

## Installation Guide

- DCM4CHEE
- OpenMRS
- Dvtk Modality Emulator
- Oviyam

## DCM4CHEE

- **Requirements** : A supported database must be installed for dcm4chee. The list of supported databases are,
  - PostgreSQL 8.1+
  - MySQL 4.1+
  - Oracle 9i+
  - SQL Server 2000+
  - DB2 8.1+
  - Firebird 2.1+

**Note:** This guide is based on MySql 5.5

<http://dev.mysql.com/downloads/mysql/>

- For detailed instructions on installing dcm4chee :  
<http://www.dcm4che.org/confluence/display/ee2/Installation>
- Download the binary distribution for dcm4chee from sourceforge and extract it : The below link is the binary for MySQL  
<http://sourceforge.net/projects/dcm4che/files/dcm4chee/2.17.1/dcm4chee-2.17.1-mysql.zip/download>
- Download the binary distribution package of JBoss Application Server 4.2.3.GA:  
<http://www.jboss.org/jbossas/downloads>
- Copy files from JBoss to dcm4chee:
  - Dcm4chee consists of components that run within the JBoss application server platform. This step will copy the JBoss runtime files to the dcm4chee directory.
  - Go to the dcm4chee-2.17.1-xxx/bin directory and execute the install\_jboss.bat or install\_jboss.sh script, as appropriate for your operating system, with the path of your JBoss as installation directory as a parameter.
  - For example:
  - `C:\apps\dcm4chee-2.17.1-psql\bin>install_jboss.bat`  
`c:\apps\jboss-4.2.3.GA`

- **Create the dcm4chee database**
- Create and initialize the dcm4chee database.
- The file `create.mysql` can be found at `<installation folder>/dcm4chee-<x.xx.x>-mysql/sql/create.mysql`, where `<x.xx.x>` is the dcm4chee version number.
- The file `create.mysql` contains SQL instructions that populate the database with empty tables.

```
> mysql -uroot -p<root password>

mysql> create database pacsdb;
mysql> grant all on pacsdb.* to 'pacs'@'localhost' identified by
'pacs';
mysql> \q
> mysql -upacs -ppacs pacsdb < create.mysql
```

- Change Port for dcm4chee WebApp (optional)
  - Default port on which dcm4chee webapp is deployed is 8080.
  - To avoid clashes with the OpenMRS server, it is recommended to change the port.
  - Go to `{install folder}\dcm4chee-2.17.1-mysql\server\default\deploy\jboss-web.deployer\server.xml`
  - Change the connector port tag from `port=8080` to a custom port.
  - **Note:** OpenMRS Standalone uses port 8081 by default.
  - **IMPORTANT: The module depends on the port that is set here for viewing images. The value used by the module is 8081 by default. If you choose to use any other free port, remember to change the port in**  
**OpenMRS→Administration→Settings→Radiology→Servers Port**  
**After saving the change in port value, you will need to restart the module.**  
 (See figures below)

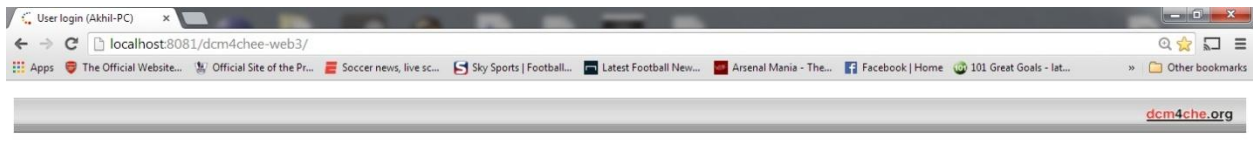
```
D:\Project\dc4chee\dc4chee-mysql\dc4chee-2.17.1-mysql\server\default\deploy\jboss-web.deployer\server.xml - Notepad++
File Edit Search View Encoding Language Settings Macro Run Plugins Window ?
pom.xml DcmOF.java Main.java openmms-runtime-properties L3 om2dcm.xml pom.xml server.xml
1 <Server>
2
3 <!--APR library loader. Documentation at /docs/apr.html -->
4 <Listener className="org.apache.catalina.core.AprLifecycleListener" SSLEngine="on" />
5 <!--Initialize Jasper prior to webapps are loaded. Documentation at /docs/jasper-howto.html -->
6 <Listener className="org.apache.catalina.core.JasperListener" />
7
8 <!-- Use a custom version of StandardService that allows the
9 connectors to be started independent of the normal lifecycle
10 start to allow web apps to be deployed before starting the
11 connectors.
12 -->
13 <Service name="jboss.web">
14
15 <!-- A "Connector" represents an endpoint by which requests are received
16 and responses are returned. Documentation at :
17 Java HTTP Connector: /docs/config/http.html (blocking & non-blocking)
18 Java AJP Connector: /docs/config/ajp.html
19 APR (HTTP/AJP) Connector: /docs/apr.html
20 Define a non-SSL HTTP/1.1 Connector on port 8080
21 -->
22 <Connector port="8081" address="{jboss.bind.address}"
23     maxThreads="250" maxHttpHeaderSize="8192"
24     emptySessionPath="true" protocol="HTTP/1.1"
25     enableLookups="false" redirectPort="8443" acceptCount="100"
26     connectionTimeout="20000" disableUploadTimeout="true" />
27
28 <!-- Define a SSL HTTP/1.1 Connector on port 8443
29 This connector uses the JSSE configuration, when using APR, the
30 connector should be using the OpenSSL style configuration
31 described in the APR documentation -->
32 <Connector port="8443" protocol="HTTP/1.1" SSLEnabled="true"
33     maxThreads="150" scheme="https" secure="true"
34     clientAuth="true" sslProtocol="TLS"
35     ciphers="SSL_RSA_WITH_NULL_SHA,TLS_RSA_WITH_AES_128_CBC_SHA"
36     keystoreFile="{jboss.server.home.dir}/conf/certificates/test_sys_1.p12"
37     keystorePass="secret" keystoreType="PKCS12"
38     truststoreFile="{jboss.server.home.dir}/conf/certificates/mesa_certs.jks"
39     truststorePass="secret" truststoreType="JKS"
40     SSLImplementation="org.dcm4chee.audit.tomcat.ATNImplementation"
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## Settings

[General Settings](#)  
[Application](#)  
[Auto Close Visits](#)  
[Basicmodule](#)  
[Concept](#)  
[Concept Drug](#)  
[Concept Map Type Management](#)  
[Concepts](#)  
[Dashboard](#)  
[Encounter Form](#)  
[Form Entry](#)  
[Formentry](#)  
[Graph](#)  
[Gzip](#)  
[HL 7 Archive](#)  
[HL 7 Processor](#)  
[Htlmformentry](#)  
[Layout](#)  
[Locale](#)  
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[Person](#)  
[Radiology](#)  
[Report](#)  
[Report Problem](#)  
[Reporting](#)  
[Reportingcompatibility](#)  
[Scheduler](#)  
[Search Widget](#)  
[Security](#)  
[Serialization](#)

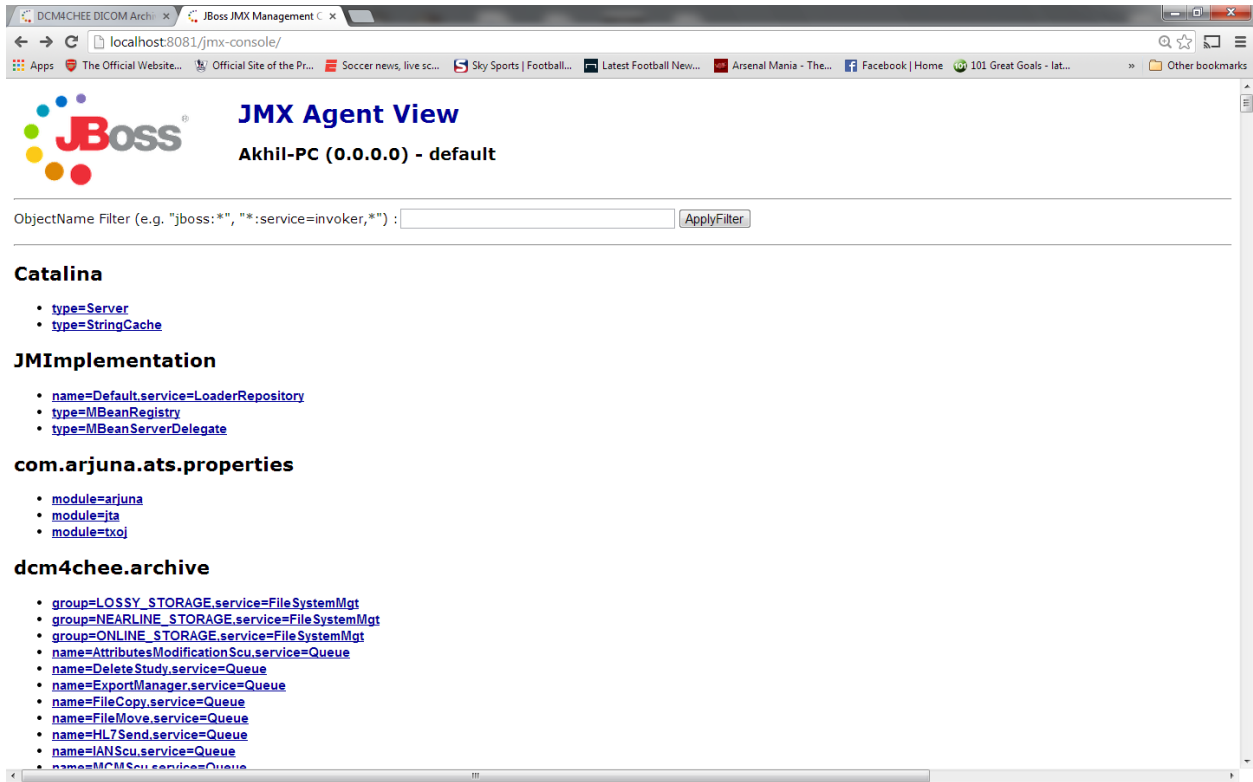
Application Entity Title Title for this application entity	<input type="text" value="RADIOLOGY_MODULE"/>
Application UID You need a application root UID, this will be the prefix of any module DICOM object, the default value serves for debugging purposes	<input type="text" value="1.2.826.0.1.3680043.8.2186"/>
Called Application Entity Title Default application entity for DCM4CHEE. Called Application Entity with respect to OpenMRS	<input type="text" value="DCM4CHEE"/>
Dev Mode On/Off. On to: 1. Set Provider or System developer (if provider does not have privileges) privileges to the roles created by the module	<input type="text" value="On"/>
Mpps Directory Directory for mpps entries	<input type="text" value="mpps"/>
Mwl Directory Directory for mwl entries. Ex: d:/tmp/mwl or /tmp/mwl	<input type="text" value="mwl"/>
Mwl Mpps Port Port of the DICOM MWL and MPPS server	<input type="text" value="11114"/>
Oviyam Local Server Name Local Server name needed for deploying Oviyam. Must match the local server name created in the Oviyam UI	<input type="text" value="oviyamlocal"/>
Servers Address IP address of the 2 DICOM servers	<input type="text" value="localhost"/>
Servers Port Port of the dcm4chee Web	<input type="text" value="8081"/>
Specific Character Set DICOM working character set	<input type="text" value="ISO-8859-1"/>
Storage Commitment Port Storage Commitment port that modality uses to confirm a storage of an image	<input type="text" value="11115"/>
Storage Directory Directory for DICOM objects	<input type="text" value="storage"/>
Storage Port Port of the DICOM storage server.	<input type="text" value="11116"/>
Study UID Slug Example: applicationUID+studyUIDSlug+orderId could be a study UID. The default value works!. Example values: 1.2, 1.1.1 (No start or end dots)	<input type="text" value="1"/>
<input type="button" value="Save"/> <input type="button" value="Cancel"/>	

- Note : For MAC Users,
  - Because there are no native codecs (compression/decompression) for these platforms, it is necessary to edit configuration to disable the loading of the native codecs. These platforms are not able to take advantage of compression/decompression. The only default loading of the codecs is in the WADO service. You can either edit the property within the JMX Console web user interface, or edit the configuration files directly.
- In {install folder}\dcm4chee-2.17.1-mysql\bin  
**Execute 'run.bat' to start the server ('run.sh' in Linux)**  
 (Ctrl-c to shut the server)
- Login to dcm4chee from a browser at <http://localhost:8081/dcm4chee-web3>
- Login credentials User:admin Password:admin



- **Setting Up Mpps Forwarding**

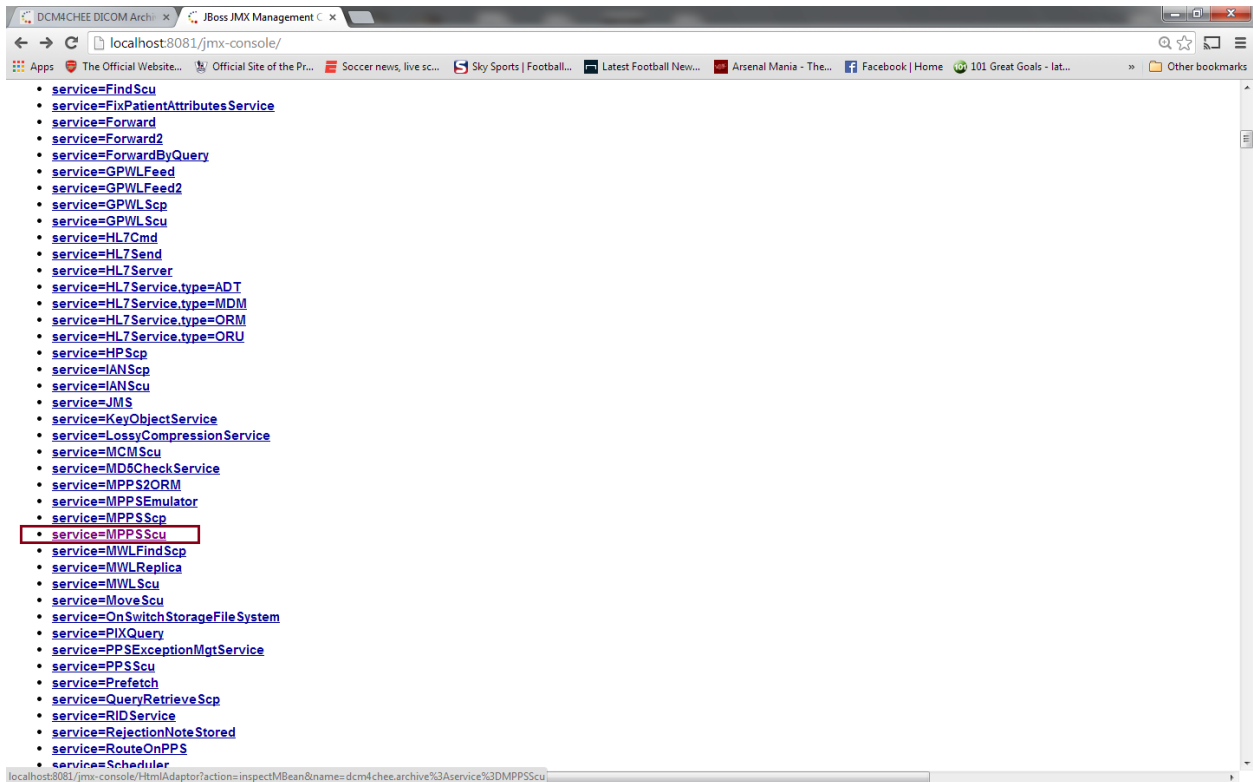
- In a new tab , open <http://localhost:8081/jmx-console/>



The screenshot shows the JBoss JMX Agent View interface in a web browser. The browser tabs include 'DCM4CHEE DICOM Archi...' and 'JBoss JMX Management C...'. The address bar shows 'localhost:8081/jmx-console/'. The page title is 'JBoss JMX Agent View' with the subtitle 'Akhil-PC (0.0.0.0) - default'. Below the title is an 'ObjectName Filter' input field with the placeholder text '(e.g. "jboss:\*", "\*:service=invoker,\*")' and an 'ApplyFilter' button. The main content area lists several categories of MBeans:

- Catalina**
  - type=Server
  - type=StringCache
- JMImplementation**
  - name=Default.service=LoaderRepository
  - type=MBeanRegistry
  - type=MBeanServerDelegate
- com.arjuna.ats.properties**
  - module=arjuna
  - module=jta
  - module=txoj
- dcm4chee.archive**
  - group=LOSSY\_STORAGE.service=FileSystemMgt
  - group=NEARLINE\_STORAGE.service=FileSystemMgt
  - group=ONLINE\_STORAGE.service=FileSystemMgt
  - name=AttributesModificationScu.service=Queue
  - name=DeleteStudy.service=Queue
  - name=ExportManager.service=Queue
  - name=FileCopy.service=Queue
  - name=FileMove.service=Queue
  - name=HL7Send.service=Queue
  - name=IANScu.service=Queue
  - name=MCMScu.service=Queue

- Search or navigate to 'service=MppsScu' and click on it



This screenshot shows the JBoss JMX Agent View interface after a search for 'service=MppsScu'. The browser tabs and address bar are the same as in the previous screenshot. The main content area now displays a list of MBeans, with 'service=MPPSScu' highlighted by a red box. The list includes:

- service=FindScu
- service=FixPatientAttributesService
- service=Forward
- service=Forward2
- service=ForwardByQuery
- service=GPWLFeed
- service=GPWLFeed2
- service=GPWLScp
- service=GPWLScu
- service=HL7Cmd
- service=HL7Send
- service=HL7Server
- service=HL7Service.type=ADT
- service=HL7Service.type=MDM
- service=HL7Service.type=ORM
- service=HL7Service.type=ORU
- service=HPScp
- service=IANScp
- service=IANScu
- service=JMS
- service=KeyObjectService
- service=LossyCompressionService
- service=MCMScu
- service=MDSCheckService
- service=MPPS2ORM
- service=MPPSEmulator
- service=MPPSScu
- service=MPPSScu
- service=MWLFindScp
- service=MWLReplica
- service=MWLScu
- service=MoveScu
- service=OnSwitchStorageFileSystem
- service=PIXQuery
- service=PPSExceptionMgtService
- service=PPSScu
- service=Prefetch
- service=QueryRetrieveScp
- service=RIDService
- service=RejectionNoteStored
- service=RouteOnPPS
- service=Scheduler

The URL in the browser's address bar is 'localhost:8081/jmx-console/HtmlAdaptor?action=inspectMBean&name=dcm4chee.archive%3Aservice%3DMPPSScu'.

- Goto the ForwardingRules section and enter the entry.

[calling!=RADIOLOGY\_MODULE]RADIOLOGY\_MODULE

And click apply changes at the bottom of the table.

MaximumPDULength	int	RW	16382	length for receiving PDUs.
TcpNoDelay	boolean	RW	<input checked="" type="radio"/> True <input type="radio"/> False	Send packets as quickly as possible (Disable Nagle algorithm).
SendBufferSize	int	RW	0	Buffer size used for socket output. 0 = use platform default.
ReceiveBufferSize	int	RW	0	Buffer size used for socket input. 0 = use platform default.
TLSConfigName	javax.management.ObjectName	RW	dcm4chee.archive.service: <a href="#">View MBean</a>	Used internally. Do NOT modify.
ForwardingRules	java.lang.String	RW	[calling!=RADIOLOGY_MODULE]RADIOLOGY_MODULE	<p>List of forwarding rules, dependent upon which application - identified by the Calling AE title - sent the MPPS. The comma separated list of AE titles after the (optional) condition defines the forwarding destination (the other MPPS SCP) by its Called AE Title.</p> <p>Syntax:</p> <pre>rules = ( rule { newline rule }   'NONE' ) (* 'NONE' = no forwarding *) rule = '[' 'calling' '[' ']' '=' 'from '[' ']' to from = aet { '[' ']' aet } (* calling AE titles *) to = aet { '[' ']' aet } (* destination AE titles *)</pre> <p>Example:</p> <pre>[calling!=ORDER_FILLER]ORDER_FILLER =&gt; Forwards received MPPS to ORDER_FILLER, except MPPS received from ORDER_FILLER</pre>
CallingAETitle	java.lang.String	RW	DCM4CHEE	Calling AE Title used in the Association Request.
Concurrency	int	RW	1	Maximum number of concurrent forwarded MPPS messages.
				<p>Number and intervals of retries for failed MPPS forward requests.</p> <p>Format:</p> <p>Comma separated list of <i>numberxinterval</i></p>

RetryIntervals	java.lang.String	RW	5x10s,5x1m,12x5m,24x1h	Number and intervals of retries for failed MPPS forward requests. Format: Comma separated list of <i>numberxinterval</i> pairs. The interval can be specified in seconds (##s), minutes (##m), hours (##h) or days (##d). Example: 5x1m,10x10m means retry a total of 5 times, one minute apart for each retry; then retry a total of 10 times, 10 minutes apart for each retry.
QueueName	java.lang.String	RW	MPPSScu	Used internally. Do NOT modify.
JMSServiceName	javax.management.ObjectName	RW	dcm4chee.archive.service: <a href="#">View MBean</a>	Used internally. Do NOT modify.
MppsScpServiceName	javax.management.ObjectName	RW	dcm4chee.archive.service: <a href="#">View MBean</a>	Used internally. Do not modify.

[Apply Changes](#)

**List of MBean operations:**

**void create()**  
Standard MBean lifecycle method  
[Invoke](#)

**void start()**  
The start lifecycle operation  
[Invoke](#)

**void stop()**

- **Adding Radiology Module AET to dcm4chee**

- Click on the “Application Entities” tab.
- Click on “New AET”
- Enter these details which are currently default in the module and click save.

- Title : RADIOLOGY\_MODULE
- Host : localhost {or ip of where OpenMRS is deployed }
- Port : 11114



DCM4CHEE DICOM Archi x

localhost:8081/dcm4chee-web3/?wicketinterface=:0:::

Apps The Official Website... Official Site of the Pr... Soccer news, live sc... Sky Sports | Football... Latest Football New... Arsenal Mania - The... Facebook | Home 101 Great Goals - lat... Other bookmarks

Folder Trash Application Entities Modality Worklist Teaching-Files Dashboard Roles Users Password

AEs AE Groups Logout (admin) Choose One dcm4chee.org

New AET Filter by:

Title	Type	Host	Port	Description	TLS	MPPS	Station name	Institution	Department
CDRECORD		localhost	10104	Media Creation Server (part of dcm4chee)	<input type="checkbox"/>	<input type="checkbox"/>			
DCM4CHEE		localhost	11112	This dcm4chee archive instance	<input type="checkbox"/>	<input type="checkbox"/>			
RADIOLOGY_MODULE	-	localhost	11114		<input type="checkbox"/>	<input type="checkbox"/>		OpenMRS	

DCM4CHEE DICOM Archi x

localhost:8081/dcm4chee-web3/?wicketinterface=:0:::

Apps The Official Website... Official Site of the Pr... Soccer news, live sc... Sky Sports | Football... Latest Football New... Arsenal Mania - The... Facebook | Home 101 Great Goals - lat... Other bookmarks

Folder Trash

AEs AE Groups

New AET Filter

Edit AET

Title: RADIOLOGY\_MODULE

Type: -

Hostname: localhost

Port: 11114

Ciphersuite #1: -

Ciphersuite #2: -

Ciphersuite #3: -

Description:

Issuer of Patient ID:

Issuer of Accession Number:

Filesystem Group ID:

Wado URL:

User Id: admin

Password: \*\*\*\*\*

Station Name:

Institution: OpenMRS

Department:

Installed: ☐

Emulate MPPS: ☐

Delay time for MPPS emulation:

Save Cancel Echo

## Notes about DCM4CHEE

- The default screens in the image archive and Worklist tabs are always empty.
- You will need to run a search to pull up relevant results.
- A search with no parameters will pull all the entries in the database.
- Resetting the search parameter and running the search will retrieve all entries.

DCM4CHEE DICOM Arch

localhost:8081/dcm4chee-web3/

Apps The Official Website... Official Site of the Pr... Soccer news, live sc... Sky Sports | Football... Latest Football New... Arsenal Mania - The... Facebook | Home 101 Great Goals - lat... Other bookmarks

Folder Trash Application Entities Modality Worklist Teaching-Files Dashboard Roles Users Password

Logout (admin) Choose One dcm4chee.org

**Search**

Patient Name Patient ID Issuer Study Date from to Accession No

Phonetic

Modality Source AET

Exact search

Latest studies first

Search for Study Expand To auto Reset Search

Pagsize 10 Delete Move Export

Show column titles

Patient Name	Patient ID/Issuer	Birth Date	Sex	Comments		
Study Date/Time	Study ID	Accession No	Modality	Description	#S/#I	Availability

DCM4CHEE DICOM Archi x

localhost:8081/dcm4chee-web3/

Apps The Official Website... Official Site of the Pr... Soccer news, live sc... Sky Sports | Football... Latest Football New... Arsenal Mania - The... Facebook | Home 101 Great Goals - lat... Other bookmarks

Folder Trash Application Entities Modality Worklist Teaching-Files Dashboard Roles Users Password

Logout (admin) Choose One dcm4chee.org

**Search**

Patient Name Patient ID Issuer Study Date to Accession No

Phonetic

Modality Source AET

Exact search

Latest studies first

Search for Study Expand To auto Reset Search

Pagesize 10 Study 1 to 5 of 5

Delete Move Export

Show column titles

Patient Name	Patient ID/Issuer	Birth Date	Sex	Comments			
Study Date/Time	Study ID	Accession No	Modality	Description	#S/#I	Availability	
Akhil^Ravindran	200-6	10/7/1987	M	Demonstration Patient for enhanced XA testing activities!			
9/27/2013 22:35	UNKNOWN		CR	Echocardiogram	1/1	ONLINE	
9/27/2013 22:45	UNKNOWN		XA	Echocardiogram	1/1	ONLINE	
enhanced XA^Test^^Siemens	SMSenhXAtest200906	11/4/1958	M	Demonstration Patient for enhanced XA testing activities!			
6/2/2009 15:59	090602enhXAAdemo1	20090602SMSenhXA	XA	derived enhXA3D from enhXA rotational Acq1/1		ONLINE	
MR/BRAIN/GRASE/1024	7	1/1/1901	M				
3/30/1995 15:08	191		MR	BRAIN	1/1	ONLINE	
Rubo DEMO	123-45-6789	10/16/1923	F				
3/23/1994 11:51	027893462		US	Echocardiogram	1/1	ONLINE	

DCM4CHEE DICOM Archi x

localhost:8081/dcm4chee-web3/

Apps The Official Website... Official Site of the Pr... Soccer news, live sc... Sky Sports | Football... Latest Football New... Arsenal Mania - The... Facebook | Home 101 Great Goals - lat... Other bookmarks

Folder Trash Application Entities Modality Worklist Teaching-Files Dashboard Roles Users Password

Logout (admin) Choose One dcm4chee.org

**Search**

Patient name Patient ID Issuer Start Date to Accession No

Phonetic

Modality Station AET Station Name Status

Latest items first

Reset Search

Pagesize 10

Patient Name	Birthdate	SPS Description	Modality	SPS Status	Start date	Station AET	Station Name	Accession number
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DCM4CHEE DICOM Archi...

localhost:8081/dcm4chee-web3/

AppsThe Official Website...Official Site of the Pr...Soccer news, live sc...Sky Sports | Football...Latest Football New...Arsenal Mania - The...Facebook | Home101 Great Goals - lat...Other bookmarks

FolderTrashApplication EntitiesModality WorklistTeaching-FilesDashboardRolesUsersPassword

Logout (admin)Choose One▼dcm4chee.org

Search

Patient name

Patient Name

Phonetic

Patient ID

Issuer

Start Date

from

to

Accession No

Modality

Station AET

Station Name

Status

Latest items first

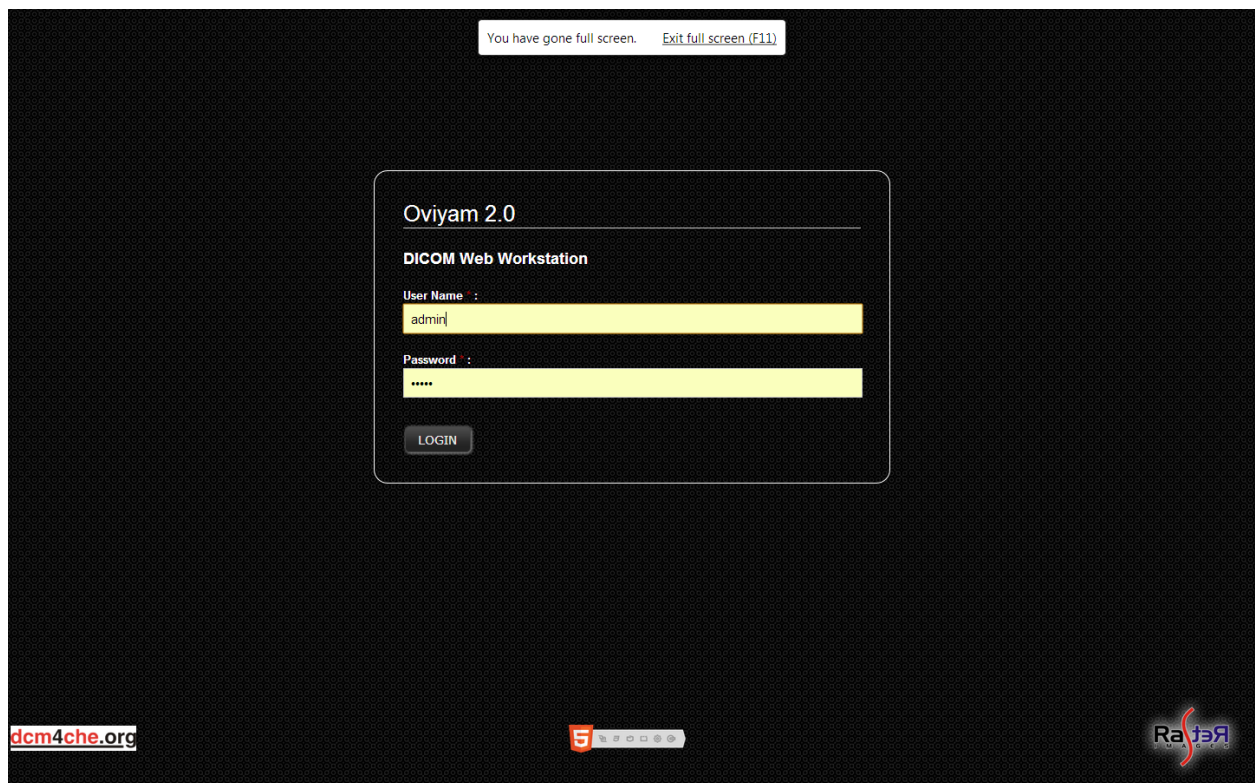
ResetSearch

Pagesize10▼Entry 1 to 3 of 3

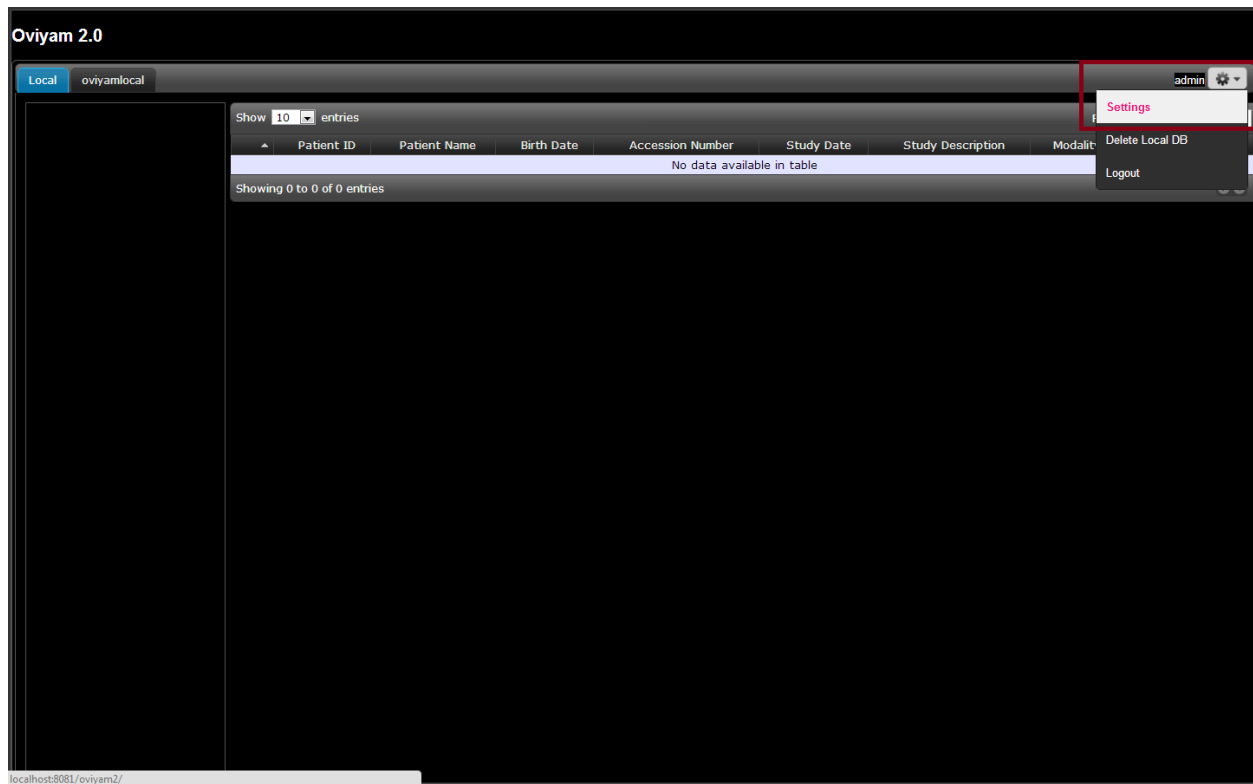
Patient Name	Birthdate	SPS Description	Modality	SPS Status	Start date	Station AET	Station Name	Accession number
Akhil^Ravindran	10/7/1987	test ct	CR	COMPLETED	9/27/2013 00:00	UNKOWN	UNKOWN	
Akhil^Ravindran	10/7/1987	test xa	XA	COMPLETED	9/27/2013 00:00	UNKOWN	UNKOWN	
Mr.^John^D^^Patient	1/1/1975	asdfg	MR	DISCONTINUED	9/27/2013 00:00	UNKOWN	UNKOWN	

## Oviyam

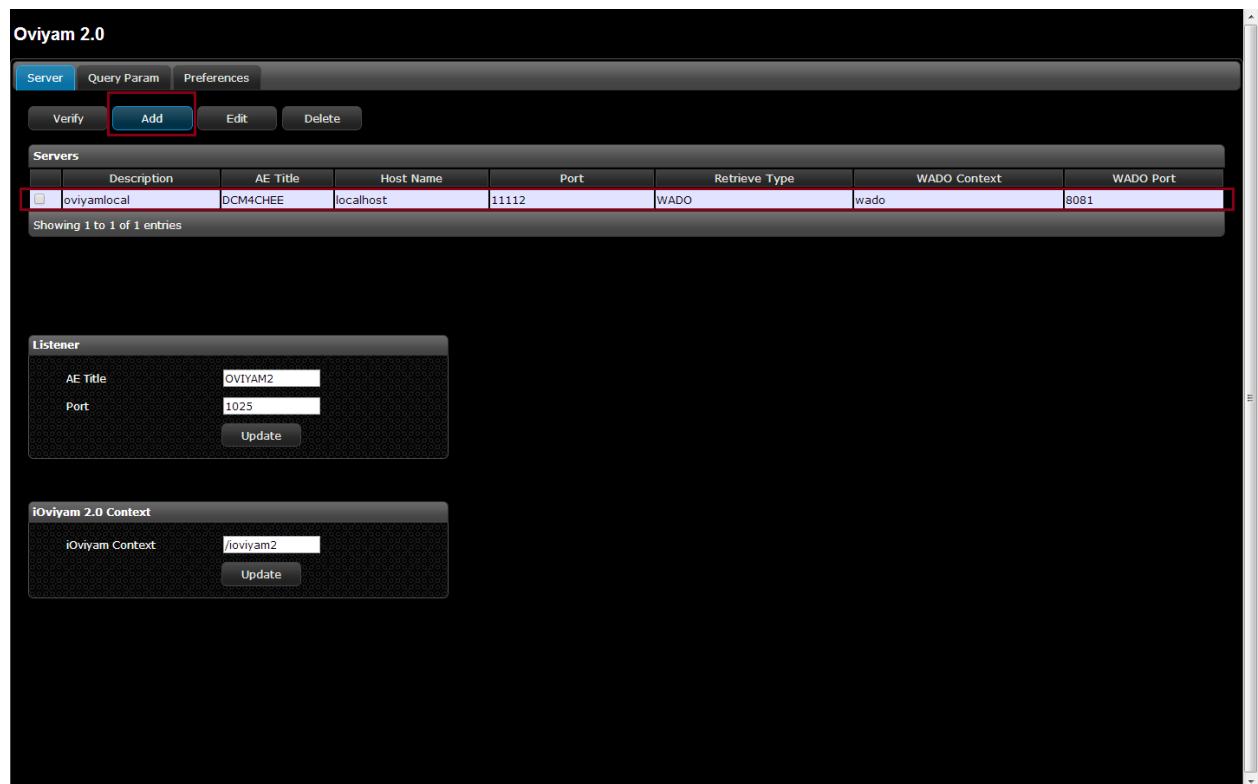
- Download the package from <http://sourceforge.net/projects/dcm4che/files/Oviyam/2.0/Oviyam-2.0-bin.zip/download>
- Extract the package and copy the war file in to `{install folder}\dcm4chee-2.17.1-mysql\server\default\deploy\`
- Restart or start the server.
- Oviyam can be viewed directly through the link <http://localhost:8081/oviyam2/>
- The login credentials are the same as dcm4chee  
User : admin Password: admin



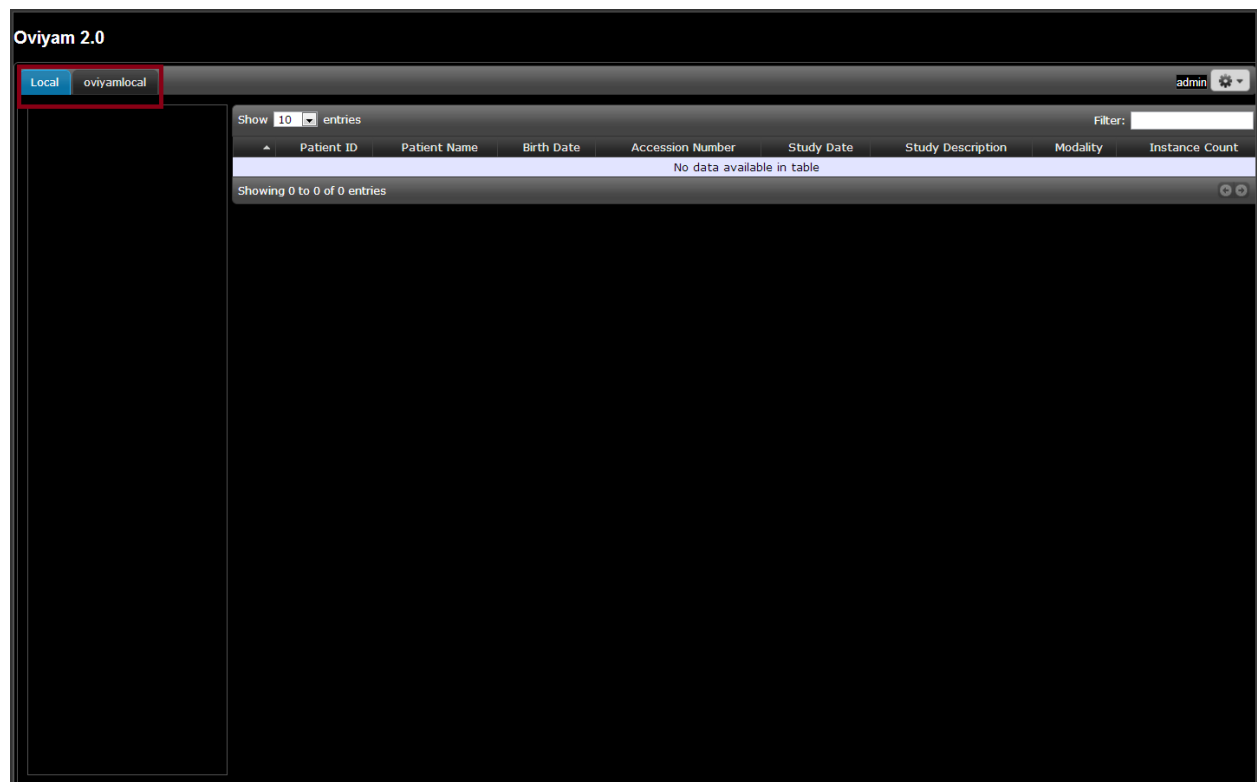
- Go to the Admin→ Settings



- Add the dcm4chee server configuration.
  - Description : oviyamlocal
  - AETitle: DCM4CHEE
  - Host: localhost {It is on the same ip address as dcm4chee}
  - Port: 11112
  - Retrieve Type :WADO
  - WADO Context: wado
  - WADO Port: 8081 {same as the dcm4chee-web3 port}
- Click the save button on the right and click Verify to check if all the settings are correct, if they are correct a green popup will display showing the verification was successful.



- The Home screen for oviyam should display the new server.



- Click on the “oviyamlocal” tab and run an empty search(if there are any images).

Oviyam 2.0

Today CT

Local

oviyamlocal

admin

Search

Patient ID

Patient Name

Accession Number

Birth Date

Study Description

Study Date (From)

Study Date (to)

Referring Physician

Modality

ALL

Search

Reset

Filter:

	Patient ID	Patient Name	Date of Birth	Accession #	Study Date	Study Description	Modality	Instance Count
✓	200-6	Akhil^Ravindran	19871007		27/09/2013 22:45:47	Echocardiogram	XA	1
✓	200-6	Akhil^Ravindran	19871007		27/09/2013 22:35:27	Echocardiogram	CR	1
✓	SMSenhXAtest200906	enhanced XA^Test^Siemens	19581104	20090602SMSenhXA	02/06/2009 15:59:48	derived enhXA3D from enhXA rotational Acq	XA	1
✓	7	MR/BRAIN/GRASE/1024	19010101		30/03/1995 15:08:29	BRAIN	MR	1
✓	123-45-6789	Rubo DEMO	19231016		23/03/1994 11:51:04	Echocardiogram	US	1

Showing 1 to 5 of 5 entries



## OpenMRS Installation Notes

- OpenMRS Standalone package comes with tomcat and mysql prepackaged.
- If installing Tomcat and MySql manually, these are some notes useful to help setup the environment quickly.

### Tomcat Notes

#### ### On Linux ###

##### #Install via Debian package on Ubuntu

```
sudo apt-get install tomcat6
```

```
sudo apt-get install tomcat6-admin
```

```
#Add users and their roles to tomcat-users.xml
```

```
sudo vi /etc/tomcat/tomcat-users.xml
```

```
<user name="admin" password="admin" roles="tomcat,admin,manager,manager-gui"/>
```

```
#Turn off the Tomcat security flag
```

```
sudo vi /etc/init.d/tomcat6
```

```
TOMCAT6_SECURITY=no ##from yes to no
```

```
#Change ownership and permission for CATALINA_HOME and CATALINA_BASE
```

```
sudo chgrp -R tomcat6 /etc/tomcat6
```

```
sudo chmod -R g+w /etc/tomcat6
```

```
sudo chgrp -R tomcat6 /var/lib/tomcat6 # CATALINA_BASE
```

```
sudo chmod -R g+w /var/lib/tomcat6
```

```
#Create and provide appropriate permissions for OpenMRS properties folder in  
CATALINA_HOME
```

```
sudo mkdir /usr/share/tomcat6/.OpenMRS
```

```
sudo chown -R tomcat6:root /usr/share/tomcat6/.OpenMRS
```

```
#Restart the server
```

```
sudo /etc/init.d/tomcat6 restart
```

##### #Install manually from package

```
#Download the zip archive of Tomcat 6.0.29
```

```
#Unpack the zip file to a suitable location such as /opt on Linux or /Library on Mac OSX
```

```
# Add ownership and provide permissions for appropriate folders
```

```
sudo useradd tomcat6
```

```
cd /opt
```

```
sudo tar zxvf apache-tomcat-6.0.29.tar.gz
```

```
sudo ln -s apache-tomcat-6.0.29 tomcat6
```

```
sudo chown tomcat6.tomcat6 apache-tomcat-6.0.29
```

```
#Add users and their roles to tomcat-users.xml
```

```
sudo vi /etc/tomcat/tomcat-users.xml
```

```
<user name="admin" password="admin" roles="tomcat,admin,manager,manager-gui"/>
```

#### ### Useful Linux commands ###

```
sudo find / -name . "openmrs-runtime.properties"
```

```
netstat -tap
```

```
netstat -tln
```

---

---

#### ### On Windows ###

```
#Use the Windows installer to install tomcat
```

```
#User access control may restrict reading and writing of new files by the server
```

```
#To get around this, run the server as an administrator by Right Click on Tomcat-->Run as Administrator
```

```
#Or Run-->MSCONFIG-->Tools-->Disable UAP-->Launch
```

---

---

#### ### Deploy OpenMRS ###

```
#Add OpenMRS in tomcat manager
```

```
http://localhost:8080/manager/html
```

```
## Upload OpenrMRS.war
```

```
#Run OpenMRS and upload module
```

```
http://localhost:8080/openmrs/index.htm
```

## Mysql Notes

#### ### On Linux ###

```
#Install using debian package
```

```
sudo apt-get install mysql-server
```

```
#Configure root password
```

```
# Stop/Start/Restart Mysql
```

```
sudo /etc/init.d/mysql start/stop/restart
```

---

---

#### ### On Windows ###

```
#Use default windows installer and configure root password
```

## OpenMRS Radiology Module

- Install the Radiology Module OMOD
- In the Administration Page,
  - There will be a new section called Radiology Module.
  - Manage Radiology Orders :
    - Allows you to add orders.
    - View all Radiology orders in the system.
    - Edit orders.
    - Reading Physicians can view Completed orders with links to launch image viewer.
    - Reading physicians can add observation on the radiology study performed.
  - Configuration and Initialization(Optional: Need not be used if the module started correctly)
    - If module started correctly, a new Order Type called 'Radiology' can be found in Administration→Orders→Manage Order Types
    - If module started correctly, new Roles called 'Scheduler', 'Performing Physician', 'Reading Physician', 'Referring Physician' can be found in Administration→Users→Manage Roles
    - If not, Click on the "Create Radiology Order Type and Roles required by the module" link.
    - If new user needs to be created, Click on the "Create Dummy Users" link.

## Administration

### Users

[Manage Users](#)  
[Manage Roles](#)  
[Manage Privileges](#)  
[Manage Alerts](#)

### Patients

[Manage Patients](#)  
[Manage Tribes](#)  
[Find Patients to Merge](#)  
[Manage Identifier Types](#)

### Person

[Manage Persons](#)  
[Manage Relationship Types](#)  
[Manage Person Attribute Types](#)

### Visits

[Manage Visit Types](#)  
[Manage Visit Attribute Types](#)  
[Configure Visits](#)

### Encounters

[Manage Encounters](#)  
[Manage Encounter Types](#)  
[Manage Encounter Roles](#)

### Providers

[Manage Providers](#)  
[Manage Provider Attribute Types](#)

### Locations

[Manage Locations](#)  
[Manage Location Tags](#)  
[View Location Hierarchy](#)  
[Manage Location Attribute Types](#)  
[Manage Layout](#)

### Observations

[Manage Observations](#)

### Orders

[Manage Orders](#)

### Concepts

[View Concept Dictionary](#)  
[Manage Concept Drugs](#)  
[Manage Proposed Concepts](#)  
[Update Concept Index](#)  
[Manage Concept Classes](#)  
[Manage Concept Datatypes](#)  
[Manage Concept Sources](#)  
[Manage Concept Stop Word](#)  
[Manage Reference Terms](#)

### Forms

[Manage Forms](#)  
[Manage Fields](#)  
[Manage Field Types](#)  
[Merge Duplicate Fields](#)

### HL7 Messages

[Manage HL7 Sources](#)  
[Manage Queued Messages](#)  
[Manage Held Messages](#)  
[Manage HL7 Errors](#)  
[Manage HL7 Archives](#)  
[Migrate HL7 Archives](#)

### Maintenance

[Set Implementation Id](#)  
[System Information](#)  
[Audit Patient Identifiers](#)  
[View Quick Reports](#)  
[Settings](#)  
[Advanced Settings](#)  
[View Server Log](#)  
[View Database Changes](#)  
[Manage Locales And Themes](#)  
[View Logged In Users](#)

### Modules

[Manage Modules](#)  
[Module Properties](#)

### Logic Module

[Token Registration](#)  
[Rule Definitions](#)  
[Test Logic Expressions](#)  
[Initial Set-Up](#)

### HTML Form Entry

[Manage HTML Forms](#)  
[Preview HTML Form from File](#)

### REST Web Services

[Settings](#)  
[Test](#)  
[Help](#)

### Basic Module

[basicmodule.replace.this.link.name](#)

### Radiology Module

[Configuration and initialization](#)  
[Manage Radiology Orders](#)

[Admin](#) | [Manage Radiology Orders](#)

## Configuration and initialization

[Create radiology order type and roles required by the module](#)  
[Create dummy users \(Optional\)](#)

Saving :

MWL entries in: C:\OpenMRS1.9.x\openmrs-core\webapp\mwml  
 MPPS entries in: C:\OpenMRS1.9.x\openmrs-core\webapp\mppps  
 DICOM image objects in: C:\OpenMRS1.9.x\openmrs-core\webapp\storage

## Xebra WADO Server initialization

1. [Create SCP](#)
2. [Create AE](#)

- Goto Administration→Maintenance→Settings→Radiology
  - **Application Entity Title** is the application entity title of the radiology module which is used by dcm4chee to forward status updates of various studies (radiology orders). This has to be identical to the Application Entities mentioned in the Application Entities Console of the dcm4chee Web Application. It should also be the Application Entity mentioned in the forwarding rules of the MPPSScu service in the JMX-Console.
  - **Called Application Entity Title** is the application entity title of dcm4chee which is used for communication which is DCM4CHEE by default.
  - **Mwl MPPS Port** is the port the Radiology Module is listening to for status updates from dcm4chee.
  - **Oviyam Local Server Name** is the 'Server Description' of the dcm4chee server in Oviyam's settings. This has to be identical to the entry in the oviyam settings as its used to build the URL to view the image.
  - **Servers Address** is the ip address of the dcm4chee server. 'localhost' is the default value.
  - **Servers Port** is the port in which the web application of dcm4chee is accessed. This is the port through which images is accessed.
- **If any of the settings are changed in Radiology Settings, the module needs to be restarted for the new settings to take effect.**

Users

[Manage Users](#)  
[Manage Roles](#)  
[Manage Privileges](#)  
[Manage Alerts](#)

Patients

[Manage Patients](#)  
[Manage Tribes](#)  
[Find Patients to Merge](#)  
[Manage Identifier Types](#)

Person

[Manage Persons](#)  
[Manage Relationship Types](#)  
[Manage Person Attribute Types](#)

Visits

[Manage Visit Types](#)  
[Manage Visit Attribute Types](#)  
[Configure Visits](#)

Encounters

[Manage Encounters](#)  
[Manage Encounter Types](#)  
[Manage Encounter Roles](#)

Providers

[Manage Providers](#)  
[Manage Provider Attribute Types](#)

Locations

[Manage Locations](#)  
[Manage Location Tags](#)  
[View Location Hierarchy](#)  
[Manage Location Attribute Types](#)  
[Manage Layout](#)

Observations

[Manage Observations](#)

Orders

[Manage Orders](#)  
[Manage Drug Orders](#)  
[Manage Order Types](#)

Scheduler

[Manage Scheduler](#)

Programs

Concepts

[View Concepts](#)  
[Manage Concepts](#)  
[Manage Proposed Concepts](#)  
[Update Concept Index](#)  
[Manage Concept Classes](#)  
[Manage Concept Datatypes](#)  
[Manage Concept Sources](#)  
[Manage Concept Stop Word](#)  
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[Manage Forms](#)  
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HL7 Messages

[Manage HL7 Sources](#)  
[Manage Queued Messages](#)  
[Manage Held Messages](#)  
[Manage HL7 Errors](#)  
[Manage HL7 Archives](#)  
[Migrate HL7 Archives](#)

Maintenance

[Set Implementation Id](#)  
[System Information](#)  
[Audit Patient Identifiers](#)  
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[Settings](#)  
[Advanced Settings](#)  
[View Server Log](#)  
[View Database Changes](#)  
[Manage Locales And Themes](#)  
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Modules

[Manage Modules](#)  
[Module Properties](#)

Logic Module

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[Rule Definitions](#)  
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[Initial Set-Up](#)

HTML Form Entry

[Manage HTML Forms](#)  
[Preview HTML Form from File](#)

REST Web Services

[Settings](#)  
[Test](#)  
[Help](#)

Basic Module

[basicmodule.replace.this.link.name](#)

Radiology Module

[Configuration and initialization](#)  
[Manage Radiology Orders](#)

You have gone full screen. [Exit full screen \(F11\)](#)

[Admin](#) | [Set Implementation Id](#) | [System Information](#) | [Audit Patient Identifiers](#) | [View Quick Reports](#) | **[Settings](#)** | [Advanced Settings](#) | [View Server Log](#) | [View Database Changes](#) | [Manage Locales And Themes](#) | [View Logged In Users](#)

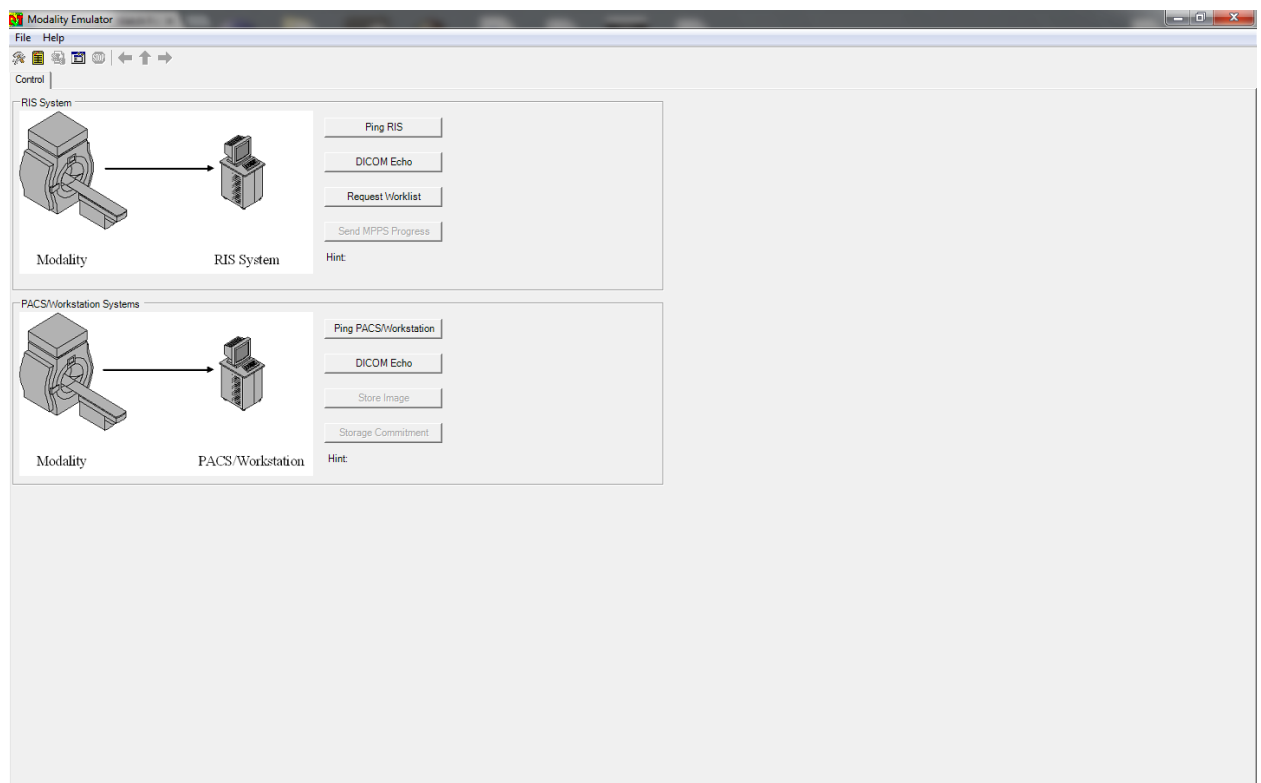
## Settings

- [General Settings](#)  
[Application](#)  
[Auto Close Visits](#)  
[Basicmodule](#)  
[Concept](#)  
[Concept Drug](#)  
[Concept Map Type Management](#)  
[Concepts](#)  
[Dashboard](#)  
[Encounter Form](#)  
[Form Entry](#)  
[Formentry](#)  
[Graph](#)  
[Gzip](#)  
[HL 7 Archive](#)  
[HL 7 Processor](#)  
[Htmlformentry](#)  
[Layout](#)  
[Locale](#)  
[Location](#)  
[Log](#)  
[Logic](#)  
[Mail](#)  
[New Patient Form](#)  
[Obs](#)  
[Patient](#)  
[Patient Identifier](#)  
[Patient Search](#)  
[Person](#)  
**[Radiology](#)**  
[Report](#)  
[Report Problem](#)  
[Reporting](#)  
[Reportingcompatibility](#)  
[Scheduler](#)  
[Search Widget](#)  
[Security](#)  
[Serialization](#)  
[Use Patient Attribute](#)  
[User](#)  
[Visits](#)  
[Webservices](#)  
[Xforms](#)

Application Entity Title Title for this application entity	<input type="text" value="RADIOLOGY_MODULE"/>
Application UID You need a application root UID, this will be the prefix of any module DICOM object, the default value serves for debugging purposes	<input type="text" value="1.2.826.0.1.3680043.8.2186"/>
Called Application Entity Title Default application entity for DCM4CHEE. Called Application Entity with respect to OpenMRS	<input type="text" value="DCM4CHEE"/>
Dev Mode On/Off. On to: 1. Set Provider or System developer (if provider does not have privileges) privileges to the roles created by the module	<input type="text" value="On"/>
Mpps Directory Directory for mpps entries	<input type="text" value="mpps"/>
Mwl Directory Directory for mwl entries. Ex: d:/tmp/mwl or /tmp/mwl	<input type="text" value="mwl"/>
Mwl Mpps Port Port of the DICOM MWL and MPPS server	<input type="text" value="11114"/>
Oviyam Local Server Name Local Server name needed for deploying Oviyam. Must match the local server name created in the Oviyam UI	<input type="text" value="oviyamlocal"/>
Servers Address IP address of the 2 DICOM servers	<input type="text" value="localhost"/>
Servers Port Port of the dcm4chee Web	<input type="text" value="8081"/>
Specific Character Set DICOM working character set	<input type="text" value="ISO-8859-1"/>
Storage Commitment Port Storage Commitment port that modality uses to confirm a storage of an image	<input type="text" value="11115"/>
Storage Directory Directory for DICOM objects	<input type="text" value="storage"/>
Storage Port Port of the DICOM storage server.	<input type="text" value="11116"/>
Study UID Slug Example: applicationUID+studyUIDSlug+orderId could be a study UID. The default value works!. Example values: 1.2, 1.1.1 (No start or end dots)	<input type="text" value="1"/>
<div><div>Save</div><div>Cancel</div></div>	

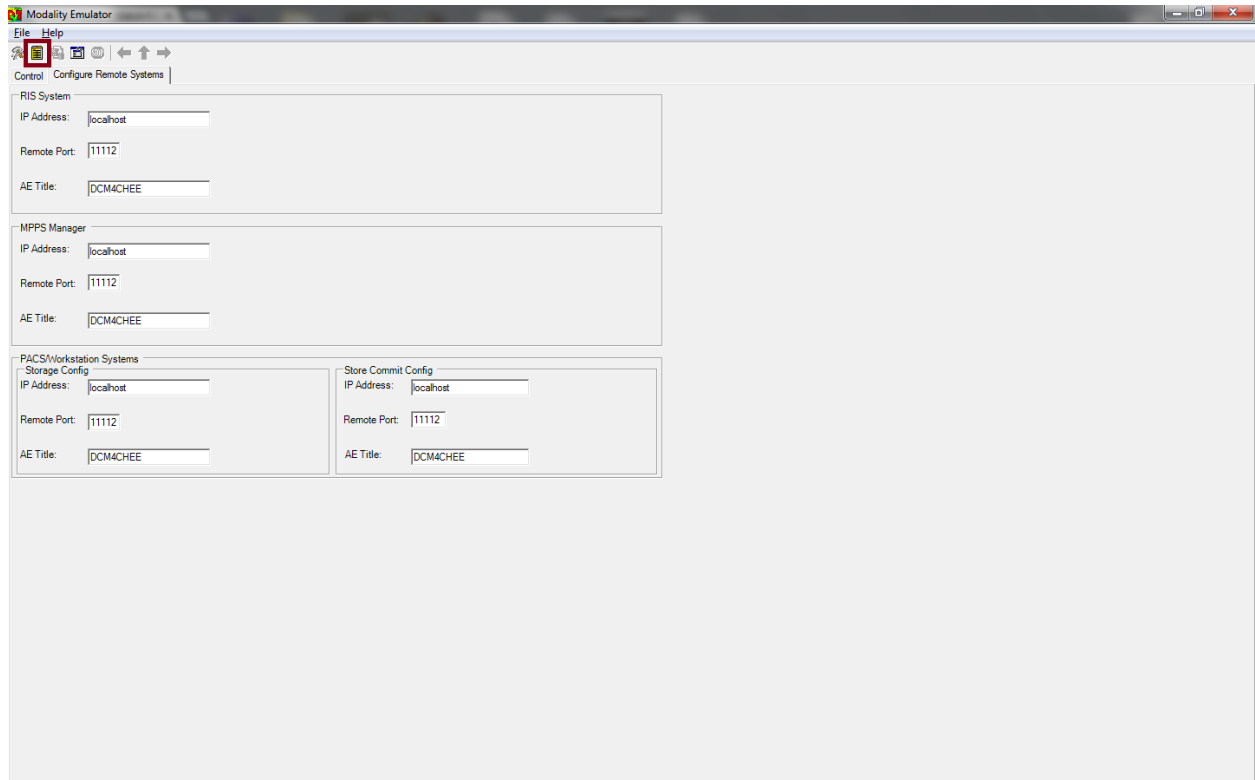
# Dvtk Modality Emulator

- Install the Modality Emulator from this link.  
<http://dicom.dvtk.org/modules/wiwimod/index.php?page=Download+Modality+Emulator&menu=downloads>
- **IMPORTANT:** Install the DICOM definition files from this link before you run the emulator.  
<http://dicom.dvtk.org/modules/wiwimod/index.php?page=Download+DICOM+Definition+Files>
- Run the emulator(there should be an icon for modality emulator in the start menu).
- **IMPORTANT :** In the emulator, a file or setting is selected if the value is highlighted.



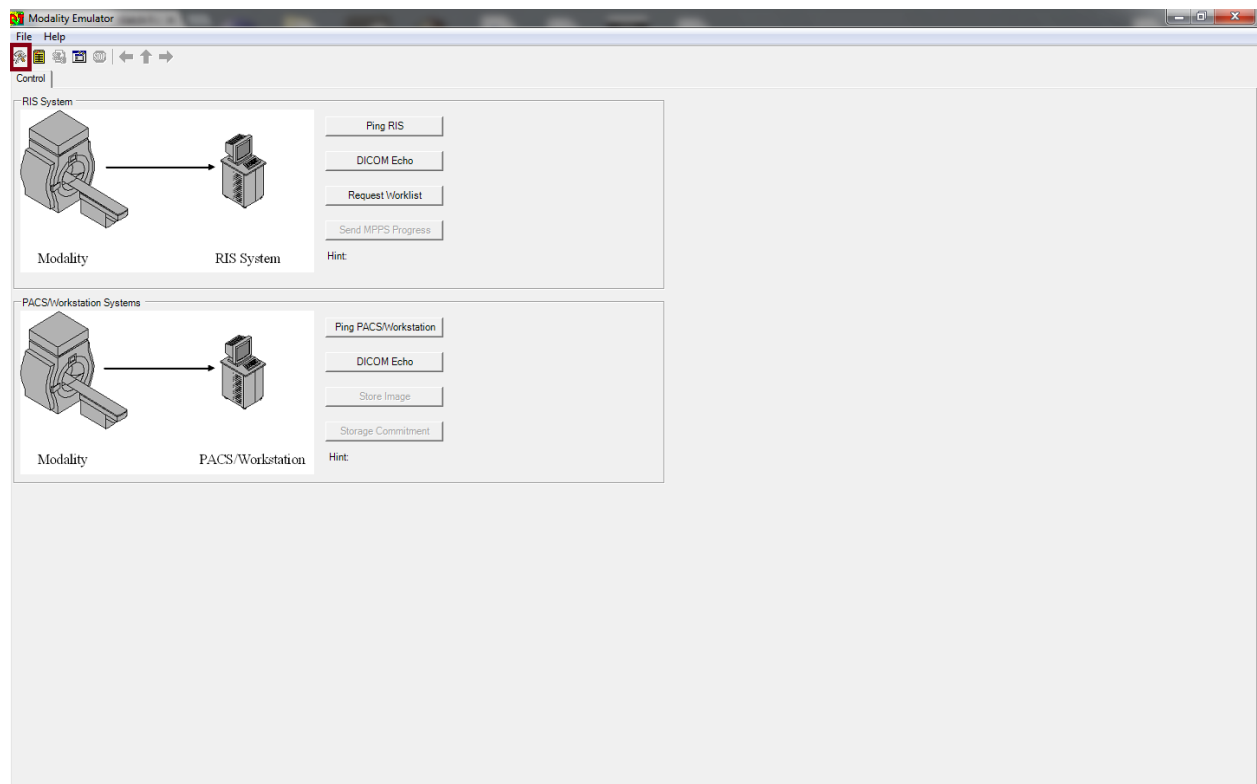
## Configure the Emulator

- Click on the “Configure Remote Systems Button.”
  - The IP Address, Remote Port and AE Title are the same for all the different systems.
  - IP Address : localhost (or ip of dcm4chee server)
  - Remote Port : 11112
  - AE Title : DCM4CHEE

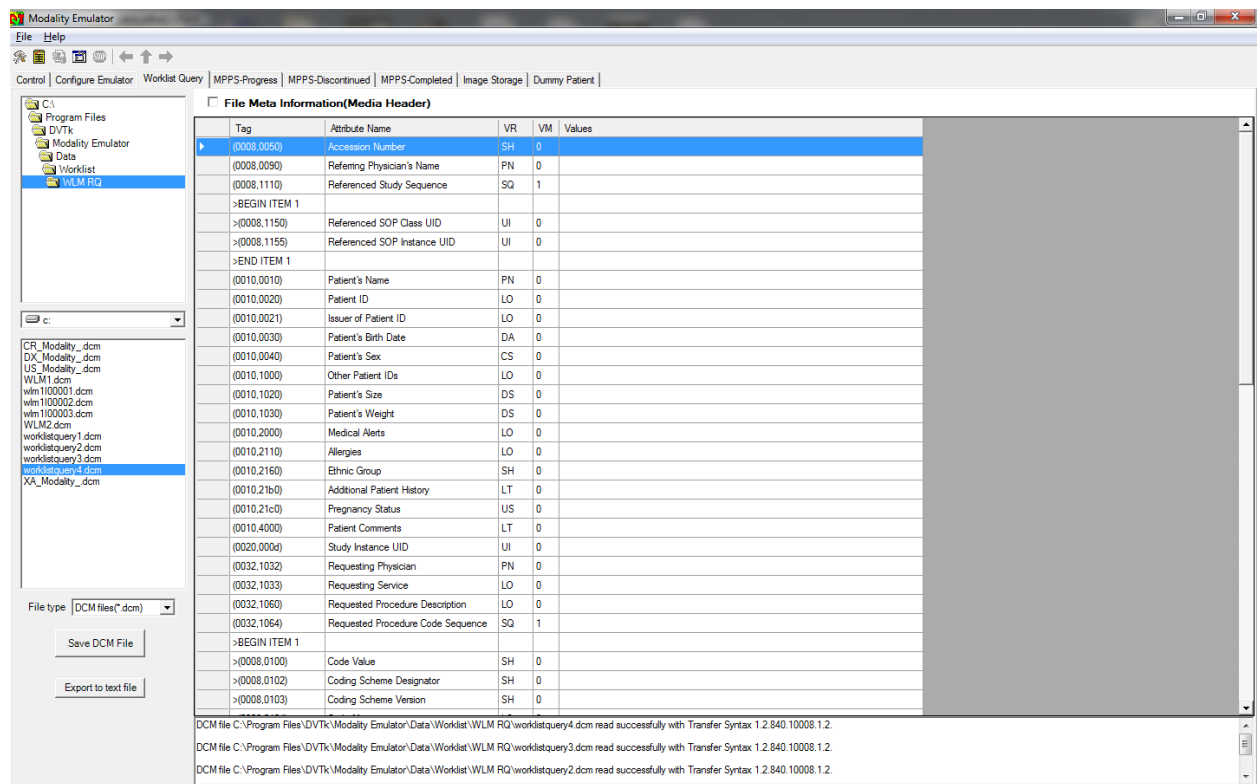


- Click on the Configure Emulator button, a number of tabs will be visible.





- Click on the Worklist query Tab.
  - In the bottom left dialog box, choose the file **“worklistquery2.dcm”**.
  - In the right side where all the attributes are displayed, scroll down to the Code Meaning “Scheduled Procedure Step Start Date” and delete the value. (The worklistquery2.dcm is an empty query with only that field having a value).
  - Save the completely empty query to another file called **“worklistquery4.dcm”** and select it.



- In the Image Storage tab, select the images on the left panel using the directory structure for the imaged you wish to send. If a file is highlighted within a folder, it is the file that is selected by the emulator.

Modality Emulator

File Help

Control | Configure Emulator | Worklist Query | MPPS-Progress | MPPS-Discontinued | MPPS-Completed | Image Storage | Dummy Patient

C:\

- Dicom Samples
  - 1.3.46.670589.6.1.0.98511171.2
  - 1.3.51.0.7.633918642.63392001
  - 39419238
  - 77654033
  - 96890234
  - DISCIMG
  - Images 2

c:\

- 0012 DCM
- 0026 DCM
- MRBRAIN DCM**

File type: DCM files(\*.dcm)

Save DCM File

Export to text file

**File Meta Information(Media Header)**

Tag	Attribute Name	VR	VM	Values
(0008,0005)	Specific Character Set	CS	1	ISO_IR 100
(0008,0008)	Image Type	CS	5	ORIGINAL\PRIMARY\OTHER\VR
(0008,0012)	Instance Creation Date	DA	1	19960823
(0008,0013)	Instance Creation Time	TM	1	093801
(0008,0014)	Instance Creator UID	UI	1	1.3.46.670589.11.0.5
(0008,0016)	SOP Class UID	UI	1	1.2.840.10008.5.1.4.1.1.4
(0008,0018)	SOP Instance UID	UI	1	1.3.46.670589.11.0.4.1996082307380006
(0008,0020)	Study Date	DA	1	19960330
(0008,0021)	Series Date	DA	1	19960330
(0008,0030)	Study Time	TM	1	150829.0000
(0008,0031)	Series Time	TM	1	155614.6300
(0008,0050)	Accession Number	SH	0	
(0008,0060)	Modality	CS	1	MR
(0008,0070)	Manufacturer	LO	1	Philips
(0008,0080)	Institution Name	LO	1	OTM4 R4.5
(0008,0090)	Referring Physician's Name	PN	0	
(0008,1030)	Study Description	LO	1	BRAIN
(0008,103e)	Series Description	LO	1	Brain STIR GR 512 TRA GraSE 4415 64
(0008,1090)	Manufacturer's Model Name	LO	1	T5
(0010,0010)	Patient's Name	PN	1	MR/BRAIN/GRASE/1024
(0010,0020)	Patient ID	LO	1	7
(0010,0030)	Patient's Birth Date	DA	1	19010101
(0010,0040)	Patient's Sex	CS	1	M
(0010,1030)	Patient's Weight	DS	1	90
(0018,0020)	Undefined	CS	1	IR
(0018,0021)	Undefined	CS	1	OTHER
(0018,0022)	Undefined	CS	0	
(0018,0023)	Undefined	CS	1	2D
(0018,0050)	Undefined	DS	1	6.000000
(0018,0080)	Undefined	DS	1	4414.826172

DCM file C:\Dicom Samples\MRBRAIN DCM read successfully with Transfer Syntax 1.2.840.10008.1.2.1.

- Make sure the MPPS In Progress, MPPS Discontinued and MPPS Complete Tabs are set correctly with the right MPPS file selected.

MPPS In Progress

Modality Emulator

File Help

Control | Configure Emulator | Worklist Query | **MPPS-Progress** | MPPS-Discontinued | MPPS-Completed | Image Storage | Dummy Patient

C:\Program Files\DVTK\Modality Emulator\data\mpps

c:\

mpps-completed1.dcm  
mpps-discontinued1.dcm  
**mpps-inprogress1.dcm**  
mpps-inprogress2.dcm

File type: DCM files(.dcm)

Save DCM File

Export to text file

**File Meta Information(Media Header)**

Tag	Attribute Name	VR	VM	Values
(0008,0003)	Undefined	UL	1	44
(0008,0005)	Specific Character Set	CS	1	ISO_IR 100
(0008,0060)	Modality	CS	1	DX
(0008,1032)	Procedure Code Sequence	SQ	1	
(0008,1120)	Referenced Patient Sequence	SQ	1	
(0010,0000)	Undefined	UL	1	98
(0010,0010)	Patient's Name	PN	1	DICOM2 Validation^NR 1
(0010,0020)	Patient ID	LO	1	PA2
(0010,0021)	Issuer of Patient ID	LO	1	Issuer of Patient ID1
(0010,0030)	Patient's Birth Date	DA	1	19710101
(0010,0040)	Patient's Sex	CS	1	M
(0018,0000)	Undefined	UL	1	8
(0018,115e)	Image and Fluoroscopy Area Dose Pro...	DS	0	
(0020,0000)	Undefined	UL	1	22
(0020,0010)	Study ID	SH	1	Procedure ID1
(0040,0000)	Undefined	UL	1	187
(0040,0241)	Performed Station AE Title	AE	1	DVT
(0040,0242)	Performed Station Name	SH	0	
(0040,0243)	Performed Location	SH	0	
(0040,0244)	Performed Procedure Step Start Date	DA	1	20060719
(0040,0245)	Performed Procedure Step Start Time	TM	1	134937
(0040,0250)	Performed Procedure Step End Date	DA	0	
(0040,0251)	Performed Procedure Step End Time	TM	0	
(0040,0252)	Performed Procedure Step Status	CS	1	IN PROGRESS
(0040,0253)	Performed Procedure Step ID	SH	1	1605.0
(0040,0254)	Performed Procedure Step Description	LO	0	
(0040,0255)	Performed Procedure Type Description	LO	0	
(0040,0260)	Performed Protocol Code Sequence	SQ	1	
(0040,0270)	Scheduled Step Attributes Sequence	SQ	1	
>BEGIN ITEM 1				

DCM file C:\Program Files\DVTK\Modality Emulator\data\mpps\mpps-inprogress2.dcm read successfully with Transfer Syntax 1.2.840.10008.1.2.

## MPPS Completed

Modality Emulator

File Help

Control | Configure Emulator | Worklist Query | MPPS-Progress | MPPS-Discontinued | **MPPS-Completed** | Image Storage | Dummy Patient

C:\Program Files\DVTK\Modality Emulator\data\mpps

c:\

**mpps-completed1.dcm**  
mpps-discontinued1.dcm  
mpps-inprogress1.dcm  
mpps-inprogress2.dcm

File type: DCM files(.dcm)

Save DCM File

Export to text file

**File Meta Information(Media Header)**

Tag	Attribute Name	VR	VM	Values
(0008,0003)	Undefined	UL	1	8
(0008,1032)	Procedure Code Sequence	SQ	1	
(0018,0000)	Undefined	UL	1	14
(0018,115e)	Image and Fluoroscopy Area Dose Pro...	DS	1	0.5703
(0040,0000)	Undefined	UL	1	276
(0040,0250)	Performed Procedure Step End Date	DA	1	20060719
(0040,0251)	Performed Procedure Step End Time	TM	1	135446
(0040,0252)	Performed Procedure Step Status	CS	1	COMPLETED
(0040,0254)	Performed Procedure Step Description	LO	0	
(0040,0255)	Performed Procedure Type Description	LO	0	
(0040,0260)	Performed Protocol Code Sequence	SQ	1	
(0040,0281)	Performed Procedure Step Discontin...	SQ	1	
(0040,0301)	Total Number of Exposures	US	1	2
(0040,030e)	Exposure Dose Sequence	SQ	1	
>BEGIN ITEM 1				
>(0018,0000) Undefined				
>(0018,0060) KVP				
>(0018,1150) Exposure Time				
>(0018,115a) Radiation Mode				
>(0018,8151) X-Ray Tube Current in uA				
>END ITEM 1				
>BEGIN ITEM 2				
>(0018,0000) Undefined				
>(0018,0060) KVP				
>(0018,1150) Exposure Time				
>(0018,115a) Radiation Mode				
>(0018,8151) X-Ray Tube Current in uA				
>END ITEM 2				
>(0040,0310) Comments on Radiation Dose				
>(0040,0321) Film Consumption Sequence				

DCM file C:\Program Files\DVTK\Modality Emulator\data\mpps\mpps-completed1.dcm read successfully with Transfer Syntax 1.2.840.10008.1.2.

MPPS DISCONTINUED

Modality Emulator

File Help

Control

Configure Emulator

Worklist Query

MPPS-Progress

MPPS-Discontinued

MPPS-Completed

Image Storage

Dummy Patient

C:\Program Files\DVTK\Modality Emulator\data\mpps

c:\mpps-completed1.dcm

mpps-discontinued1.dcm

mpps-inprogress1.dcm

mpps-inprogress2.dcm

File type DCM files(.dcm)

Save DCM File

Export to text file

File Meta Information(Media Header)

Tag	Attribute Name	VR	VM	Values
(0008,0000)	Undefined	UL	1	8
(0008,1032)	Procedure Code Sequence	SQ	1	
(0018,0000)	Undefined	UL	1	14
(0018,115e)	Image and Fluoroscopy Area Dose Pro...	DS	1	0.5703
(0040,0000)	Undefined	UL	1	278
(0040,0250)	Performed Procedure Step End Date	DA	1	20060719
(0040,0251)	Performed Procedure Step End Time	TM	1	135446
(0040,0252)	Performed Procedure Step Status	CS	1	DISCONTINUED
(0040,0254)	Performed Procedure Step Description	LO	0	
(0040,0255)	Performed Procedure Type Description	LO	0	
(0040,0260)	Performed Protocol Code Sequence	SQ	1	
(0040,0281)	Performed Procedure Step Discontin...	SQ	1	
(0040,0301)	Total Number of Exposures	US	1	2
(0040,030e)	Exposure Dose Sequence	SQ	1	
>BEGIN ITEM 1				
>(0018,0000) Undefined				
>(0018,0060) KVP				
>(0018,1150) Exposure Time				
>(0018,115a) Radiation Mode				
>(0018,8151) X-Ray Tube Current in uA				
>END ITEM 1				
>BEGIN ITEM 2				
>(0018,0000) Undefined				
>(0018,0060) KVP				
>(0018,1150) Exposure Time				
>(0018,115a) Radiation Mode				
>(0018,8151) X-Ray Tube Current in uA				
>END ITEM 2				
(0040,0310)	Comments on Radiation Dose	ST	1	1, Hand pa, 48kV, 5.946mA, 22.95ms, SID 1100, EI 80, 0mmA, 0.3575dGycm2, 2, ...
(0040,0321)	Film Consumption Sequence	SQ	1	

DCM file C:\Program Files\DVTK\Modality Emulator\data\mpps\mpps-discontinued1.dcm read successfully with Transfer Syntax 1.2.840.10008.1.2.

THAT'S THE INSTALLATION!!

## User Guide

- Run DCM4CHEE, OpenMRS and the DVTK Modality Emulator.
- **NOTE:** The modality emulator runs only on Windows.
- **NOTE:** If the module has trouble starting up due to port errors or java socket problems.
  - **Start Tomcat or Jetty with the following parameters.**  
`-Djava.net.preferIPv4Stack=true`
- Goto OpenMRS→Administration→Manage Users.
  - Create a new user with the role reading physician.
- Goto OpenMRS→ Administration→ Manage Radiology Orders→Add Order

**OpenMRS** Currently logged in as Super User | [Log out](#) | [My Profile](#) | [Help](#)

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[Admin](#) | [Manage Radiology Orders](#)

**Manage Radiology Orders**

[Add Radiology Order](#)

**Worklist** Clear Results

Patient:  Start Date:  End Date:

Show **20** entries Search:  Show/Hide Columns

Edit	Patient Id	Patient Full Name	Priority	Referring Physician	Scheduler	Performing Physician	Reading Physician	Appointment Date	Modality	Status	Instructions
1	100-8	Mr. John D Patient	Unknown	Super User				2013-09-26 00:00:00.0	CR	Unknown Unknown	<a href="#">test xa</a>
2	100-8	Mr. John D Patient	STAT	Super User	Super User	Super User	Akhil Ravindran	2013-09-26 00:00:00.0	XA	SCHEDULED Unknown	<a href="#">test xa</a>
3	100-8	Mr. John D Patient	ROUTINE	Super User	Super User	Super User	Akhil Ravindran	2013-09-26 00:00:00.0	MR	SCHEDULED IN PROGRESS	<a href="#">test 2</a>
4	100-8	Mr. John D Patient	ROUTINE	Super User	Super User	Super User	Akhil Ravindran	2013-09-26 00:00:00.0	CT	SCHEDULED IN PROGRESS	<a href="#">qwerty</a>
5	200-6	Akhil Ravindran	STAT	Super User	Super User	Super User	Akhil Ravindran	2013-09-26 00:00:00.0	XA	SCHEDULED Unknown	<a href="#">testing again and again</a>
6	100-8	Mr. John D Patient	STAT	Super User	Super User	Super User	Akhil Ravindran	2013-09-26 00:00:00.0	XA	SCHEDULED COMPLETED	<a href="#">testing after db clear</a>
7	100-8	Mr. John D Patient	HIGH	Super User	Super User	Super User	Akhil Ravindran	2013-09-27 00:00:00.0	MR	SCHEDULED COMPLETED	<a href="#">asdfg</a>
8	200-6	Akhil Ravindran	Unknown	Super User	Super User	Super User	Akhil Ravindran	2013-09-27 00:00:00.0	CR	SCHEDULED COMPLETED	<a href="#">test ct</a>
9	200-6	Akhil Ravindran	STAT	Super User	Super User	Super User	Akhil Ravindran	2013-09-27 00:00:00.0	XA	SCHEDULED COMPLETED	<a href="#">test xa</a>

Viewing 1 - 9 of 9 firstPrevious1Nextlast

English (United Kingdom) | [English \(United States\)](#) | Last Build: Oct 17 2013 01:29 AM | Version: 1.9.1 Build 28992 | Powered by OpenMRS

- Add order details and save order with an allowed reading physician.

**Order**

Patient	<input type="text" value="Enter patient name or id"/> <a href="#">More Information</a>
Related Concept	<input type="text" value="Enter concept name or id"/>
Priority	<input type="text" value="Select"/>
Scheduled status	<input type="text" value="Select"/>
Performed status	<input type="text" value="Select"/>
Modality	<input type="text" value="CR"/>
Instructions	<input type="text" value=""/>
Related Encounter	<input type="text" value="Enter encounter id, patient name or id"/>
Orderer	<input type="text" value="Enter user name"/>
Start date	<input type="text" value=""/> (dd/mm/yyyy)
Auto-expire date	<input type="text" value=""/> (dd/mm/yyyy)
Scheduler	<input type="text" value="Enter user name"/>
Performing Physician	<input type="text" value="Enter user name"/>
Reading Physician	<input type="text" value="Enter user name"/>
<input type="button" value="Save Order"/>	

**Order**

Patient	<input type="text" value="John D Patient"/> <a href="#">More Information</a>	
Related Concept	<input type="text" value="ANEMIA, BLOOD LOSS"/>	
Priority	<input type="text" value="STAT"/>	
Scheduled status	<input type="text" value="SCHEDULED"/>	
Performed status	<input type="text" value="COMPLETED"/>	
Modality	<input type="text" value="XA"/>	
Instructions	<input type="text" value="testing after db clear"/>	
Related Encounter	<input type="text" value="Enter encounter id, patient name or id"/>	
Orderer	<input type="text" value="Super User"/>	
Start date	<input type="text" value="26/09/2013"/> (dd/mm/yyyy)	
Auto-expire date	<input type="text" value="26/09/2013"/> (dd/mm/yyyy)	
Scheduler	<input type="text" value="Super User"/>	
Performing Physician	<input type="text" value="Super User"/>	
Reading Physician	<input type="text" value="Akhil Ravindran"/>	
Created By	<input type="text" value="Super User - 26 September 2013 14:42:38 PDT"/>	
<input type="button" value="Save Order"/>		

- Check the dcm4chee console for modality worklists. Run an empty search to retrieve all Worklists(orders).

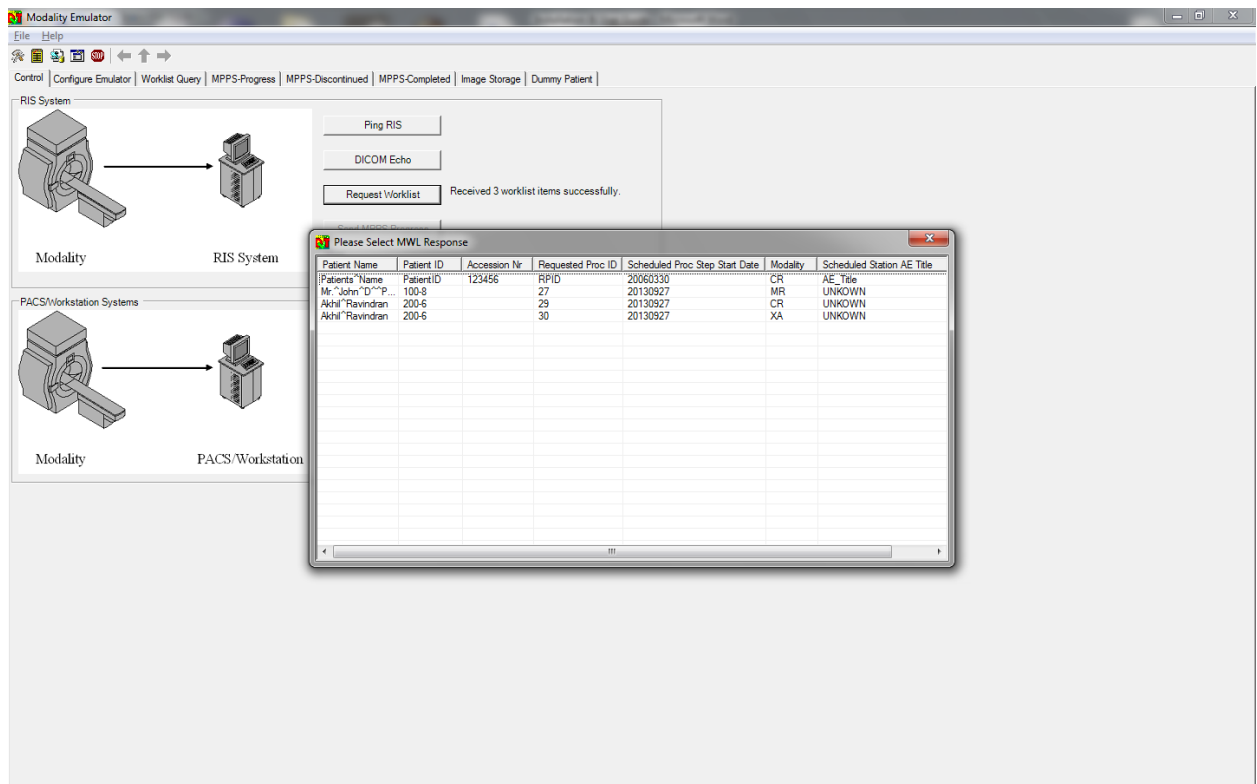
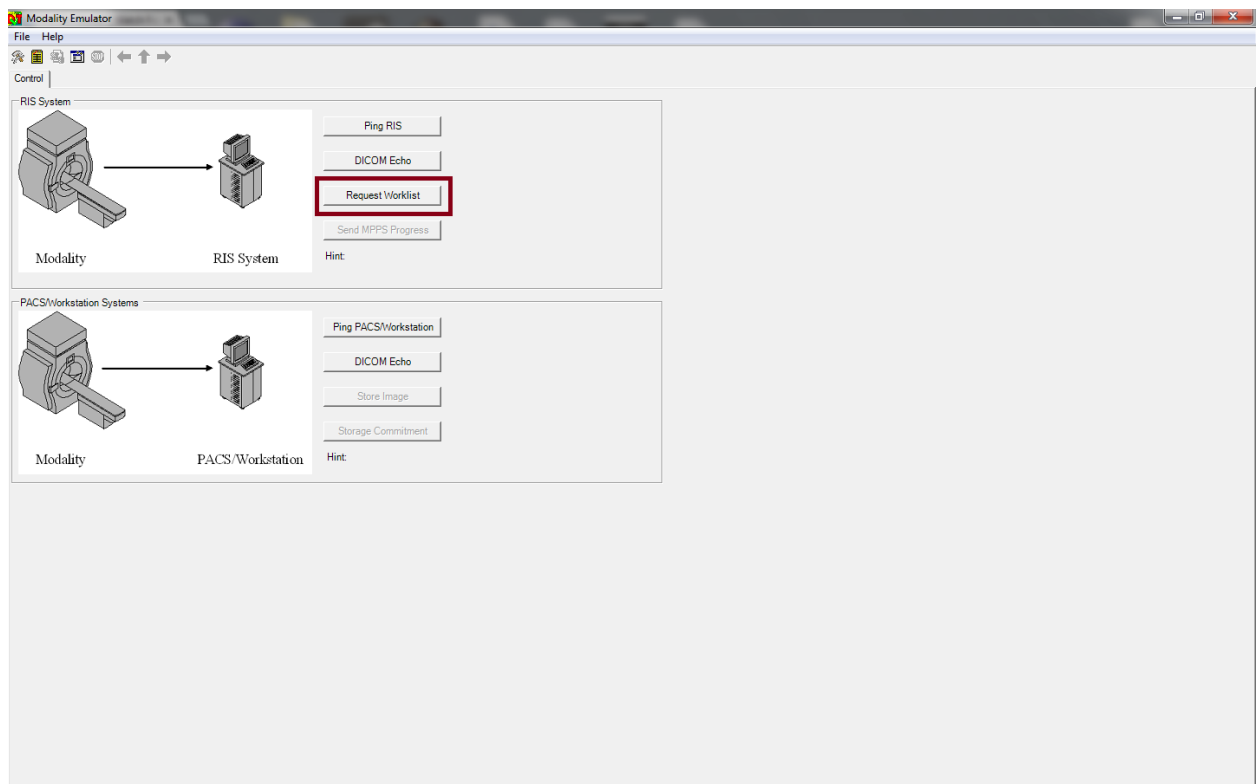
The screenshot shows the dcm4chee web interface. The 'Modality Worklist' tab is selected and highlighted with a red box. Below the navigation bar, there is a search form with fields for Patient Name, Patient ID, Issuer, Start Date, Station AET, Station Name, and Status. The 'Reset' and 'Search' buttons are also highlighted with a red box. Below the search form, there is a table with 9 columns: Patient Name, Birthdate, SPS Description, Modality, SPS Status, Start date, Station AET, Station Name, and Accession number. The table contains 3 entries.

Patient Name	Birthdate	SPS Description	Modality	SPS Status	Start date	Station AET	Station Name	Accession number
Akhi^Ravindran	10/7/1987	test ct	CR	COMPLETED	9/27/2013 00:00	UNKOWN	UNKOWN	
Akhi^Ravindran	10/7/1987	test xa	XA	COMPLETED	9/27/2013 00:00	UNKOWN	UNKOWN	
Mr.^John^D^^Patient	1/1/1975	asdfg	MR	DISCONTINUED	9/27/2013 00:00	UNKOWN	UNKOWN	

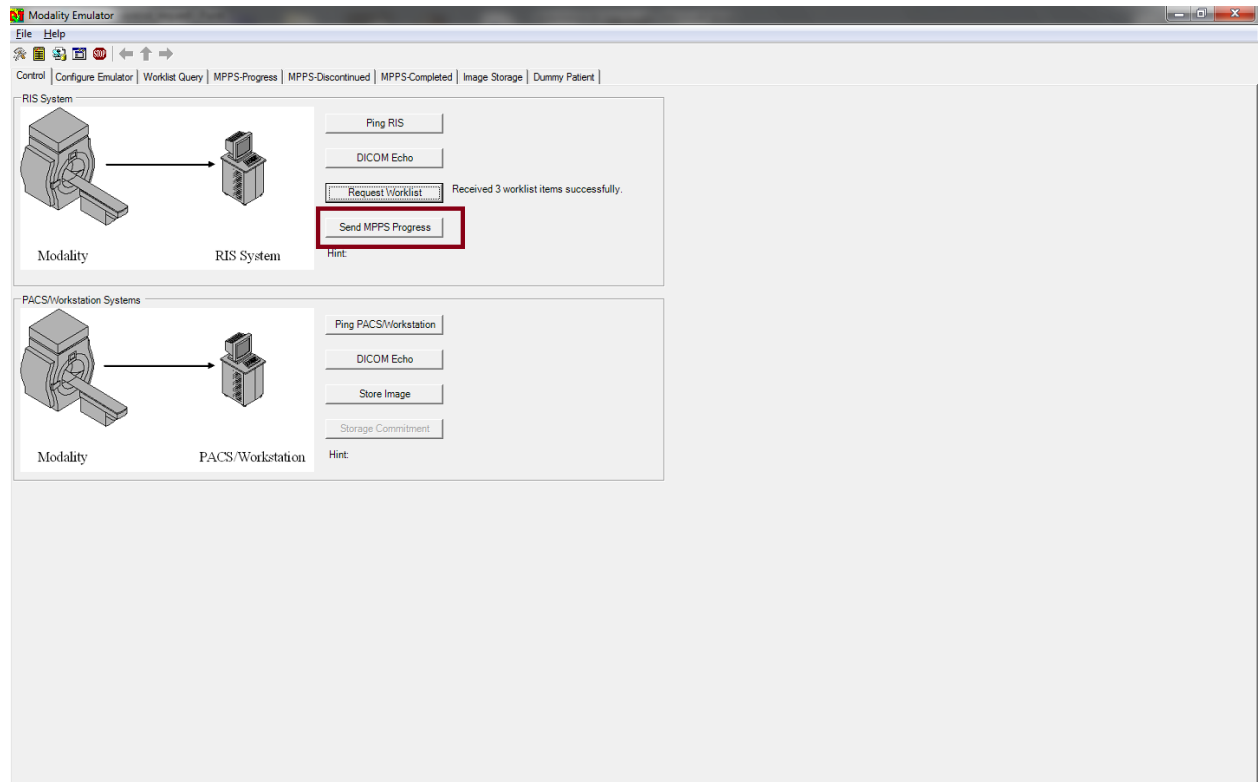


- In the Modality Emulator, Click Request Worklist and Choose the order that was just made in Opepmrs.

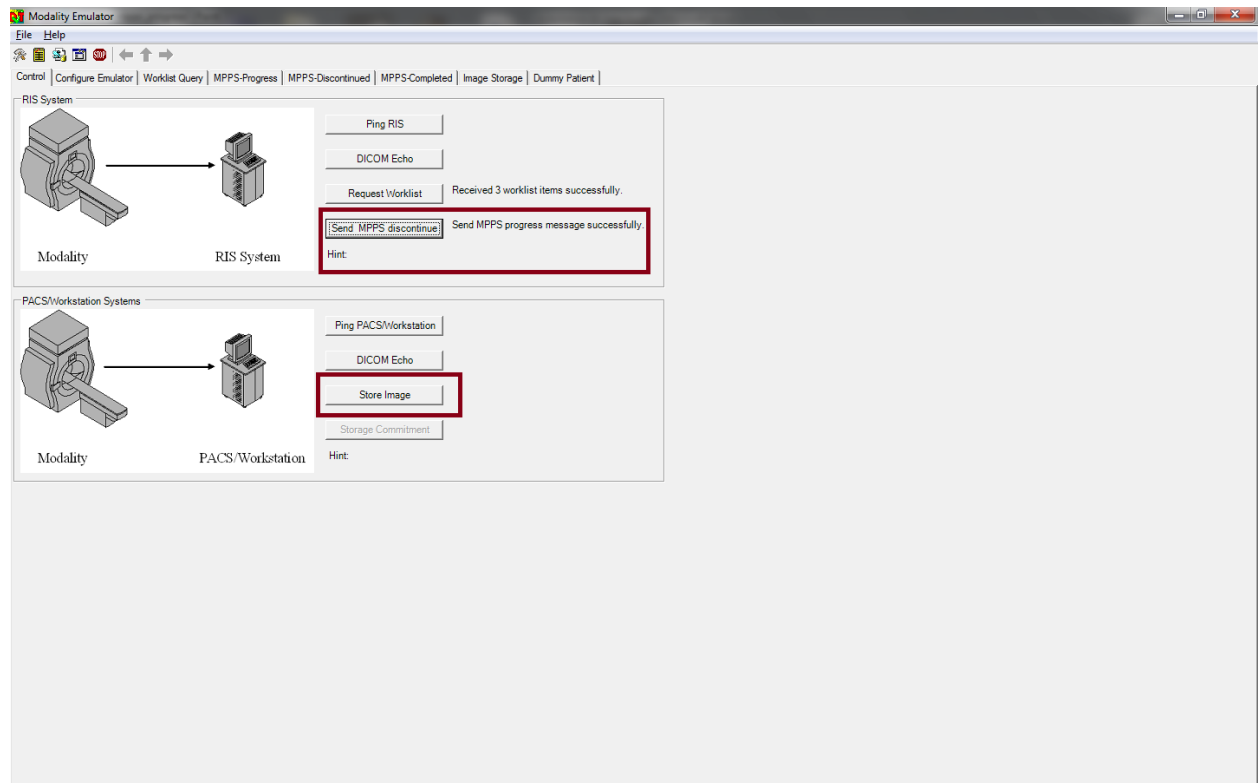




- Send MPPS In progress to indicate the procedure has started.



- Once the In progress status has been sent, emulator gives you options to discontinue the order or store image.



- Click on the image storage tab to choose the image you want to send and return to the control and click “Store Image”.

Modality Emulator

File Help

Control | Configure Emulator | Worklist Query | MPPS-Progress | MPPS-Discontinued | MPPS-Completed | Image Storage | Dummy Patient

C:\

- Dicom Samples
  - 1.3.46.670589.6.1.0.9851171.2
  - 1.3.51.0.7.633918642.63392001
  - 39419238
  - 77654033
  - 96890234
  - DISCIMG
  - images 2

c:\

0012 DCM

0000 DCM

MRBRAIN DCM

File type: DCM files(\*.dcm)

Save DCM File

Export to text file

**File Meta Information(Media Header)**

Tag	Attribute Name	VR	VM	Values
(0008,0005)	Specific Character Set	CS	1	ISO_IR 100
(0008,0008)	Image Type	CS	5	ORIGINAL\PRIMARY\OTHER\VR
(0008,0012)	Instance Creation Date	DA	1	19960823
(0008,0013)	Instance Creation Time	TM	1	093801
(0008,0014)	Instance Creator UID	UI	1	1.3.46.670589.11.0.5
(0008,0016)	SOP Class UID	UI	1	1.2.840.10008.5.1.4.1.1.4
(0008,0018)	SOP Instance UID	UI	1	1.3.46.670589.11.0.4.1996082307380006
(0008,0020)	Study Date	DA	1	19960330
(0008,0021)	Series Date	DA	1	19960330
(0008,0030)	Study Time	TM	1	150829.0000
(0008,0031)	Series Time	TM	1	155614.6300
(0008,0050)	Accession Number	SH	0	
(0008,0060)	Modality	CS	1	MR
(0008,0070)	Manufacturer	LO	1	Philips
(0008,0080)	Institution Name	LO	1	OTM4 R4.5
(0008,0090)	Referring Physician's Name	PN	0	
(0008,1030)	Study Description	LO	1	BRAIN
(0008,103e)	Series Description	LO	1	Brain STIR GR 512 TRA GraSE 4415 64
(0008,1090)	Manufacturer's Model Name	LO	1	T5
(0010,0010)	Patient's Name	PN	1	MR/BRAIN/GRASE/1024
(0010,0020)	Patient ID	LO	1	7
(0010,0030)	Patient's Birth Date	DA	1	19010101
(0010,0040)	Patient's Sex	CS	1	M
(0010,1030)	Patient's Weight	DS	1	90
(0018,0020)	Undefined	CS	1	IR
(0018,0021)	Undefined	CS	1	OTHER
(0018,0022)	Undefined	CS	0	
(0018,0023)	Undefined	CS	1	2D
(0018,0050)	Undefined	DS	1	6.000000
(0018,0080)	Undefined	DS	1	4414.826172

DCM file C:\Dicom Samples\MRBRAIN DCM read successfully with Transfer Syntax 1.2.840.10008.1.2.1.

Modality Emulator

File Help

Control | Configure Emulator | Worklist Query | MPPS-Progress | MPPS-Discontinued | MPPS-Completed | Image Storage | Dummy Patient

**RIS System**

Modality → RIS System

Ping RIS

DICOM Echo

Request Worklist Received 3 worklist items successfully.

Send MPPS discontinues Send MPPS progress message successfully.

Hint:

**PACS/Workstation Systems**

Modality → PACS/Workstation

Ping PACS/Workstation

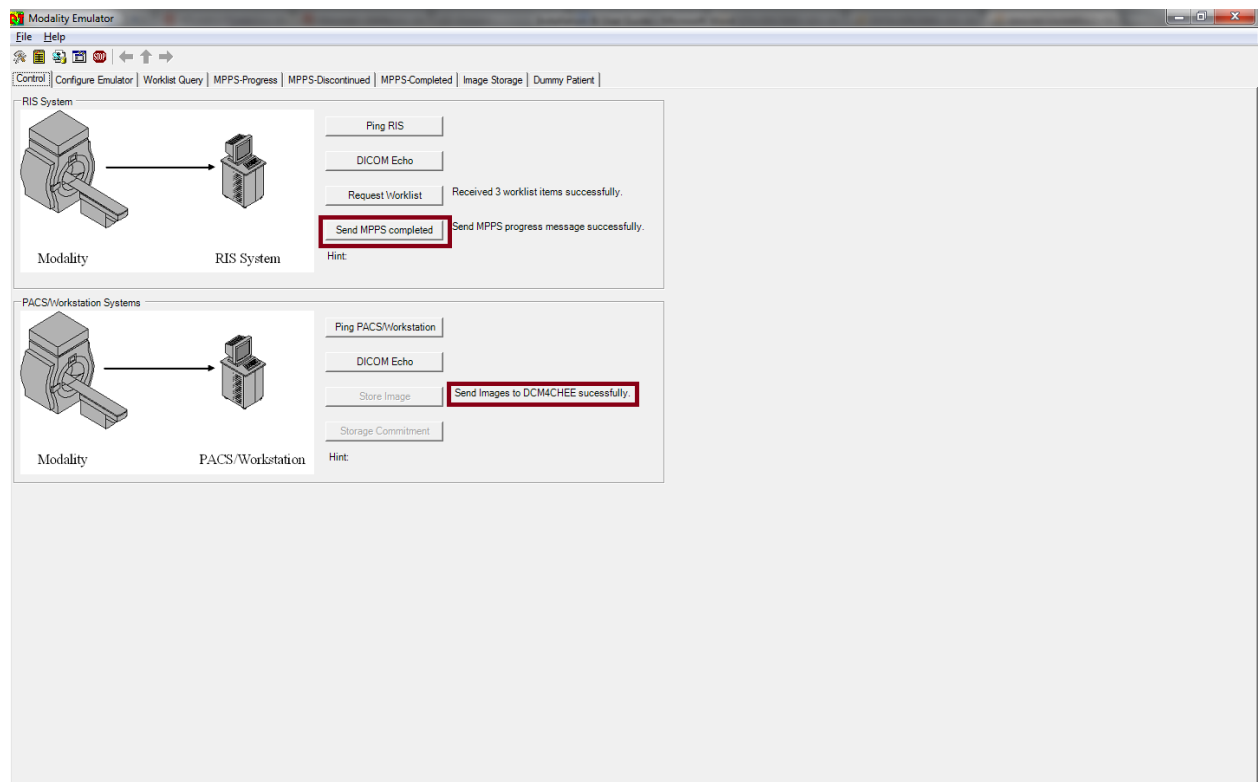
DICOM Echo

Store Image

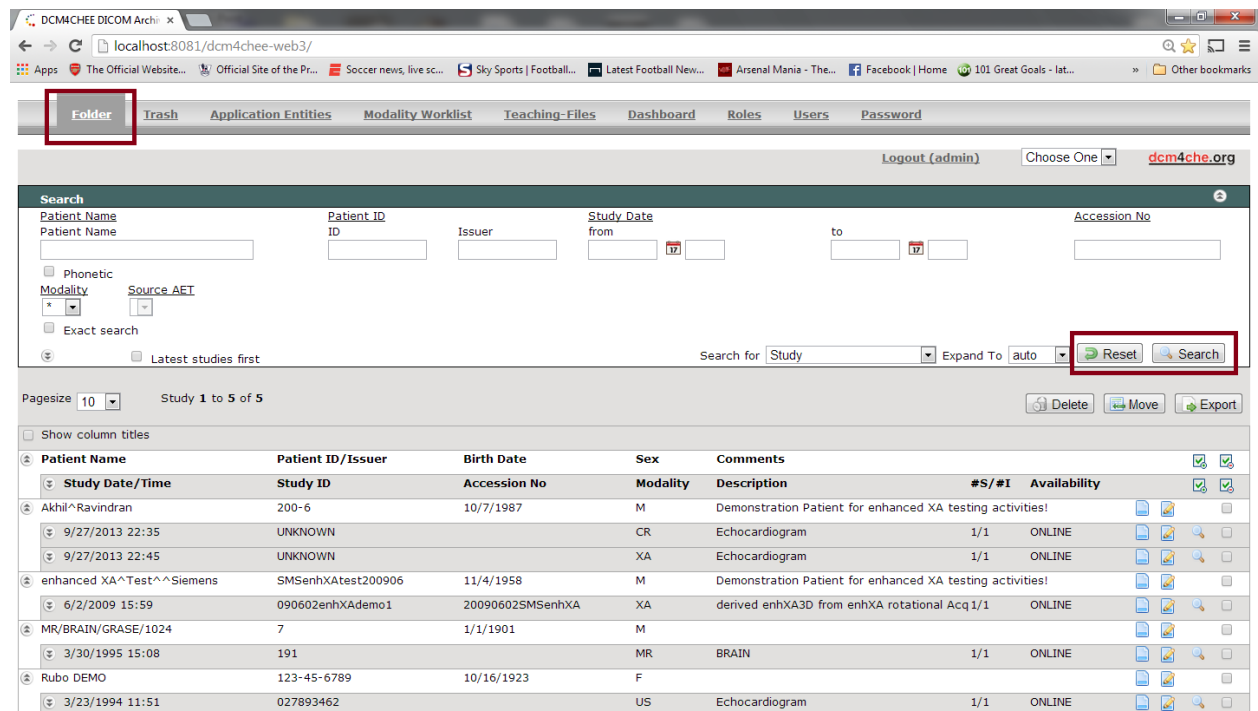
Storage Commitment

Hint:

- After the image has been sent successfully, the image will show up in the archive.



- Send MPPS Complete button.



- (Optional: Not necessary if the status of the worklist is complete) Last Step Is to signify the Procedure is done in DCM4CHEE, click the emulate MPPS icon in the archive to complete the order.

Folder
Trash
Application Entities
Modality Worklist
Teaching-Files
Dashboard
Roles
Users
Password

Logout (admin)
Choose One
dcm4chee.org

Search

Patient Name
Patient ID
Issuer
Study Date
Accession No

Phonetic
Modality
Source AET
Exact search
Latest studies first
Search for Study Expand To auto Reset Search

Pagesize 10 Study 1 to 6 of 6
Delete Move Export

Show column titles

Patient Name	Patient ID/Issuer	Birth Date	Sex	Comments		
Study Date/Time	Study ID	Accession No	Modality	Description	#S/#1	Availability
Akhil^Ravindran	200-6	10/7/1987	M	Demonstration Patient for enhanced XA testing activities!		
9/27/2013 22:35	UNKNOWN		CR	Echocardiogram	9/9	ONLINE
9/27/2013 22:45	UNKNOWN		XA	Echocardiogram	1/1	ONLINE
enhanced XA^Test^^Siemens	SMSenhXAtest200906	11/4/1958	M	Demonstration Patient for enhanced XA testing activities!		
6/2/2009 15:59	090602enhXAdemo1	20090602SMSenhXA	XA	derived enhXA3D from enhXA rotational Acq1/1		ONLINE
Mr.^John^D^^Patient	100-8	1/1/1975	M	Demonstration Patient for enhanced XA testing activities!		
9/17/2013 01:27	UNKNOWN		MR	Echocardiogram	8/8	ONLINE
MR/Brain/UGRASE/1024	7	1/1/1901	M			
3/30/1995 15:08	191		MR	BRAIN	1/1	ONLINE
Rubo DEMO	123-45-6789	10/16/1923	F			
3/23/1994 14:51	027893462		US	Echocardiogram	1/1	ONLINE

Phonetic  
Modality: \* Source: AET  
Exact search  
Latest studies first  
Search for: Study Expand To: auto Reset Search

Pagesize: 10 Study 1 to 6 of 6  
Delete Move Export

Show column titles

Patient Name	Patient ID/Issuer	Birth Date	Sex	Comments		
Study Date/Time	Study ID	Accession No	Modality	Description	#S/#1	Availability
Akhil^Ravindran	200-6	10/7/1987	M	Demonstration Patient for enhanced XA testing activities!		
9/27/2013 22:35	UNKNOWN		CR	Echocardiogram	9/9	ONLINE
9/27/2013 22:45	UNKNOWN		XA	Echocardiogram	1/1	ONLINE
enhanced XA^Test^Siemens	SMSenhXATest200906	11/4/1958	M	Demonstration Patient for enhanced XA testing activities!		
6/2/2009 15:59	090602enhXAdemo1	20090602SMSenhXA	XA	derived enhXA3D from enhXA rotational Acq1/1	ONLINE	
Mr.^John^D^Patient	100-8	1/1/1975	M	Demonstration Patient for enhanced XA testing activities!		
10/17/2013 01:27	UNKNOWN		MR	Echocardiogram		ONLINE
10/17/2013 01:26			MR		1/1	
1	MODALITY		MR	SeriesDescription	1	ONLINE
10/17/2013 01:26			MR		1/1	
1	MODALITY		MR	SeriesDescription	1	ONLINE
10/17/2013 01:26			MR		1/1	
10/17/2013 01:27	1	MODALITY	MR	Brain STIR GR 512 TRA GraSE 4415 64	1	ONLINE
10/17/2013 01:26			MR		1/1	
1	MODALITY		MR	SeriesDescription	1	ONLINE
10/17/2013 01:26			MR		1/1	
2	MODALITY		MR	Post-Stress	1	ONLINE
10/17/2013 01:27			MR		1/1	
10/17/2013 01:27	3	MODALITY	MR	RotationalAngioNative	1	ONLINE
10/17/2013 01:25	1605.0	27	MR		1/9	COMPLETED
	5	MODALITY	MR	Directional Coronary Atherectomy	1	ONLINE
10/17/2013 01:26			MR		1/1	

- The order and its status will be updated in OpenMRS and will be available for viewing by the reading physician.

OpenMRS  
Currently logged in as Akhil Ravindran Log out My Profile Help

Home Find/Create Patient Dictionary Administration

Admin Manage Radiology Orders

### Manage Radiology Orders

Add Radiology Order

Worklist Clear Results

Patient: Start Date: End Date: Find

Show 20 entries Search: Show/Hide Columns

Obs.	Patient Id	Patient Full Name	Priority	Referring Physician	Scheduler	Performing Physician	Reading Physician	Appointment Date	Modality	Status	Instructions
1	100-8	Mr. John D Patient	Unknown	Super User				2013-09-26 00:00:00.0	CR	Unknown Unknown	test xa
2	100-8	Mr. John D Patient	STAT	Super User	Super User	Super User	Akhil Ravindran	2013-09-26 00:00:00.0	XA	SCHEDULED Unknown	test xa
3	100-8	Mr. John D Patient	ROUTINE	Super User	Super User	Super User	Akhil Ravindran	2013-09-26 00:00:00.0	MR	SCHEDULED IN PROGRESS	test 2
4	100-8	Mr. John D Patient	ROUTINE	Super User	Super User	Super User	Akhil Ravindran	2013-09-26 00:00:00.0	CT	SCHEDULED IN PROGRESS	qwerty
5	200-6	Akhil Ravindran	STAT	Super User	Super User	Super User	Akhil Ravindran	2013-09-26 00:00:00.0	XA	SCHEDULED Unknown	testing again and again
6	100-8	Mr. John D Patient	STAT	Super User	Super User	Super User	Akhil Ravindran	2013-09-26 00:00:00.0	XA	SCHEDULED COMPLETED	testing after db clear
7	100-8	Mr. John D Patient	HIGH	Super User	Super User	Super User	Akhil Ravindran	2013-09-27 00:00:00.0	MR	SCHEDULED COMPLETED	asdfg
8	200-6	Akhil Ravindran	Unknown	Super User	Super User	Super User	Akhil Ravindran	2013-09-27 00:00:00.0	CR	SCHEDULED IN PROGRESS	test ct
9	200-6	Akhil Ravindran	STAT	Super User	Super User	Super User	Akhil Ravindran	2013-09-27 00:00:00.0	XA	SCHEDULED COMPLETED	test xa

Viewing 1 - 9 of 9 firstPrevious1Nextlast

- As a reading physician, the observation UI will open wherein the image can be viewed and Observations can be recorded.

OpenMRS

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[Admin](#) | [Manage Radiology Orders](#)

### Observation

Person	<input type="text" value="John D Patient"/>	<a href="#">More Information</a>
Encounter	<input type="text" value="Select"/>	
Order	<input type="text" value="27"/>	
Location	<input type="text" value=""/>	
Observation Date	<input type="text" value=""/>	(Format: dd/mm/yyyy)
Question Concept	<input type="text" value="Select"/>	
Comment	<input type="text" value=""/>	
Study results	<a href="#">View Study in Qvlyam</a>	

- Click on the view image link.



