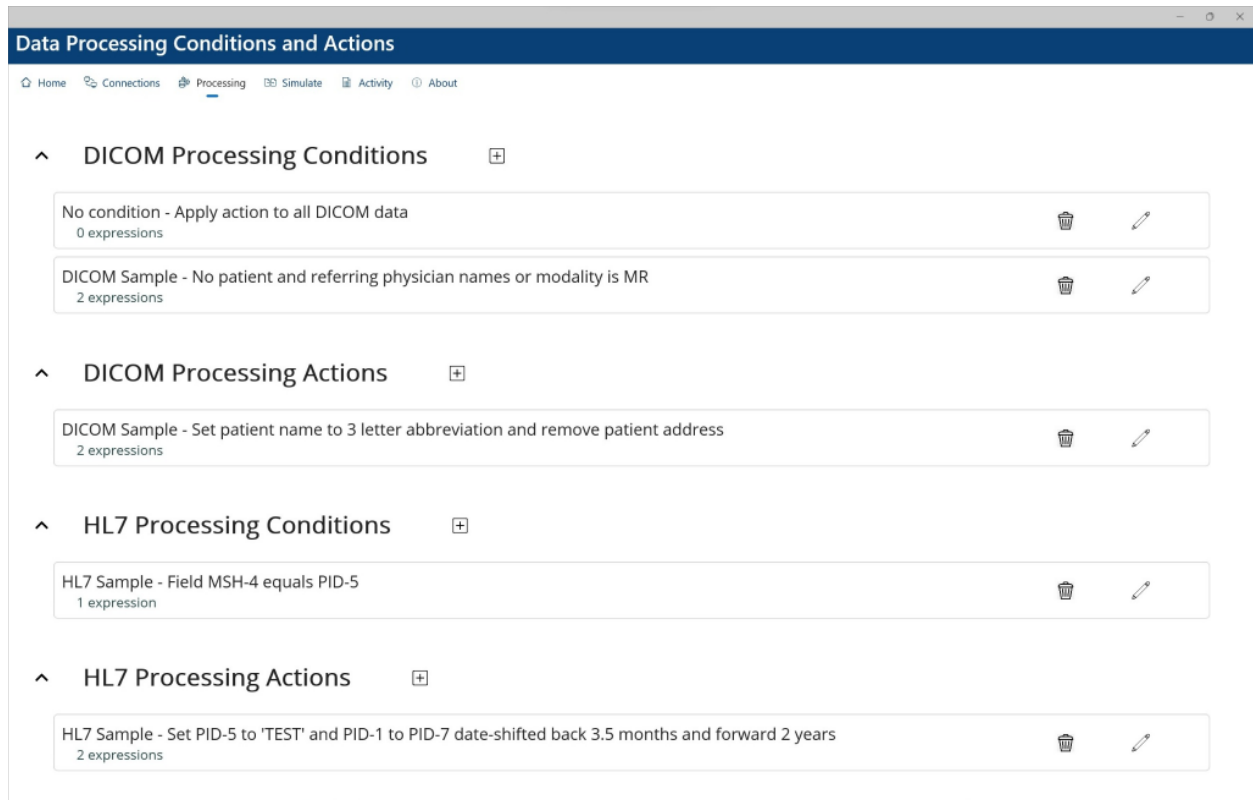
Port: 14560

IP Address: 192.168.20.15

HL7 Encoding Type: UTF-8 ▼

Processing Tab

The Processing page is where you can add, edit or delete DICOM Processing Conditions, DICOM Processing Actions, HL7 Processing Conditions and HL7 Processing Actions. Conditions (either DICOM or HL7) define one or more specific requirements that the data passing through the Dicominator must meet before the Dicominator will manipulate the data via configured actions. Actions (either DICOM or HL7) define one or more data manipulations that will occur to data passing through the Dicominator if the configured conditions are met. Once conditions and actions are configured, you can configure your workflows with one or more processing rules (see Workflows Section above) to apply the desired data manipulations, where each processing rule consists of a selected condition and a selected action.



DICOM Processing Conditions section:

The DICOM Processing Conditions section is where you can add, edit or delete the requirements (or expressions) that must be met by the DICOM data passing through the Dicominator before an action will be executed on the data. The settings are:

- Description (required field) and Expressions.
- Click the “Add” button to configure the expressions in a condition. Once the “Add” button is clicked, a section displays where you enter a required IF value in the first entry box, select a comparison operator from the dropdown menu, and then enter a second value in the second entry box (if necessary) to compare the first value to.

- The options in the comparison operator dropdown menu are: EQUALS, NOT EQUAL TO, GREATER THAN, LESS THAN, GREATER THAN OR EQUAL TO, LESS THAN OR EQUAL TO, CONTAINS, DOES NOT CONTAIN, STARTS WITH, and DOES NOT START WITH.
- The first box contains a single tag number whose value should be used for comparison OR an actual value to compare.
 - If a single tag is entered, such as “00100010”, then the value of that tag is used for comparison. The tag is cleaned and not case sensitive such that “[0008103e]” or “{0008103E}” or “<0008103e>” or “0008,103E” or “0008:103e” are supported.
 - If an actual value is entered, any valid value can be used, including values obtained after evaluation of any xml-formatted data manipulations as described below in “Supported Data Manipulations”.
- You can optionally enable settings to make the conditions case sensitive and/or on error during the evaluation of the expression, default to true. These settings are both disabled by default.
- In the case of multiple expressions, they are evaluated sequentially. If the final result is true, then the corresponding action selected in the workflow’s processing rule will be executed.
- For example:

Expression 1, which evaluates to FALSE
OR
Expression 2, which evaluates to TRUE
AND
Expression 3, which evaluates to TRUE

Then the final result is evaluated:
(FALSE OR TRUE) = TRUE
then (TRUE AND TRUE) = **TRUE**
- Another example:

Expression 1, which evaluates to FALSE
AND

Expression 2, which evaluates to TRUE

OR

Expression 3, which evaluates to TRUE

Then the final result is evaluated:

(FALSE AND TRUE) = FALSE

then (FALSE OR TRUE) = **TRUE**

- Another example: Expression 1, which evaluates to FALSE
AND
Expression 2, which evaluates to TRUE
OR
Expression 3, which evaluates to TRUE
AND
Expression 4, which evaluates to FALSE

Then the final result is evaluated:

(FALSE AND TRUE) = FALSE

then (FALSE OR TRUE) = TRUE

then (TRUE AND FALSE) = **FALSE**

Add/Edit DICOM Condition

Home Connections **Processing** Simulate Activity About

Description

Expressions in this condition: +

TAG IS EMPTY OR DOES NOT EXISTS ▼

☐ On error, default to true?

OR ▼

EQUALS ▼

☐ Case sensitive? ☒ On error, default to true?

DICOM Processing Actions section:

The DICOM Processing Actions section is where you can add, edit or delete the data manipulation action(s) to be executed on the DICOM data passing through the Dicominator if the condition(s) specified in the workflow's processing rule is satisfied. The settings are:

- Description (required field) and Expressions.
- Click the “Add” button to configure the expressions in a condition. Once the “Add” button is clicked, a section displays where you enter the expressions in the action.
 - The available actions display in a dropdown menu: SET TAG(S), REMOVE TAG(S), TRANSCODE, SAVE DATA TO CSV, SEND DICOM AS-IS, DELAY SEND, BLOCK SEND, DE-ID PIXEL DATA - CUSTOM, DE-ID PIXEL DATA - MAKE MODEL, and VERIFY CLEAN PIXEL DATA.

- When SET TAG(S) is selected, required fields for the FROM and TO values must be configured
- When REMOVE TAG(S) is selected, the tag to remove must be configured.
- When TRANSCODE is selected, required fields for the FROM and TO values must be configured to the desired transfer syntax UIDs.
- When SAVE DATA TO CSV is selected, the FROM and TO fields must be defined. The SAVE DATA TO CSV action is always run at the end of all other defined DICOM Processing actions no matter the order in which it is configured. Data is still written to the CSV file even if there is an error that results in a blocked send. This action can be configured to either create a new row in the CSV file for each DICOM image processed or update existing rows (see the TO field bullet below for this configuration example).
 - In the FROM field, include the name of the column header to which the data will be written, specify “O” or “F” to define whether the original or final DICOM tag value should be used, and include the DICOM tag number from which to pull the data.

- For example, you may be using Dicominator to modify the MRN DICOM tag when data is sent to an outbound destination and you want to store a CSV file with the original and final DICOM tag values. To write the original patient name, original DOB, original MRN, and final MRN values to a CSV file, the FROM field would be set to:

“Original Patient

Name”:O:<TAG>00100010</TAG>,”Original

DOB”:O:<TAG>00100030</TAG>,”Original

MRN”:O:<TAG>00100020</TAG>,”Final

MRN”:F:<TAG>00100020</TAG>

In this example, when the DICOM Processing Action is run, a CSV file would be generated with four columns: Original

Patient Name, Original DOB, Original MRN, and Final MRN. The value populated into any “O” column is pulled from the defined DICOM tags when the image is ingested into Dicominator. The value populated into any “F” column is pulled from the defined DICOM tag after all of the other DICOM Processing Actions have been applied.

- In the TO field, set the file path for the CSV to which the data should be written. For example, “<CSV>FILE::C:\Original Tag Data.csv</CSV>”. With this configuration, each DICOM image that is processed creates a new row in the CSV file.

To update existing rows instead, use the example

“<CSV>FILE::C:\Original Tag

Data.csv|UPDATEMATCHCOLUMNS::MRN,Final DOB</CSV>. With this configuration, all rows in the CSV file that contain matching data in the columns for the defined UPDATEMATCHCOLUMNS will be updated. If there are no existing rows with matching data, a new row will be created.

- When SEND DICOM AS-IS is selected, no further configuration is needed.
- When DELAY SEND is selected, the delay time must be configured, either as a specific time in a parsable format such as yyyyMMddHHmmss, or a specific number of YEARS, MONTHS, WEEKS, DAYS, HOURS, MINUTES or SECONDS (ie “2WEEKS”), or an xml-styled expression to extract tag data resulting in one of those two formats.
- When BLOCK SEND is selected, no further configuration is needed.
- When DE-ID PIXEL DATA - CUSTOM is selected, the custom redaction bounding box(es) must be configured.
- When DE-ID PIXEL DATA - MAKE MODEL is selected, a list of specific modality types displays. The redaction bounding boxes for each modality are automatically configured from data obtained from MIRC-CTP. (See <https://github.com/susom/mirc-ctp/blob/master/scripts/stanford-scrubb>)

er.script) For more information, ask Dicominator support for the data file used to configure the bounding boxes for each specific modality type.

- When VERIFY CLEAN PIXEL DATA is selected, and the “Perform OCR on pixel data when using the DICOM action” setting is enabled in the Settings tab (enabled by default), Dicominator automatically flags any images that appear to contain 3 or more characters or symbols in the overlay or pixel data. If the “Perform OCR on pixel data when using the DICOM action” setting is NOT enabled, ALL images are flagged. In both cases, any images containing pixel data in overlays or the pixel data tag are not sent outbound until you manually approve the imaging using the Image Viewer for Pixel PHI Verification tool in the Tools tab.
- Two settings can be configured in case of error:
 - Block send (checkbox, disabled by default).
 - Save data to path (checkbox, disabled by default). When enabled, you can enter a folder path to save the DICOM data that encountered the processing error. For example, C:\Dicominator\Blocked Sends

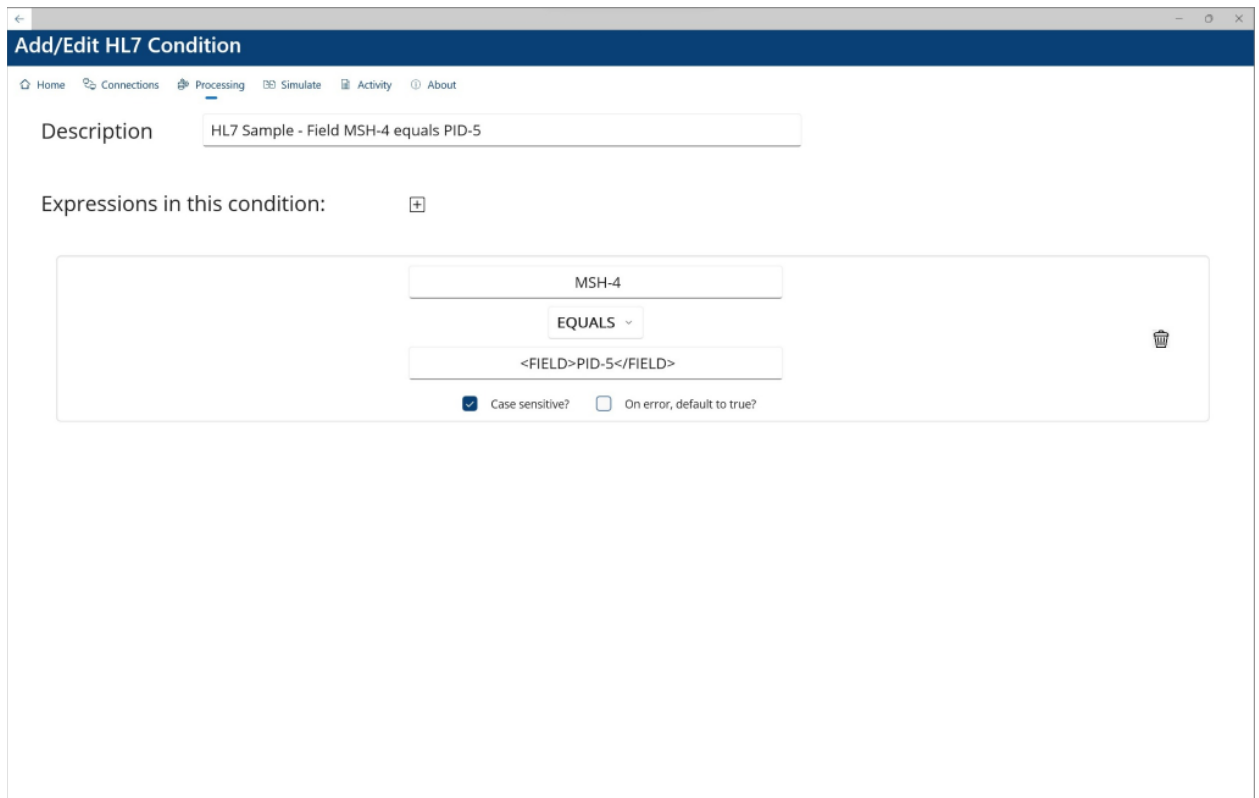
The screenshot shows the 'Add/Edit DICOM Action' window. The title bar is 'Add/Edit DICOM Action'. The menu bar includes Home, Connections, Processing (active), Simulate, Activity, and About. The description field contains 'DICOM Sample - Set patient names to 3 character abbreviations and remove patient address'. Below the description, there is a section 'Expressions in this action:' with a plus icon. The first expression is a 'SET TAG(S)' action with tag '00100010' and a regex expression: '<REGEX><TAG>00100010</TAG> ~&~ (?<=^|\\^)[^\\^]{1,3}(?=\\^|\$) ~&~ \$0 ~&~</REGEX>'. The second expression is an 'AND' action with a 'REMOVE TAG(S)' action and tag '00101040'. At the bottom, there are two checkboxes: 'Save data to path:' (checked) and 'Block send' (checked). The 'Save data to path:' checkbox is followed by a text field containing 'C:\\DICOMinator\\Desktop\\SG Testing\\Blocked Sends'.

HL7 Processing Conditions section:

The HL7 Processing Conditions section is where you can add, edit or delete the requirements (or expressions) that must be met by the HL7 data passing through the Dicominator before an action will be executed on the data. The settings are:

- Description (required field) and Expressions.
- Click the “Add” button to configure the expressions in a condition. Once the “Add” button is clicked, a section displays where you enter a required IF value in the first entry box, select a comparison operator from the dropdown menu, and then enter a second value in the second entry box (if necessary) to compare the first value to.
 - The options in the operator dropdown menu are: EQUALS, NOT EQUAL TO, GREATER THAN, LESS THAN, GREATER THAN OR EQUAL TO, LESS THAN OR EQUAL TO, CONTAINS, DOES NOT CONTAIN, STARTS WITH, and DOES NOT START WITH.
 - The first box contains a single field number whose value should be used for comparison OR an actual value to compare.
 - If a single field is entered, such as “PID.5.2”, then the value of that field is used for comparison. The field is cleaned such that “-” is acceptable in place of “.”. For example, “PID-5-2” is supported.
 - If an actual value is entered, any valid value can be used, including values obtained after evaluation of any xml-formatted data manipulations as described below in “Supported Data Manipulations”.
 - You can optionally enable settings to make the conditions case sensitive and/or on error during the evaluation of the expression, default to true. These settings are both disabled by default.

- In the case of multiple expressions, they are evaluated sequentially. If the final result is true, then the corresponding action selected in the workflow's processing rule will be executed.
- For examples of how the expressions are evaluated sequentially, see the DICOM Processing Conditions section above.



Add/Edit HL7 Condition

Home Connections Processing Simulate Activity About

Description: HL7 Sample - Field MSH-4 equals PID-5

Expressions in this condition: +

MSH-4

EQUALS

<FIELD>PID-5</FIELD>

☒ Case sensitive?
 ☐ On error, default to true?

HL7 Processing Actions section:

The HL7 Processing Actions section is where you can add, edit or delete the data manipulation action(s) to be executed on the HL7 data passing through the Dicominator if the condition(s) specified in the workflow's processing rule is satisfied. The settings are:

- Description (required field) and Expressions.
- Click the "Add" button to configure the expressions in a condition. Once the "Add" button is clicked, a section displays where you enter the expressions in the action.

- The available actions display in a dropdown menu: SET FIELD(S), REMOVE SEGMENT(S), CREATE MESSAGE, SAVE DATA TO CSV, SEND MESSAGE AS-IS, DELAY SEND, and BLOCK SEND.
- When SET FIELD(S) is selected, required fields for the FROM and TO values must be configured.
- When REMOVE SEGMENT(S) is selected, the segment to remove must be configured.
- When CREATE MESSAGE is selected, the HL7 message template must be configured.
- When SAVE DATA TO CSV is selected, the FROM and TO fields must be defined. The SAVE DATA TO CSV action is always run at the end of all other defined HL7 Processing actions no matter the order in which it is configured. Data is still written to the CSV file even if there is an error that results in a blocked send. This action can be configured to either create a new row in the CSV file for each HL7 message processed or update existing rows (see the TO field bullet below for this configuration example).
 - In the FROM field, include the name of the column header to which to write the data, specify “O” or “F” to define whether the original or final HL7 field value should be pulled, and include the HL7 field number from which to pull the data.
 - For example, you may be using Dicominator to modify the MRN HL7 field when the data is sent to an outbound destination and want to store a CSV file with the original and final HL7 field values. To write the original patient name, original DOB, original MRN, and final MRN values to a CSV file, the FROM field would be set to:

 “Original Patient Name”:O:<FIELD>PID.5</FIELD>,”Original DOB”:O:<FIELD>PID.7</FIELD>,”Original MRN”:O:<FIELD>PID.3</FIELD>,”Final MRN”:F:<FIELD>PID.3</FIELD>

In this example, when the HL7 Processing Action is run, a CSV file would be generated with four columns: Original Patient Name, Original DOB, Original MRN, and Final MRN. The value populated into any “O” column is pulled from the defined HL7 field when the message is ingested into Dicominator. The value populated into any “F” column is pulled from the defined HL7 field after all other HL7 Processing Actions have been applied.

- In the TO field, set the file path for the CSV to which the data should be written. For example, “<CSV>FILE::C:\Original HL7 Field Data.csv</CSV>”. With this configuration, each HL7 message that is processed creates a new row in the CSV file.

To update existing rows instead, use the example

“<CSV>FILE::C:\Original HL7 Field Data.csv|UPDATEMATCHCOLUMNS::MRN,Final DOB</CSV>”. With this configuration, all rows in the CSV file that contain matching data in the columns for the defined UPDATEMATCHCOLUMNS will be updated. If there are no existing rows with matching data, a new row will be created.

- When SEND MESSAGE AS-IS is selected, no further configuration is needed.
- When DELAY SEND is selected, the delay time must be configured, either as a specific time in a parsable format such as yyyyMMddHHmmss, or a specific number of YEARS, MONTHS, WEEKS, DAYS, HOURS, MINUTES or SECONDS (ie “2WEEKS”), or an xml-styled expression to extract HL7 message field data resulting in one of those two formats.
- When BLOCK SEND is selected, no further configuration is needed.
- Two settings can be configured in case of error:
 - Block send (checkbox, disabled by default).

- Save data to path (checkbox, disabled by default). When enabled, you can enter a folder path to save the HL7 data that encountered the processing error. For example, C:\Dicominator\HL7\Blocked Sends

Add/Edit HL7 Action

Home Connections Processing Simulate Activity About

Description: HL7 Sample - Set PID-5 to 'TEST' and PID-1 to formatted PID-7 date-shifted back 3.5 months and forwa

Expressions in this action:

- SET FIELD(S)
 - PID-5
 - TO
 - TEST
- AND
 - SET FIELD(S)
 - PID-1
 - TO
 - <DATESHIFT>-3.5MONTHS<FIELD>PID-7</FIELD>2YEARS:MM-yyyy</DATESHIFT>

In case of error: ☒ Save data to path: C:\DICOMinator\Desktop\SG Testing\HL7\Blocked Sends ☒ Block send

Data Manipulations

Dicominator provides robust data manipulation options for both DICOM and HL7 data. They include xml-styled formatting to extract and modify existing values, mapping file path components of inbound data to tags and fields, mapping tags and fields to outbound file path components, special terms such as “ALL” to provide bulk processing in certain situations, and transcoding.

XML-Styled Formatting to Extract and Modify Data:

In many cases you will want to specify a value derived using various data manipulations for comparisons (both first and second entry boxes in DICOM or HL7 Conditions) or for setting new tag or field values (second entry box only in DICOM or HL7 Actions). These

xml-styled options can be embedded within each other as well such that multiple tag or field values can be manipulated in multiple ways to arrive at the desired value. The following types of xml-styled formatting are currently supported.

- **<TAG> (for DICOM only)**

- Specifies a DICOM tag's value.
- For example, "<TAG>00100010</TAG>".
- To set a tag within a sequence, specify the sequence tag (optionally followed by "#" and the sequence item number which defaults to 1 for the first sequence item) followed by ":" and then the tag number within the sequence item. Multiple sequences can be specified to handle nested sequences.
- For example, "<TAG>00081140#3:00081150</TAG>" specifies the value of tag 00081150 within the third sequence item inside the 00081140 sequence.
- A nested sequence example, "<TAG>00089124:00082112:0040A170:00080100</TAG>" specifies the value of tag 00080100 within the first sequence item of the 0040A170 sequence within the first sequence item of the 00082112 sequence within the first sequence item of the 00089124 sequence.

- **<FIELD> (for HL7 only)**

- Specifies an HL7 message field's value.
- For example, "<FIELD>PID.5.1</FIELD>".

- **<REGEX>**

- Specifies a regular expression to perform on a given input. Normally the input is a tag or field value. The REGEX configuration must contain 4 components: input, pattern, replace, and options. Each of the components is separated by the characters "~&~".
- For example, "<REGEX><TAG>00100020</TAG>--<TAG>00100010</TAG>~&~ ^(.{0,8}).*\$ ~&~ \$1 ~&~ </REGEX>" would result in the first 8 characters being taken from the string combination of the patient ID and "--" and the patient name.

- **<CSV>**

- Specifies a CSV lookup file containing replacement values for DICOM tags or HL7 fields. The CSV configuration must contain 4 components separated by the “|” character where each component contains a key/value separated by “::” as follows:

- **FILE** – Specifies the csv’s full file name.
- **MATCHCOLUMN** – Specifies the column name to look for the matching value.
- **MATCHVALUE** – Specifies the value to look for in the match column. Normally this would be a tag or field which could also be manipulated by <REGEX> or <DATESHIFT>, etc.
- **NEWVALUECOLUMN** – When a matching row is found via the MATCHCOLUMN and MATCHVALUE, this specifies the column containing the new value to be inserted.
- **NOTFOUNDDEFAULT** is an optional fifth column that can be included to define a default value to use when the lookup value is not found in the CSV file. This can be set to a static text value, a DICOM tag (or HL7 field), or both. This can also be set to another lookup value.

- For example,
“<CSV>FILE::C:\TESTDATA\test.csv|MATCHCOLUMN::MRN|MATCHVALUE: <TAG>00100020</TAG>|NEWVALUECOLUMN::subject_id</CSV>” would extract the Patient ID value contained in tag 00100020 of the inbound data, then look for that value in the MRN column in the CSV file name C:\TESTDATA\test.csv, and if a matching row is found, replace the specified tag with the value found in the subject_id column in that row. If no match is found, the action is considered to have failed, and the “Block Send” on error and/or “Save Data to Path” on error options are applied.

- To map a default value if no match is found instead of failing the action, use the example
“<CSV>FILE::C:\TESTDATA\test.csv|MATCHCOLUMN::MRN|MATCHVALUE: <TAG>00100020</TAG>|NEWVALUECOLUMN::subject_id|NOTFOUNDDEFAULT::TestID <TAG>00100020</TAG></CSV>”

- In the example above, the CSV file should be formatted as follows:

Header row:	MRN,trial_id,subject_id,site_id
Row per study:	EXAMPLEMRN1111,999,1001,67
	EXAMPLEMRN1112,999,1002,67
	EXAMPLEMRN1113,999,1003,67
	EXAMPLEMRN1114,999,1004,67

EXAMPLEMRN1115,999,1005,67

- **<DATESHIFT>**

- Specifies a date value and how much to shift the date, and optionally how to format the resulting date value. A <TAG> or <FIELD> must be specified inside the <DATESHIFT> and, once again, it could also be manipulated by <REGEX>, etc. A shift value can be placed either before or after (or both) the <TAG> or <FIELD> and must be in the format <number><time> where <time> can be either YEARS, MONTHS, WEEKS, DAYS, HOURS, MINUTES, SECONDS or MILLISECONDS.
- For example,
“<DATESHIFT>-3.1DAYS<TAG>00080020</TAG>2YEARS:yyyyMM</DATESHIFT>” would shift the value in the Study Date tag backward 3.1 days and forward 2 years, with the result being in the format yyyyMM.

- **<DATESHIFTFROMNOW>**

- Specifies how much to shift the current date, and optionally how to format the resulting date value. It must be in the format <number><time> where <time> can be either YEARS, MONTHS, WEEKS, DAYS, HOURS, MINUTES, SECONDS or MILLISECONDS.
- For example, “<DATESHIFT>-3.0DAYS:ddMMyyyy</DATESHIFT>” would give a result of today’s date shifted back 3 days and in the format ddMMyyyy.

- **<DATETIMESHIFT>**

- Specifies a date/time value and how much to shift the date/time, and optionally how to format the resulting date/time value. A <TAG> or <FIELD> must be specified inside the <DATETIMESHIFT> and, once again, it could also be manipulated by <REGEX>, etc. A shift value can be placed either before or after (or both) the <TAG> or <FIELD> and must be in the format <number><time> where <time> can be either YEARS, MONTHS, WEEKS, DAYS, HOURS, MINUTES, SECONDS or MILLISECONDS.
- For example,
“<DATETIMESHIFT>-3.1MINUTES<FIELD>MSH.7.1</FIELD>2YEARS:yyyyMMddHHmmss.ffff</DATETIMESHIFT>” would shift the value in the HL7 message time field backward 3.1 minutes and forward 2 years, with the result being in the format yyyyMMddHHmmss.ffff.

- **<DATETIMESHIFTFROMNOW>**
 - Specifies how much to shift the current date/time, and optionally how to format the resulting date/time value. It must be in the format <number><time> where <time> can be either YEARS, MONTHS, WEEKS, DAYS, HOURS, MINUTES, SECONDS or MILLISECONDS.
 - For example,
“<DATETIMESHIFTFROMNOW>-3.0DAYS:yyyyMMddHHmmss</DATETIME SHIFTFROMNOW>” would give a result of today’s date/time shifted back 3 days and in the format yyyyMMddHHmmss.
- **<TIMESHIFT>**
 - Specifies a time value and how much to shift the time, and optionally how to format the resulting time value. A <TAG> or <FIELD> must be specified inside the <TIMESHIFT> and, once again, it could also be manipulated by <REGEX>, etc. A shift value can be placed either before or after (or both) the <TAG> or <FIELD> and must be in the format <number><time> where <time> can be either YEARS, MONTHS, WEEKS, DAYS, HOURS, MINUTES, SECONDS or MILLISECONDS.
 - For example,
“<TIMESHIFT>-3.1MINUTES<TAG>00080030</TAG>2YEARS:HHmmss.ffff</DATESTIMESHIFT>” would shift the value of the Study Time tag backward 3.1 minutes and forward 2 years, with the result being in the format HHmmss.ffff.
- **<TIMESHIFTFROMNOW>**
 - Specifies how much to shift the current time, and optionally how to format the resulting time value. It must be in the format <number><time> where <time> can be either YEARS, MONTHS, WEEKS, DAYS, HOURS, MINUTES, SECONDS or MILLISECONDS.
 - For example,
“<TIMESHIFTFROMNOW>-3.0SECONDS:HHmmss.fff</TIMESHIFTFROMNOW>” would give a result of today’s time shifted back 3 days and in the format HHmmss.fff.
- **<RANDOM>**
 - Specifies that a random number should be created and inserted using the given optional format. Both floating point and integer values are supported.

- The first two numbers specify the possible range. The second number must be larger than or equal to the first. The third value is an optional format (defaults to "F0"). See <https://learn.microsoft.com/en-us/dotnet/standard/base-types/standard-numeric-format-strings> and <https://learn.microsoft.com/en-us/dotnet/standard/base-types/custom-numeric-format-strings> for details on available formats.
- For example, "<RANDOM>0,99,D2</RANDOM>" would insert a randomly generated number between 0 and 99, formatted to two digits (zero padding, if necessary)
- Another example, "<RANDOM>-365.0,0.0,000.0</RANDOM>" would insert a randomly generated number between -365.00 and 0, formatted to three digits and one decimal digit (zero padding, if necessary)
- **<STUDY>**
 - When used in the second entry box when setting tags in DICOM Action expressions only, this option can be used to set a tag to the value of a field in the Study table, such as "ID", "UUID", "PATIENTSNAME", etc.
 - For example, <STUDY>ID</STUDY> would return the ID of the study.
 - NOTE: Studies are saved based on unique study UID and workflow ID combinations. Therefore, the same study UID being processed through two or more different workflows would return a different ID value for each workflow ID.
- **<SELECTBYPRIORSTUDYDATE>**
 - When used in the second entry box when setting tags in DICOM Action expressions only, this option can be used to set a tag to a value that is dependent on the image's study date relative to the first prior study date for the given Patient ID
 - For example, in a DICOM Action Expression where SETTAG(S) is selected with "00120020" in the first entry box, the following can be set in the second entry box:
"<SELECTBYPRIORSTUDYDATE>VALUES::baseline,week_4,week_8,week_12,week_16|INTERVAL::4WEEKS</SELECTBYPRIORSTUDYDATE>"

- The SELECTBYPRIORSTUDYDATE configuration must contain 2 components separated by the “|” character where each component contains a key/value separated by “::” as follows:
 - VALUES – Specifies a comma-separated list of the values to select from.
 - INTERVAL – Specifies the length of the time interval which determines which value to select. It must be in the format <number><time> where <time> can be either YEARS, MONTHS, WEEKS or DAYS.
- In the example given above, since the interval is 4 weeks, the number of 4-week intervals that have passed since the oldest prior study for the Patient ID are calculated, rounding it to the nearest one. This has the effect of making any study with a study date within 2 weeks of the first study received to have all 00120020 tags in all images in the study getting set to "baseline". If no prior studies exist for the Patient ID, the study received becomes the oldest prior and tag 00120020 for all images in the study would be set to “baseline”. Therefore, for this feature to work correctly, it is important that the first study performed on the given Patient ID is the first study sent to Dicominator. Studies coming in (with the same patient ID) 3-6 weeks after the first one get set to "week_4". Studies coming in (with the same patient ID) 7-10 weeks after the first one get set to "week_8". Studies coming in (with the same patient ID) 11-14 weeks after the first one get set to "week_12". Studies coming in (with the same patient ID) any time from week 15 going forward get set to "week_16". Any study sent to Dicominator after the first one, but having a study date preceding that of the first one, gets tag 00120020 set to “baseline” for all images in the study.
- **<ADD>**
 - Specifies a number to add to the specified number. A <TAG> or <FIELD> must be specified inside the <ADD> and, once again, it could also be manipulated by <REGEX>, etc. The number to add can be placed either before or after (or both) the <TAG> or <FIELD>.
 - For example, “<ADD>0.1<TAG>00180050</TAG></ADD>” would result in the Slice Thickness tag value plus 0.1.
- **<SUBTRACT>**
 - Specifies a number to subtract from the specified number or vice versa. A <TAG> or <FIELD> must be specified inside the <SUBTRACT> and, once

again, it could also be manipulated by <REGEX>, etc. The number to subtract can be placed either before or after (or both) the <TAG> or <FIELD>.

- For example, "<SUBTRACT>0.1<TAG>00180050</TAG>0.5</SUBTRACT>" would result in the value 0.1 minus the Slice Thickness tag value minus 0.5.
- **<MULTIPLY>**
 - Specifies a number to multiply times the specified number. A <TAG> or <FIELD> must be specified inside the <MULTIPLY> and, once again, it could also be manipulated by <REGEX>, etc. The number to multiply can be placed either before or after (or both) the <TAG> or <FIELD>.
 - For example, "<MULTIPLY>-2.1<TAG>00180050</TAG></MULTIPLY>" would result in the value of the Slice Thickness tag value times negative 2.1.
- **<DIVIDE>**
 - Specifies a number to divide by the specified number or vice versa. A <TAG> or <FIELD> must be specified inside the <DIVIDE> and, once again, it could also be manipulated by <REGEX>, etc. The number to divide can be placed either before or after (or both) the <TAG> or <FIELD>. If the number is placed before, then it is divided by the number resulting from the <TAG> or <FIELD>. If the number is placed after, then the number resulting from the <TAG> or <FIELD> is divided by the number placed after.
 - For example, "<DIVIDE>10.5<TAG>00180050</TAG>0.7</DIVIDE>" would result in the value 10.5 divided by the Slice Thickness tag value divided by 0.7.
- **<TRANSFORMTONUMBERINRANGE>**
 - Specifies a numeric range. The defined DICOM tag or HL7 field will be transformed to a randomized value within the defined range. The same output value is used each time for the same input and range.
 - The setting is case insensitive by default but can be configured to be case sensitive.

- For example, “<TRANSFORMTONUMBERINRANGE>10,Doe^John,75</TRANSFORMTONUMBERINRANGE>” transforms the value “Doe^John” or (“doe^john”) to a random number from 10 to 75. To match on only “Doe^John”, the configuration should be set to “<TRANSFORMTONUMBERINRANGE>10,Doe^John,75,CASESENSITIVE</TRANSFORMTONUMBERINRANGE>”.
- This configuration can be used in conjunction with other data manipulation options, such as date shifting.
- For example, to configure that a date tag should be shifted 2 years plus a number of days between -30 and 30, based on the patient ID DICOM tag such that the shift is always the same for the same patient ID:
 <DATESHIFT><TRANSFORMTONUMBERINRANGE>-30,<TAG>00100020</TAG>,30</TRANSFORMTONUMBERINRANGE>DAYS<TAG>00080020</TAG>2YEARS:yyyyMMdd</DATESHIFT>
- <MD5>
 - The value inside the <MD5></MD5> will be transformed to an MD5 hash value.
 - For example, “<MD5>Doe^John</MD5>” would transform the value “Doe^John” to an MD5 hash value.
 - Normally, the original value in a defined DICOM tag or HL7 field would be transformed to an MD5 hash value.
 - For example, “<MD5><TAG>00100020</TAG></MD5>” would transform the value of the patient ID tag to an MD5 hash value.

Mapping file path components of inbound data to tags and fields:

When ingesting data inbound via the Migration Folder, Dropbox Folder or Cloud Provider Inbound Connection types, the file path components of the data files being ingested can be mapped to DICOM tags or HL7 fields using the xml-styled options described above.

- The same file path component can be mapped to multiple tags or fields by separating the tag or field numbers with “&”.

- Regular expressions can also be applied to the file path components to map modified values to tags or fields.
- For example, if the Path Mappings configuration of a DICOM Dropbox Folder connection was set to:

```
"\00120050\\00100010&00080090\00080020<REGEX> ~&~ (\d{8}) ~&~ $1 ~&~  
</REGEX>\00081030"
```

and a DICOM file named "DROPBOX TEST.dcm" is copied into the Dropbox Root Path like this:

```
"C:\Trial 12345\Dropbox\Doe^John\20230411082543\DROPBOX TEST.dcm"
```

then the Clinical Trial Time Point ID will be set to "Trial 12345", the patient name AND the referring physician name tags will be set to 'Doe^John', the study date tag will be set to "20230411" and the study description tag will be set to "DROPBOX TEST.dcm".

Note that the value resulting from the regular expression is mapped to the tag which is directly beside it, in this case 00080020. But the tag number can come either before or after the <REGEX>...</REGEX>. Also, no input component is necessary in this case for the regular expression as it is implied that the input is the file path component, in this case "20230411082543". When the regular expression pattern and replace are applied, the first 8 characters are extracted and mapped to the tag, in this case "20230411".

Not all file path components need to be mapped. The mappings are applied in reverse order, right to left. So, if the Path Mappings configuration was set to simply "\00081030" then the only mapping that would occur is the Study Description being set to the file name "DROPBOX TEST.dcm".

If the Path Mappings configuration was set to "\00081030\" (note that here it ends with "\"), then it is implied that the file name itself is not being mapped and only the folder name is mapped. In that case, the Study Description tag would be set to "20230411082543".

- Note that Azure Blob Storage and AWS S3 use forward slashes to delimitate "folders". All of the same rules apply as described above, but the "/" character needs to be used in place of the "\" character when defining the path mappings.

Mapping tags and fields of outbound data to file path components:

Similar to ingesting data inbound, when sending data outbound via the File Path or Cloud Provider Outbound Connection types, the DICOM tags or HL7 fields of the data files being sent can be mapped to file path components using the xml-styled options described above. For the File Path connection type, the configuration is called Full File Path. For the Cloud Provider Outbound connection type, the configuration is called Object Key Mappings.

- Multiple tags or fields can be mapped to a single file path component in addition to any static text.
- Regular expressions can also be applied to the tags or fields in order to map modified values to file path components.
- For example, if the Full File Path configuration of a DICOM File Path connection was set to:

```
"C:\Dicominator-DATA\Dr. <TAG>00080090</TAG> for Patient <REGEX>
<TAG>00100010</TAG> ~&~ (\d{5}) ~&~ $1 ~&~
</REGEX>\<TAG>00080018</TAG>.dcm"
```

and the outbound DICOM file had a Referring Physician tag value of "Smith^Jane", a Patient Name tag value of "Doe^John" and a SOP InstanceUID tag value of "1.2.3.4.5.6", then the data file would be saved as:

```
"C:\Dicominator-DATA\Dr. Smith^Jane for Patient Doe^J\1.2.3.4.5.6.dcm"
```

Note the regular expression extracts only the first 5 characters of the patient name tag and this value is combined with the static text and referring physician tag value.

IMPORTANT: If the Full File Path configuration does NOT end with the "\" character, then the characters after the last "\" specify the new file name. If xml-style mappings are not included in this last component for the file name, the file names will be the same for every file being saved and, depending on how other file path components are mapped, overwriting is very likely. Therefore, it is strongly recommended to either include xml-style mappings in the file name component OR ending the Full File Path configuration with "\". When the configuration ends with "\", a default file name will be used. For DICOM files, this is the SOP Instance UID. For HL7 files, this is a random guid.

- Note that Azure Blob Storage and AWS S3 use forward slashes to delimitate “folders”. All of the same rules apply as described above, but the “/” character needs to be used in place of the “\” character when defining the path mappings.

Using special terms for specific situations:

The following terms can be used in the second entry box when setting tags in DICOM Action expressions only:

- “<EMPTY>” – Specifies that the tag should be cleared but not removed.
- “<UIDANONYMIZE>” - Specifies that the defined UID DICOM tag should be anonymized with a new value using the Dicominator root UID.

The following terms can be used in the first entry box when setting or removing tags in DICOM Action expressions only:

- “ALLTAGS” – The action should be applied to all of the tags in the DICOM data (should rarely if ever be used as it will likely invalidate the DICOM data).
- “ALLTAGSEXCEPT-” – The action should be applied to all tags in the DICOM data except for the comma-separated list of tags following the “-”. For example, “ALLTAGSEXCEPT-0010****,00100020”. Note that tags inside sequences are not currently supported in “ALLTAGSEXCEPT-”.
- “ALLPRIVATETAGS” – The action should be applied to all of the PRIVATE tags in the DICOM data.
- “ALLPRIVATETAGSEXCEPT-” – The action should be applied to all of the PRIVATE tags only in the DICOM data except for the comma-separated list of tags following the “-”. For example, “ALLPRIVATETAGSEXCEPT-0019****,0021002*”. Note that tags inside sequences are not currently supported in “ALLPRIVATETAGSEXCEPT-”.

The following term can be used in the first entry box when setting tags in DICOM Action expressions or fields in HL7 Action expressions:

- “ALLINSTANCES-” – The value(s) of the DICOM tag(s) or HL7 field(s) in the comma-separated list of tags or fields following the “-” should be searched for

throughout the DICOM data or HL7 data. Any tags or fields found to contain the specified value(s) will be replaced with the value specified in the second entry box. Note that for safety, an error will occur if the value inside the specified tag is less than 4 characters long.

- For example, setting the first entry box to “ALLINSTANCES-00102201” and the second entry box to “<EMPTY>” will find the value of tag 00102201 anywhere that it exists throughout all of the DICOM tags in the image and remove the matching characters.
- For example, setting the first entry box to “ALLINSTANCES-00080050” and the second entry box to “<EMPTY>::FINALVALUE::<TAG>00080050</TAG>” will find the value of tag 00102201 anywhere that it exists throughout all of the DICOM tags in the image and remove the matching characters, but the 00080050 tag itself will maintain its original value.
- For a more complex example including multiple tags and tags within sequences, setting the first entry box to “ALLINSTANCES-00102202:00080104,00080030” and the second entry box to “111111” will find the value of the tag 00080104 inside sequence 00102202 throughout all of the DICOM tags in the image and replace the matching characters with “111111”. Similarly, it will also find the value of tag 00080030 throughout all of the DICOM tags in the image and replace the matching characters with “111111”.
- For an HL7 example, setting the first entry box to “ALLINSTANCES-PID.5,PV1.8” and the second entry box to “<EMPTY>::FINALVALUE::<FIELD>PID.7</FIELD>” will find the value of the patient name and referring physician fields anywhere that it exists throughout all of the DICOM tags in the image and remove the matching characters, but the PID.5 and PV1.8 fields themselves will be set to the value in the Patient Date of Birth field.
- Several options are available for the “ALLINSTANCES” feature:
 - “EXCLUDETAGS:” - Enables specification of a comma-separated list of DICOM tags after the “:” that should be excluded from the search for matching values.
 - “EXCLUDEFIELDS:” - Enables specification of a comma-separated list of HL7 fields after the “:” that should be excluded from the search for matching values.
 - “NOTCASESENSITIVE” - The search for matching values in tags/fields is not case sensitive.

- “REPLACEFULLTAG” - When a DICOM tag contains a match of the value being searched, the entire tag should be replaced with the specified value, not just the matching characters.
- “REPLACEFULLFIELD” - When an HL7 field contains a match of the value being searched, the entire field should be replaced with the specified value, not just the matching characters.
- “MINLENGTH:” - Enables specification after the “:” of the minimum length allowed of the value being searched for. Default is 4 characters. If the tag value being searched for has a length less than the number specified, the “ALLINSTANCES” search is ignored.
- “EQUALS” - Specifies that matching tags must be equal to the value being searched for, not just containing the value.
- “EXCLUDESEQUENCETAGS” - Tags within any sequence are excluded from the search for matching values.
- “EXCLUDEPRIVATETAGS” - All private tags are excluded from the search for matching values.

The configuration values are semi-colon separated instead of comma-separated so that multiple comma-separated tag numbers can be specified for EXCLUDETAGS. To exclude private tags, use the configuration option “EXCLUDEPRIVATETAGS”. To exclude sequence tags, use the configuration option “EXCLUDESEQUENCETAGS”.

- The above optional configuration values are semi-colon separated.
- For example:
ALLINSTANCES-EXCLUDETAGS:00100010,00100020,00080022;NOTCASESENSITIVE;REPLACEFULLTAG;MINLENGTH:3;EXCLUDESEQUENCETAGS;EXCLUDEPRIVATETAGS-00080050
- The above sample would search for the value contained within the accession number tag if it has a length of at least 3 characters, the search would not be case sensitive, and sequence tags, private tags and tags 00100010, 00100020, and 00080022 would be excluded from the search.
- The ALLINSTANCES feature supports regular expressions to match on a partial DICOM tag value.
- For example:
ALLINSTANCES-MINLENGTH:2-<REGEX><TAG>00100010</TAG> ~&~ ^[^\^]*\^[^\^]* ~&~ \$1 ~&~ </REGEX>

- In the above example, the second component of the patient name DICOM tag is extracted and the matching characters are removed anywhere that they exist throughout all of the DICOM tags.
- Multiple tags and multiple regular expressions can be defined in the same configuration.
- For example, to include multiple regular expressions:
 ALLINSTANCES-MINLENGTH:2-<REGEX><TAG>00100010</TAG> ~&~
 ^[\^\\^]* ~&~ \$1 ~&~ </REGEX>,<REGEX><TAG>00100010</TAG> ~&~
 ^[\^\\^]*\^([\^\\^]*) ~&~ \$1 ~&~ </REGEX>
- In the above example, both the first and second components of the patient name DICOM tag are extracted and the matching characters are removed anywhere that they exist throughout all of the DICOM tags.
- For example, to include multiple tags and multiple regular expressions:
 ALLINSTANCES-MINLENGTH:3-0040030e:00180015,<REGEX><TAG>00100
 010</TAG> ~&~ ^[\^\\^]*\^([\^\\^]*) ~&~ \$1 ~&~ </REGEX>,<TAG>00081090
- In the above example, all instances of tag 00180015 in the sequence 0040030e would be removed, then all instances of the last name would be removed, and finally all instances of tag 00081090 would be removed.

The wildcard characters “*”, “x”, or “X” can be used when specifying DICOM tag numbers (including sequence tag numbers) when removing tags, or in the second entry box when setting tags as long as the first entry box is utilizing either the “ALLTAGSEXCEPT-” feature or the “ALLPRIVATETAGSEXCEPT-” feature. Only 4 wildcard characters are allowed per tag.

For example:

- SETTAG(S) ALLPRIVATETAGSEXCEPT-0009****,001900** to ABC
- REMOVETAG(S) ALLTAGSEXCEPT-0008****,0010****, 0028,00**,7FE00010

When transcoding is selected in DICOM Action expressions only:

"ALL" – When used in the first entry box, it specifies that all supported input transfer syntaxes should be transcoded to the transfer syntax UID specified in the second entry box.

When removing segments in HL7 Action expressions only:

"ALL-<segment name>" – Can be used in the first entry box when removing segments in HL7 Action expressions only. It specifies that all instances of the segment name in an HL7 message should be removed. For example, "ALL-NK1" would remove all NK1 segments. Note that if there are multiple NK1 segments, and only "NK1" is specified in the first entry box, then only the first NK1 segment in the HL7 message will be removed.

The following term can be used in the first entry box when configuring a condition in DICOM Condition expressions only:

- "MODALITY" – When entered, a dropdown automatically appears allowing you to select a specific modality (or auto-select) to be matched and process data from, typically for pixel de-ID purposes. If the tag data of an image matches the required criteria for that modality type, then the condition passes and, assuming any other conditions pass, any configured actions would be executed (likely including a 'DE-ID PIXEL DATA - MAKE MODEL' action with the same modality type selected). If the 'AUTO MATCH FROM DEFINED MODALITIES' option is selected, the condition evaluates to true if the tag data of an image matches the required criteria for ANY defined modality type.

Transcoding:

All of the following supported transfer syntaxes can be transcoded to any of the other transfer syntaxes listed:

Uncompressed:

- | | |
|--------------------------|---|
| • 1.2.840.10008.1.2 | Implicit VR Endian: Default Transfer Syntax for DICOM |
| • 1.2.840.10008.1.2.1 | Explicit VR Little Endian |
| • 1.2.840.10008.1.2.1.99 | Deflated Explicit VR Little Endian |
| • 1.2.840.10008.1.2.2 | Explicit VR Big Endian |

Compressed:

- 1.2.840.10008.1.2.4.50 JPEG Baseline (Process 1): Default Transfer Syntax for Lossy JPEG 8-bit Image Compression
- 1.2.840.10008.1.2.4.51 JPEG Baseline (Processes 2 & 4): Default Transfer Syntax for Lossy JPEG 12-bit Image Compression Process 4 only)
- 1.2.840.10008.1.2.4.57 JPEG Lossless, Nonhierarchical (Processes 14)
- 1.2.840.10008.1.2.4.70 JPEG Lossless, Nonhierarchical, First- Order Prediction (Processes 14 [Selection Value 1]): Default Transfer Syntax for Lossless JPEG Image Compression
- 1.2.840.10008.1.2.4.80 JPEG-LS Lossless Image Compression
- 1.2.840.10008.1.2.4.81 JPEG-LS Lossy (Near- Lossless) Image Compression
- 1.2.840.10008.1.2.4.90 JPEG 2000 Image Compression (Lossless Only)
- 1.2.840.10008.1.2.4.91 JPEG 2000 Image Compression
- 1.2.840.10008.1.2.5 RLE Lossless

Note that images with 16 bits stored do not transcode successfully to 1.2.840.10008.1.2.4.50 - JPEG Baseline (Process 1) or to 1.2.840.10008.1.2.4.50 - JPEG Baseline (Processes 2 & 4)

Using Dicominator

Once Dicominator is configured with the desired connections, data processing conditions and actions, and workflows, it is ready for use. On the Home tab, simply enabling the Dicominator and its workflow(s) will immediately turn on the Dicominator. However, to assist you in using the Dicominator effectively, there are seven additional tabs (described below): Simulate, Q/R, Activity, Reports, Tools, Settings, and About.

Simulate Tab:

The Simulate tab is where you can test your configurations by simulating how data will be manipulated when passing through Dicominator. Simulating the data processing is highly recommended in order to ensure that the data will be manipulated as desired before enabling Dicominator and its workflows on live data.

To test a workflow on the Simulate tab, select the workflow to simulate from the dropdown list, optionally enter a simulated file name for mapping file name components to DICOM tags (or HL7 fields), select a sample data file to process, and click the “Execute!” button:

Simulate Workflows

Workflow to Simulate:

Optional simulated original file name (for path to tag mapping):

Select DICOM File:

Execute! Result: Final file would be sent to AE Title 'PACS' via DICOM C-STORE.

Tag	VR	Length	Value
(0002,0000) File Meta Information Group Length	UL	4	212
(0002,0001) File Meta Information Version	OB	2	0\1
(0002,0002) Media Storage SOP Class UID	UI	28	1.2.840.1000
(0002,0003) Media Storage SOP Instance UID	UI	64	1.3.6.1.4.1.1
(0002,0010) Transfer Syntax UID	UI	18	1.2.840.1000
(0002,0012) Implementation Class UID	UI	20	1.3.6.1.4.1.1
(0002,0013) Implementation Version Name	SH	14	fo-dicom 5.3
(0002,0016) Source Application Entity Title	AE	6	POSDA
(0007,0007) Unknown	UN	22	49\46\50\46\
(0008,0005) Specific Character Set	CS	10	I90 IR 100
(0008,0008) Image Type	CS	60	DERIVED\PRIN
(0008,0016) SOP Class UID	UI	28	1.2.840.1000
(0008,0018) SOP Instance UID	UI	64	1.3.6.1.4.1.1
(0008,0020) Study Date	DA	8	19590405
(0008,0021) Series Date	DA	8	19590405
(0008,0023) Content Date	DA	8	19590405
(0008,0030) Study Time	TM	6	091326
(0008,0031) Series Time	TM	6	091326
(0008,0033) Content Time	TM	6	091439
(0008,0050) Accession Number	SH	0	
(0008,0060) Modality	CS	2	US
(0008,0070) Manufacturer	LO	14	GE Healthcare
(0008,0090) Referring Physician's Name	PN	0	
(0008,1030) Study Description	LO	20	US Abdomen (
(0008,103E) Series Description	LO	20	US Abdomen (
(0008,1090) Manufacturer's Model Name	LO	8	LOGIQE9
(0010,0010) Patient's Name	PN	18	CMB-CRC-MSB
(0010,0020) Patient ID	LO	18	CMB-CRC-MSB
(0010,0030) Patient's Birth Date	DA	0	
(0010,0040) Patient's Sex	CS	2	O
(0010,2160) Ethnic Group	SH	12	Non-Hispanic
(0012,0050) Clinical Trial Time Point ID	LO	4	-270
(0012,0051) Clinical Trial Time Point Description	ST	30	Phase offset

Tag	VR	Length	Value
(0002,0000) File Meta Information Group Length	UL	4	216
(0002,0001) File Meta Information Version	OB	2	0\1
(0002,0002) Media Storage SOP Class UID	UI	28	1.2.840.1000
(0002,0003) Media Storage SOP Instance UID	UI	64	1.3.6.1.4.1.1
(0002,0010) Transfer Syntax UID	UI	22	1.2.840.1000
(0002,0012) Implementation Class UID	UI	20	1.3.6.1.4.1.1
(0002,0013) Implementation Version Name	SH	14	fo-dicom 5.3
(0002,0016) Source Application Entity Title	AE	6	POSDA
(0007,0007) Unknown	UN	22	49\46\50\46\
(0008,0005) Specific Character Set	CS	10	I90 IR 100
(0008,0008) Image Type	CS	60	DERIVED\PRIN
(0008,0016) SOP Class UID	UI	28	1.2.840.1000
(0008,0018) SOP Instance UID	UI	64	1.3.6.1.4.1.1
(0008,0020) Study Date	DA	8	20230411
(0008,0021) Series Date	DA	8	19590405
(0008,0023) Content Date	DA	8	19590405
(0008,002A) Acquisition DateTime	DT	14	202304110902
(0008,0030) Study Time	TM	6	091326
(0008,0031) Series Time	TM	6	091326
(0008,0033) Content Time	TM	6	091439
(0008,0050) Accession Number	SH	0	
(0008,0060) Modality	CS	2	US
(0008,0090) Referring Physician's Name	PN	0	Doe\John
(0008,1030) Study Description	LO	12	DROPPBOX-TEST
(0008,103E) Series Description	LO	20	US Abdomen (
(0008,1090) Manufacturer's Model Name	LO	8	LOGIQE9
(0010,0010) Patient's Name	PN	8	Doe\John
(0010,0020) Patient ID	LO	8	CMB-1234
(0010,0030) Patient's Birth Date	DA	0	
(0010,0040) Patient's Sex	CS	2	O
(0010,2160) Ethnic Group	SH	12	Non-Hispanic
(0012,0050) Clinical Trial Time Point ID	LO	4	-270
(0012,0051) Clinical Trial Time Point Description	ST	30	Phase offset

Simulate Workflows

HomeConnectionsProcessingSimulateActivityAbout

Workflow to Simulate:

Dropbox to My PACS ID: 56

Optional simulated original file name (for path to tag mapping):

C:\DROPBOX\ Doe\John\20230411082543\DROPBOX-TEST

Select DICOM File

C:\TESTDATA\test.dcm

Execute!

Result: Final file would be sent to AE Title 'PACS' via DICOM C-STORE.

Original:

(0018,6024)	Physical Units X Direction	US	2	3
(0018,6026)	Physical Units Y Direction	US	2	3
(0018,6028)	Reference Pixel Physical Value X	FD	8	0
(0018,602A)	Reference Pixel Physical Value Y	FD	8	0
(0018,602C)	Physical Delta X	FD	8	0.0182899353
(0018,602E)	Physical Delta Y	FD	8	0.0182899353
(0018,6030)	Transducer Frequency	UL	4	4000
(0018,6031)	Transducer Type	CS	14	CURVED LINE
(0020,000D)	Study Instance UID	UI	64	1.3.6.1.4.1.
(0020,000E)	Series Instance UID	UI	64	1.3.6.1.4.1.
(0020,0010)	Study ID	SH	0	
(0020,0011)	Series Number	IS	2	1
(0020,0013)	Instance Number	IS	2	1
(0020,0020)	Patient Orientation	CS	0	
(0028,0002)	Samples per Pixel	US	2	1
(0028,0004)	Photometric Interpretation	CS	12	MONOCHROME2
(0028,0008)	Number of Frames	IS	2	1
(0028,0010)	Rows	US	2	819
(0028,0011)	Columns	US	2	1092
(0028,0100)	Bits Allocated	US	2	8
(0028,0101)	Bits Stored	US	2	8
(0028,0102)	High Bit	US	2	7
(0028,0103)	Pixel Representation	US	2	0
(0028,0301)	Burned In Annotation	CS	2	NO
(0028,0303)	Longitudinal Temporal Information Modified	CS	8	MODIFIED
(0028,1050)	Window Center	DS	4	127
(0028,1051)	Window Width	DS	4	256
(0028,2110)	Lossy Image Compression	CS	2	00
(0040,2017)	Filler Order Number / Imaging Service Request	LO	0	
(7FE0,0010)	Pixel Data	OW	894348	<large value

Final:

(0018,6024)	Physical Units X Direction	US	2	3
(0018,6026)	Physical Units Y Direction	US	2	3
(0018,6028)	Reference Pixel Physical Value X	FD	8	0
(0018,602A)	Reference Pixel Physical Value Y	FD	8	0
(0018,602C)	Physical Delta X	FD	8	0.0182899353
(0018,602E)	Physical Delta Y	FD	8	0.0182899353
(0018,6030)	Transducer Frequency	UL	4	4000
(0018,6031)	Transducer Type	CS	14	CURVED LINE
(0020,000D)	Study Instance UID	UI	64	1.3.6.1.4.1.
(0020,000E)	Series Instance UID	UI	64	1.3.6.1.4.1.
(0020,0010)	Study ID	SH	0	
(0020,0011)	Series Number	IS	2	1
(0020,0013)	Instance Number	IS	2	1
(0020,0020)	Patient Orientation	CS	0	
(0028,0002)	Samples per Pixel	US	2	1
(0028,0004)	Photometric Interpretation	CS	12	MONOCHROME2
(0028,0008)	Number of Frames	IS	2	1
(0028,0010)	Rows	US	2	819
(0028,0011)	Columns	US	2	1092
(0028,0100)	Bits Allocated	US	2	8
(0028,0101)	Bits Stored	US	2	8
(0028,0102)	High Bit	US	2	7
(0028,0103)	Pixel Representation	US	2	0
(0028,0301)	Burned In Annotation	CS	2	NO
(0028,0303)	Longitudinal Temporal Information Modified	CS	8	MODIFIED
(0028,1050)	Window Center	DS	4	127
(0028,1051)	Window Width	DS	4	256
(0028,2110)	Lossy Image Compression	CS	2	01
(0028,2112)	Lossy Image Compression Ratio	DS	6	17.296
(0028,2114)	Lossy Image Compression Method	CS	12	ISO 14495-1
(0040,2017)	Filler Order Number / Imaging Service Request	LO	0	
(7FE0,0010)	Pixel Data	OB	-	
Offset Table		--	4	#entries=1
Fragment		--	72734	

DICOM Tag and HL7 Message Comparison View

For example, you may want to test a workflow which takes data from a Dropbox, manipulates the data, and sends it to a DICOM device. If you have configured the following condition:

Add/Edit DICOM Condition

Home Connections Processing Simulate Activity About

Description: Modality is US

Expressions in this condition: +

00080060
EQUALS
US

☐ Case sensitive? ☐ On error, default to true?

and the following action:

Add/Edit DICOM Action

Home Connections Processing Simulate Activity About

Description: Change patient ID, remove manufacturer and transcode

Expressions in this action: +

SET TAG(S)
00100020
TO
CMB-1234

AND
REMOVE TAG(S)
00080070

AND
TRANSCODE
1.2.840.10008.1.2
TO
1.2.840.10008.1.2.4.81

and have configured a workflow to ingest data via a Dropbox connection, apply the condition to the data, execute the data manipulation if the condition is met, and send the data to a DICOM device as follows:

then you could test the workflow as shown in the screenshots above by selecting the workflow to simulate from the dropdown, entering a simulated original file name for mapping the file name components to DICOM tags, selecting a sample DICOM US file for simulation, and clicking the “Execute!” button.

- Assuming the Path Mapping configuration on the ‘DICOM Dropbox’ connection was set to “00100010&00080090\0008002A&00080020<REGEX> ~&~ ^(\d{8}).* ~&~ \$1 ~&~ </REGEX>\00081030”, the Dropbox file name components from the input simulated file name “C:\DROPBOX\Doe^John\20230411082543\DROPBOX-TEST” would be mapped to 5 different tags. Note these mappings occur regardless of whether or not the configured condition (that the modality must be of type ‘US’) be met. Conditions only affect whether or not their corresponding action(s) are applied. They do not affect mappings that are configured on connections.
- The Path Mappings configuration contains three components, delimited by “\”. As explained in the Inbound Path Mapping section above, the mappings are executed from

right to left. In this case, because the Path Mappings configuration does not end with “\”, the last component is mapped from the file name itself. Here are the changes to the DICOM tags and why:

- The final component of Path Mappings, ‘00081030’, results in the Study Description tag being set to the final component of the Dropbox file name, which is the file name itself, ‘DROPBOX-TEST’.
- The second component of Path Mappings, ‘0008002A&00080020<REGEX> ~&~ ^(\d{8}).* ~&~ \$1 ~&~ </REGEX>’, results in the Acquisition DateTime being set to the unaltered Dropbox subfolder name, ‘20230411082543’, while the REGEX next to ‘00080020’ results in the regex-modified value of ‘20230411’ being saved to the Study Date tag.
- The first component of Path Mappings, ‘00100010&00080090’, results in both the Patient Name and the Referring Physician Name being set to the value of the Dropbox subfolder name, ‘Doe^John’.
- Since the input data file was of modality type ‘US’, the condition specified in the workflow was met and the corresponding actions were applied as follows:
 - The Patient ID (00100020) tag was set to ‘CMB-1234’.
 - The Manufacturer tag (00080070) was removed.
 - Since the input file had the specified input transfer syntax UID ‘1.2.840.10008.1.2’ (Implicit VR Endian), the file was transcoded to the specified output transfer syntax ‘1.2.840.10008.1.2.4.81’ (JPEG-LS Lossy). This results in several changes.
 - First, the Transfer Syntax UID tag is updated to ‘1.2.840.10008.1.2.4.81’, and since the Transfer Syntax UID tag is a group 2 tag, the File Meta Information Group Length tag (00020000) was updated to the new group length of 216.
 - Second, scrolling down the resulting data (see second screenshot) shows the modifications to the DICOM pixel data due to the transcoding:
 - The Lossy Image Compression tag (00282110) is updated to ‘01’.
 - The Lossy Image Compression Ratio tag (00282112) is added with a value of 12.296.
 - The Lossy Image Compression Method tag (00282114) is added with a value of ‘ISO_14495_1’.
 - The pixel data tag (7FE00010) size is updated from 894348 to 72734.

If the input data file was of modality type ‘MR’, the condition of the workflow’s processing rule would not be met, so none of the actions described above would be performed. However, the Path Mappings would still apply, as seen below:

Simulate Workflows

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Workflow to Simulate: Dropbox to My PACS ID: 56

Optional simulated original file name (for path to tag mapping): C:\DROPBBOX\ Doe\John\20230411082543\DROPBOX-TEST

Select DICOM File

C:\TESTDATA\dicom-00001.dcm

Execute!

Result: Final file would be sent to AE Title 'PACS' via DICOM C-STORE.

Original:

Tag	VR	Length	Value
(0002,0000) File Meta Information Group Length	UL	4	190
(0002,0001) File Meta Information Version	OB	2	0\1
(0002,0002) Media Storage SOP Class UID	UI	26	1.2.840.10008.5.1.4.1.3
(0002,0003) Media Storage SOP Instance UID	UI	56	1.2.276.0.7230010.3.1.4
(0002,0010) Transfer Syntax UID	UI	20	1.2.840.10008.1.2.1
(0002,0012) Implementation Class UID	UI	20	1.3.6.1.4.1.30071.8
(0002,0013) Implementation Version Name	SH	14	fo-dicom 5.1.1
(0008,0005) Specific Character Set	CS	10	ISO_IR 100
(0008,0014) Instance Creator UID	UI	24	1.3.46.670589.11.17169
(0008,0016) SOP Class UID	UI	26	1.2.840.10008.5.1.4.1.3
(0008,0018) SOP Instance UID	UI	56	1.2.276.0.7230010.3.1.4
(0008,0020) Study Date	DA	8	20200327
(0008,0021) Series Date	DA	8	20200327
(0008,0030) Study Time	TM	6	122027
(0008,0050) Accession Number	SH	0	
(0008,0060) Modality	CS	2	MR
(0008,0070) Manufacturer	LO	24	Philips Medical Systems
(0008,0090) Referring Physician's Name	PN	0	
(0008,1030) Study Description	LO	32	NCI PDMP Tumor Character
(0008,103E) Series Description	LO	12	TSE45 split
(0008,1040) Institutional Department Name	LO	4	SAIP
(0008,1070) Operators' Name	PN	0	
(0008,1080) Admitting Diagnoses Description	LO	0	
(0008,1090) Manufacturer's Model Name	LO	8	Achieva
(0010,0010) Patient's Name	PN	18	144126-210-T-1637
(0010,0020) Patient ID	LO	18	144126-210-T-1637
(0010,0030) Patient's Birth Date	DA	0	
(0010,0040) Patient's Sex	CS	2	M
(0010,0212) Strain Description	UC	36	NOD.Cg-Prkdc<scid> I12
(0010,0213) Strain Nomenclature	LO	8	MGI_2013
(0010,0219) Strain Code Sequence	SQ	-	
(FFFF,E000) Item	-	-	
(0008,0100) Code Value	SH	8	3577020

Final:

Tag	VR	Length	Value
(0002,0000) File Meta Information Group Length	UL	4	190
(0002,0001) File Meta Information Version	OB	2	0\1
(0002,0002) Media Storage SOP Class UID	UI	26	1.2.840.10008.5.1.4.1.3
(0002,0003) Media Storage SOP Instance UID	UI	56	1.2.276.0.7230010.3.1.4
(0002,0010) Transfer Syntax UID	UI	20	1.2.840.10008.1.2.1
(0002,0012) Implementation Class UID	UI	20	1.3.6.1.4.1.30071.8
(0002,0013) Implementation Version Name	SH	14	fo-dicom 5.1.1
(0008,0005) Specific Character Set	CS	10	ISO_IR 100
(0008,0014) Instance Creator UID	UI	24	1.3.46.670589.11.17169
(0008,0016) SOP Class UID	UI	26	1.2.840.10008.5.1.4.1.3
(0008,0018) SOP Instance UID	UI	56	1.2.276.0.7230010.3.1.4
(0008,0020) Study Date	DA	8	20230411
(0008,0021) Series Date	DA	8	20200327
(0008,002A) Acquisition DateTime	DT	14	20230411082543
(0008,0030) Study Time	TM	6	122027
(0008,0050) Accession Number	SH	0	
(0008,0060) Modality	CS	2	MR
(0008,0070) Manufacturer	LO	24	Philips Medical Systems
(0008,0090) Referring Physician's Name	PN	8	Doe*John
(0008,1030) Study Description	LO	12	DROPBBOX-TEST
(0008,103E) Series Description	LO	12	TSE45 split
(0008,1040) Institutional Department Name	LO	4	SAIP
(0008,1070) Operators' Name	PN	0	
(0008,1080) Admitting Diagnoses Description	LO	0	
(0008,1090) Manufacturer's Model Name	LO	8	Achieva
(0010,0010) Patient's Name	PN	8	Doe*John
(0010,0020) Patient ID	LO	18	144126-210-T-1637
(0010,0030) Patient's Birth Date	DA	0	
(0010,0040) Patient's Sex	CS	2	M
(0010,0212) Strain Description	UC	36	NOD.Cg-Prkdc<scid> I12
(0010,0213) Strain Nomenclature	LO	8	MGI_2013
(0010,0219) Strain Code Sequence	SQ	-	
(FFFF,E000) Item	-	-	
(0008,0100) Code Value	SH	8	3577020

DICOM Raw Image Comparison View

The Simulate Tab also supports viewing the before-and-after raw DICOM images. This is useful when using the DICOM Pixel Data De-ID feature. To view the before-and-after images, select the “View Images” checkbox.

For example, consider the following DICOM Action configuration:

Add/Edit DICOM Action

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Description De-id

Expressions in this action: +

DE-ID PIXEL DATA - CUSTOM

0,0,850,150,1;1700,10,440,400,100

In case of error: ☒ Block send ☐ Save data to path:

When selecting the “DE-ID PIXEL DATA - CUSTOM” Action, the entry box expects a semi-colon-separated list of bounding boxes to redact. Each bounding box definition consists of 4 or 5 comma-separated components where the first is the zero-indexed X pixel coordinate, the second is the zero-indexed Y pixel coordinate, the third is the box width in pixels, the fourth is the box height in pixels, and the fifth (optional) is the color byte which must range from 0 to 255.

The “DE-ID PIXEL DATA - MAKE MODEL” option enables you to pick a specific modality type to redact. Only data matching the tag conditions of the specific modality selected will be redacted. The modalities available are defined in the “Modality Specific Redaction.json” file, where all of the specific modality bounding box data and tag value conditions were obtained from MIRC-CTP (See <https://github.com/susom/mirc-ctp/blob/master/scripts/stanford-scrubber.script>). For more information, ask Dicominator support for the data file used to configure the bounding boxes for each specific modality type.

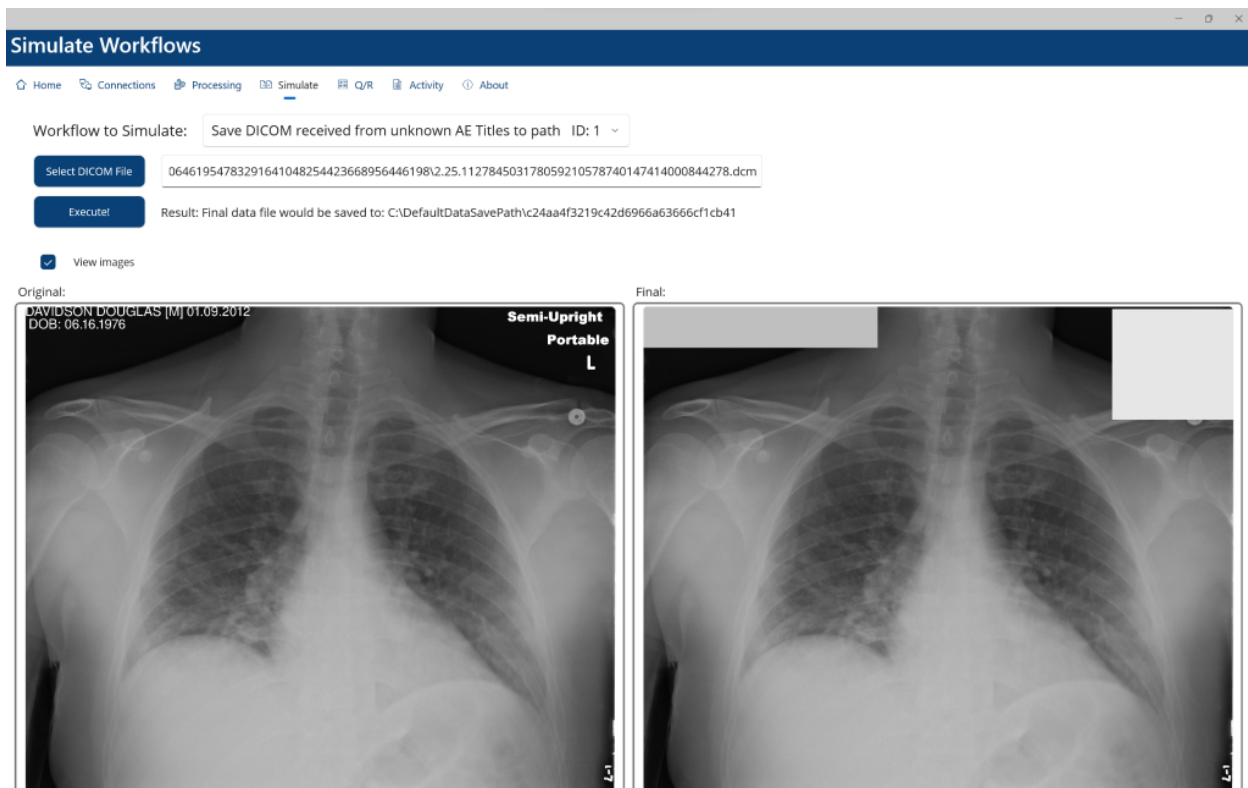
In the event that you wish to redact all imaging that matches any of the defined specific modalities, you can select the first option in the list “AUTO MATCH FROM DEFINED MODALITIES”.

An alternative json configuration format can also be used with “DE-ID PIXEL DATA - CUSTOM”. The json structure matches the json structure in the “Modality Specific Redaction.json” file. For

example, the equivalent configuration in json format of the comma-separated format shown above would be:

```
{ "BoundingBoxes": [ { "X": 0, "Y": 0, "Width": 850, "Height": 150, "Color": 1 }, { "X": 1700, "Y": 10, "Width": 440, "Height": 400, "Color": 100 } ] }
```

Executing the simulation (with no condition required to be met or the specified condition being met) and viewing the images will result in the following view:



Note that pixel data de-id requires that compressed images are decompressed before the redaction. To prevent data loss which can result from decompressing and then re-compressing JPEG lossy images, only lossless images are automatically re-compressed.

Q/R Tab:

The Q/R tab is where you can query for DICOM studies stored in a defined DICOM destination and retrieve them using Dicominator.

- The “Q/R DICOM Connection” field is a dropdown list that displays any DICOM device configured in the Connections tab.
- The “using Dicominator” field is a dropdown list that displays any Dicominators configured in the Home tab.
- The selected DICOM connection must be set as an “Inbound Connection” in an enabled workflow (configured in the Home tab) that is associated with the selected Dicominator.
- You can query for studies in the defined DICOM device using the following search fields: Patient Name, Patient ID, Accession Number (exact match), Study Instance UID, Modality, Study Description, Referring Physician, Patient DOB, and Study Date. Note: when performing a search by Accession Number, only exact matches are returned. All other fields return studies that contain the input value, not just exact matches.
 - When querying by accession number, you can define an individual accession number, enter a comma-separated list of accession numbers, or query retrieve using values stored in a CSV file.
 - To search for a list of accession numbers, enter a comma-separated list such as 900,901,902,903.
 - To search for accession numbers stored in a CSV file, set the file path in the Accession Number field and define either the column name or the column number that contains the accession number values.
 - For example, if the CSV contains a header row, set Accession number field to:

“<CSV>FILE::C:\\CSV Test Data\\studies.csv|COLUMNNAME::Accession Number</CSV>”

where the CSV data is:

```
Patient Name,Patient ID,Accession Number,Modality
Pat100,100,900,CT
Pat101,101,901,CT
Pat102,102,902,CT
Pat103,103,903,CT
```

- For example, if the CSV does not contain a header row, set the Accession Number field to:

“<CSV>FILE::C:\\CSV Test Data\\studies.csv|COLUMNNUMBER::3</CSV>”

where csv data is:
 Pat100,100,900,CT
 Pat101,101,901,CT
 Pat102,102,902,CT
 Pat103,103,903,CT

- Enter the desired search criteria, then click the “Query” button. Dicominator performs a C-FIND to the selected DICOM destination and returns a list of all matching studies.

Query/Retrieve

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Q/R DICOM Connection: SG CCW
 using DICOMinator: SG Dicominator (AE: SGDICOMINATOR)

Patient Name

Doe

Patient ID

Accession Number

Study Instance UID

Modality

Study Description

Referring Physician

Patient DOB:

☐

From: 8/4/2024

To: 8/11/2024

Study Date:

☐

From: 8/4/2024

To: 8/11/2024

Query

☐

	Patient ID	Patient Name	Patient DOB	Accession Number	Study Date	Modality	Description	Referring Physician	Study UID	Instances
☐	1123455	Doe^Jane	19800101	ACC00002	20231101	CT	CT1 abdomen		1.2.826.0.1.3680043.8.1055.1.201111021507585 91.92402465.76095170	361
☐	1123455	Doe^Jane	19800101	ACC00001	20231001	MR	Knee (R)		1.2.826.0.1.3680043.8.1055.1.201111031111482 88.98361414.79379639	135

- To retrieve a study, click the checkbox on the left within the list. To retrieve all studies, click the checkbox on the top left of the list. Then, click the “Retrieve” button.

☐ Retrieve

	Patient ID	Patient Name	Patient DOB	Accession Number	Study Date	Modality	Description	Referring Physician	Study UID	Instances
☐	1123455	Doe^Jane	19800101	ACC00002	20231101	CT	CT1 abdomen		1.2.826.0.1.3680043.8.1055.1.201111021507585 91.92402465.76095170	361
☒	1123455	Doe^Jane	19800101	ACC00001	20231001	MR	Knee (R)		1.2.826.0.1.3680043.8.1055.1.201111031111482 88.98361414.79379639	135

- Dicominator performs a C-MOVE on the selected studies. When the retrieve is complete, the checkbox next to the associated study turns green.

Patient ID	Patient Name	Patient DOB	Accession Number	Study Date	Modality	Description	Referring Physician	Study UID	Instances
☐	1123455	Doe^Jane	19800101	ACC00002	20231101	CT	CT1 abdomen	1.2.826.0.1.3680043.8.1055.1.201111021507585 91.92402465.76095170	361
☒	1123455	Doe^Jane	19800101	ACC00001	20231001	MR	Knee (R)	1.2.826.0.1.3680043.8.1055.1.201111031111482 88.98361414.79379639	135

Activity Tab:

The Activity tab is where you can view DICOM studies and HL7 messages that have been processed or are currently being processed by Dicominator. When the “Detailed Logs” checkbox is checked, the view switches to show detailed Dicominator logs to diagnose problems, see current progress, or save logs for sharing to others such as Dicominator customer support.

Activity View:

The Activity view page shows DICOM studies or HL7 messages that have been processed or are currently being processed by Dicominator and changes made to the data. Note that the inspection pages described below display the actual changes that were made to the data before being sent to the outbound connection.

- For DICOM studies, each line represents a unique study UID and workflow ID combination. For example, if the same study was processed by three separate workflows, three lines would appear for that study UID in the Activity view, each with a different workflow ID. If the same study is processed through the same workflow multiple times, no additional study lines would appear in the view. However, the number of times that an individual image was processed through the same workflow is indicated on the study inspection pages.
- For HL7 messages, each line represents the processing of an HL7 message. Even duplicate messages received will result in additional lines displayed.
- The DICOM studies or HL7 messages that are displayed can be filtered by workflow by selecting specific inbound and/or outbound connections and/or specific Dicominator instances.

- The DICOM studies or HL7 messages that are displayed can be filtered by the type of data being processed (DICOM or HL7) and/or whether they are still processing and/or whether they have completed processing.
- The DICOM studies or HL7 messages that are displayed can be filtered by several standard DICOM tag and/or HL7 message field values.
 - If the “DICOM” checkbox is checked, but not the “HL7” checkbox (the default) then filtering can be performed on Patient Name, Patient ID, Accession Number, Modality, Study Description, Referring Physician and Study Date.
 - If both the “DICOM” checkbox and the “HL7” checkbox are checked then filtering can be performed on Patient Name, Patient ID, Accession/Order Number, Modality, Study Description, Referring Physician and Study Date.
 - Note in this case if you insert a value in the “Accession/Order Number” entry box, DICOM studies are filtered by Accession Number while at the same time HL7 Messages are filtered by Order Number.
 - DICOM-specific tag values are not matched to HL7 message field values.
 - If the “HL7” checkbox is checked, but not the “DICOM” checkbox then filtering can be performed on only Patient Name, Patient ID and Order Number.
 - Filtering on Accession/Order Number is an exact match. All other fields match if the DICOM study’s tag or HL7 message field contains the value.
- The DICOM studies or HL7 messages that are displayed can be filtered by the date they were initially received by selecting the “Date Range” radio button. Otherwise, activity occurring since the last time Dicominator was started is displayed.
- The DICOM studies or HL7 messages that are displayed can be deleted by clicking on the trash icon next to the item. Confirming the deletion of a study or HL7 message from the Activity view permanently deletes all information concerning the processing of that study or HL7 message from Dicominator.

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All DICOMinators

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All Outbound Connections

DICOM

HL7

In Process

Completed

Patient Name

an

Modality

Patient ID

Study Description

Study Instance UID

Accession / Order Number

Referring Physician

Study Date:

From:

1/31/2024

To:

2/12/2024

Search

Refresh

Live

Date Range

Detailed Logs

STUDY	Patient Name: Pat*Anony105	Patient ID: 105	Acc Number: 105	Study Date: 20240126	Modality: MR	Study Desc: NCI PDMR Tumor Characterization	Referring Physician:	
	Last Receive: 2/12/2024 1:44:44 PM	Workflow ID: 1	UID: 1.3.6.1.4.1.25403.1099485031519.6524.20240126085218.1			37 of 37 Images sent at: 2/12/2024 1:44:48 PM		
STUDY	Patient Name: Anony116	Patient ID: 116	Acc Number: 116	Study Date: 20240211	Modality: US	Study Desc: US Abdomen Complete	Referring Physician:	
	Last Receive: 2/11/2024 3:26:34 PM	Workflow ID: 1	UID: 1.3.6.1.4.1.25403.1099485031519.19188.20240211023215.1			1 of 1 Images sent at: 2/11/2024 3:26:37 PM		
HL7	ADT*ADT_A01	Patient Name: EVERYMAN*DOE*A	Patient ID:	Order Number:	Sending Facility: GOOD HEALTH HOSPITAL	Sending Application: REGADT		
	Received: 2/11/2024 3:10:41 PM	Workflow ID: 2	Message sent to destination at:					
STUDY	Patient Name: Pat115*Anony115	Patient ID: 115	Acc Number: 115	Study Date: 20240210	Modality: US	Study Desc: US Abdomen Complete	Referring Physician:	
	Last Receive: 2/11/2024 1:34:30 PM	Workflow ID: 1	UID: 1.3.6.1.4.1.25403.1099485031519.4468.20240210021703.1			1 of 1 Images sent at: 2/11/2024 1:34:33 PM		
STUDY	Patient Name: Pat102*Anony102*Jimmy*Junior	Patient ID: test-change tags	Acc Number: 102	Study Date: 20240111	Modality: PT	Study Desc: TEST change tags	Referring Physician:	
	Last Receive: 2/11/2024 1:34:30 PM	Workflow ID: 1	UID: 1.3.6.1.4.1.25403.1099485031519.29504.20240111034332.1			1 of 1 Images sent at: 2/11/2024 1:34:33 PM		
STUDY	Patient Name: Pat*Anony104	Patient ID: 104	Acc Number: 104	Study Date: 20240126	Modality: MR	Study Desc: NCI PDMR Tumor Characterization	Referring Physician:	
	Last Receive: 2/11/2024 1:34:30 PM	Workflow ID: 1	UID: 1.3.6.1.4.1.25403.1099485031519.6524.20240126085154.1			1 of 1 Images sent at: 2/11/2024 1:34:33 PM		
STUDY	Patient Name: Pat108*Anony108	Patient ID: 108	Acc Number: 108	Study Date: 20240131	Modality: PT	Study Desc: TEST change tags	Referring Physician:	
	Last Receive: 2/11/2024 1:34:30 PM	Workflow ID: 1	UID: 1.3.6.1.4.1.25403.1099485031519.6524.20240131053744.1			1 of 1 Images sent at: 2/11/2024 1:34:33 PM		
STUDY	Patient Name: Pat112*Anon112	Patient ID: 112	Acc Number: 112	Study Date: 20240203	Modality: US	Study Desc: US Abdomen Complete	Referring Physician:	
	Last Receive: 2/11/2024 1:34:30 PM	Workflow ID: 1	UID: 1.3.6.1.4.1.25403.0.11508.20240203120638.1			1 of 1 Images sent at: 2/11/2024 1:34:33 PM		
STUDY	Patient Name: Pat113*Anony113	Patient ID: 113	Acc Number: 113a	Study Date: 20231001	Modality: US	Study Desc: US Abdomen Complete	Referring Physician:	
	Last Receive: 2/11/2024 1:34:30 PM	Workflow ID: 1	UID: 1.3.6.1.4.1.25403.0.11508.20240204050032.1			1 of 1 Images sent at: 2/11/2024 1:34:33 PM		

- To view details of how a study or HL7 message was processed by Dicominator, click on the eyeglass icon next to the item. Note that the icon does not appear until the inspection details are available for an item.
- Clicking the eyeglass icon next to a study opens the Inspect Study page. This page displays all images in the study, grouped by series.

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Inspect Study

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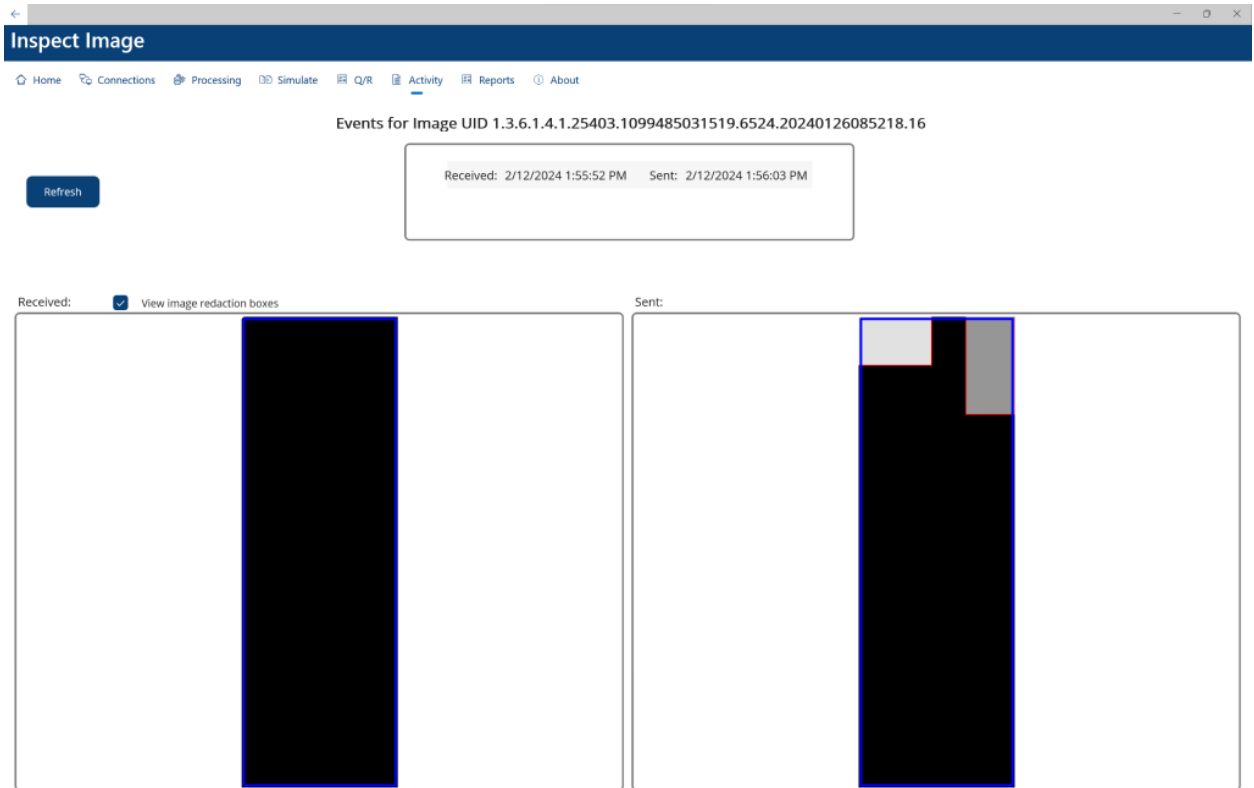
Refresh
Workflow ID: 1 'Save DICOM received from unknown AE Titles to path'

Study UID: 1.3.6.1.4.1.25403.1099485031519.6524.20240126085218.1 NCI PDMR Tumor Characterization
Patient Name: Pat*Anony105 Patient ID: 105 Patient Birth Date: Accession Number: 105 Study Date: 20240126

Series UID:	1.3.6.1.4.1.25403.1099485031519.6524.20240126085218.8	MR	TSE45 split
	1.3.6.1.4.1.25403.1099485031519.6524.20240126085218.101		Received: 2/12/2024 1:44:40 PM Sent: 2/12/2024 1:44:44 PM
	1.3.6.1.4.1.25403.1099485031519.6524.20240126085218.20		Received: 2/12/2024 1:44:41 PM Sent: 2/12/2024 1:44:46 PM
	1.3.6.1.4.1.25403.1099485031519.6524.20240126085218.19		Received: 2/12/2024 1:44:41 PM Sent: 2/12/2024 1:44:45 PM
	1.3.6.1.4.1.25403.1099485031519.6524.20240126085218.29		Received: 2/12/2024 1:44:41 PM Sent: 2/12/2024 1:44:46 PM
	1.3.6.1.4.1.25403.1099485031519.6524.20240126085218.116		Received: 2/12/2024 1:44:41 PM Sent: 2/12/2024 1:44:45 PM
	1.3.6.1.4.1.25403.1099485031519.6524.20240126085218.104		Received: 2/12/2024 1:44:40 PM Sent: 2/12/2024 1:44:44 PM
	1.3.6.1.4.1.25403.1099485031519.6524.20240126085218.107		Received: 2/12/2024 1:44:40 PM Sent: 2/12/2024 1:44:44 PM
	1.3.6.1.4.1.25403.1099485031519.6524.20240126085218.16		Received: 2/12/2024 1:44:41 PM Sent: 2/12/2024 1:44:45 PM
	1.3.6.1.4.1.25403.1099485031519.6524.20240126085218.113		Received: 2/12/2024 1:44:41 PM Sent: 2/12/2024 1:44:44 PM
	1.3.6.1.4.1.25403.1099485031519.6524.20240126085218.26		Received: 2/12/2024 1:44:41 PM Sent: 2/12/2024 1:44:46 PM
	1.3.6.1.4.1.25403.1099485031519.6524.20240126085218.110		Received: 2/12/2024 1:44:40 PM Sent: 2/12/2024 1:44:45 PM
	1.3.6.1.4.1.25403.1099485031519.6524.20240126085218.23		Received: 2/12/2024 1:44:41 PM Sent: 2/12/2024 1:44:46 PM
	1.3.6.1.4.1.25403.1099485031519.6524.20240126085218.38		Received: 2/12/2024 1:44:41 PM Sent: 2/12/2024 1:44:46 PM
	1.3.6.1.4.1.25403.1099485031519.6524.20240126085218.32		Received: 2/12/2024 1:44:41 PM Sent: 2/12/2024 1:44:47 PM
	1.3.6.1.4.1.25403.1099485031519.6524.20240126085218.35		Received: 2/12/2024 1:44:41 PM Sent: 2/12/2024 1:44:46 PM
	1.3.6.1.4.1.25403.1099485031519.6524.20240126085218.41		Received: 2/12/2024 1:44:41 PM Sent: 2/12/2024 1:44:46 PM

- Each image can then also be inspected by clicking on the eyeglass icon next to it, opening the Inspect Image page. By default, the most recent instance of that image being processed is displayed.
- Any changes made to the DICOM data are shown except for tags that are more than 2048 bytes in length, which are ignored and not stored.

- Pixel data is not stored. However, clicking on the “View image redaction boxes” checkbox will display a blank image with the actual image’s aspect ratio and the redaction boxes (bordered in red for clarity) as they were applied to the image. The color within the redaction boxes accurately reflects the color of the redactions. The background color of the image does not reflect the color of the actual image, but is merely selected to contrast with the bounding boxes.



- If the same image was received and processed by Dicominator more than once through the same workflow ID, all events concerning the image will be available to view by selecting the desired event in the dropdown list at the top of the Inspect Image page.
- In the event that you are waiting for a study or image to be processed, “Refresh” buttons are available on the inspection pages which will update the page display with any newly available data.
- If the eyeglass icon is clicked next to an HL7 message in the Activity view, the received and sent HL7 message will be displayed indicating any changes that were made to the message data.

Inspect HL7 Message

Home Connections Processing Simulate Q/R Activity Reports About

Workflow ID: 2 'Incoming HL7 to 7-Edit'

HL7 message received at 12-02-2024 14:17:27.373 from 'Incoming HL7 from any device (Permanent default)'

HL7 message sent at 12-02-2024 14:17:28.471 to '7-Edit 127.0.0.1:21110'

Message Received:

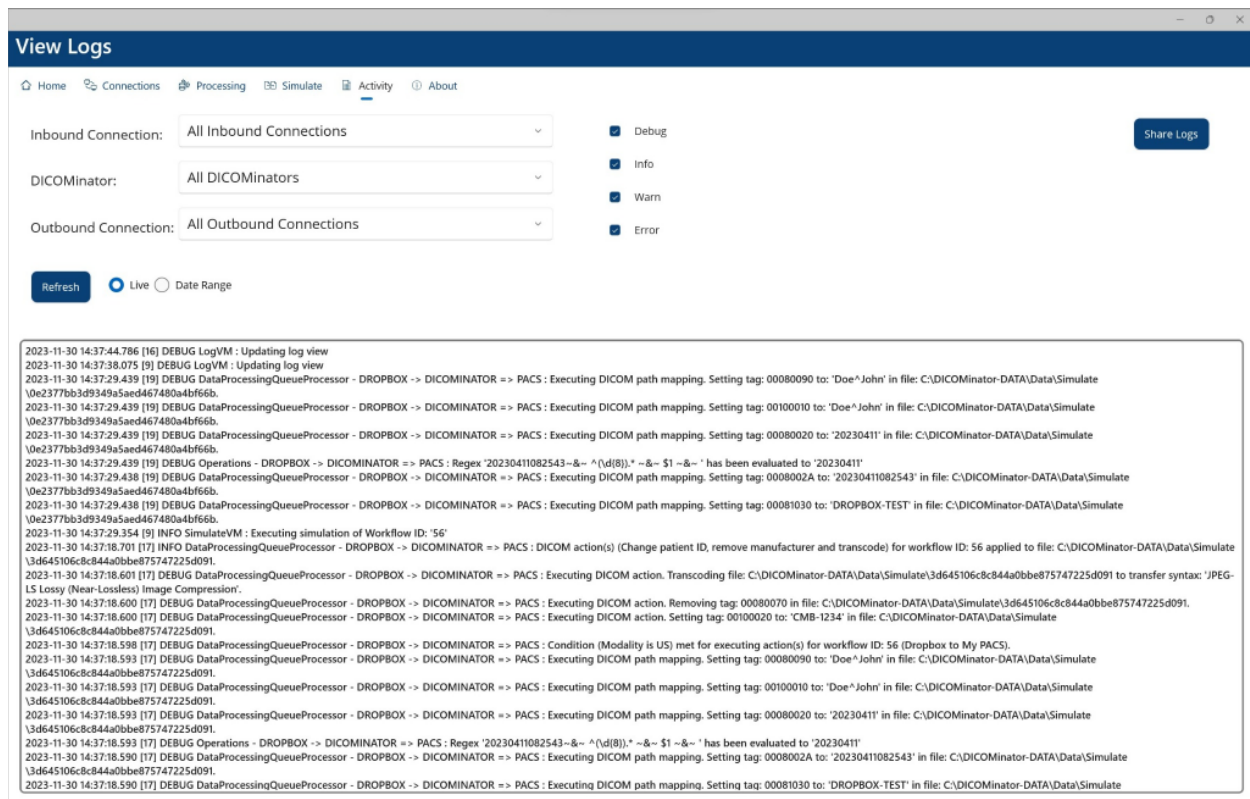
```
MSH|^~\&|REGADT|GOOD HEALTH HOSPITAL|GHH LAB||200712311501||ADT^A04^ADT_A01|000001||
EVN|A04|200701101500|200701101400|01||200701101410
PID||191919^GOOD HEALTH HOSPITAL^^USSA^SS|253763|EVERYMAN^DOE^A||20000129|M|||
NK1|1|NUCLEAR^NELDA|SPO|6666 HOME STREET^^ISHPEMING^MI^49849^***^|555-555-5001|555-5
NK1|2|MUM^MARTHA|MTH|4444 HOME STREET^^ISHPEMING^MI^49849^***^|555-555-2006|555-555-
NK1|3
NK1|4|16666 WORKER LOOP^^ISHPEMING^MI^49849^***^|500|545-1200|E^EMPLOYER|19940609
PV1||O|O/R|||0148^ATTEND^AARON^A|0148^ATTEND^AARON^A|0148^ATTEND^AARON^A|MED|||||
PV2|||||200701101400|||||N
OBX||ST|1010.1^BODY WEIGHT||62|kg||||F
OBX||ST|1010.1^HEIGHT||190|cm||||F
DG1|1|19||BIOPSY||A|
GT1|1|EVERYMAN^ADAM^A|2222 HOME STREET^^ISHPEMING^MI^49849^***^|444-33 3333|555-555-
IN1|0|0|UAI|UARE INSURED, INC.|8888 INSURERS CIRCLE^^ISHPEMING^MI^49849^***^|555-555-
IN1|2|**|^
```

Message Sent:

```
MSH|^~\&|REGADT|GOOD HEALTH HOSPITAL|GHH LAB||200712311501||ADT^A04^ADT_A01|000001||
EVN|A04|200701101500|200701101400|01||200701101410
PID||191919^GOOD HEALTH HOSPITAL^^USSA^SS|253763|Doe^John||19870110|M|||2222 HK
NK1|1|NUCLEAR^NELDA|SPO|6666 HOME STREET^^ISHPEMING^MI^49849^***^|555-555-5001|555-5
NK1|2|MUM^MARTHA|MTH|4444 HOME STREET^^ISHPEMING^MI^49849^***^|555-555-2006|555-555-
NK1|3
NK1|4|16666 WORKER LOOP^^ISHPEMING^MI^49849^***^|500|545-1200|E^EMPLOYER|19940609
PV1||O|O/R|||0148^ATTEND^AARON^A|0148^ATTEND^AARON^A|0148^ATTEND^AARON^A|MED|||||
PV2|||||200701101400|||||N
OBX||ST|1010.1^BODY WEIGHT||62|kg||||F
OBX||ST|1010.1^HEIGHT||190|cm||||F
DG1|1|19||BIOPSY||A|
GT1|1|EVERYMAN^ADAM^A|2222 HOME STREET^^ISHPEMING^MI^49849^***^|444-33 3333|555-555-
IN1|0|0|UAI|UARE INSURED, INC.|8888 INSURERS CIRCLE^^ISHPEMING^MI^49849^***^|555-555-
IN1|2|**|^
```

Detailed Logs View:

- Live logs are viewed by default, but a radio button allows you to select a desired date/time range to view logs.
- The log view is refreshed or updated with newly selected options by clicking the “Refresh” button.
- Many log messages contain the Inbound Connection name (or AE Title), the Dicominator AE Title, and/or the Outbound Connection name (or AE Title). For example, ‘DROPBOX -> Dicominator => PACS’. For clarity, these messages can be filtered by selecting the desired Inbound Connection, Dicominator, and/or Outbound Connection from their respective dropdowns.
- Each log message has an associated log level. The four log levels are DEBUG, INFO, WARN, and ERROR. The messages can be filtered by log level by selecting the desired log level check boxes.
- When you click the “Share Logs” button, a zip file containing all of the logs currently displayed in the log window is saved to ‘C:\Dicominator Logs\logs.zip’. If the current root is not the C: drive, the log zip file will be saved to the current root drive.



Reports Tab:

The Reports tab is where you can run custom reports on the DICOM and HL7 data that has been processed by Dicominator. Users select the report data source, define their filter criteria, and select the format before generating the report as a CSV file.

Click the “Load Report Template” button to select a previously created report template file. The report settings will be mapped from the selected file.

Report data source

In the “Select source of report data” section, you see the following options:

- “Data type” is a dropdown list of three options: DICOM, HL7, and HL7 created from DICOM.
- “Dicominator” is a dropdown list of all Dicominators that you have created in the Dicominators section of the Home tab.

- “Workflow” is a dropdown list of available Dicominator workflows. If the “Dicominator” dropdown is set to “All Dicominators”, this dropdown will display all workflows. If the “Dicominator” dropdown is filtered on one specific value, the list will be filtered to only display workflows associated with the selected Dicominator.

If a data type that is not associated with any workflows is selected, an error message will display to alert you.

The screenshot shows the 'Reports' page in the Dicominator application. The navigation bar includes links for Home, Connections, Processing, Simulate, Q/R, Activity, Reports (active), Settings, and About. A 'Load Report Template' button is visible. The 'Select source of report data' section contains three dropdown menus: 'Data type' (set to 'DICOM'), 'DICOMinator' (set to 'All DICOMinators'), and 'Workflow' (set to 'All Workflows').

The screenshot shows the 'Reports' page with an error message displayed in red text: 'Reports cannot currently be generated because no DICOMinators have any Workflows configured using data type 'HL7''. The 'Data type' dropdown is set to 'HL7', while 'DICOMinator' is set to 'All DICOMinators' and 'Workflow' is set to 'All Workflows'.

Report filter criteria

In the “Select filter criteria” section, you can choose to filter your report on selected processing conditions that you have configured in the Processing tab. If “DICOM” is selected as the data type, DICOM processing conditions will display as options. If “HL7” is selected as the data type, HL7 processing conditions will display.

- When DICOM is selected as the report data type, the following filter fields display:

- The “Include only data in the report that is:” filter field includes the following radio button options:
 - Successfully sent, Failed/pending, Block by Action, Blocked by Action error, or Rejected by User.
- The “Condition to be met on data received” filter field includes the following options:
 - “No Condition on DICOM data received” is the default value and applies no processing condition filter to the report.
 - Any DICOM Processing Condition created in the Processing tab.
 - Enable the “Received date/time” checkbox to filter their report on DICOM data received by the selected Dicominator within a specified period of time. The date and time values are in your local time zone.
- The “Condition to be met on data sent” filter field includes the following options:
 - “No Condition on DICOM data sent” is the default value and applies no processing condition filter to the report.
 - Any DICOM Processing Condition created in the Processing tab.
 - Enable the “Sent date/time” checkbox to filter their report on DICOM data received by the selected Dicominator within a specified period of time. The date and time values are in your local time zone.

Select filter criteria: (add desired Conditions on the Processing tab)

Include only data in report that is: ☒ Successfully sent ☐ Failed/pending ☐ Blocked by Action ☐ Blocked by Action error ☐ Rejected by User

Condition to be met on data received: No Condition on DICOM data received ▾

Received date/time: ☐ From: 9/2/2025 8:21 PM To: 9/3/2025 11:59 PM

Condition to be met on data sent: No Condition on DICOM data sent ▾

Sent date/time: ☐ From: 9/2/2025 8:21 PM To: 9/3/2025 11:59 PM

- When HL7 is selected as the report data type, the following filter fields display:
 - The “Include only data in the report that is:” filter field includes the following radio button options:

- Successfully sent, Failed/pending, Block by Action, Blocked by Action error, or Rejected by User.
- The “Condition to be met on data received” filter field includes the following options:
 - “No Condition on HL7 data received” is the default value and applies no processing condition filter to the report.
 - Any HL7 Processing Condition created in the Processing tab.
 - Enable the “Received date/time” checkbox to filter their report on HL7 data received by the selected Dicominator within a specified period of time. The date and time values are in your local time zone.
- The “Condition to be met on data sent” filter field includes the following options:
 - “No Condition on HL7 data sent” is the default value and applies no processing condition filter to the report.
 - Any HL7 Processing Condition created in the Processing tab.
 - Enable the “Sent date/time” checkbox to filter their report on HL7 data received by the selected Dicominator within a specified period of time. The date and time values are in your local time zone.

Select filter criteria: (add desired Conditions on the Processing tab)

Include only data in report that is:
☒ Successfully sent
☐ Failed/pending
☐ Blocked by Action
☐ Blocked by Action error
☐ Rejected by User

Condition to be met on data received:

No Condition on HL7 data received

Received date/time:
☐

From:
9/2/2025
8:21 PM

To:
9/3/2025
11:59 PM

Condition to be met on data sent:

No Condition on HL7 data sent

Sent date/time:
☐

From:
9/2/2025
8:21 PM

To:
9/3/2025
11:59 PM

Report format

In the “Select report format” section, you can configure their desired format for the CSV report that is generated.

When “DICOM” is selected as the report source data type, you can manually configure the “Column Header”, “DICOM Tag Number”, and “Data Received or Sent” fields, or load in a preconfigured report template in CSV format by clicking the “Load Column Template” button.

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You can define individual DICOM tags to be included in the report, define a group of tags using wildcard values, include all tags or include all tags excluding a specific tag or group of tags, include the time the data was received or sent, and include the size of the data that was received or sent. If data is being received from or written to a file path, you can also include the inbound or outbound file name when the “Image based” selection is enabled.

- The “Column Header” field is a text input field where you must enter a column header value. Please note that the “Column Header” value must include “<TAGNUMBER>” and/or “<TAGNAME>” if a wildcard value, “ALLTAGS”, “ALLTAGSEXCEPT-[DICOM tag(s) comma separated]”, or “ALLTAGSEXCEPT-[DICOM group and wildcard value]” are being used in the corresponding DICOM Tag Number field.
- The “DICOM Tag Number” field is a text input field where you must enter a specific DICOM tag value to be populated into the associated Column Header value field, a wildcard DICOM tag value, “ALLTAGS”, or either “ALLTAGSEXCEPT-[DICOM tag(s) comma separated]” or “ALLTAGSEXCEPT-[DICOM group and wildcard value]” to include all DICOM tags except those listed.
 - For example, if you have entered “Accession Number” into the Column Header field, the corresponding “DICOM Tag Number” value should be “00080050”.
 - To include all group 20 DICOM tags in the report, for example, include “<TAGNUMBER>” and/or “<TAGNAME>” in the Column Header field and “0020****” in the DICOM Tag Number field.
 - To include all DICOM tags in the report, for example, include “<TAGNUMBER>” and/or “<TAGNAME>” in the Column Header field and “ALLTAGS” in the DICOM Tag Number field.
 - To include all DICOM tags except for study UID, for example, include “<TAGNUMBER>” and/or “<TAGNAME>” in the Column Header field and “ALLTAGSEXCEPT-0020000D” in the DICOM Tag Number field.
 - To include all DICOM tags except the group 0028 tags, for example, include “<TAGNUMBER>” and/or “<TAGNAME>” in the Column Header field and “ALLTAGSEXCEPT-0028****” in the DICOM Tag Number field.
 - To include the inbound or outbound filename, enter a text value in the Column Header field (such as File Name) and “FILENAME” in the DICOM Tag Number field.
 - To include the time that the data was received by or sent to Dicominator (in local time offset from UTC), include “TIME” in the DICOM Tag Number field.

- To include the size of the data that was received by or sent to Dicominator (in bytes), include “SIZE” in the DICOM Tag Number field.

When “HL7” or “HL7 created from DICOM” is selected as the report source data type, you can manually configure the “Column Header”, “HL7 Field Number”, and “Data Received or Sent” fields, or load in a preconfigured report template in CSV format by clicking the “Load Column Template” button. You can define individual HL7 fields to be included in the report, include all fields or include all fields excluding a specific field or group of fields, include the time the data was received or sent, and include the size of the data that was received or sent. Note that unlike reporting on DICOM tag data, the “FILENAME” option and wildcards are not currently supported when specifying HL7 fields. If data is being received from or written to a file path, users can also include the inbound or outbound file name.

- The “Column Header” field is a text input field where you must enter a column header value. Please note that the “Column Header” value must include “<FIELDNUMBER>” if “ALLFIELDS”, or “ALLFIELDSEXCEPT-[HL7 field(s) comma separated]” are being used in the corresponding HL7 Field Number field.
- The “HL7 Field Number” field is a text input field where you must enter a specific HL7 field value to be populated into the associated Column Header value field, “ALLFIELDS” to include all HL7 fields in the message, or “ALLFIELDSEXCEPT-[HL7 field(s) comma separated]” to include all HL7 fields except those listed.
 - For example, if you have entered “Accession Number” into the Column Header field, the corresponding “HL7 Field” value should be “OBR.3”.
 - To include all HL7 fields in the report, for example, include “<FIELDNUMBER>” in the Column Header field and “ALLFIELDS” in the HL7 Field Number field.
 - To include all HL7 fields except for patient name and patient date of birth, for example, include “<FIELDNUMBER>” in the Column Header field and “ALLFIELDSEXCEPT-PID.5,PID.7” in the HL7 Field Number field.
 - To include the time that the data was received by or sent to Dicominator (in local time offset from UTC), include “TIME” in the HL7 Field Number field.
 - To include the size of the data that was received by or sent to Dicominator (in bytes), include “SIZE” in the HL7 Field Number field.
- The “Data Received or Sent” field is a dropdown list with “Received” and “Sent” as options. When “Received” is selected, the report will display the selected DICOM tag value that was stored on the study when it was received by Dicominator. When “Sent” is selected, the report will display the selected DICOM tag value that was stored on the study when it was sent to another destination by Dicominator.

- An “Add Column” button displays once one column header and corresponding tag value have been defined with the correct formatting. Click this button to add the configuration to the report.
- Continue this process to add additional columns to the report configuration.
- Click the trash can icon to remove an unwanted configuration.

Select report format (at least one column required):

Column Header	DICOM Tag Number	Data Received or Sent
Required	Required	Received ▾
Accession Number	00080050	Received 

- Click the “Load Column Template” button to import a preconfigured report in CSV format. For example, the CSV should be in the following format:
 - Study UID,0020000D,Received
 - Patient ID Before,00100020,Received
 - Patient ID After, 00100020,Sent
 - Time Received,TIME,Received
 - Time Sent,TIME,Sent
 - Size Received,SIZE,Received
 - Size Sent,SIZE,Sent

Report Output

You can configure the report output to be at the study level, series level, or image level.

- When “Image based” is selected, the report will include one row for each image that matches the defined filter criteria. “Image based” is selected by default.
- When “Series based” is selected, the report will include one row for each series that matches the defined filter criteria.
- When “Study based” is selected, the report will include one row for each study that matches the defined filter criteria. This setting is selected by default.

- You can optionally enable the “Only include study when all of the most recently processed images in the study meet the filter criteria” setting to ensure that the report only includes studies in which all images match the defined filter criteria. This setting is disabled by default.
- You can optionally enable the “Include all details above in report file” setting. This setting is disabled by default.
- The file path for the exported report must be defined. The default file path is set to “C:\Dicominator Reports\Reports.csv”. Manually enter the desired file path, or click the “Select Report File” button to select a specific file from the File Explorer.
- Click the “Save Report Template” button and select a file name and location to optionally save your report configuration.

☒ Study based (one row in report file for each study meeting filter criteria)

☐ Series based (one row in report file for each series meeting filter criteria)

☐ Image based (one row in report file for each image meeting filter criteria)

☐ Only include study when all of the most recently processed images in the study meet the filter criteria

☐ Include all details above in report file

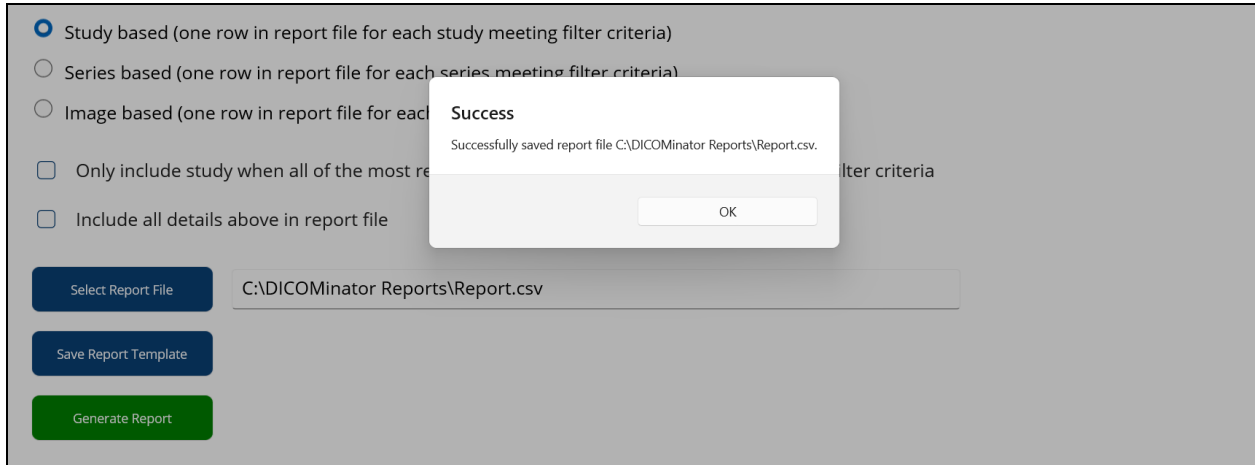
Select Report File

C:\DICOMinator Reports\Report.csv

Save Report Template

Generate Report

- Click the “Generate Report” button to run the configured report. A success message will display when the report has completed and the CSV file has been created in the defined file path.



Tools Tab:

The Tools tab is where you can access advanced options including generating HL7 messages from a CSV file, generating modality worklist data from HL7 data, and viewing images for pixel PHI verification.

Generate HL7 from CSV

- Click the “Select CSV File” button to define the file path of the CSV file that the HL7 messages should be generated from. Enable the “CSV has header row” checkbox if the source file contains header data.
- Define the filepath where the generated HL7 messages should be stored in the “Output path” field.
- Define the template to use for generating the messages in the HL7 Template field. If the source CSV file contains a header row, use `<COLUMNNAME>VALUE_HERE</COLUMNNAME>` to define the values that should be mapped to template fields. If the source CSV file does not contain a header row, use `<COLUMNNUMBER>NUMBER_HERE</COLUMNNUMBER>`.
 - For example, if the source CSV file contains a header row, use `<COLUMNNAME>MRN</COLUMNNAME>` to map the MRN column to the template.
 - For example, if the source CSV file does not contain a header row, use `<COLUMNNUMBER>3</COLUMNNUMBER>` to map the value in column 3 to the template.

Store MWL Data from Inbound HL7

You can enable an MWL workflow using the toggle button at the top of this section.

The “Use Dicominator” dropdown is set to “All Dicominators” by default. A specific Dicominator can be selected if you wish to enable this workflow for one specific Dicominator. Note that the selected Dicominator determines the HL7 listening port for the inbound HL7.

Define the type of inbound HL7 message to generate MWL data from in the “HL7 Message Types” field. The default value is SIU.

Define the values to map from the incoming HL7 messages to the MWL data in the “HL7 Fields to Tag Mappings” section. One value is defined per row in the format “PID.5=>00100010”.

Image Viewer for Pixel PHI Verification

This tool allows you to manually review images that were cleared or flagged by the “VERIFY CLEAN PIXEL DATA” DICOM Processing Action option configured in the Processing tab. When the “Perform OCR on pixel data when using the DICOM action ‘VERIFY CLEAN PIXEL DATA’” option is enabled in the Settings tab and the “VERIFY CLEAN PIXEL DATA” DICOM Processing Action is selected for a workflow, Dicominator automatically flags any images that appear to contain 3 or more characters or symbols in the overlay or pixel data. If the “Perform OCR on pixel data when using the DICOM action” setting is NOT enabled, ALL images are flagged. In both cases, any images containing pixel data in overlays or the pixel data tag are not sent outbound until you manually approve the imaging using this tool.

The “Use Dicominator” field is a dropdown menu that can be used to filter images processed by a specific Dicominator instance. This field is set to “All Dicominators” by default.

The “Save Path for Rejected Images” field is an optional text field where a file path can be defined. By default, if no value is set in this field, rejected images are deleted and not sent outbound. If this field is set to a valid path (tag mapping is available in the path as well), then any rejected images will get saved to the path along with the jpeg file that was viewed.

Only the first three and last three frames of multi-frame images are displayed in the viewer by default. The number of frames to display is modifiable. You can also unselect the “Display only the first and last X frames of multi-frame images” checkbox entirely to view all frames.

^ Image Viewer for Pixel PHI Verification

Use DICOMinator: All DICOMinators

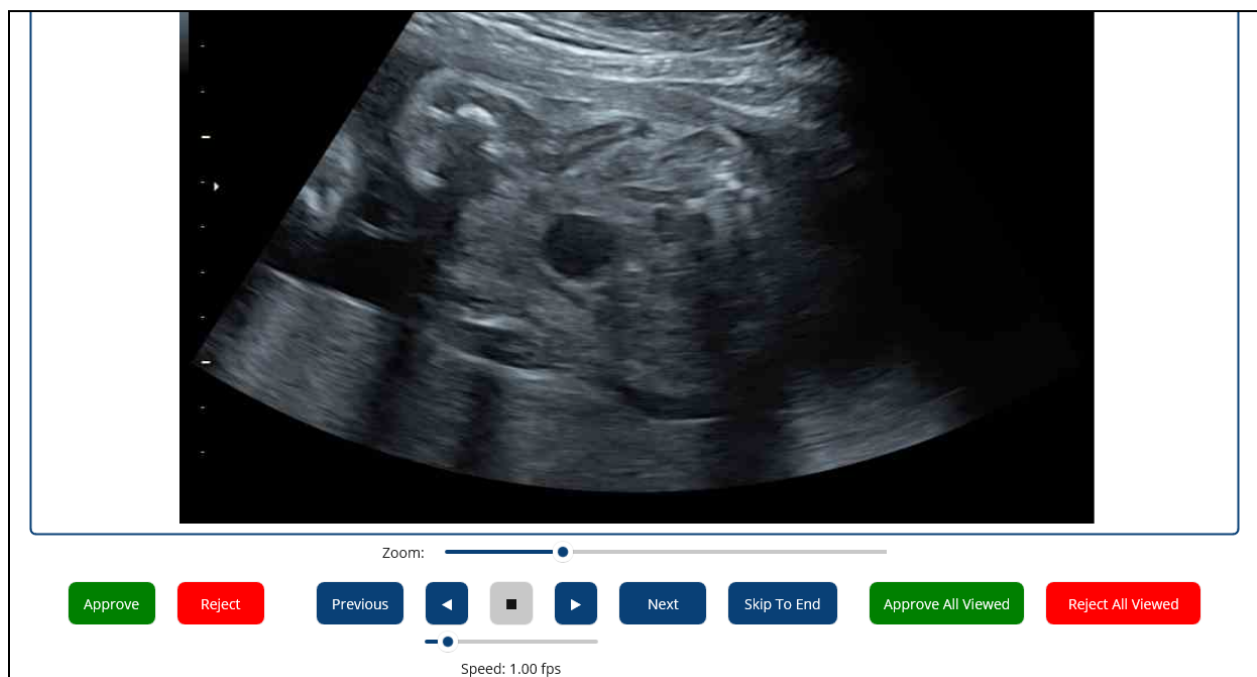
Save Path for Rejected Images: Optional - data will be deleted if not provided

☒ Display only the first and last 3 frames of multi-frame images

Image #: 1
☐ Cleared
☒ Flagged
Refresh
Images viewed : 1 of 43

Flagged images display in the viewer by default. Toggle between cleared and flagged images using the radio buttons. Note that when the setting “Perform OCR on pixel data when using the DICOM action VERIFY CLEAN PIXEL DATA” on the Settings tab is NOT checked, then all images are flagged.

You have the option to scroll through the cleared or flagged images either individually using the “Previous” and “Next” buttons or using the cine feature. The cine feature is enabled by clicking the left or right arrow button and auto-scrolls through the displayed images at a rate of 1 frames per second. The speed can be adjusted using the slider bar. The “Skip to End” button can be used to quickly move to the last image. The “Approve” and “Reject” buttons act upon the image currently being viewed. The “Approve All Viewed” and “Reject All Viewed” buttons act upon all of the images viewed since the last Refresh of the images. Note that for multi-frame SOP instances, all frames present in the pixel data (or overlay) must be viewed and approved for the SOP instance to be approved. If just one frame in the SOP instance is rejected, the entire SOP instance is rejected.



Settings Tab:

The Settings tab is where you can configure general Dicominator settings, clear processing queues, and save or load configuration and recovery files.

General Settings

The “Enable remote Dicominator communication” setting is used to turn on remote connection workflows. This setting is disabled by default.

The “Perform OCR on pixel data when using the DICOM action ‘VERIFY CLEAN PIXEL DATA’” setting is used to enable the “VERIFY CLEAN PIXEL DATA” DICOM Processing Action option configured in the Processing tab. When this setting is enabled and the “VERIFY CLEAN PIXEL DATA” processing action is selected, Dicominator uses OCR to automatically flag any images that appear to contain 3 or more characters or symbols in the overlay or pixel data.

The “Save successfully sent size/image data to path” field is an optional text field where you can define a file path for a CSV file where information about successfully sent data should be stored. When a file path is defined here, the study UID, image UID, accession number, MRN and byte size are saved to the specified CSV file for each successful send.

The “Save results from queries from Q/R tab to file” field is an optional text field where you can define a file path for a CSV file where query retrieve results should be stored.

The “Perform priority lookup on CSV” field is an optional text field where you can define a file path for a CSV file that contains data that indicates which studies received by the Dicominator’s DICOM listener should be prioritized for processing. The CSV file must contain the columns “Original MRN” and “Priority”. The “Original MRN” column is to find a matching row, if any. The “Priority” column specifies that the study should be prioritized (i.e. the priority is set to 1) if the column contains “S”, “STAT”, “A” or “U” (not case sensitive).

Queues

Click the “Clear All Processing” button next to the “Clear all current Dicominator processing queues” option to stop and clear anything that Dicominator is currently processing.

Click the arrow next to “Advanced Queue Settings” to expand the section and set the following fields:

- “Dicominator” is a dropdown menu. Any Dicominator created in the Home tab will display here. Select the specific Dicominator for which you want to modify the queue settings from this menu.

- “Queue” is a dropdown menu that contains each available Dicominator queue. The options are:
 - Data Processing
 - DICOM Download
 - DICOM C-Find SCU
 - DICOM C-Move SCP
 - DICOM C-Move SCU
 - DICOM Print SCP
 - DICOM Print SCU
 - DICOM Save to Cloud
 - DICOM Save to Path
 - DICOM C-Store SCU
 - DICOM Upload
 - HL7 Download
 - HL7 Save To Cloud
 - HL7 Save To Path
 - HL7 Send
 - HL7 Upload
 - Pre Processing
- “Max Threads”. Defines the maximum number of threads for the defined Dicominator to use for the selected queue. The default value is 10.
- “Max Attempts”. Defines the maximum number of attempts for the defined Dicominator to use for the selected queue. Once all attempts have been exhausted, the queue item and associated data is removed. The default value is 10.
- “Retry Factor”. The defined decimal retry factor is used to calculate the minimum delay in seconds before the queue item is attempted to be processed again. The retry delay is set to 5 to the power of the attempt number times the retry factor. If the retry factor is negative, the delay in seconds before the next retry is fixed and is set to 10 times the retry factor (non negative). The default value is 1. Here are some examples:
 - If the retry factor is set to 1 and the first processing attempt fails, the next attempt will occur 5 seconds later (5 to the power of 1 = 5 and 5 times 1 = 5).
 - If the retry factor is set to 1 and the third processing attempt fails, the next attempt will occur 125 seconds later (5 to the power of 3 = 125 and 125 times 1 = 125).
 - If the retry factor is set to 3 and the first processing attempt fails, the next attempt will occur 15 seconds later (5 to the power of 1 = 5 and 5 times 3 = 15).
 - If the retry factor is set to 3 and the third processing attempt fails, the next attempt will occur 6 minutes and 15 seconds later (5 to the power of 3 = 125 and 125 times 3 = 375 seconds).

- If the retry factor is set to -20 then each retry attempt will have a fixed delay of 3 minutes and 20 seconds between attempts (10 times 20 = 200 seconds).

Backups

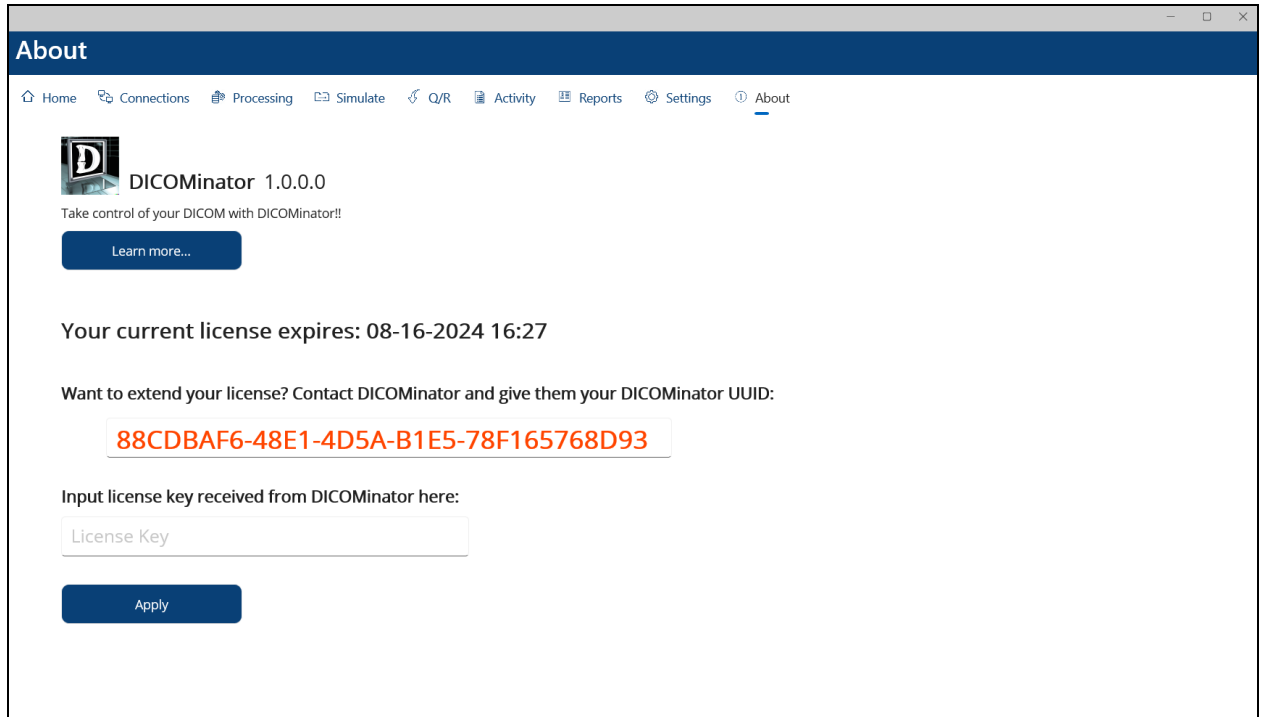
You have the ability to save the current Dicominator configuration to a file for backup using the “Save Configurations” button. The backup file can then later be loaded back into Dicominator using the “Load Configurations” button. When “Load Configurations” is selected, any existing configuration, data that is being processed, and historical data is cleared and Dicominator is completely reset to the configuration in the selected file.

You have the ability to save the current Dicominator configuration and historical data to a file for backup using the “Save Recovery File” button. The backup recovery file can then later be loaded back into Dicominator using the “Load Recovery File” button. When “Load Recovery File” is selected, any existing configuration, data that is being processed, and historical data that has been processed since you saved the recovery file is cleared and Dicominator is completely reset to the configuration and historical data in the selected file.

About Tab:

The About tab is where you can get more information about Dicominator and update the license for the application.

- Get more information about Dicominator and access help guides by clicking the “Learn more...” button to open the default browser to the Dicominator website.
- Upon first install, Dicominator is activated for one week. The About page displays the expiration date and time of the current license. When the Dicominator license expires, all configured Dicominator instances are disabled and all data processing will stop. Dicominator can still be configured as desired, and even simulated to test the configurations, but live data processing will be disabled. To extend your license, contact Dicominator customer support, supply them with your Dicominator UUID displayed on the About page, and purchase the desired license. Dicominator will provide a unique code that can be pasted into the “License key” text box and applied by clicking “Apply”. Note that license keys can only be used once and are specific to a given Dicominator installation.



Version Control

Name:

Dicominator

Place of Business:

28 Gurney Street, Unit 2
Cambridge, MA 02138

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