Using JDICOM

Introduction

JDICOM is a summary of DICOM applications which are very useful for troubleshooting. Our best appreciation to Mr. Gunter Zeilinger which created this great tool.
If you have any questions or problems, do not hesitate to contact us. The e-mail addresses are ccc@med.siemens.de or klaus.gartner@med.siemens.de .
The description is valid for the actual version of JDICOM 1.7.5. It was installed on the following operating systems Win98, WinNT, Win2000, Linux (RedHat 6.1 and Suse 7.0). Required is a java2 runtime environment for the used hardware architecture.

Functionality of contained applications

ImageServer

Supports Image related DICOM Services Classes:
Receives images over network and stores them on (local) disk
(= SCP of Storage SOP classes + FSC+FSU of Media Storage SOP classes).
Dispatches received query/retrieve requests by transmitting information about stored images or images themselves to specified destination.
(= SCP of Query/Retrieve SOP classes + FSR of Media Storage SOP classes).
Notifies specified peer application about received images
(= SCU of Study Content Notification SOP class).
Sends requested commitments back about received images.
(=SCU of Storage Commitment SOP class)

StorageSCU

Load images from (local) disk and send them over network.
(= SCU of Storage SOP classes).
Receives commitments back about transmitted images.
(=SCP of Storage Commitment SOP class)

QueryRetrieveSCU

Queries image archives and controls remote retrieve of images to specified destination.
(= SCU of Query/Retrieve SOP classes).

RisServer

Supports RIS related DICOM Services Classes:
Receives worklist requests over the network
(= SCP of Basic Worklist SOP class).
Receives notifications about the (image) content of studies over network
(= SCP of Study Content Notification SOP class).
Receives performed procedure steps about the patient from the network
(= SCU of Performed Procedure Step SOP class).

ModalitySCU

Supports RIS related DICOM Services Classes:
Sends worklist requests over the network
(= SCU of Basic Worklist SOP class).
Receives notifications about the (image) content of studies over network
(= SCP of Study Content Notification SOP class).
Sends performed procedure steps about the patient over the network to the RisServer.
(= SCP of Performed Procedure Step SOP class).

`PrintServer`

Supports Basic Print related DICOM Services Classes:
Receives printable images over network
(= SCP Basic Print SOP class).

PrintSCU (not yet described)

`EditDicomObject`

Administration tool for DICOM File to:
Display and modify the DICOM files tags.

`EditDicomDir`

Administration tool for DICOM File-sets to:
Display and modify the DICOMDIR file containing the Media Storage Directory information (= FSC+FSU of Media Storage SOP classes). Delete images from the File-sets, by deleting the image files and updating the DICOMDIR file accordingly. Import images into the File-sets, by updating the DICOMDIR file with Directory information extracted from the new added images.

`Validate`

Checks DICOM files - containing Composite Information Objects - for its DICOM conformance.
Lists attribute names and values of contained Data Elements.

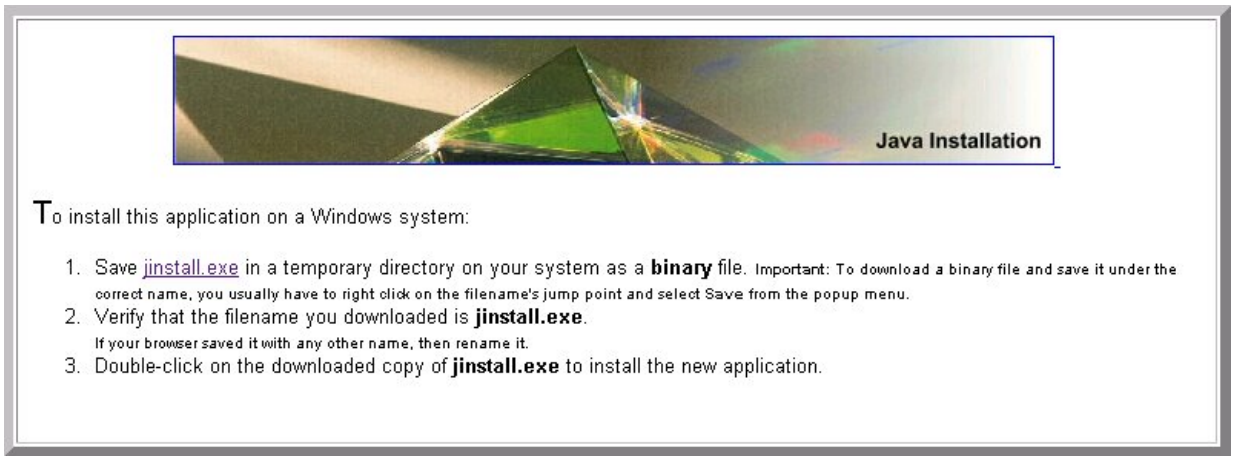
Getting started

Installation

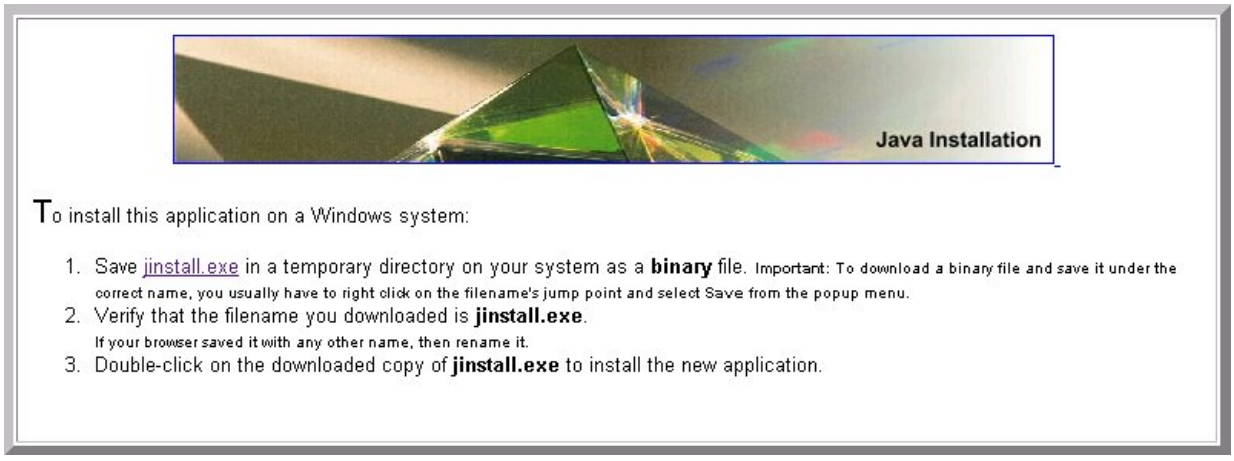
The JDicom applications runs on Java Platform 2. So you can either download the JDicom version which already includes the Java virtual machine from the following location :
http://www.tiani.com/JDicom/install/

Use the link for Windows "Windows including a JVM" and for Linux "Linux including a JVM" in order to download the corresponding JDicom package.

If the file is successfully downloaded use following the installation instruction
for Windows:

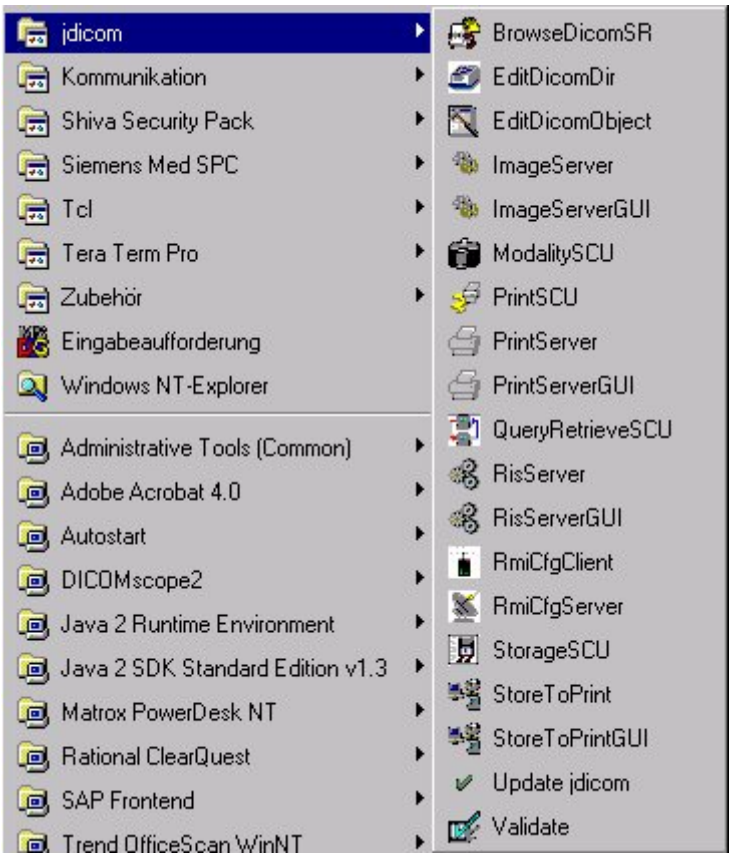


for Linux:



to install JDicom on your PC.

After the successful installation of JDicom you find this menu structure in "START -> PROGRAMS"



The important entries are:

EditDicomDir
EditDicomObjects
ImageServer
ImageServerGUI
ModalitySCU
PrintSCU
PrintServer
PrintServerGUI
QueryRetieveSCU
RisServer
RisServerGUI
StorageSCU
Validate

The files are installed by using the default settings in the directory: "`C:\Program Files\jdicom`" Automatically subfolders are created in the default installation directory. In the subdirectory applet you can find the available applet version of JDicom. These applets are running in a Web Browser which supports Java.

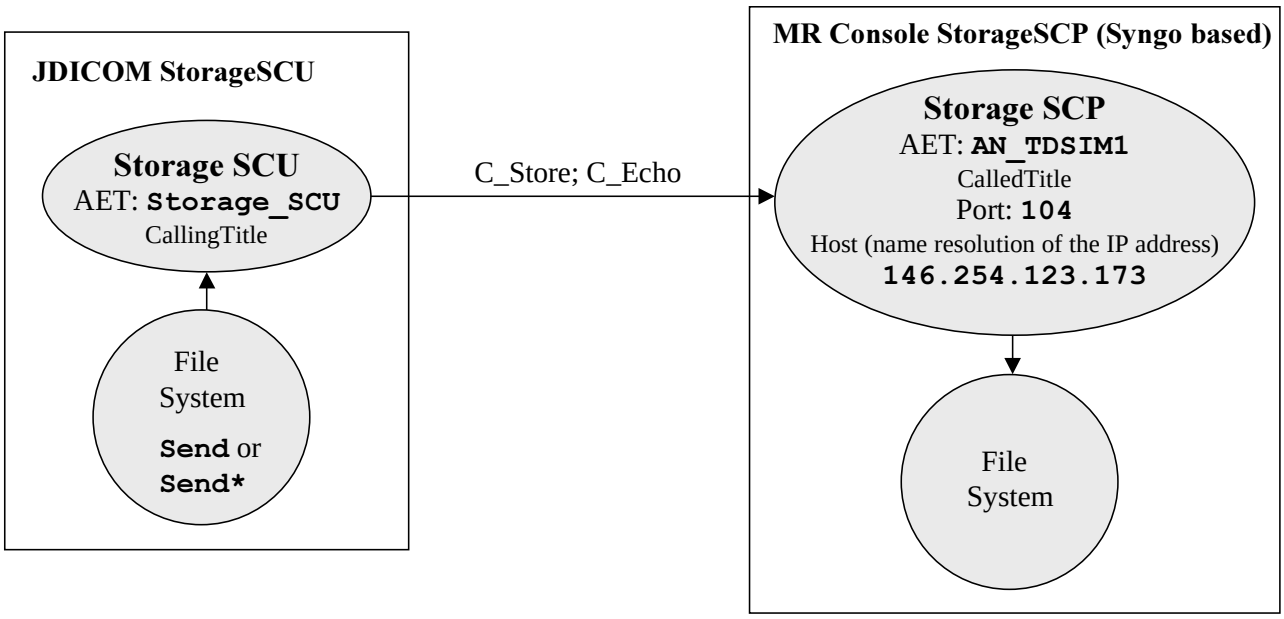
Quick tour

The following DICOM services are not yet described in this ducument:

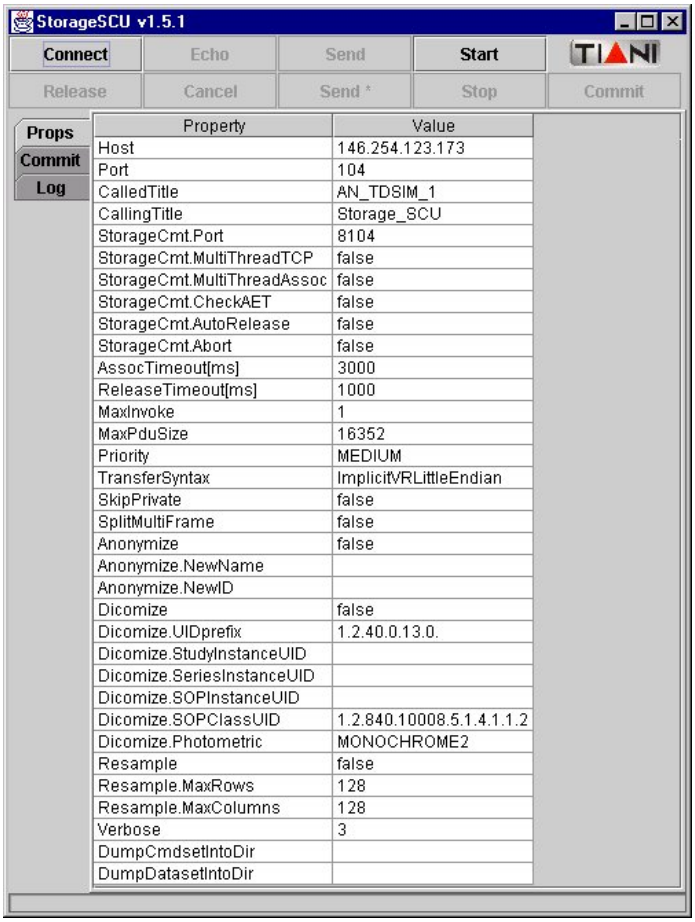
- Storage Commitment SCU/SCP
- Query/Retrieve SCP
- Print SCU

StorageSCU

With the JDICOM application StorageSCU you can simulate the behaviour of the DICOM service Storage as Service Class User. An Association can be opened, a DICOM Verification can be made and DICOM images can be transferred to a remode DICOM destination.



The DICOM application StorageSCU runs with a graphical user interface (GUI). Select the entry StorageSCU in the JDicom menu.



Here are the minimum entries which sould be modified before you can use StorageSCU:

`Host:`
Enter here the IP address or hostname of the StorageSCP (DICOM partner for receiving the image)
If a host name is used, an entry in the hosts file is required or DNS has to be enabled.

`Port:`
Portnumber of the StorageSCP (DICOM partner for receiving the image)

`Called Title:`
DICOM AET of the StorageSCP (DICOM partner for receiving the image)

`Calling Title:`
Own DICOM AET

`Transfer Syntax:`
This are the possible values:

- **ImplicitVRLittleEndian**
- **ExplicitVRLittleEndian**
- **ExplicitVRBigEndian**
- **JPEGLossless**
- **JPEGBaseline** (lossy for 8 bit images)

If you are using a wrong entry for the TransferSyntax a message is displayed in the log tab when you try to open the association with "**Connect**":

TransferSyntax: java.lang.IllegalArgumentException: not one of {ImplicitVRLittleEndian,ExplicitVRLittleEndian,ExplicitVRBigEndian,JPEGLossless,JPEGBaseline}

With the following properties it is possible to change the Patient Name and Patient ID during the image transfer to the new values:

`Anoymize:` **false** (no change is done)
true (change the name and ID)

`Anoymize.NewName:` new PatientName

`Anoymize.NewID :` new PatientID

`Verbose:`
Specifies the log level. The value which can be used starts with
"**0**" no output in the log tab window
"**1**"
"**2**" decode of DIMSE (DICOM Message Service Element)
"**3**" decode of data elements

Note: **If you change an entry in the Props tab you have to confirm it by pressing the <ENTER> key on your keyboard. If you have changed a property value you have to CLOSE/OPEN the association in order to activate the made changes.**

In this example the DICOM partner for receiving images (StorageSCP) has the parameters:

Hostname: **146.254.123.173**
Portnumber of the StoreSCP process: **104**
AET of the StoreSCP process: **AN_TDSIM_1**
The local (own) DICOM AET of the StorageSCU JDICOM program: **Storage_SCU**
Transfer Syntax: **ImplicitVRLittleEndian**
Anoymize: **false**
Verbose mode: **3**

Start the Association by clicking the "**Connect**" button.

With "**Echo**" you start a Verification (C_Echo).

With "**Send**" only one selected image can be transferred.

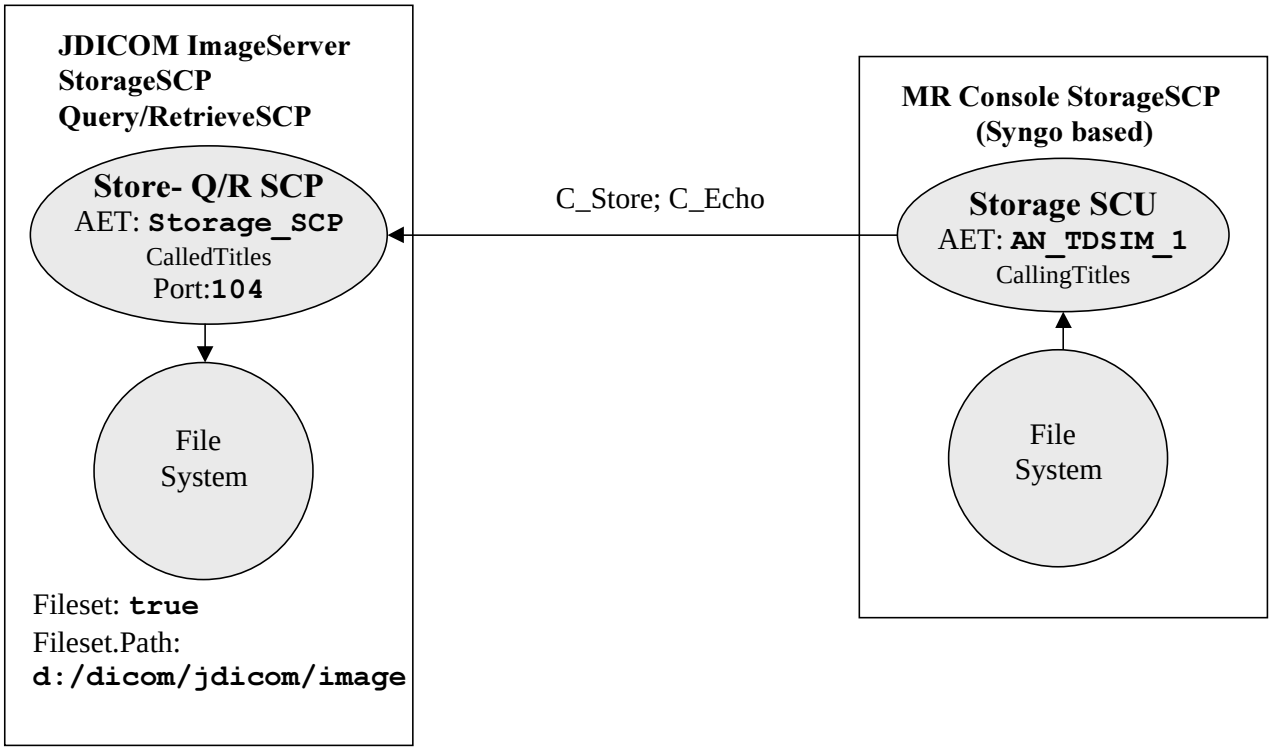
With "**Send***" multiple images can be transferred.

With "**Cancel**" the started image transfer can be interrupted.

Close the Association by clicking the "**Release**" button.

ImageServer

With the JDICOM application ImageServer you can simulate the behaviour of the DICOM service Storage as Service Class Provider. DICOM Verification is supported, DICOM images can be received and stored into a specified directory. The ImageServer simulates also the DICOM services Query/Retieve and Storage Commitment as Provider.



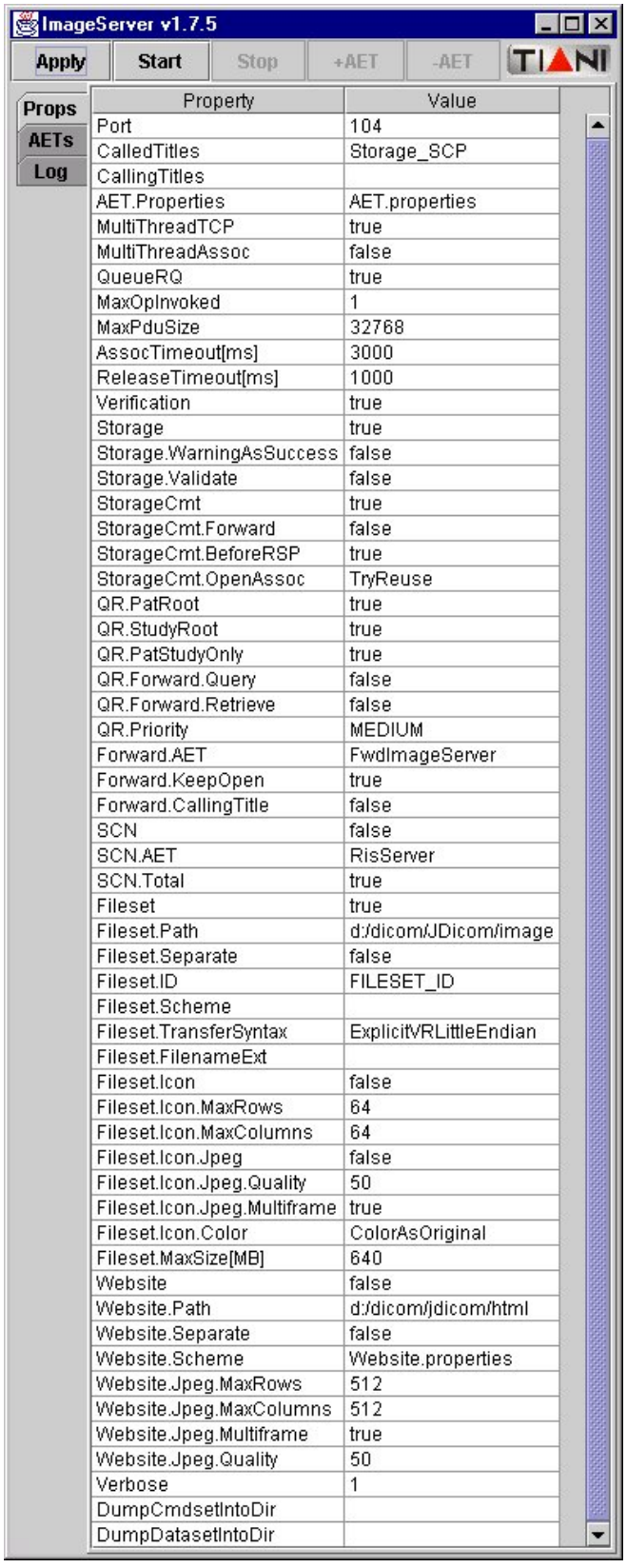
The DICOM application ImageServer can be run either with a graphical user interface (GUI) or in command line mode.

To run it with a GUI select 

in the JDicom menu.

To run it in command line mode select 

from the JDicom menu (recommended only for advanced users).



`Fileset.TransferSyntax:`
Used Transfer Syntax for storing the images to harddisc. Possible values:

AcrNema
ImplicitVRLittleEndian
ExplicitVRLittleEndian
ExplicitVRBigEndian
JPEG_14_SelectionValue1 (lossless)

In the ImageServerGUI you find three tab cards.
`Props:` tabcard for changing the properties of the Imageserver
`AET's:` tabcard only requiered for using the Retrieve and Storage Commitment function (destinations entries for it: AET, IP address and Port)
`Log:` tabcard for the log output area

The following entries in the Props tabcard are the minimum once which should be modified before you can use the ImageServer:

`Port:`
Own Portnumber of the ImageServer (for DICOM services StoreSCP and Q/R SCP)

`Called Title:`
Own DICOM AET of the ImageServer (for DICOM services StoreSCP and Q/R SCP)

`Calling Title:`
If no entry was made here, all AET's from the StoreSCU's and Q/R SCU's are accepted. If you want to restrict the access to the Imageserver you can put in here the allowed AET's. The AET's should be separated by comma.

`Verification:`
Specifices wether the Imageserver accepts a Verification DIMSE (C_Echo). Possible values are:

true Verification is supported
false Verification is not supported

`Fileset:`
This value should be set to "**true**", in order to save the received images in the fileset.path directory. Possible values are true and false.

`Fileset.path:`
Exisiting directory for storing the received images. If this directory doesn't exist on your PC you will get an error message after starting your ImagesServer.
Example for the entry : **`d:/dicom/JDicom/image`**
You can also use the **** to separate the subdirectories.

`Verbose:`
Specifies the log level. The value which can be used starts with
"**0**" no output in the log tab window
"**1**"
"**2**" decode of DIMSE (DICOM Message Service Element)
"**3**" decode of data elements

If you are using an wrong entry for the Fileset.TransferSyntax a message is displayed in the log tab when you try to start the ImageServer with "**Start**":

```
java.lang.IllegalArgumentException: Fileset.TransferSyntax:
java.lang.IllegalArgumentException: not one of
{AcrNema,ImplicitVRLittleEndian,ExplicitVRLittleEndian,ExplicitVRBigEndian,
JPEG_14_SelectionValu1}
```

In this example the following properties are used for the ImageServer:

	Property	Value
Portnumber of the ImageServer process:	Port	**104**
AET of the ImageServer process:	CalledTitles	**Storage_SCP**
AET's accepted StoreSCU's:	CallingTitles	
Save images on hard disc enabled:	Fileset	**true**
Path on the hard disc:	Fileset.Path	**d:/dicom/JDicom/image**
Image store syntax	Fileset.TransferSyntax:	**ImplicitVRLittleEndian**
Mode of the output log:	Verbose	**1**

Note: **If you change an entry in the Props tab you have to confirm it by pressing the <ENTER> key on your keyboard. If you have changed a property value you have to STOP/START the JDICOM ImageServer in order to activate the made changes.**

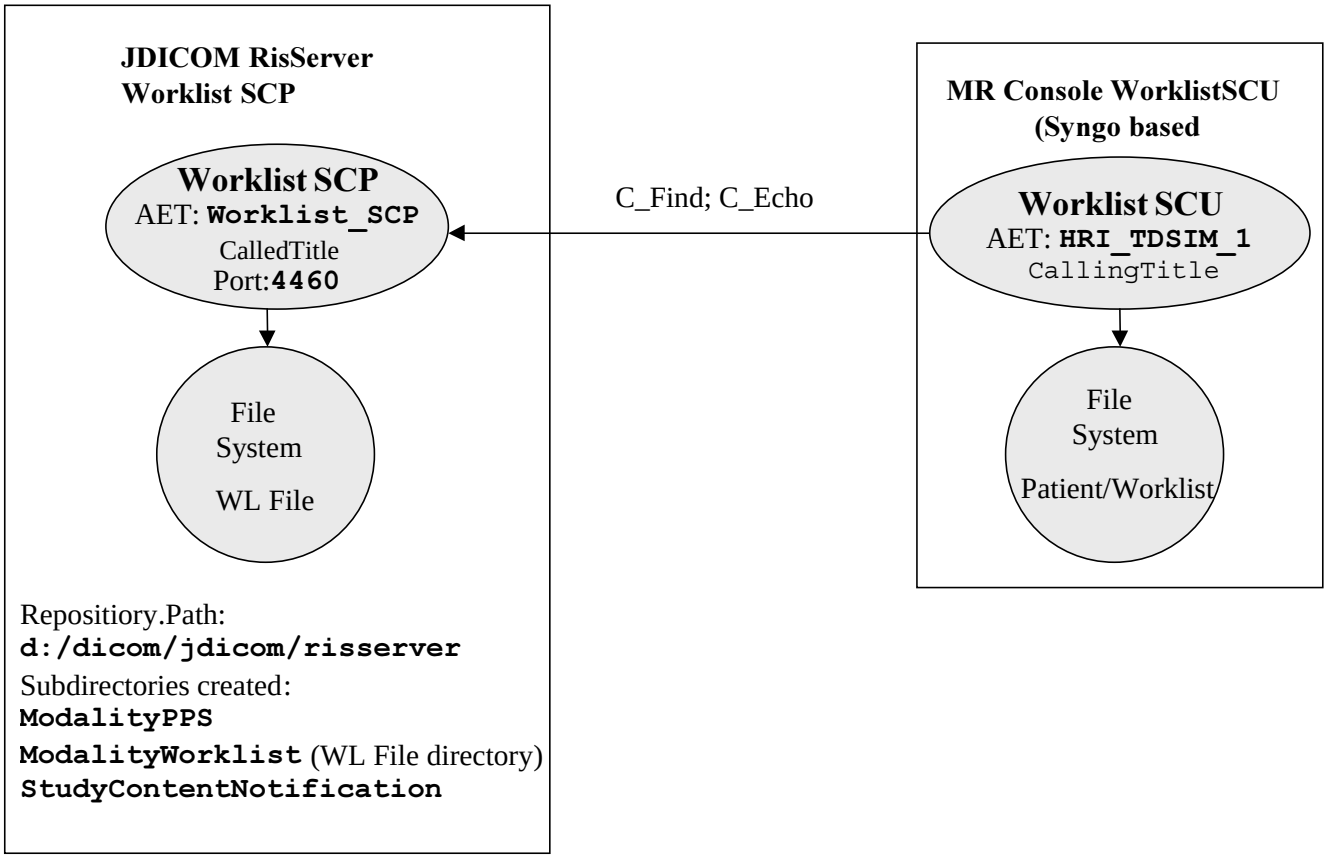
Save the made changes in the property tab card by pressing the "**Apply**" button. The property values are than saved in the properties file for the ImageServer (ImageServer.properties).

Start the ImageServer by clicking the "**Start**" button.

With "**Stop**" the ImageServer will be stopped.

RisServer

With the JDICOM application RisServer you can simulate the behaviour of the RIS or HIS system. The JDICOM RisServer supports the DICOM Services Modality Worklist, Modality Performed Procedure Step and Study Content Notification. The JDICOM RisServer is for all mentioned services Service Class Provider. The JDICOM RisServer supports DICOM Verification and can be used to generate worklist entries.



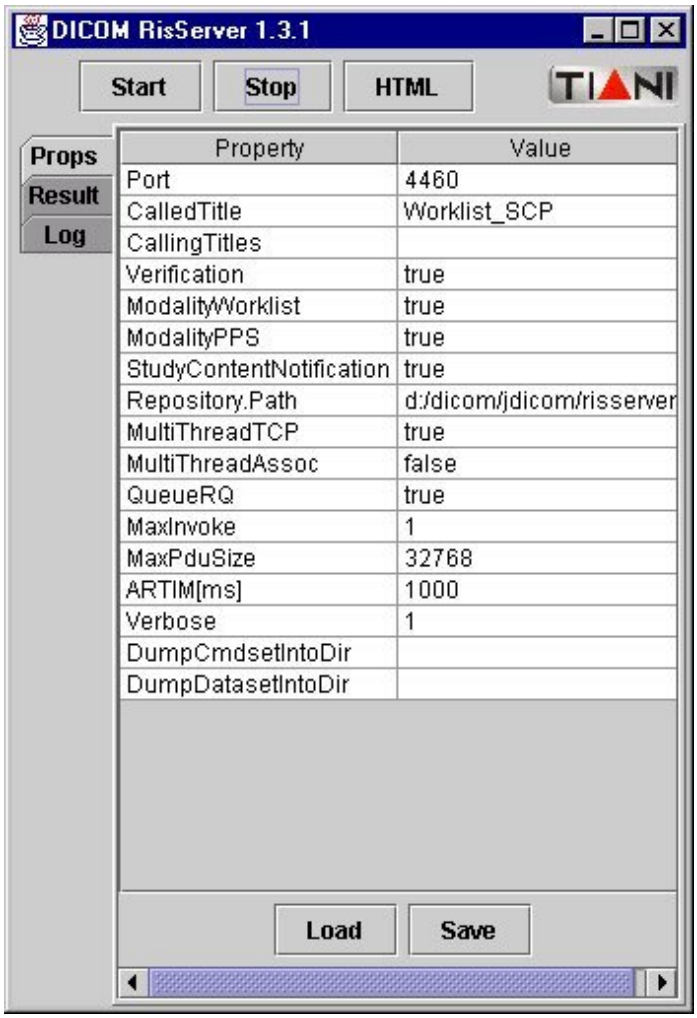
The DICOM application RisServer can be run either with a graphical user interface (GUI) or in command line mode.

To run it with a GUI select 

in the JDicom menu.

To run it in command line mode select 

from the JDicom menu (recommended only for advanced users).



In the RisServerGUI you find three tab cards.
`Props:` tabcard for for changing the properties of the RisServer
`Result:` tabcard for creating/listing worklist entries
`Log:` tabcard for the log output area

The following entries in the Props tabcard are the minimum once which should be modified before you can use the ImageServer:

`Port:`
Own Portnumber of the RisServer (for DICOM Basic Worklist SCP)

`Called Title:`
Own DICOM AET of the RisServer (for DICOM Basic Worklist SCP)

`Calling Title:`
If no entry was made here, all AET's from the Basic Worklist SCU's are accepted. If you want to restrict the access to the Imageserver you can put in here the allowed AET's. The AET's should be separated by comma.

`Verification:`
Specifices wether the Risserver accepts a Verification DIMSE (C_Echo). Possible values are:

- **true** Verification is supported
- **false** Verification is not supported

`ModalityWorklist:`
Specifices whether the Risserver acts as a Basic Worklist SCP. Possible values are:

- **true** Basic Worklist support is enabled.
- **false** Basic Worklist support is disenabled

`ModalityPPS:`
Specifices whether the Risserver acts as a Modality Performed Procedure Step SCP. Possible values are:

- **true** ModalityPPS support is enabled.
- **false** ModalityPPS support is disenabled

`StudyContentNotification:`
Specifices whether the Risserver acts as a Study Content Notification SCP. Possible values are:

- **true** Study Content Notification support is enabled.
- **false** Study Content Notification support is disenabled

`Repository.path:`
Exisiting directory for storing the created WL entries. If this directory doesn't exists on your PC you will get an error message after starting your RisServer. Example for the entry : **`d:/dicom/jdicom/risserver`**
You can also use the **** to separate the subdirectories.

`Verbose:`
Specifies the log level. The value which can be used starts with
"**`0`**" no output in the log tab window
"**`1`**"
"**`2`**" decode of DIMSE (DICOM Message Service Element)
"**`3`**" decode of data elements

Save the made changes in the property tab card by pressing the "**Save**" button. The property values are than saved in the properties file for the RisServer (RisServer.properties). You have to do it once after the installation because this file doesn't exist directly after the installation. You can choose a different name for the RisServer.properties file. With "**load**" you can load a different named RisServer.properties file which you have created before.

In this example the following properties are used for the RisServer:

	Property	Value
Portnumber of the RisServer process:	`Port`	**`4460`**
AET of the RisServer process:	`CalledTitles`	**`Worklist_SCP`**
AET's accepted Worklist SCU's:	`CallingTitles`	
Path on the hard disc:	`Repository.Path`	**`d:/dicom/jdicom/worklist`**
Mode of the output log:	`Verbose`	**`1`**

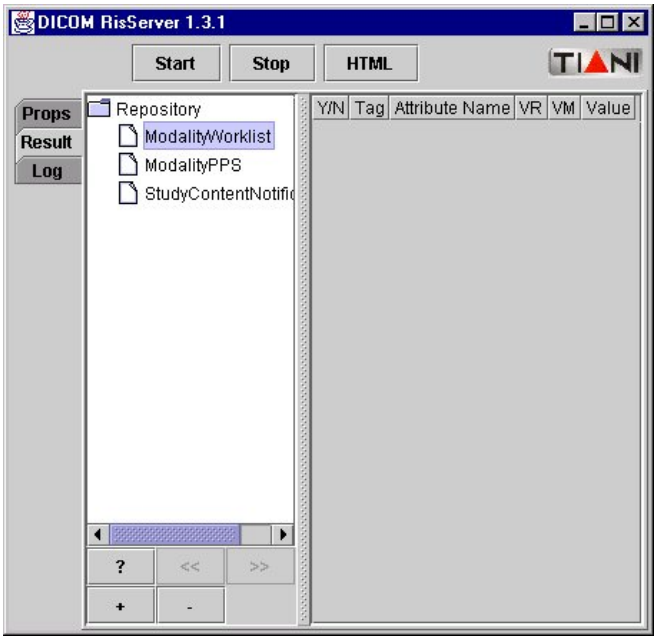
Note: **If you change an entry in the Props tab you have to confirm it by pressing the <ENTER> key on your keyboard. If you have changed a property value you have to STOP/START the JDICOM RisServer in order to activate the made changes.**

Start the RisServer by clicking the "**Start**" button.

With "**Stop**" the RisServer will be stopped.

Creation of a new Worklist entry:

- Select the "**`Result`**"tab card in the RisServerGUI



Double click the folder icon Repository and the tree with the following entries is expanded (see image on the right side):

ModalityWorklist:
Select entry for generation of Basic Worklist data sets.

ModalityPPS:
Select entry for displaying received Modality Perfored Procedure Steps data sets.

StudyContentNotification:
Select entry for generation of Study Content Notification data sets.

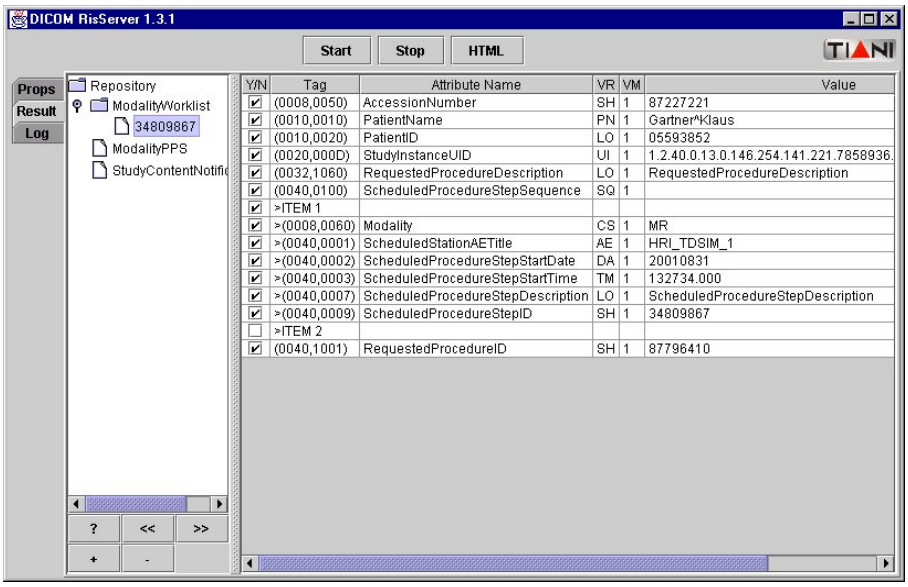
In order to generate an Basic Worklist data set entry select "ModalityWorklist" in the Repository tree and press the + button. With the - button an data set entry can be deleted.

The ? button you can refresh the Repository tree.

Automatically a worklist entry is generated and saved. It has default values for each DICOM tag which are generated.
The values can be modified under the RisServerGUI platform. For adding additional WL tag's, select the appropriate Worklist entry in the Repository/ModalityWorklist tree and click on the 

button. Modify the values of the corresponding tag's and save the made modifications by clicking on the 

button.



Important worklist tags which should match for the worklist request from the modality (WL SCU):

`Modality:`
Insert here your modality abbreviation (e.g. MR, CT, AX, US, OT, ...) [in this example: **MR**]

`ScheduledStationAETitle:`
Insert here the AET for which the worklist entry is. Only for this AET it is possible to get this specific worklist entry. Is this tag empty all Worklist SCU's from the same modality can retrieve this Worklist entry. [in this example: **HRI_TDSIM_1**]

`ScheduledProcedureStepStartDate:`
Default date when the WL entry is generated. Change it when the WL entry is not generated today to the date of today.

Note: **If you change a tag value you have to confirm it by pressing the <ENTER> key on your keyboard.**

To check if your made changes are OK, select the folder `ModalityWorklist` and then again the WL entry. Now the modified WL file should be loaded into the RisServerGUI.

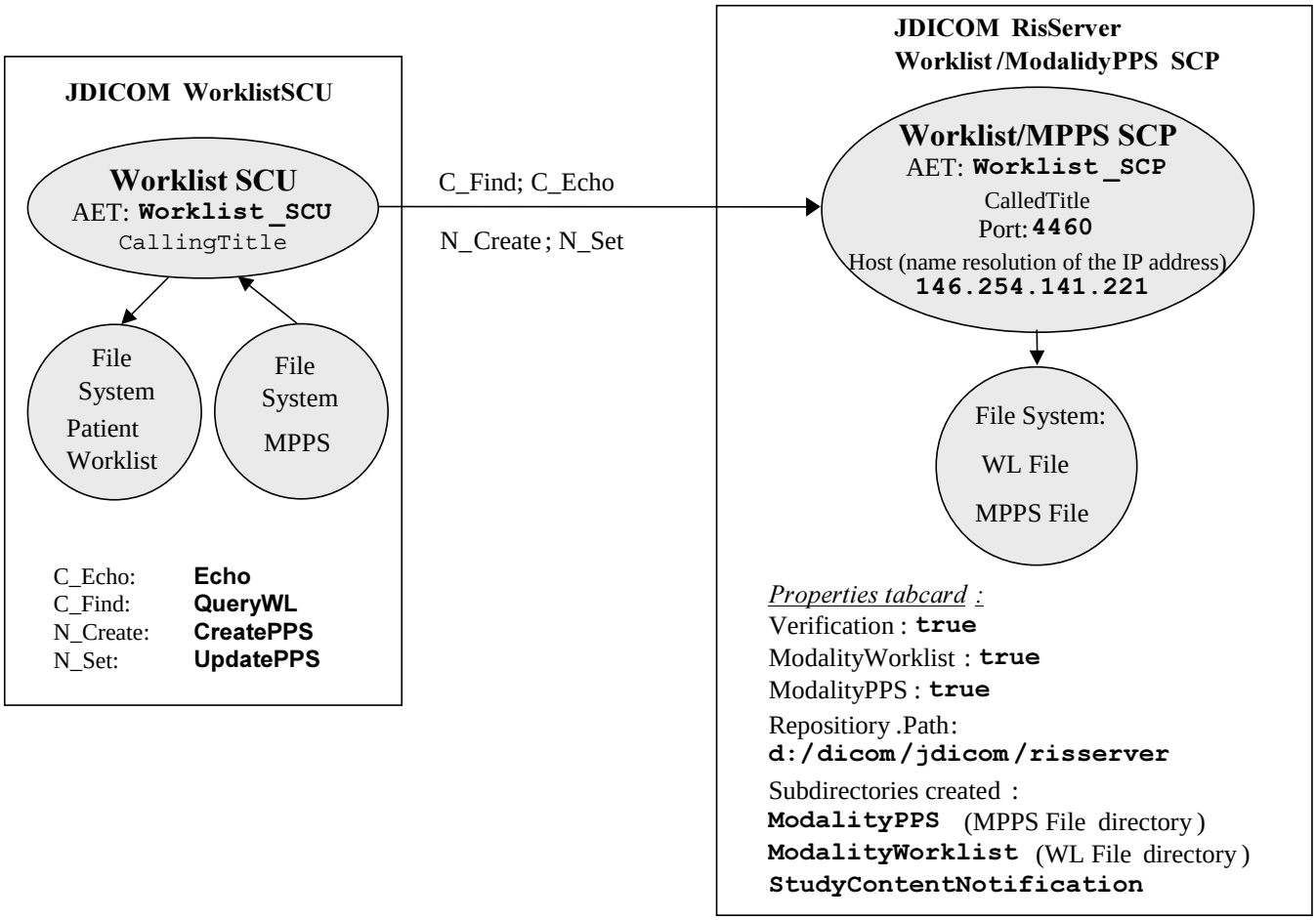
Start the RisServer by clicking the "**Start**" button if not already done. Check in the log tab card whether the RisServer is successfully started or not.

The messages " `Waiting for invocations from clients...` " indicates an successful start of the RisServer.

If you get the following message "`java.io.IOException: d:\dicom\jdicom\risserver224 is not a writeable directory!`" the RisServer is not started. Check the entry for the **`Repository.Path`** whether this directory exists on your hard disc.

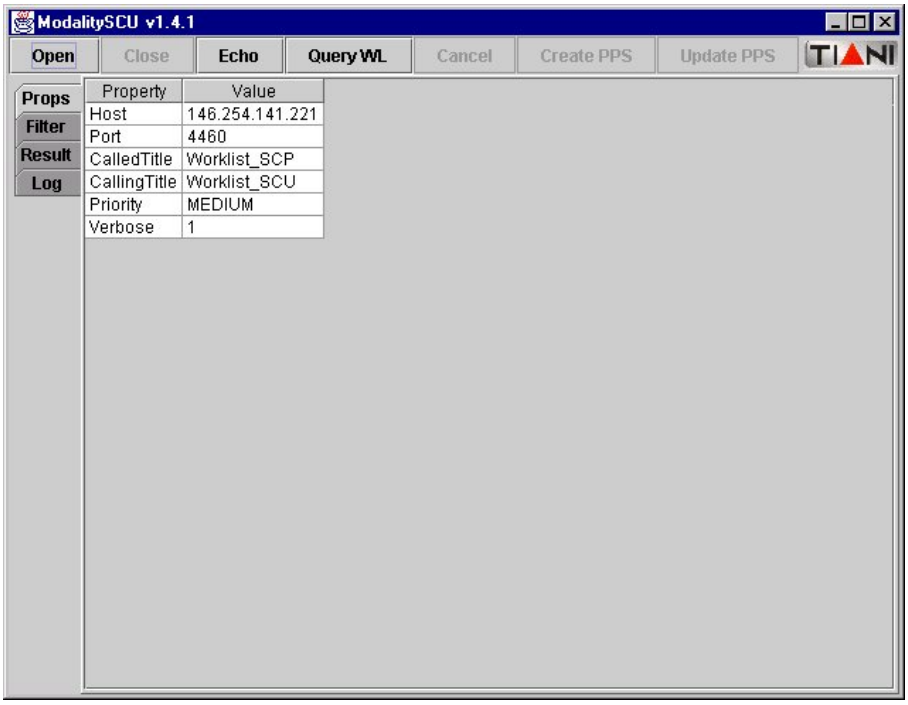
ModalitySCU (WL SCU)

With the JDICOM application ModalitySCU you can simulate the behaviour of the DICOM services Modality Worklist and Modality Performed Procedure Step, both as Service Class User. An Association can be opened, a DICOM Verification can be made and Worklist information can be retrieved. From the retrieved Worklist a performed procedure step can be created and transferred to the RisSystem. In this case the RisSystem must support MPPS.



The DICOM application ModalitySCU runs with a graphical user interface (GUI). Select the entry

in the JDicom menu.



Here are the minimum entries which should be modified in the Property tabcard before you can use ModalitySCU:

`Host:`
Enter here the IP address or hostname of the RisServer (Worklist SCP)

`Port:`
Portnumber of the Worklist SCP

`Called Title:`
DICOM AET of the Worklist SCP (RisServer or HisServer)
`Calling Title:`
Own DICOM AET

`Verbose:`
Specifies the log level. The value which can be used starts with
"**0**" no output in the log tab window
"**1**"
"**2**" decode of DIMSE (DICOM Message Service Element)
"**3**" decode of data elements

There are three more tabcards available:

Filter tabcard for setting the requested WL tags
Result tabcard shows the received worklist entries
Log tabcard shows the log of the DICOM session

Note: **If you change an entry in the Props tab you have to confirm it by pressing the <ENTER> key on your keyboard. If you have changed a property value you have to CLOSE/OPEN the association in order to activate the made changes.**

In this example the DICOM RisServer (Worklist SCP) has the parameters:

Hostname: **`146.254.141.221`**
Portnumber of the Worklist SCP process: **`4460`**
AET of the Worklist SCP process: **`Worklist_SCP`**

The local (own) DICOM AET of the ModalitySCU JDICOM program: **`Worklist_SCU`**
Verbose mode: **`1`**

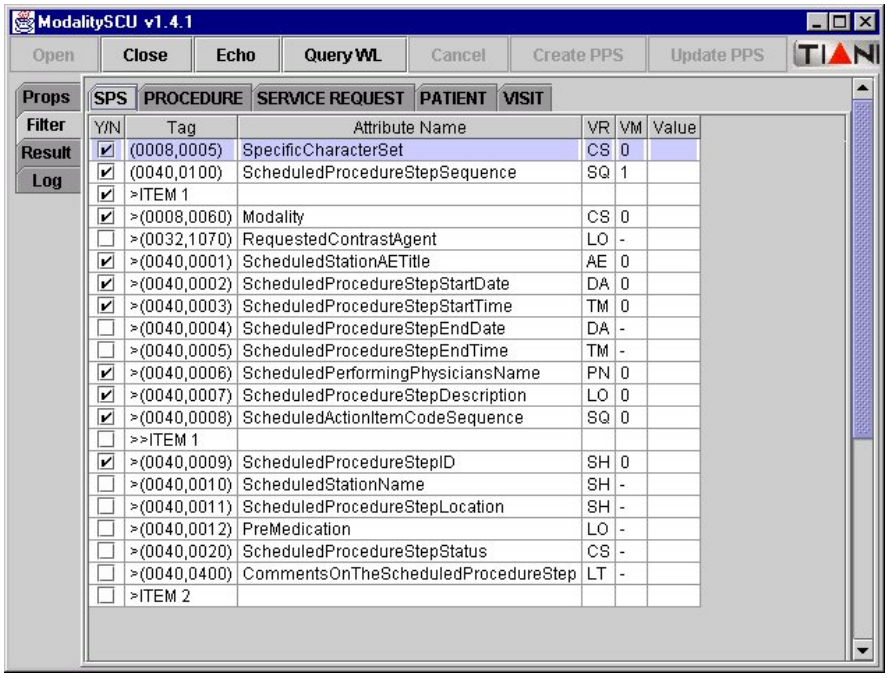
Start the Association by clicking the "**Open**" button.

With "**Echo**" you start a Verification (C_Echo).

With "**Query WL**" request the worklist entries from the RisServer (C-FIND).

With "**Close**" you can close the association to the RisServer.

- Setting filter in the JDICOM ModalitySCU:



Y/N	Tag	Attribute Name	VR	VM	Value
☑	(0008,0005)	SpecificCharacterSet	CS	0	
☑	(0040,0100)	ScheduledProcedureStepSequence	SQ	1	
☑	>ITEM 1				
☑	>(0008,0060)	Modality	CS	0	
☐	>(0032,1070)	RequestedContrastAgent	LO	-	
☑	>(0040,0001)	ScheduledStationAETitle	AE	0	
☑	>(0040,0002)	ScheduledProcedureStepStartDate	DA	0	
☑	>(0040,0003)	ScheduledProcedureStepStartTime	TM	0	
☐	>(0040,0004)	ScheduledProcedureStepEndDate	DA	-	
☐	>(0040,0005)	ScheduledProcedureStepEndTime	TM	-	
☑	>(0040,0006)	ScheduledPerformingPhysiciansName	PN	0	
☑	>(0040,0007)	ScheduledProcedureStepDescription	LO	0	
☑	>(0040,0008)	ScheduledActionItemCodeSequence	SQ	0	
☐	>>ITEM 1				
☑	>(0040,0009)	ScheduledProcedureStepID	SH	0	
☐	>(0040,0010)	ScheduledStationName	SH	-	
☐	>(0040,0011)	ScheduledProcedureStepLocation	SH	-	
☐	>(0040,0012)	PreMedication	LO	-	
☐	>(0040,0020)	ScheduledProcedureStepStatus	CS	-	
☐	>(0040,0400)	CommentsOnTheScheduledProcedureStep	LT	-	
☐	>ITEM 2				

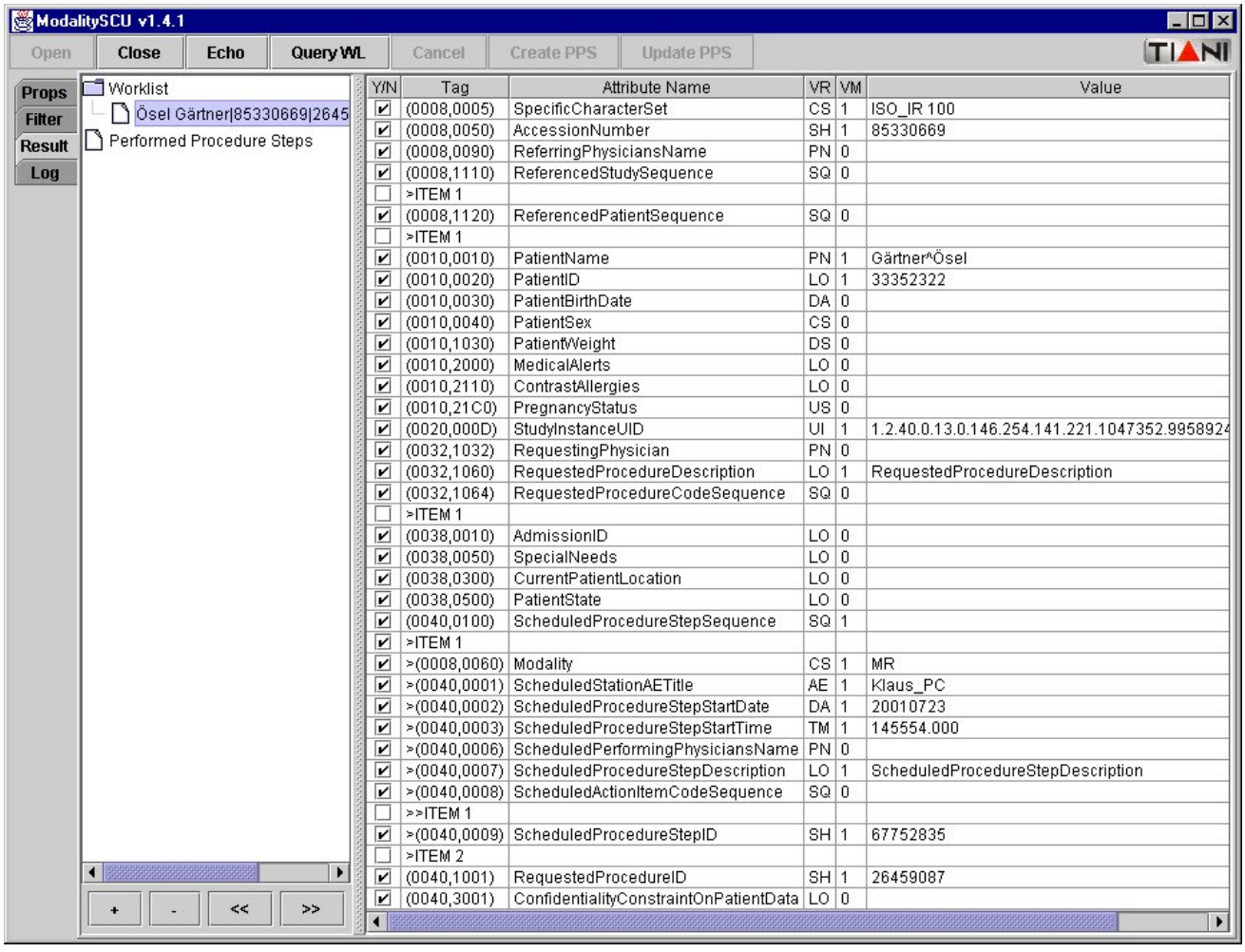
For setting a WL query filter select the Filter tabcard and choose the tag group by selectin one of the tabcards:

SPS (Scheduled Procedure Step)
PROCEDURE
SERVICE REQUEST
PATIENT
VISIT

The marked (with ✓) tags are default set. If you want to add tags just mark them. This is done by clicking on ☐.
Removing the tag from the WL query just click on the mark ✓ and the ☐ is empty.

- Displaying the WL Query result in JDICOM ModalitySCU:

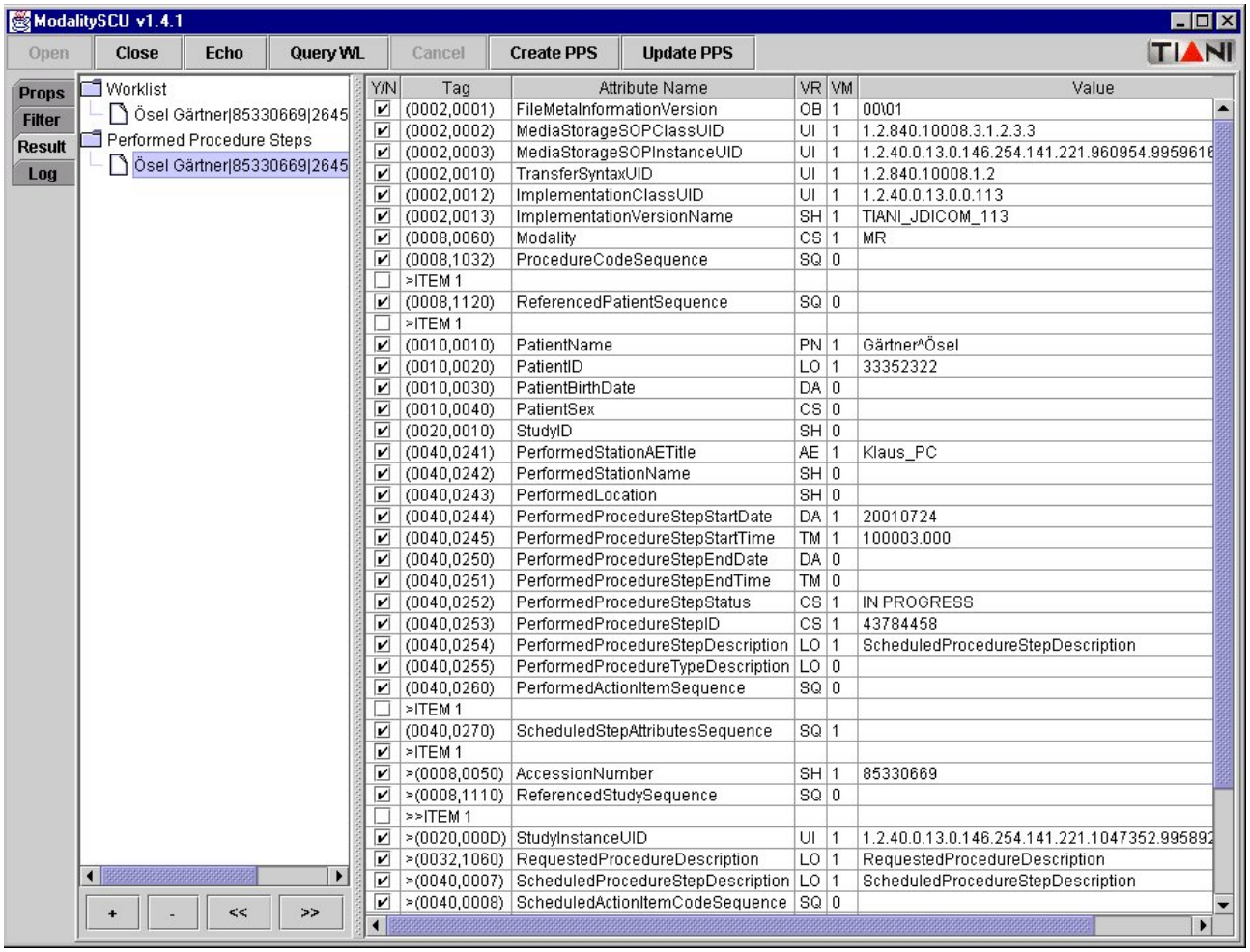
In the Worklist tree you can find the received worklist data sets



Y/N	Tag	Attribute Name	VR	VM	Value
☑	(0008,0005)	SpecificCharacterSet	CS	1	ISO_IR 100
☑	(0008,0050)	AccessionNumber	SH	1	85330669
☑	(0008,0090)	ReferringPhysiciansName	PN	0	
☑	(0008,1110)	ReferencedStudySequence	SQ	0	
☐	>ITEM 1				
☑	(0008,1120)	ReferencedPatientSequence	SQ	0	
☐	>ITEM 1				
☑	(0010,0010)	PatientName	PN	1	Gärtner^Ösel
☑	(0010,0020)	PatientID	LO	1	33352322
☑	(0010,0030)	PatientBirthDate	DA	0	
☑	(0010,0040)	PatientSex	CS	0	
☑	(0010,1030)	PatientWeight	DS	0	
☑	(0010,2000)	MedicalAlerts	LO	0	
☑	(0010,2110)	ContrastAllergies	LO	0	
☑	(0010,21C0)	PregnancyStatus	US	0	
☑	(0020,000D)	StudyInstanceUID	UI	1	1.2.40.0.13.0.146.254.141.221.1047352.9958924
☑	(0032,1032)	RequestingPhysician	PN	0	
☑	(0032,1060)	RequestedProcedureDescription	LO	1	RequestedProcedureDescription
☑	(0032,1064)	RequestedProcedureCodeSequence	SQ	0	
☐	>ITEM 1				
☑	(0038,0010)	AdmissionID	LO	0	
☑	(0038,0050)	SpecialNeeds	LO	0	
☑	(0038,0300)	CurrentPatientLocation	LO	0	
☑	(0038,0500)	PatientState	LO	0	
☑	(0040,0100)	ScheduledProcedureStepSequence	SQ	1	
☑	>ITEM 1				
☑	>(0008,0060)	Modality	CS	1	MR
☑	>(0040,0001)	ScheduledStationAETitle	AE	1	Klaus_PC
☑	>(0040,0002)	ScheduledProcedureStepStartDate	DA	1	20010723
☑	>(0040,0003)	ScheduledProcedureStepStartTime	TM	1	145554.000
☑	>(0040,0006)	ScheduledPerformingPhysiciansName	PN	0	
☑	>(0040,0007)	ScheduledProcedureStepDescription	LO	1	ScheduledProcedureStepDescription
☑	>(0040,0008)	ScheduledActionItemCodeSequence	SQ	0	
☐	>>ITEM 1				
☑	>(0040,0009)	ScheduledProcedureStepID	SH	1	67752835
☐	>ITEM 2				
☑	(0040,1001)	RequestedProcedureID	SH	1	26459087
☑	(0040,3001)	ConfidentialityConstraintOnPatientData	LO	0	

Function of the  buttons are:

 with this button you can generate an PPS (Performed Procedure Step) entry for the selected worklist entry. In order to do it select first the desired selected worklist entry and click  button. The PPS data set is stored under the folder "***Performed Procedure Steps***".



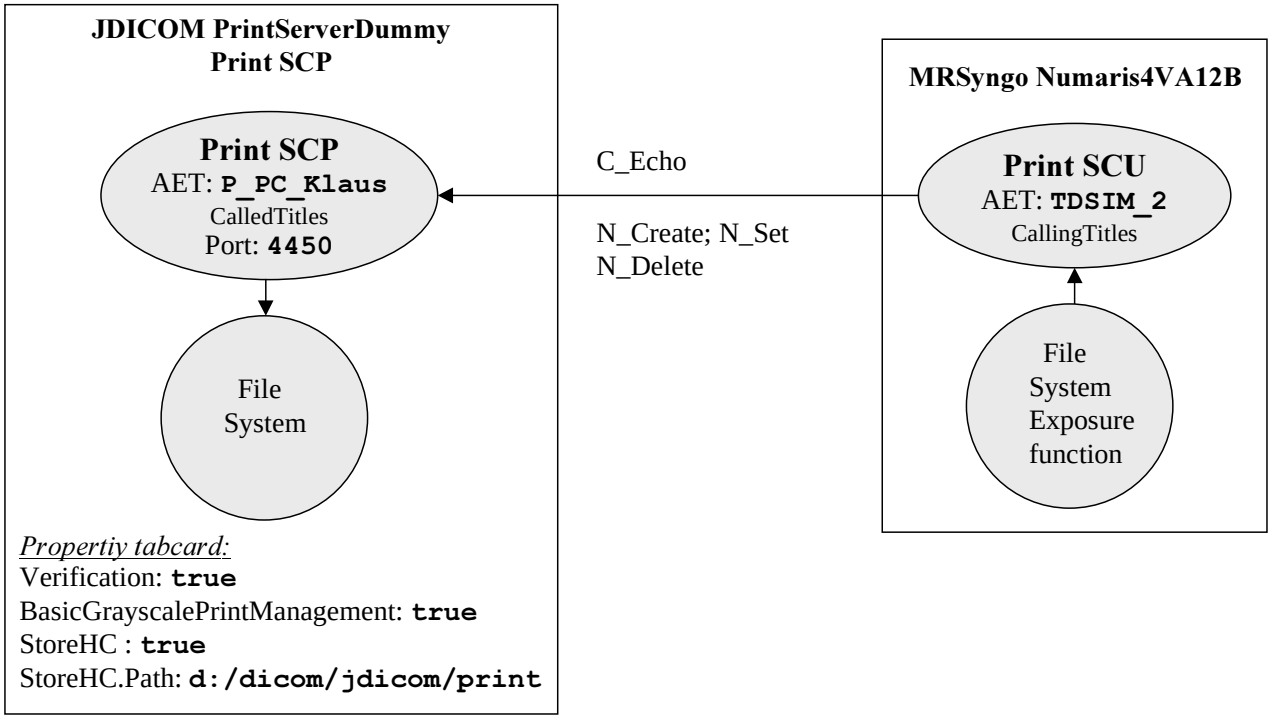
 with this button you can remove an selected data set entry from the folder "***Worklist***" or "***Performed Procedure Steps***".

 with this button you can add PPS DICOM tags from the selected PPS entry in the PPS folder.

 with this button you can save the made changes in the selected PPS entry.

PrintServerDummy (PrintSCP)

With the JDICOM application PrintServerDummy you can simulate the behaviour of a DICOM Camera. DICOM Verification is supported and a hardcopy file can be received. This file is stored into a specified directory and can be displayed by any DICOM viewer.



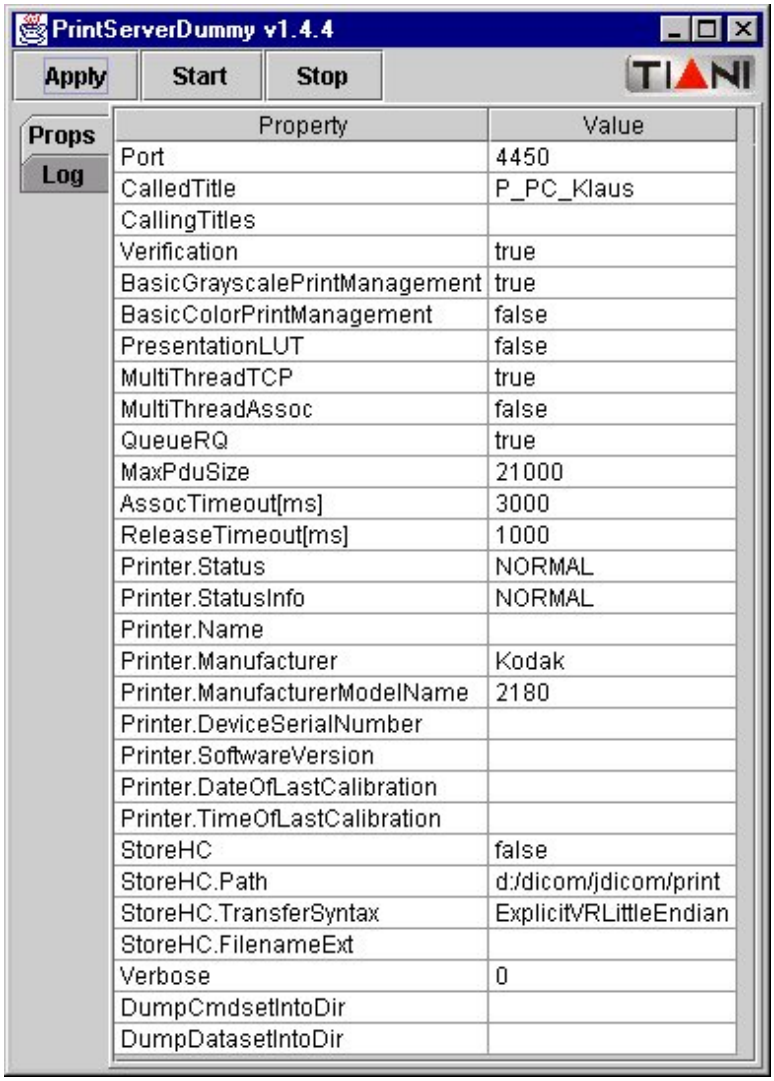
The JDICOM application PrintServerDummy can be run either with a graphical user interface (GUI) or in command line mode.

To run it with a GUI select 

in the JDicom menu.

To run it in command line mode select 

from the JDicom menu (recommended only for advanced users).



Property	Value
Port	4450
CalledTitle	P_PC_Klaus
CallingTitles	
Verification	true
BasicGrayscalePrintManagement	true
BasicColorPrintManagement	false
PresentationLUT	false
MultiThreadTCP	true
MultiThreadAssoc	false
QueueRQ	true
MaxPduSize	21000
AssocTimeout[ms]	3000
ReleaseTimeout[ms]	1000
Printer.Status	NORMAL
Printer.StatusInfo	NORMAL
Printer.Name	
Printer.Manufacturer	Kodak
Printer.ManufacturerModelName	2180
Printer.DeviceSerialNumber	
Printer.SoftwareVersion	
Printer.DateOfLastCalibration	
Printer.TimeOfLastCalibration	
StoreHC	false
StoreHC.Path	d:/dicom/jdicom/print
StoreHC.TransferSyntax	ExplicitVRLittleEndian
StoreHC.FilenameExt	
Verbose	0
DumpCmdsetIntoDir	
DumpDatasetIntoDir	

In the PrintServerDummy GUI you find two tab cards.
`Props:` tabcard for for chaning the properties of the PrintServerDummy.
`Log:` tabcard for the log output area

The following entries in the Props tabcard are the minimum once which should be modified before you can use the PrintServerDummy.

`Port:`
Own Portnumber of the PrintServerDummy (for DICOM service Basic Print SCP)

`Called Title:`
Own DICOM AET of the PrintServerDummy (for DICOM servicesBasic Print SCP)

`Calling Title:`
If no entry was made here, all AET's from the PrintSCU's are acceped. If you want to restrict the access to the PrintServerDummy you can put in here the allowed AET's. The AET's should be separated by comma.

`Verbose:`
Specifies the log level. The value which can be used starts with
"**`0`**" no output in the log tab window
"**`1`**"
"**`2`**" decode of DIMSE (DICOM Message Service Element)
"**`3`**" decode of data elements

In this example the following properties are used for the PrintServerDummy:

	Property	**Value**
Portnumber of the PrintServerDummy process:	`Port`	**`4450`**
AET of the PrintServerDummy process:	`CalledTitles`	**`P_PC_Klaus`**
AET's accepted PrintSCU's:	`CallingTitles`	
Mode of the output log:	`Verbose`	**`1`**

Note: **If you change an entry in the Props tab you have to confirm it by pressing the <ENTER> key on your keyboard. If you have changed a property value you have to STOP/START the JDICOM PrintServerDummy in order to activate the made changes.**

Save the made changes in the property tab card by pressing the "**Apply**" button. The property values are than saved in the properties file for the PrintServerDummy (PrintServerDummy.properties).

Start the PrintServerDummy by clicking the "**Start**" button.

With "**Stop**" the PrintServerDummy will be stopped.

It is possible to save the received DICOM Basic Print data to hard disc. Therefore you have to modify the following entries in the property tab card.

Property	Value
StoreHC	true
StoreHC.Path	Existing path on PC

In this example the values for this store functionality are :

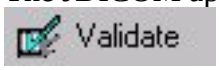
	Property	Value
Enable hardcopy store to hard disc:	StoreHC	**true**
Directory for the stored hardcopy files:	StoreHC.Path	**d:/dicom/jdicom/print**

You can also use the **** to separate the subdirectories.

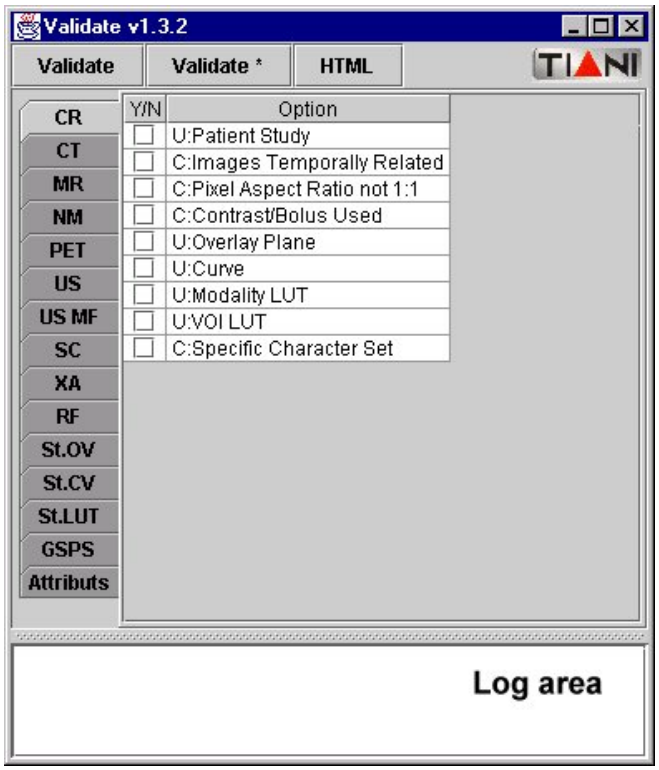
The stored files which you can find under the StoreHC.Path can be loaded and viewed in any DICOM viewer (e.g. eFilm, DICOMscope, Osiris ..)

Validate

With the JDICOM application Validate you can check DICOM files according the conformity to the DICOM standard.

The JDICOM application Validate runs with a graphical user interface (GUI). Select the entry 

in the JDicom menu.



In the JDICOM Validate application you find serveral tab cards. The tab cards are related to the IOD definitions.

With "**Validate**" only one selected dicom file can be checked.

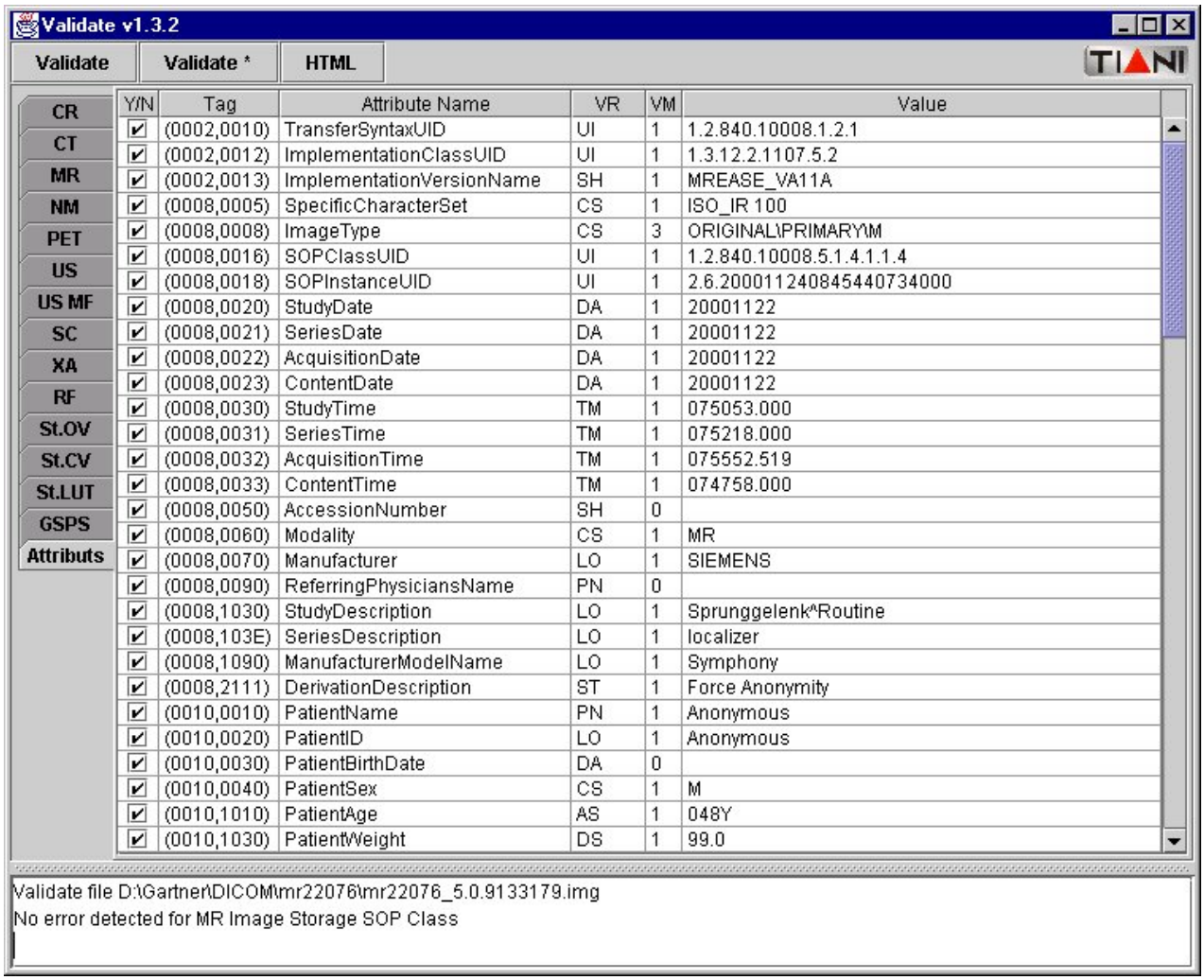
With "**Validate***" multible dicom file can be checked.

With "**HTML**" you can export from the validated DICOM file the attributs in an HTML file.

In the log area you will get informations about the valitation.

In the window part "**Options**" you can select (mark ✓) optional DICOM modules for your IOD to be checked.

Example for the validation of a MR image. To display the DICOM tags of the selected image the "**Attributs**" tab card needs to be selected.



Y/N	Tag	Attribute Name	VR	VM	Value
☑	(0002,0010)	TransferSyntaxUID	UI	1	1.2.840.10008.1.2.1
☑	(0002,0012)	ImplementationClassUID	UI	1	1.3.12.2.1107.5.2
☑	(0002,0013)	ImplementationVersionName	SH	1	MREASE_VA11A
☑	(0008,0005)	SpecificCharacterSet	CS	1	ISO_IR 100
☑	(0008,0008)	ImageType	CS	3	ORIGINAL\PRIMARY\M
☑	(0008,0016)	SOPClassUID	UI	1	1.2.840.10008.5.1.4.1.1.4
☑	(0008,0018)	SOPInstanceUID	UI	1	2.6.200011240845440734000
☑	(0008,0020)	StudyDate	DA	1	20001122
☑	(0008,0021)	SeriesDate	DA	1	20001122
☑	(0008,0022)	AcquisitionDate	DA	1	20001122
☑	(0008,0023)	ContentDate	DA	1	20001122
☑	(0008,0030)	StudyTime	TM	1	075053.000
☑	(0008,0031)	SeriesTime	TM	1	075218.000
☑	(0008,0032)	AcquisitionTime	TM	1	075552.519
☑	(0008,0033)	ContentTime	TM	1	074758.000
☑	(0008,0050)	AccessionNumber	SH	0	
☑	(0008,0060)	Modality	CS	1	MR
☑	(0008,0070)	Manufacturer	LO	1	SIEMENS
☑	(0008,0090)	ReferringPhysiciansName	PN	0	
☑	(0008,1030)	StudyDescription	LO	1	Sprunggelenk^Routine
☑	(0008,103E)	SeriesDescription	LO	1	localizer
☑	(0008,1090)	ManufacturerModelName	LO	1	Symphony
☑	(0008,2111)	DerivationDescription	ST	1	Force Anonymity
☑	(0010,0010)	PatientName	PN	1	Anonymous
☑	(0010,0020)	PatientID	LO	1	Anonymous
☑	(0010,0030)	PatientBirthDate	DA	0	
☑	(0010,0040)	PatientSex	CS	1	M
☑	(0010,1010)	PatientAge	AS	1	048Y
☑	(0010,1030)	PatientWeight	DS	1	99.0

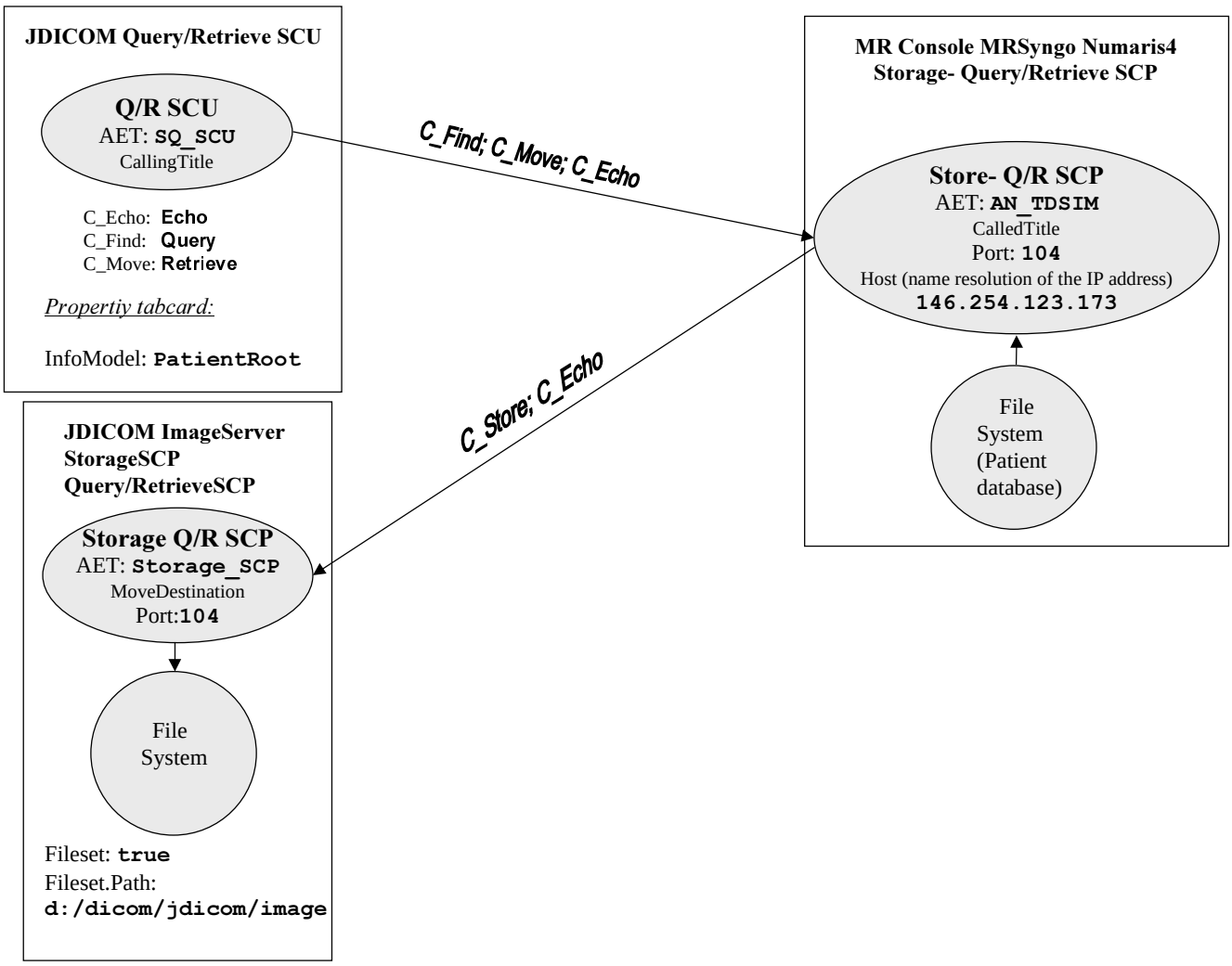
In the log you get the following information :

```
Validate file D:\Gartner\DICOM\mr22076\mr22076_5.0.9133179.img
No error detected for MR Image Storage SOP Class
```

This indicates that the DICOM file was successfully checked.

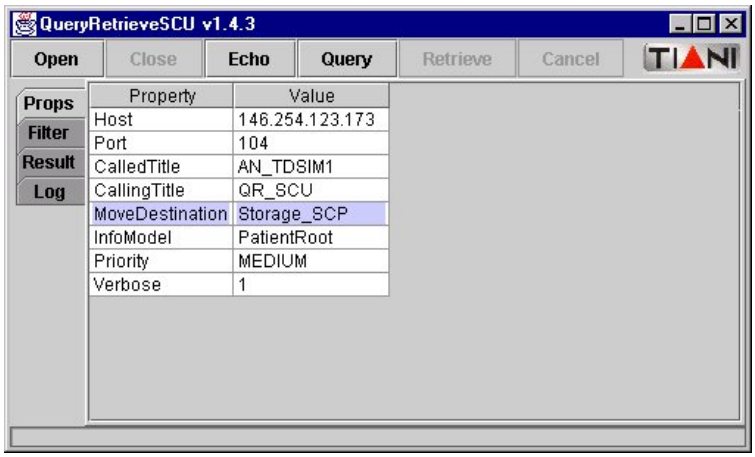
QueryRetrieveSCU

With the JDICOM application QueryRetrieveSCU you can simulate the behaviour of the DICOM service Query Retrieve as Service Class User. An Association can be opened, a DICOM Verification can be made. The image database of a QueryRetrieveSCP can be queried and images can be retrieved.



The DICOM application QueryRetrieveSCU runs with a graphical user interface (GUI). Therefore select the entry 

in the JDicom menu.



This are the minimum entries which should be modified before you can use QueryRetrieveSCU:

`Host:`
Enter here the hostname or IP address of the QueryRetrieveSCP (DICOM partner for querying the database and retrieving images)
If a host name is used, an entry in the hosts file is required or DNS has to be enabled.

`Port:`
Port number of the QueryRetrieveSCP (DICOM partner querying the database and retrieving images)

`Called Title:`
DICOM AET of the QueryRetrieveSCP (querying the database and retrieving images)

`Calling Title:`
Own DICOM AET

`MoveDestionation:`
DICOM AET of the StoreSCP which should receive the retrieved images

`InfoModel:`
Used information model. Possible entries are: **PatientRoot**
StudyRoot
PatientStudyOnly

`Verbose:`
Specifies the log level. The value which can be used starts with
"**0**" no output in the log tab window
"**1**"
"**2**" decode of DIMSE (DICOM Message Service Element)
"**3**" decode of data elements

Note: **If you change an entry in the Props tab you have to confirm it by pressing the <ENTER> key on your keyboard.**
If you change a property value you have to CLOSE/OPEN the association in order to activate the made changes.

In this example the DICOM partner for receiving the Query/Retrieve requests (Q/R SCP) has the following parameters:

Hostname: **146.254.123.173**
Port number of the QueryRetrieveSCP process: **104**
AET of the QueryRetrieveSCP process: **AN_TDSIM1**
MoveDestination AET of the StoreSCP process: **QR_SCU**
(AET of the JDICOM ImageServer on the local PC)
The local (own) DICOM AET of the QueryRetrieveSCU JDICOM program: **Storage_SCP**
Used QueryRetrieve information model: **PatientRoot**
Verbose mode: **1**

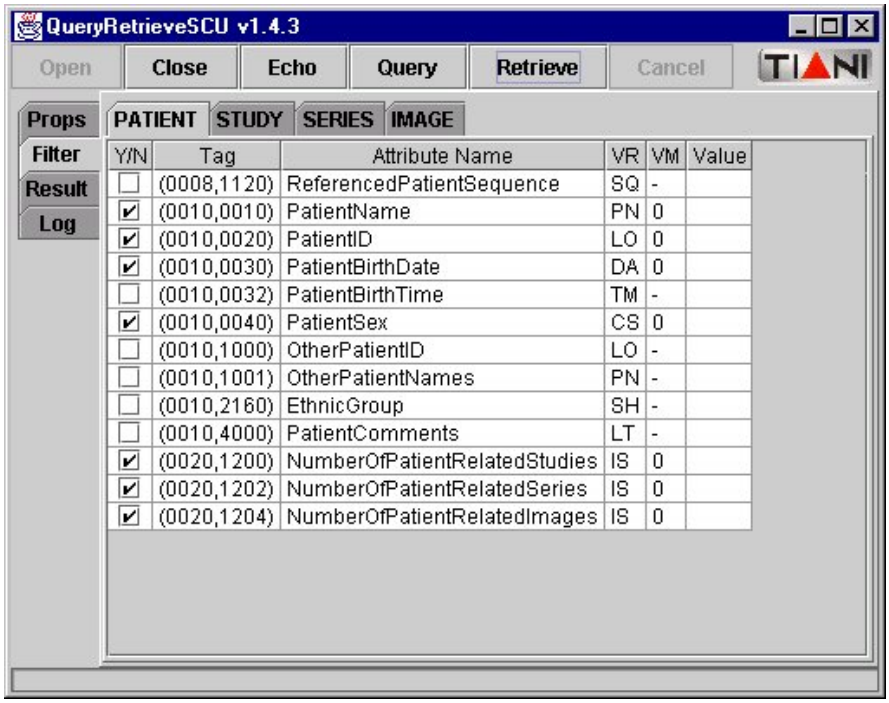
Start the Association by clicking the "**Connect**" button.

With "**Echo**" you start a Verification (C_Echo).

With "**Query**" sends an query (C_Find) request to the QueryRetrieveSCP.

With "**Retrieve**" you can retrieve the selected Patient/Study/images according the used information model.

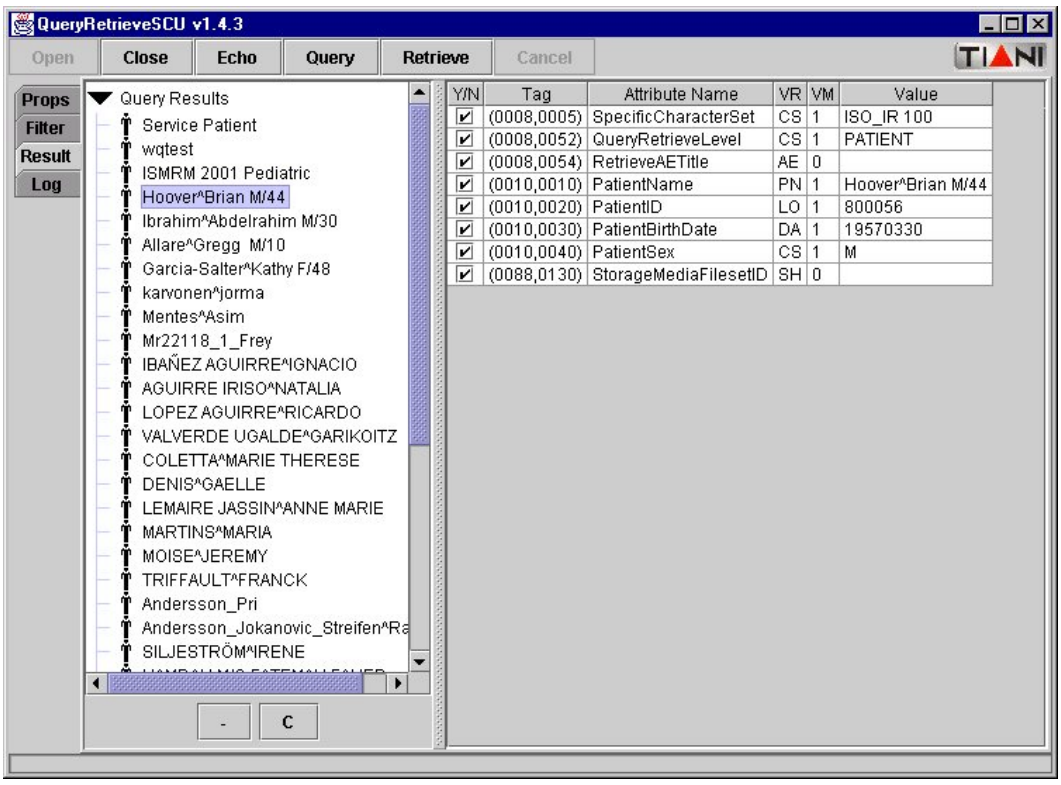
- **Filter tab card of the JDICOM QueryRetrieveSCU application**



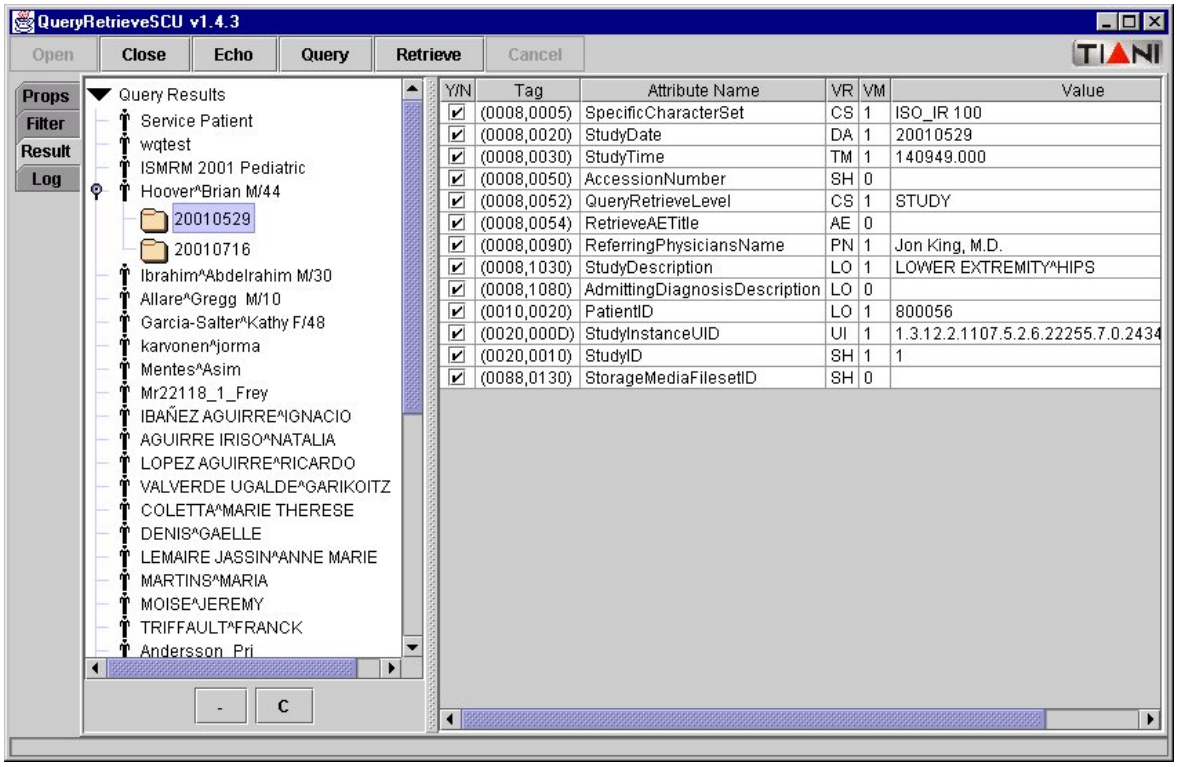
In this filter tabcard you can select the tags which shall be used in the query request. Characters entered in under Value will be sent in the Query request as searching (matching) criteria. You can do this for the DICOM tag groups Patient, Study, Series and Image by selecting the tab card for the corresponding tag group.

- **Result tab card of the JDICOM QueryRetrieveSCU application**

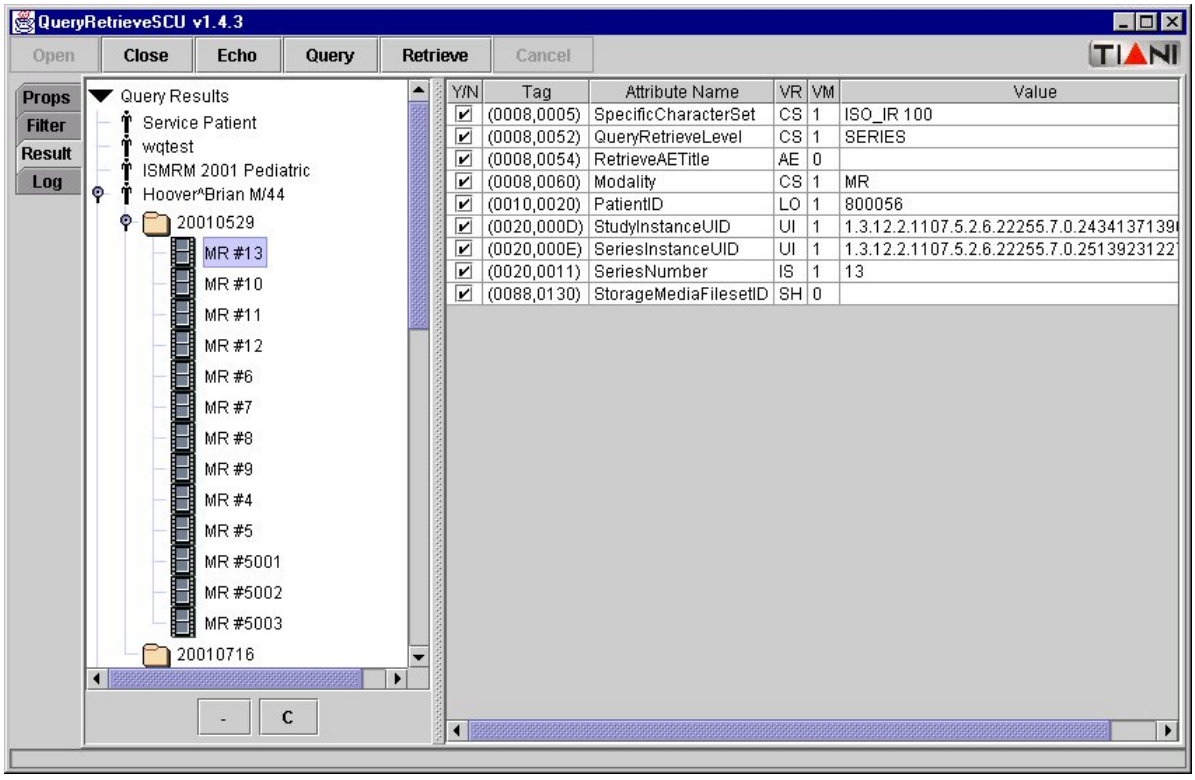
After sending an query request (C_Find) to the QueryRetrieveSCP the feedback is displayed in the result tab card. In this example the information model **PatientRoot** was used.



Selecting the Patient name in the Query Result tree you get DICOM tags displayed for the patient. To query the database for study information you can do this either by double clicking on the patient name or by pressing the "**Query**" button . The study level information are than visible.



Selecting the study (folder icon) you get then the study DICOM tags displayed. In order to get the information of the image level you can do this either by double clicking on the study folder or by pressing the "**Query**" button. The image level information are than visible.



Selecting the image in the Query tree you get the image DICOM tags displayed.

You can retrieve the images by selecting in

- the patient level the patient name and click the "**Retrieve**" button.
- the study level the study folder and click the "**Retrieve**" button.
- the image level the image and click the "**Retrieve**" button.

Be sure that the StoreSCP (e.g. JDICOM ImageServer) is running, otherwise the retrieve will fail.

With 

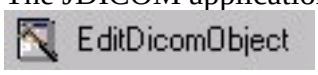
you can remove the selected entry in the Query Results tree and

with 

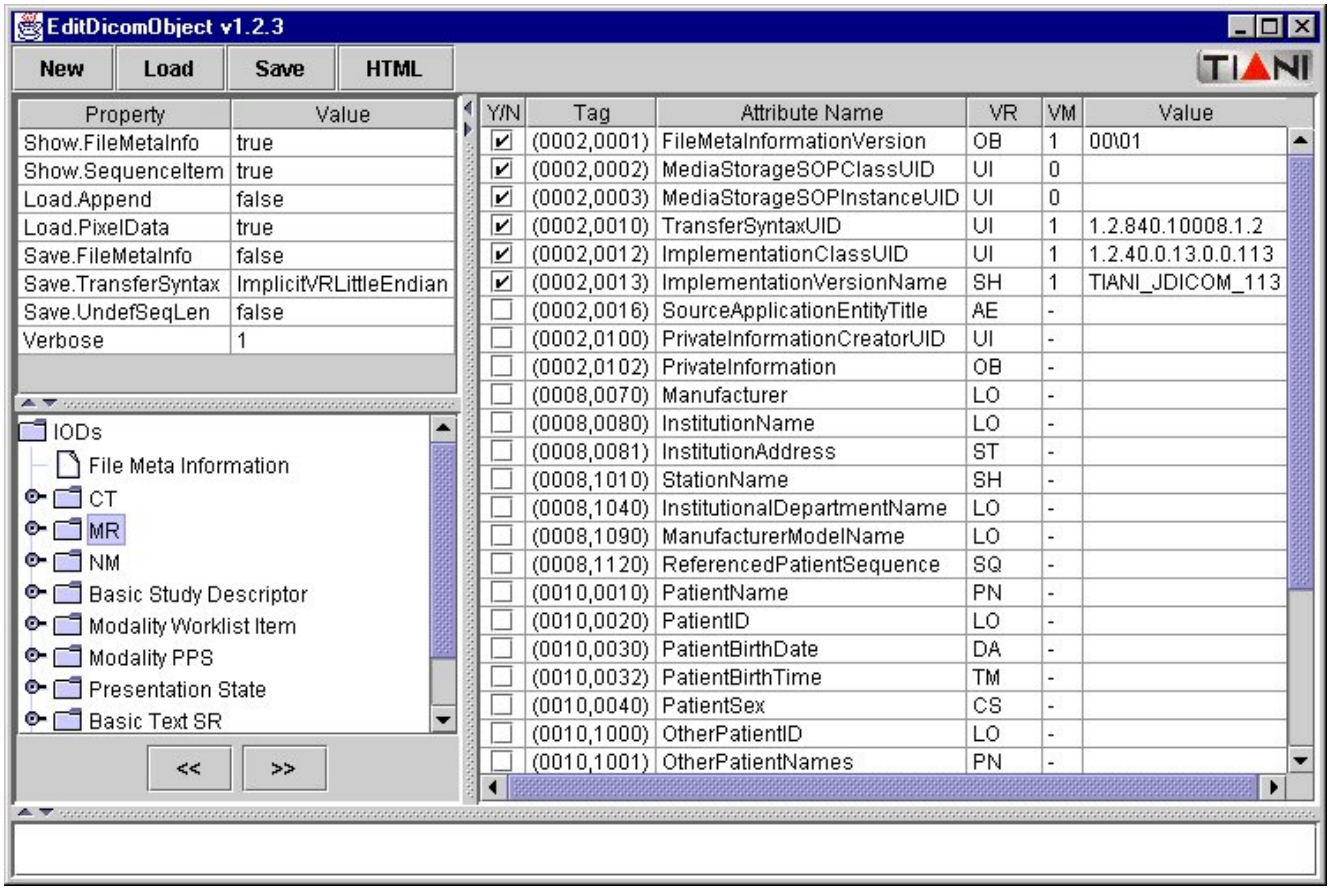
you can clear the Query Results tree.

EditDicomObjects

With the JDICOM application EditDicomObject you can create new or modify DICOM files. This files can be DICOM images, worklist entries or mpps files.

The JDICOM application EditDicomObjects runs with a graphical user interface (GUI). Select the entry 

in the JDicom menu.



Description of the following buttons: 

With the "**New**" button you can create a new DICOM file.
With "**Load**" you can load an existing DICOM file (image file or worklist file from JDICOM WL)
With "**Save**" you can save the modified file.
With "**HTML**" you can create a dump of the used DICOM tags from the loaded DICOM file in HTML format.

Note:
Check value of the Property "`Save.FileMetaInfo`".
If the Value entry of this property is "true" you have to fill out the following File Meta Information Tag:

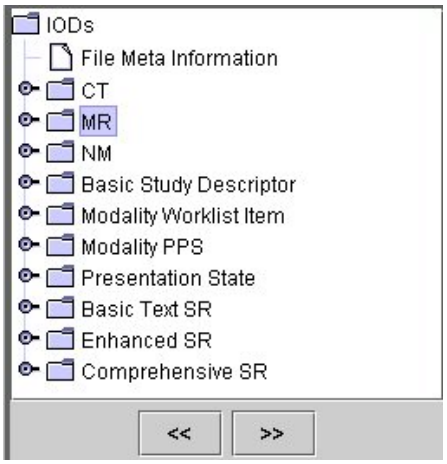
Tag	Attribute Name	VR	VM	Value
(0002,0012)	ImplementationClassUID	UI	1	nnn.nnn.nnn

If this entry isn't made you will get the error message "`com.archimed.dicom.DicomException: Missing ImplementationClassUID`" wen you try to save the file. In order to avoid this you can modify the value entry in the property "**`Save.FileMetaInfo`**" to **false**. This change can not be saved from the GUI EditDicomObjects. When you start the JDicom program EditDicomObjects the value for the tag "`Save.FileMetaInfo`" is set back to the original one. But there is a way to modify the tag by changing the value in the EditDicomObjects.properties file. You will find this file in the installation directory of JDicom. Use an text editor (e.g. notepad) in order to do the necessary modification. Contents of the "`EditDicomObjects.properties`" file.

```
#Properties for EditDicomObject
#Thu Jul 19 16:22:40 GMT+02:00 2001
Save.UndefSeqLen=false
Load.PixelData=true
Save.FileMetaInfo=true      (property which should be set to false)
Load.Append=false
Save.TransferSyntax=ImplicitVRLittleEndian
Show.FileMetaInfo=true
Show.SequenceItem=true
Verbose=1
```

Procedure how to insert or remove tags :

- Load the DICOM file into the EditDicomObjects editor
- Choose from the IOD's window the part which you want to insert



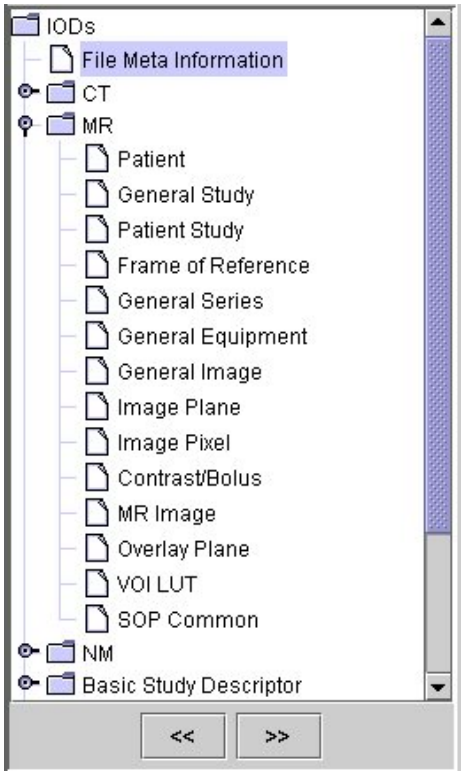
By double clicking on the folder icon of the IOD's tree you can expand the tree for the required selection (e.g. IOD's for MR). Use again the buttons

To add or to remove MR IOD's from the loaded DICOM file.

For inserting the tags select the entry in the IOD's tree with the mouse and use the 

button to add the tags. If you want to remove the tags, select first the entry in the IOD's tree and use the 

to remove the selected IOD's tag group.



For example if you want to add the group Patient from the IOD's MR you have to expand the folder MR in the IOD's tree select the entry "Patient" and use the add button 

to get the Patient MR IOD tags. You will get than the following output:

Y/N	Tag	Attribute Name	VR	VM	Value
☐	(0008,1120)	ReferencedPatientSequence	SQ	-	
☑	(0010,0010)	PatientName	PN	1	Hallo^Hallo
☐	(0010,0020)	PatientID	LO	-	
☐	(0010,0030)	PatientBirthDate	DA	-	
☐	(0010,0032)	PatientBirthTime	TM	-	
☐	(0010,0040)	PatientSex	CS	-	
☐	(0010,1000)	OtherPatientID	LO	-	
☐	(0010,1001)	OtherPatientNames	PN	-	
☐	(0010,2160)	EthnicGroup	SH	-	
☐	(0010,4000)	PatientComments	LT	-	

Select the tag which you want to use and instert the correct value. Automatically the tag gets marked with ✓ after confirming the made entry with the <ENTER> key on the keyboard.
For resetting the value remove the mark ✓ by clicking on it.

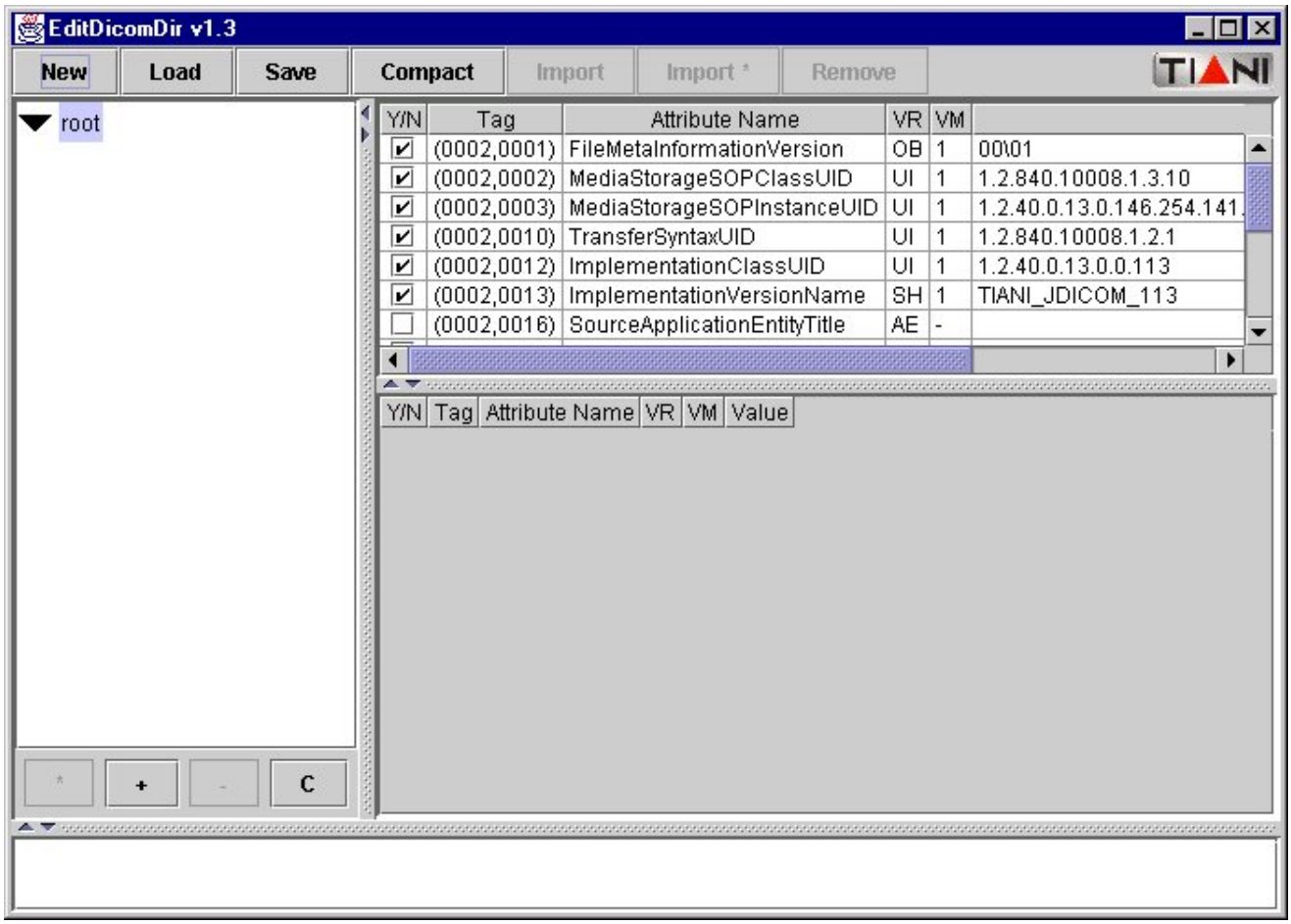
Note: **If you change or make an IOD entry you have to confirm it by pressing the <ENTER> key on your keyboard.**

If all changes were made on the DICOM file, save it.

EditDicomDir

The JDICOM application EditDicomDir runs with a graphical user interface (GUI). Select the entry 

in the JDicom menu.



Description of the buttons:

New	with the new button an empty DICOMDIR is generated, but not save to disc.
Load	with the load button you can load an existing DICOMDIR file into the JDICOM application EditDicomDir.
Save	with the save button you can save the DICOMDIR file to disc.

Example for a loaded DICOMDIR file: