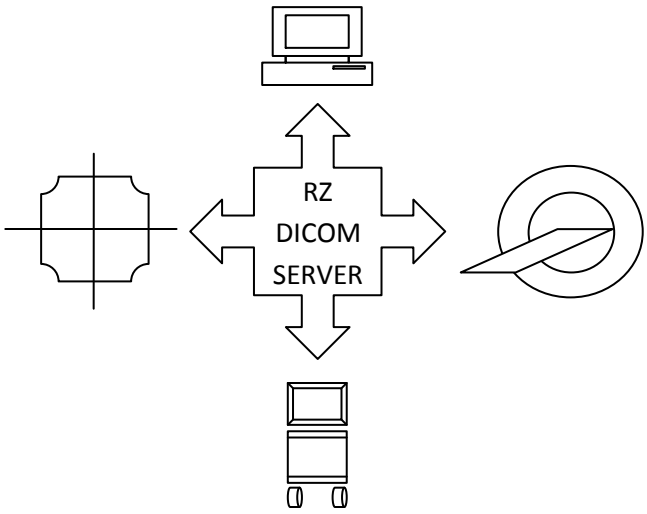

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DSRSVC Users Manual

Extensible OEM DICOM Server

DSRSVC is an extensible OEM DICOM Archive (PACS) with Plugin API for Microsoft Windows.

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9/10/2012

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Overview

DSRSVC is an extensible DICOM Server (PACS) for OEM. DSRSVC exposes a rich plguin API.

Built on top of RZ's popular DICOM Toolkit, RZDCX, DSRSVC is fully compatible with any DICOM application such as imaging modalities, radiology workstations and other PACS.

Who Should Read This Document

This document assumes the very basic understanding of DICOM communication and windows operating system.

Main Features

- Out-of-the box 'install and go' zero configuration DICOM Storage Service
- Automatic startup/shutdown with Windows System as backend service
- Full audit log on system event logger ready for email and text notifications
- Open Architecture Plug-in API controls all functionality

Rich Plugins Library

DSRSVC functionality can be extended and modified to your needs with the unique Plugin API. We provide ready to use plugins:

- Database Plugin for Microsoft SQL Server for open architecture PACS Implementation using MS SQL Server 2005/2008 (All editions including Express)
    - DICOM Storage SCP
    - DICOM Q/R SCP
    - DICOM Storage Commitment SCP
    - DICOM Modality Performed Procedure Step SCP
    - DICOM Modality Worklit SCP
- INI File Plugin for configurable, lean, zero footprint, DICOM backend service
- Hot Folder Plugin for distribution solutions

System Requirements

DSRSVC requires minimum system resources and can be used on embedded appliances.

DSRSVC is tested on the following Operating Systems:

- Windows XP (Home, Professional and Embedded)
- Windows 2003 Server
- Windows 2003 Server (x32/x64
- Windows 2008 Server ((x32/x64)
- Windows Vista (x32/x64)
- Windows 7 (x32/x64)

Basic Installation and Configuration

Download the latest version of RZ Software Services Toolkit and DICOM Server and unpack its content.

There are two distributions, for x32 and for x64 computers. We recommend using the x64 distribution when possible.

Avoid installing both distributions on a single computer.

The DICOM Server Software is in the DSRSVC\DistX64 (or DistWin32) folder.

Default Configuration

The DSRSVC can be used as is with no other dependencies, configuration files or plug-ins. Copy the executable file DicomServer.exe and run or install it.

The default configuration of the DSRSVC is detailed in the following table:

Feature	Value	Comment
Storage Root	\DSRSVC	The DSRSVC will store all incoming files is a directory named DSRSVC at the root of the local drive that it is installed on. If you saved DicomServer.exe on drive C: then the files will be stored in the directory C:\DSRSVC\
AE Title	DSRSVC	
Listener Port	104	The DSRSVC will listen on port 104. Make sure that the firewall is open for this port.

Default File Names

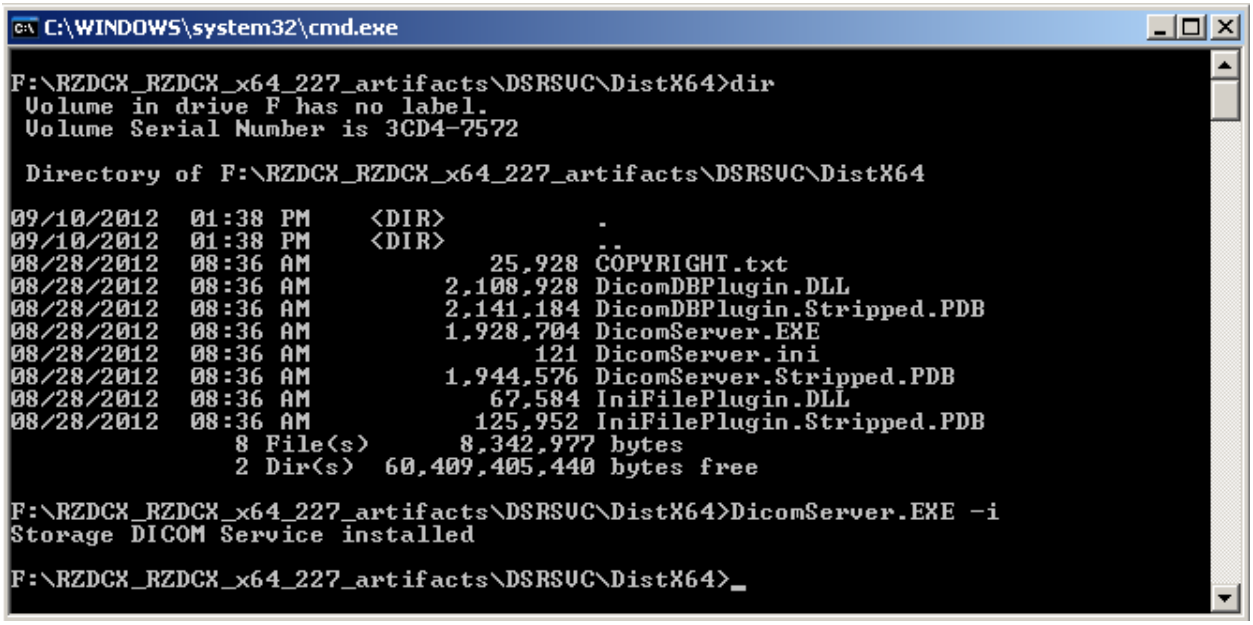
The default names of the stored files when no configuration is used:

C:\DSRSVC\study-uid\series-uid\instance-uid.dcm

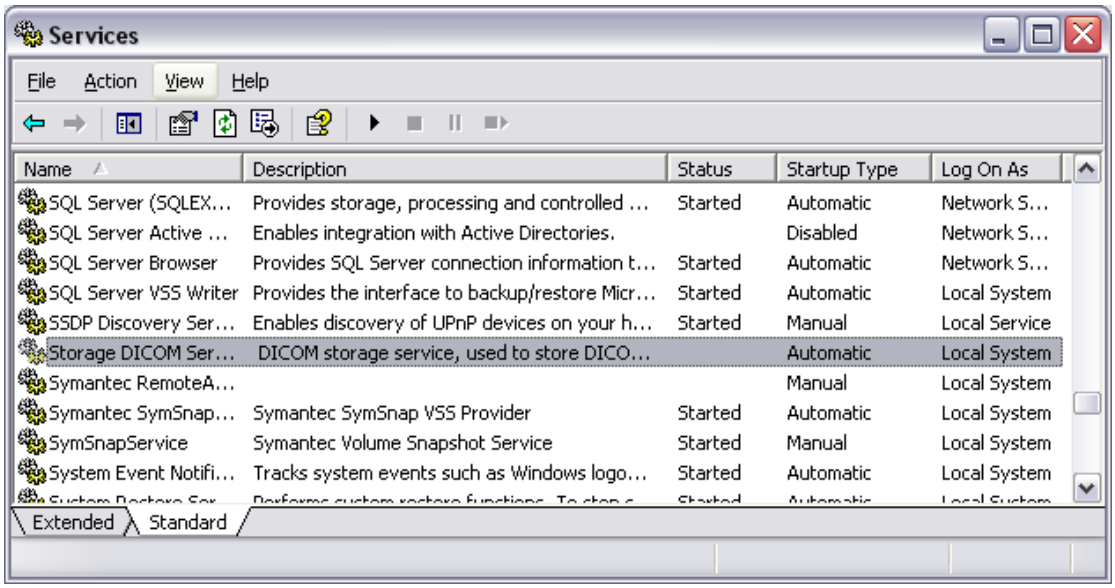
Installing the DICOM Server as a Windows Service

1. From a command line, navigate to the distribution folder

2. Run the following command:
   DicomServer.exe -i



3. The following line should be printed:
   Storage DICOM Service installed
4. Open the services manager (services.msc) and verify that the service is in the list



Starting the DICOM Server

From the service manager: select the DICOM Server and click the start button.

From command line: run the following command: NET START “Storage DICOM Service”

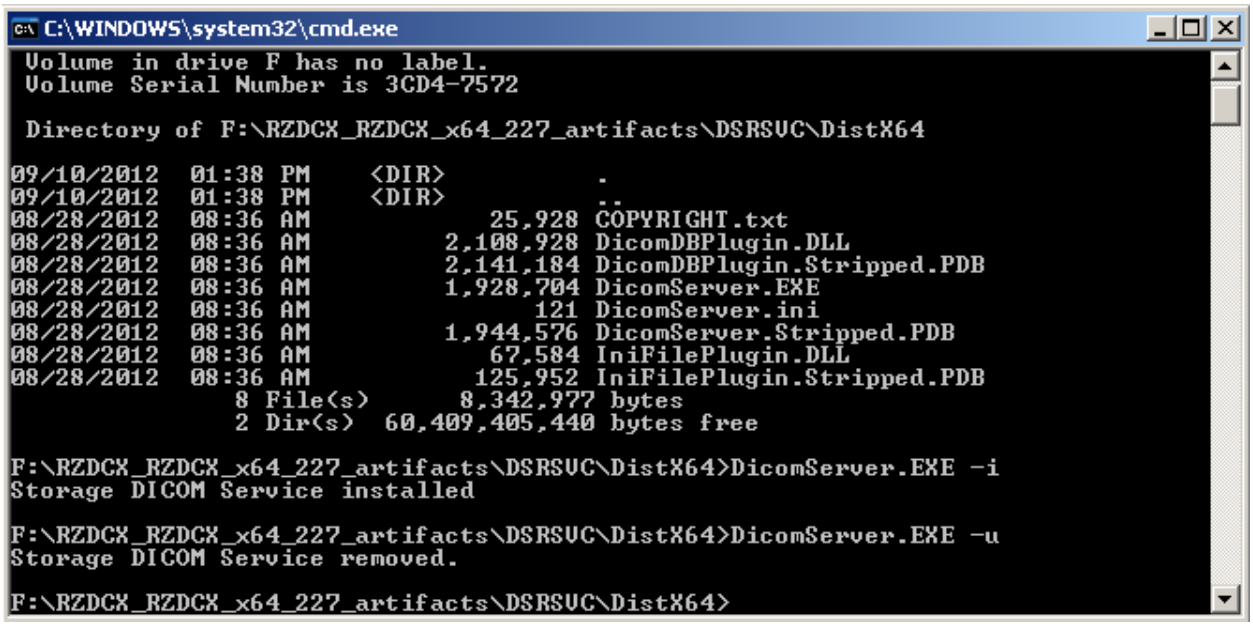
Stopping the DICOM Server

From the service manager: select the DICOM Server and click the stop button.

From command line: run the following command: NET STOP “Storage DICOM Service”

Uninstalling the DICOM Server

1. From a command line, navigate to the distribution folder
2. Run the following command:
   DicomServer.exe –u



3. The following line should be printed:
   Storage DICOM Service removed.
4. Open the services manager (services.msc) and verify that the service is no longer in the list

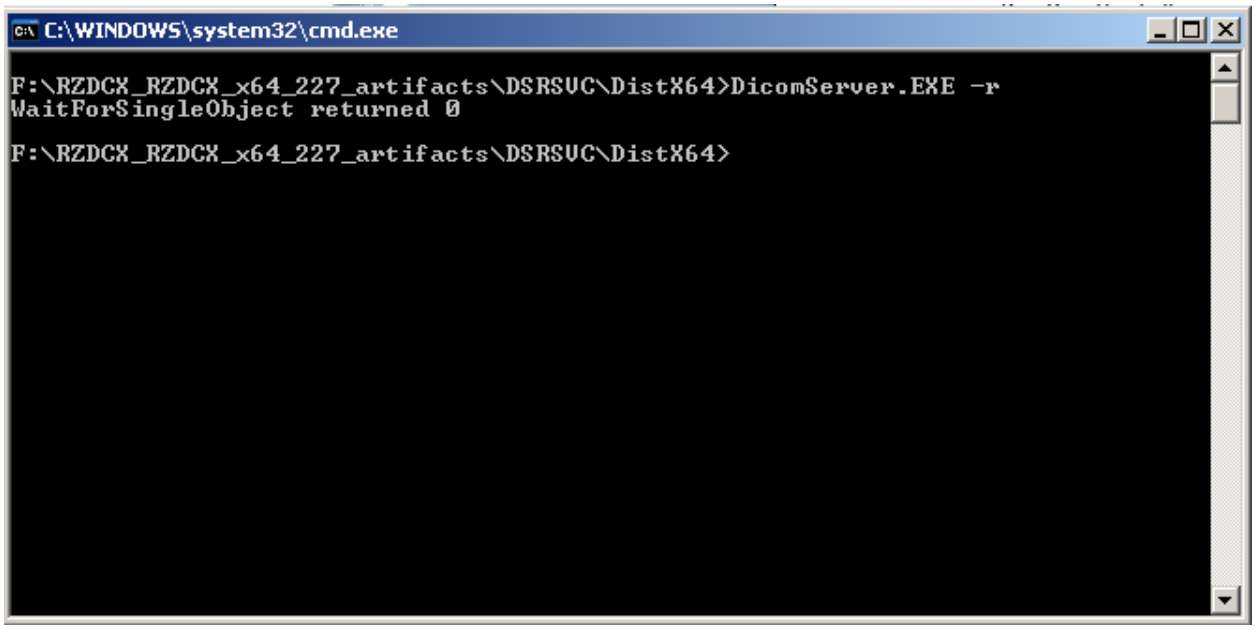
Running the DICOM Server from Command Line

1. From a command line, navigate to the distribution folder
2. Run the following command:
   DicomServer.exe -r
3. The server is now running.

To stop the DICOM Server when running from command line:

4. Click CTRL-C. The server should stop after approximately 5 seconds.

5. The following will be printed on the screen:
   WaitForSingleObject returned 0



To Install DSRSVC as a background process (service) run it with the –i (install) parameter. No further configuration is required. The service is added to the system and starts automatically with the system listening on port 104 and store files on the default hard drive in the DSRSVC folder.

Use the default INI configuration file to set AE title, port, location of storage and remote application.

To install a plugin, save the plugin DLL named DSRSVCp.DLL in the same folder with the application EXE and configure parameters such as connection string and other settings.

Plug-ins

A Plug-in is an extension of the DICOM Server that implements the DICOM Server API and control the functionality of the server.

The distribution package includes two plug-ins:

1. The Ini File Plugin
2. The DICOM DB Plugin

Installing a Plug-In

To install a plug-in follow these steps:

1. Stop the service

2. Copy the plugin DLL to the installation folder where DicomServer.EXE is located and rename it to: DSRSVCP.DLL
3. Copy any configuration files that the plug-in use to the installation folder.
4. Start the service

INI File Plug-in

Installing and Configuring the Ini File Plugin

1. Stop the service
2. Copy the IniFilePlugin.DLL to the installation folder where DicomServer.EXE is located and rename it to: DSRSVCP.DLL
3. Create a file named DicomServer.INI and edit it using a text editor so it has the following content:

```
[DICOM_SERVER]
AE_TITLE=DSRSVC
PORT=104
STORAGE_ROOT=C:\YOURDIR
FILENAME_TEMPLATE="StudyInstanceUID\SeriesInstanceUID\SOPInstanceUID.dcm"
```

4. Start the service

IniFilePlugin Configuration

Key	Default	Meaning
AE_TITLE	DSRSVC	The AE Title that the DICOM Server identifies itself with
PORT	104	The port that the DICOM Server listens on
STORAGE_ROOT	\DSRSVC	The folder where files will be stored (must be accessible and writeable
FILENAME_TEMPLATE	StudyInstanceUID\SeriesInstanceUID\SOPInstanceUID.dcm	A template used to name stored files.

Using the FILENAME Template configuration Entry

The template is used to name files that are stored by the server. Use valid DICOM Tag Names.

Use \ for folder separator and . for suffix.

Example:

PatientName\AccessionNumber\StudyDate\SeriesNumber\InstanceNumber

This will create nested folders for:

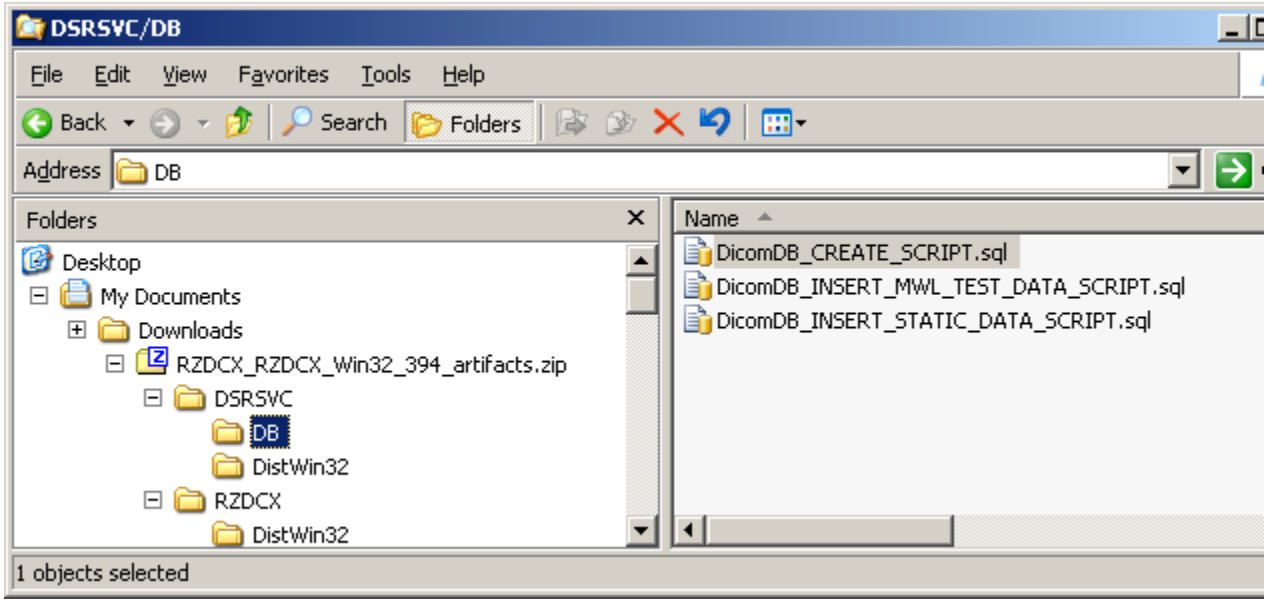
1. Patient Name
2. Accession Number
3. Study Date
4. Series Number

And files names according to the InstanceNumber.

DICOM DB Plugin

Adding Q/R SCP and MWL SCP

To add Modality Worklist, Storage Commitment and Query/Retrieve you'll need a database to record the images, key attributes and worklist records. The DicomDBPlugin.DLL adds this functionality.



Database Creation Scripts

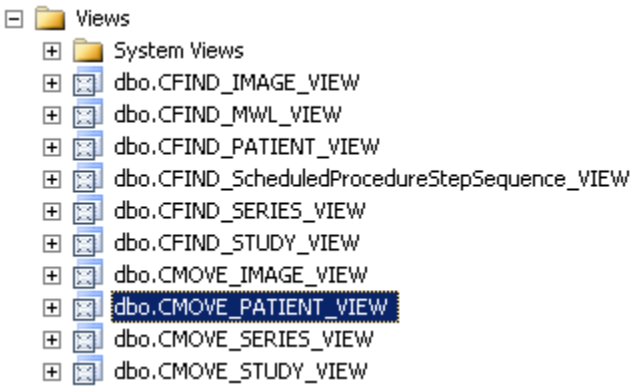
Follow these steps:

1. Run DicomDB_CREATE_SCRIPT.sql to create the RZ_DICOM schema,
2. Run DicomDB_INSERT_STATIC_DATA_SCRIPT.sql,
3. Copy DicomDBPlugin.DLL to the folder where the DicomServer.EXE is and**rename it to DSRSVCP.DLL**
4. Copy DicomServer.INI to the same folder and change the connection string to match your database server and credentials.

5. Restart the service

Configuring the Q/R SCP and MWL SCP of the DICOM DB Plug-in

The supported tags for Q/R and MWL are all dynamic and controlled using the column names of the database views.



Database Views to control Q/R and MWL

Each of these views has column names identical to DICOM attribute names. The C-FIND and C-MOVE views have also Q/R level in their name so a patient level query will be made from the CFIND_PATIENT_VIEW. There's no distinction between the query models and all are mapped to the same views. To add a supported column, all you need to do is to add the appropriate column name to the view that is mapped to the query and that's it. Oh, and you need to get the data for it. If you implement the plugin API that's easy.

Mapping Sequence Matching to Database Views

The MWL C-FIND command makes extensive use of sequence matching. In sequence matching, a sequence element in the query is matched to database tables. The DB plugin does this mapping by using a column named as the sequence tag as the relationship key between the parent and child tables.

The root view is CFIND_MWL_VIEW that has a column names ScheduledProcedureStepSequence that is the name of the DICOM tag. The child view is CFIND_ScheduledProcedureStepSequence_VIEW that also has the same field name.

Adding more sequences for example for codes is done dynamically in the same way and no software change is required other than adding the views to the database.

To test the MWL SCP run the SQL script DicomDB_INSERT_MWL_TEST_DATA_SCRIPT.sql and run the modality worklist.

Plug-ins Development

The Plug-in API is used to modify and enhance the functionality of the DICOM server. For complete documentation and source code examples of the Plug-in API and plug-ins development see the DSRSVC Programming Guide.

Audit Trails and Logs

The DICOM Server uses the system event viewer for logging.

The following logs are created:

Log Name	Used by	Purpose
Application Log	Service Manager	Service start and stop, information, warning and error messages
Storage DICOM Service	DICOM Server	-
RZ-DICOM-DB-PLUGIN	DICOM DB Plugin	Database plug-in