

## Conquest DICOM Server 1.4.14 CONFORMANCE STATEMENT and detailed software revision history

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Revision 1; 19961103	As taken from the 'developers cut' distribution of MicroPACS
Revision 2; 19980703	Conquest additions; pre-release 1.3.1.
Revision 3; 19980713	Conquest additions; release 1.3.1
Revision 4; 19990415	Updated according to latest software revisions (mainly for RT), release 1.3.2
Revision 5; 19990527	Small software updates, birthday, sex, bolus, release 1.3.3
Revision 6; 20000131	NKI specific sops updated, new compression mode, mirroring, release 1.3.4
Revision 7; 20000316	Added operation as NT service, pre-release 1.3.5
Revision 8; 20000403	Unlimited servers/services, auto-login, self-test, sop choices, fixes for GE Hi-Speed, improved display, fixed hang concurrent C-ECHO's, final release 1.3.5
Revision 9; 20000701	Improved browser menu, other ODBC drivers, release 1.3.6
Revision 10; 20001129	Multithread and UNC path fixes, edit ID, send to, edit database, release 1.3.7
Revision 11; 20010318	Hostname fix, optionally runs 4 services, show incoming, release 1.3.8
Revision 12; 20010502	GUI additions database fixing; faster compression; fixed leaks, release 1.3.9
Revision 13; 20011109	better forward/export, extended DB/sop, zip logs, drag and drop, release 1.3.10
Revision 14; 20020508	reliability and error handling fixes, UID configurable, dbrev 6
Revision 15; 20020613	Implemented StudyModality, db rev 7, find local missing pats, release 1.3.11
Revision 16; 20020822	FilenameSyntax options for DICOM-Works; printing, release 1.3.12
Revision 17; 20021215	Various fixes. Non-ODBC driver; read-ahead thread; <b>release 1.4.0</b>
Revision 18; 20030303	Bug fix release 1.4.1
Revision 19; 20030710	Release 1.4.2, flexible compression and transfer fixes, db rev 11
Revision 20; 20030922	Prepare release 1.4.3, registry / administrator bug/doc; long filenames
Revision 21; 20040406	Release 1.4.4, mysql fix / large disks / db rev 13 / jpeg fixes / GUI uses MAG0..9 / system DSN
Revision 22; 20040426	Release 1.4.4a, mysql fix broke MS-access and SQL server, added DoubleBackSlashToDB (see 4.1.3)
Revision 23; 20040615	Release 1.4.5, built-in DbaseIII driver now suitable for huge archives; better deletion tools; auto-move
Revision 24; 20040722	Release 1.4.6, Added FixKodak; Added "nj" compression; FixPhilips/FixKodak defaults 0 (!)
Revision 25; 20040805	Release 1.4.6a, Fix in move for single image
Revision 29; 20041129	Release 1.4.7, JPEG fix, bugreport button; split/merge, 'k' compress, uid list matching, AE with ~xx
Revision 30; 20050131	Release 1.4.8, Fixed delete, nightlymove, 4-server; hold failed forwards/copies; distribution compiles, initial linux release and initial web interface
Revision 31; 20050912	Release 1.4.9, Fixes in web and Linux, modality worklist
Revision 32; 20051024	Release 1.4.9a, Fix crashes due to no patch in controls.pas
Revision 33; 20060103	Release 1.4.10, VirtualServerFor, fixes leaks, linux, postgres
Revision 34; 20060328	Release 1.4.11, K-Pacs viewer, native MySQL, worklist fix, virtualserver fix, flexible filenamesyntax, WEBReadOnly, Fix forwarder retry logic

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Revision 35; 20060708	Release 1.4.12alpha: bug fixes, db performance improved, and appendix 5-7
Revision 36; 20061222	Release 1.4.12: bug fixes in dbaseIII driver and in deleting, forwarding and grabbing, resizeable GUI
Revision 37; 20070127	Release 1.4.12b: importconverters, converter scripting, fixes in dbaseIII driver and web access, no nki compression in .dcm
Revision 38; 20070201	Release 1.4.12c: "storage" importconverter, fix ExportFilter and problem in most GUI commands
Revision 39; 20070305	Release 1.4.13alpha: "defer" exportconverter, stuff for k-pacs web viewer; manual split into user and technical part by radtraveller – this is the technical part
Revision 39; 20070707	Release 1.4.13beta: native mysql fixes, delayed converters, sqllite
Revision 40; 20070709	Release 1.4.13beta2: some last fixes
Revision 41; 20071116	Release 1.4.13: more fixes and parameters
Revision 42; 20080322	Release 1.4.14beta: uj compression; database changes; fixes
Revision 43; 20080902	Release 1.4.14: fixes, improved web pages; added query on 'Number of Patient Related Studies' items etc.

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## SECTION 1. INTRODUCTION

The MicroPACS is a Windows or Linux based PACS system that has, at its core, the UCDCM DICOM Network Transport libraries. This system has been combined with a complete user interface (Windows only), which also acts as installation program (written in Borland Delphi) to form the Conquest DICOM server. The Information Definition is designed to be field/run-time programmable. Below the DICOM interface is a database connectivity class that uses a stable built-in DBASEIII driver, talks to ODBC compatible data sources (Windows only), MySQL, or a built-in SQLite driver. This combination permits a PACS system with the following features:

- Complete DICOM Interface. Including SCP's for run-time programmable storage IOD's, and SCP for DICOM Queries and Retrieves.
- Programmable SQL Database tables. This user-programmable feature allows the MicroPACS to be custom tailored to a particular Clinical/Research area. For instance, in a CR setting, the PACS system can be programmed to allow users to query on kvp and ma or in a CT setting, the PACS can be programmed to allow queries on slice-distance.
- Communication to database is done via a built-in dBaseIII driver (default and advised for small archives of up to 100.000 images), ODBC (Windows only), SQLite, or native MySQL (Windows only). This allows de-coupling PACS and SQL technology. ODBC was tested with (Windows):
  - Microsoft Access
  - SQL server (most reliable and advised for serious use)
  - Some users have reported successful operation using Interbase and Oracle. Versions 1.4.5 and up have a small fix to work with MySQL – which seems suitable for up to 100.000 images (see the DoubleBackSlashToDB setting in dicom.ini). Oracle requires manual editing of the DICOM.SQL file, where the names of fields 'rows' and 'columns' are changed to, e.g., 'qrows' and 'qcolumns'.

**Note:** The built-in dBaseIII driver (Conquest addition) is not a full SQL server and poses limitations on query keys: only queries like 'key' = exact match; 'key\*' = value starts with key; and '\*key\*' = value contains key, are supported, as well as date-range queries and multiple UID matching queries (since 1.4.7). Only common hierarchical queries are supported with fields that are listed in the single de-normalized table for the selected query level (see file DICOM.SQL). Regular queries passing PatientID, StudyUID, and/or SeriesUID will be (very) fast, even for huge archives. Other (image) queries in large archives (>1000.000 images) may be very slow. Server startup time for huge archives may be long due to in-memory index creation (about 1 minute per 1000.000 images). During indexing the server is read-only and only shows indexed images. For Linux, the built-in driver is advised, however, Postgres and SQLite versions are included.

- (Conquest addition) Fast and safe (CRC checked) error free compression (>2x) of image data on disk. Do not use this option if you want to read the image files directly from disk yourselves using third party software.
- (Conquest addition) Easy installation of many servers on a single PC. Servers may run as service(s).

- (Conquest addition) A database browser and slice viewer (Windows only) integrated in the PACS system with options for: viewing the DICOM information in a slice, creating BMP files (ideal for slides), sending selected images, printing, and database fix tools such as changing patient IDs, and deleting and anonymizing studies and series. Also tools to merge or split series. Drag and drop to load DICOM or HL7 files or directories.
- (Conquest addition) A simple query/move user interface (Windows only) for diagnostic purposes, to improve your knowledge of DICOM, and to grab missing data from another server.
- (Conquest addition) Fully integrated functionality in one user interface.
- (Conquest addition) Simple print server (Windows) - to default printer.
- (Conquest addition) Log files, which are daily zipped (Windows only). We use the TZipMaster VCL by Chris Vleghert and Eric W. Engler.
- (Conquest addition) Correct display of JPEG and RLE compressed images in browser (Windows only).
- (Conquest addition) Flexible configuration of JPEG and NKI private compression with optional (de)compression of incoming, dropped, transmitted and archived files. The actual JPEG (de)compression is done using executables from the OFFIS DICOM toolkit (DCMTK version 3.5.3), developed by Kuratorium OFFIS e.V.. Since version 1.4.7, also a built-in decompression engine is included (Windows only) using the International JPEG group code, and JPEG compression had some fixes.
- (More conquest additions) Highly improved performance (e.g., using a read-ahead thread), and simple image forwarding/action capability.
- The archive is well suited as DICOM server for the DICOMWORKS viewer by Phillipe Puech.
- If the BDE is not installed, we use the MiTeC DBFTable component by MichaL MutL. For other data sources ADO is used (Windows only). Alternatively libmysql.dll may be used to access mysql directly (copy it from mysql server version 5.0.22 to the dicom server directory).
- Server core of version 1.4.8 up runs on Linux; preliminary WEB interface.
- Version 1.4.9 up has preliminary DICOM Worklist query functionality.
- Version 1.4.10 up has preliminary virtual server functionality.
- Version 1.4.12 can use a native MySQL driver (based on Rangel Gustavo Reale's TMySQLDataset and Matthias Fichtner's mysql.pas) and includes a preliminary advanced series viewer based on EZDicom / K-Pacs (many thanks to Chris Rorden and Andreas Knopke). Fixes: strip group 2 information of any files sent, retry logic, worklist query.
- Version 1.4.12 improves database performance, has some important bug fixes (rare crashes, incomplete deletion and grabbing, and rare database corruption on dbaseIII). Further it has the possibility to forward multiple images on a single association, and improved documentation
- Version 1.4.12b and c add importconverters and bug fixes in dbaseIII driver and web access and do not allow .dcm with nki compression
- Version 1.4.13 has a web viewer based on K-PACS, SQLite is now included, and more import and export converter options were added such as delayed forwarding and preretrieval. Then small fixes were made in

native mysql (also the driver is now included in the package), and several other aspects of the server, such as handling of compression errors, out of memory conditions, and others.

- Version 1.4.14 has a more web options (move, delete and viewers), more elaborate exportconverters and adds 'Number of Patient Related Studies' etc. query items

## SECTION A(2). CONFORMANCE STATEMENT

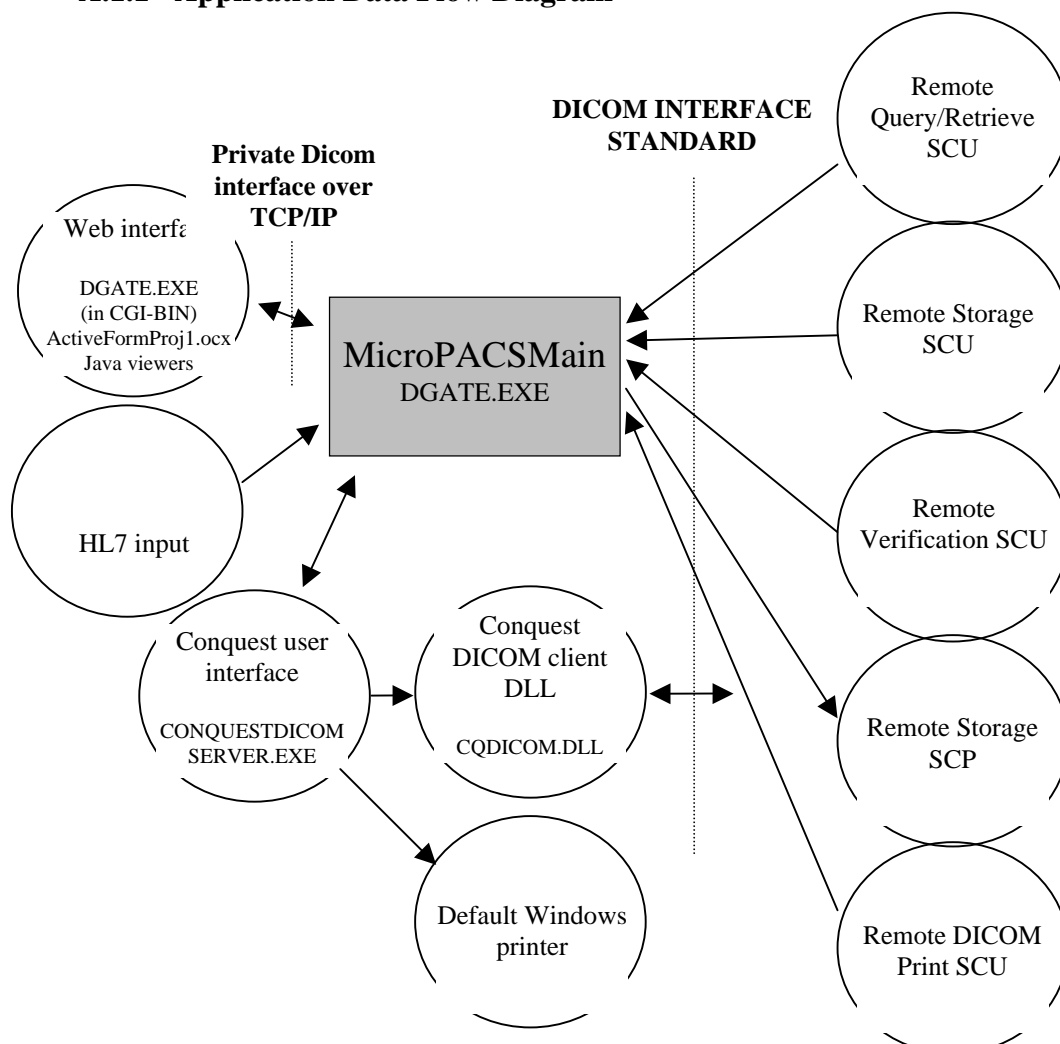
### A.0 INTRODUCTION

This conformance statement (CS) details the MicroPACS compliance to DICOM v3.0. It covers all DICOM Service Class roles in this product:

- Various Storage Service Class (SCP) Roles
- Morphing Storage Service Class (SCU) Roles
- Patient Root Query & Retrieve (SCP) Roles
- Study Root Query & Retrieve (SCP) Roles
- Patient/Study Root Query & Retrieve (SCP) Roles
- Verification Service Class (SCP) Role
- Print Management (SCP) Role
- Worklist Query (SCP) Role

### A.1 IMPLEMENTATION MODEL

#### A.1.1 Application Data Flow Diagram



### A.1.2 Functional Definition of AE's

#### Application Entity 1, MicroPACSMMain

Supports the following functions:

- Has access to patient demographics and pixel data in the local database.
- Responds to DICOM associations containing image and worklist query requests using the information in the local database.
- Moves IOD modules to any configured DICOM AE when requested to do so by a remote DICOM AE.
- Responds to DICOM associations containing storage requests and places the IOD in the local database.
- Responds to DICOM associations containing verification requests.
- Responds to DICOM associations containing print requests and prints items on the default local Windows printer.
- Responds to private DICOM associations to support the WEB interface.

**NOTE:** The Conquest Applications (not part of the server release) or other DICOM network viewers (e.g., KPacs) will use separate AE's which **MUST** be configured in ACRNEMA.MAP (use the “**Known DICOM providers**” page) to allow access of images from the DICOM server.

### A.1.3 Sequencing of Real - World Activities

#### Image Store:

- The remote AE will initiate a DICOM association.
- The MicroPACSMMain AE will select the appropriate Abstract and Transfer Syntax's from those proposed by the remote AE.
- The remote AE will initiate a C-Store to send the IOD.
- The MicroPACSMMain AE will respond with a C-Store-RSP upon receipt of the IOD.
- The following processing occurs using the WorkList database (can be enabled/disabled using 'WorkListMode' in DICOM.INI):
  - WorkListMode=0: no processing occurs.
  - WorkListMode=1: The AccessionNumber is looked up in the local WorkList database, if it is found, any element in the DICOM object that is also present (and non-NULL) in the WorkList database, will be replaced by the value from the WorkList database. These changes are made both in the database and in the image that is stored on disk.
  - WorkListMode=2: As mode 1, but the image will be refused if the AccessionNumber is not found.
  - Note: there is no DICOM method of filling the worklist database (see the description of WorkListMode).
- The following processing (can be enabled/disabled by defining 'FixPhilips = 0/1' in DICOM.INI) of the patient ID occurs to conform patient ID's generated by a Philips scanner with NKI policy:
  - From a patient ID of 10 digits (i.e., only exactly 10 digits) and a numeric value larger than 0001000000, starting with at least 2 zeros, the first 2 or 3 leading zeros are stripped. I.e., '0123456789' is not changed, '0020101234' is replaced by '20101234', '0009901234' is replaced by '9901234', and '0000012345' is replaced by 0012345. The result is that a 10 digit ID from Philips that consists of a valid NKI patient ID with extra leading zeros is converted to a valid NKI patient

ID. These changes are made both in the database and in the image that is stored on disk.

- The following processing (can be enabled/disabled by defining 'FixKodak = 0/1' in DICOM.INI) of the patient ID occurs to conform patient ID's generated by a Kodak RIS worklist with NKI policy:
  - From a patient ID of 8 digits (i.e., only exactly 8 digits) and a numeric value larger than 01000000, starting with at least 1 zero, the leading zero is stripped. I.e., '0123456789' is not changed, '09901234' is replaced by '9901234', and '00012345' is replaced by 0012345. The result is that a 8 digit ID from Kodak RIS that consists of a valid NKI patient ID of before 2000 with a superfluous leading zero, is converted to a valid NKI patient ID. These changes are made both in the database and in the image that is stored on disk.
- Trailing space are discarded from the patient ID.
- ImportConverters are called as scripts or rules to modify, delete or log images or VR's in them.
- The pixel data is NKI or JPEG compressed if this option is enabled.
- The image is stored and disk and image header data is (re-)entered in the database at all four levels (patient, study, series, and image). The following consistency checking is performed on the data entered in the database (without changing the image information that is stored):
  - Inconsistent link information (e.g., two images of the same series belong to different patients), lead to a reject to store the new image with reported failure to the sending client.
  - Filled items will not be overwritten by empty items.
  - Known sex (M or F) in the patient database will not be overwritten with any other value than M or F.
  - A known date of birth in the database will not be overwritten with an empty date or with a date on the 1st of January (which has a high probability to be wrong). When the original date of birth is empty, any value will be accepted.
  - In case of any other inconsistency, the newer values will be written in the database, and the change will be logged as a warning in serverstatus.log. Inconsistencies in the birthdate are also logged in PacsTrouble.log.
  - The (series) Modality field is appended to the Study Modality field in the database if it does not already contain this Modality.
  - The PatientName, PatientBirthDate and PatientSex items are duplicated in the study table (database rev8 and up), to allow detection of patient ID mix-ups.
- Optionally the image is processed or forwarded (compressed or uncompressed) if Modality and StationName match with values specified in dicom.ini and the optional ExportFilter test is passed (see appendix 7).
- Some logging of activity occurs.

#### Query/Retrieve:

- The remote AE will initiate a DICOM association.
- The MicroPACSMMain AE will select the appropriate Abstract and Transfer Syntax's from those proposed by the remote AE.
- Queries can be forwarded to up to 10 VirtualServerFor entries. The received data will be merged with the data from the server's database and cleaned of duplicates (see appendix 7).
- Optionally the 'Number of Patient Related Studies'-like items will be computed (this executes another query for each result of the first query)



- Upon receipt of a C-Move request, the MicroPACSMMain AE will initiate an SSC/SCU association morphing to the stored IOD SOP Class to the specified and configured DICOM AE. Compressed pixel data will be decompressed or recompressed prior to transmission. A C-Move response message will be generated synchronously with the associated C-Store.
- Retrieval of data stored on one or more of the VirtualServerFor entries and not on the local server will initiate automatic transfer from the listed servers in the VirtualServerFor table to the local server, followed by a transfer to the C-MOVE destination. After the retrieval data can be optionally deleted again (see appendix 7).
- Some logging of activity occurs.

#### Worklist Query:

- The remote AE will initiate a DICOM association.
- The MicroPACSMMain AE will select the appropriate Abstract and Transfer Syntax's from those proposed by the remote AE.
- The MicroPACSMMain AE will query the Worklist database and respond with zero or more modality worklist items.
- Some logging of activity occurs.
- Note: there is no DICOM method of filling the worklist database. It can be filled through the web interface, by drag and dropping hl7 files or programatically (see the description of WorkListMode).

#### Verification:

- The remote AE will initiate a DICOM association.
- The remote AE will initiate a C-ECHO.
- The MicroPACSMMain AE will respond with a C-ECHO-RSP.
- Some logging of activity occurs.

#### DICOM Print:

- The remote AE will initiate a DICOM association.
- The remote AE will create a basic film session using N-CREATE.
- The MicroPACSMMain AE will ignore the information but will respond with a N-CREATE-RSP.
- The remote AE will create a basic film box using N-CREATE.
- The MicroPACSMMain AE extracts the Image Display Format (only "STANDARD\#rows,#cols" is accepted), and the film orientation (LANDSCAPE or PORTRAIT) and passes this information to the CONQUEST user interface. All other information is ignored.
- The MicroPACSMMain AE creates the correct amount of Basic Grayscale or Color Image Box objects for the film page and transmits their UIDs to the remote AE in the N-CREATE-RSP. The UIDs contain information about the page number, number of rows and columns, and the image location on the page that will be used by the CONQUEST user assemble the printed page.
- The remote AE will use N-SET to fill each Image Box object.
- The MicroPACSMMain AE will store each incoming Image Box onto disk (in directory "printer\_files" on device MAG0) and responds with N-SET-RSP. The name (UID) of the files is passed to the CONQUEST user interface.
- The CONQUEST user interface (Windows only) will queue incoming images and will asynchronously convert each DICOM file into a BMP file, load it in memory and assemble the pictures to be printed on a page.

Processed DICOM files and BMP files are deleted. *Note: the basic print support in the CONQUEST user interface will not handle multiple simultaneous print requests correctly!*

- The remote AE will request printing of each film or of the complete session using an N-ACTION command for a basic film session or a basic film box.
- The MicroPACSMMain AE passes these requests onto the CONQUEST user interface and responds with an N-ACTION-RSP.
- The CONQUEST user interface (Windows only) prints the pages on the default Windows printer. The only way to configure this printer is to change its default document settings in Windows. Printing progress is shown using a simple progress bar on the server status page.
- The remote AE may query the printer status with a N-GET request on the printer object.
- The MicroPACSMMain AE will always respond with a N-GET-RSP with a “NORMAL” status and the name of the printer, which is pre-set to “Conquest dicom printer”.
- Other N-DELETE, N-SET, and N-EVENTREPORT requests are acknowledged with an adequate RSP and ignored.
- Some logging of activity occurs.

Web access:

- The remote client will request a web page from cgi-application dgate.exe
- The cgi-application will fill a page with information. Patient information is requested over a private DICOM protocol (e.g., query2 or patientlister) from the main server to fill tables. Furthermore links may be added to:
  - GIF or BMP images
  - Viewer controls
- Links to GIF/BMP images will access the cgi-application, which in turn will request them from the main server over a private DICOM protocol. The main server is responsible for converting DICOM to GIF/BMP.
- The links to the viewer controls (OCX or Java) have two purposes. First the control will be downloaded and installed in the web viewer. This requires reduced security settings (trusted site), download of Java and/or installation of the OCX control with regsrv32.exe. Then the viewer controls will request DICOM images as needed from the cgi-application, which in turn will request these from the main server over a private DICOM protocol. The main server is responsible for (de)compressing and optionally downsizing the DICOM images.

```

client  -> webserver      url      http://127.0.0.1/scripts/dgate.exe?mode=seriesviewer&series=...
webserver -> dicomserver    query    imagelister:CONQUESTSRV1|.....
client   <- webserver <- dicomserver query results      (to build list of urls of dicom slices)

client   <- webserver      activex control http://127.0.0.1/ActiveFormProj1.ocx

Then for each slice that is required:

control  -> webserver      url      http://127.0.0.1/scripts/dgate.exe?mode=dicom&slice=.....
webserver -> dicomserver    request   convert_to_dicom:....
control   <- webserver <- dicomserver dicom data

```

## A.2 AE SPECIFICATIONS

### A.2.1 AE1 Specification

This Application Entity provides Standard Conformance to the following DICOM v3.0 SOP Classes as an SCU:

SOP Class Name	SOP Class UID
Verification (Echo)	1.2.840.10008.1.1
* Unknown IOD Storage	* See note

**NOTE:** This MicroPACS will initiate outgoing DICOM C-STORE requests masquerading as any stored IOD module. The behavior of this outgoing association link will be like the DICOM defined SCU role: Storage Service Class.

This Application Entity provides Standard Conformance to the following DICOM v3.0 SOP Classes as SCP:

SOP Class Name	SOP Class UID
Verification (Echo)	1.2.840.10008.1.1
Patient Root Query/Retrieve Info. Model -FIND	1.2.840.10008.5.1.4.1.2.1.1
Patient Root Query/Retrieve Info. Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2
Study Root Query/Retrieve Info. Model -FIND	1.2.840.10008.5.1.4.1.2.2.1
Study Root Query/Retrieve Info. Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2
Patient Study Only Query/Retrieve Info. Model -FIND	1.2.840.10008.5.1.4.1.2.3.1
Patient Study Only Query/Retrieve Info. Model - MOVE	1.2.840.10008.5.1.4.1.2.3.2
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18
Modality WorkList Query	1.2.840.10008.5.1.4.31
* Unknown IOD Storage	* See note

**NOTE:** This MicroPACS will accept any incoming DICOM C-STORE request sent using the DICOM defined SCP role: Storage Service Class. The dgatesop.lst file (see configuration section and dicom.ini file) can be used to selectively restrict this ability.

#### A.2.1.1 Association Establishment Policies

##### A.2.1.1.1 General

The DICOM Application Context Name (ACN) that is always proposed is:

<b>Application Context Name</b>	<b>1.2.840.10008.3.1.1</b>
---------------------------------	----------------------------

The Maximum Length PDU negotiation is included in all association establishment requests. The maximum length PDU for an association initiated by the NetMain AE is:

<b>Maximum Length PDU</b>	<b>16Kbytes</b>
---------------------------	-----------------

The SOP class Extended Negotiation is not supported and ignored.

There is no limit on the maximum number of Presentation Contexts Items that will be proposed. In this implementation, each Abstract syntax will be proposed with either a single Transfer Syntax, or with a few JPEG transfer syntaxes, depending on the configuration in *acrnama.map*.

The user info items sent by this product are:

- Maximum PDU Length
- Implementation UID
- Implementation Version

**Note:** Max PDU length is not configurable at run time.

#### **A.2.1.1.2 Number of Associations**

MicroPACSMMain AE will initiate one DICOM association to perform image store for each concurrently incoming C-MOVE request.

There is no artificial maximum placed on the number of simultaneous DICOM associations open at one time. It should be noted that system response time will be degraded, and this could possibly adversely effect a time-out period on other remote AE's.

The Print Management function will correctly handle multiple simultaneous associations, but the elementary print support in the CONQUEST user interface will not correctly print (i.e., images on the pages will be mixed up) when multiple print jobs are sent simultaneously.

#### **A.2.1.1.3 Asynchronous Nature**

Asynchronous mode is not supported. All operations will be performed synchronously.

#### **A.2.1.1.4 Implementation Identifying Information**

The Implementation UID allows unique identification of a set of products that share the same implementation.

The Implementation UID for this ID/Net v3.0 Implementation is:

<b>Storage &amp; Q/R UID</b>	<b>1.2.826.0.1.3680043.2.135.1066.101</b>
------------------------------	---

### **A.2.1.2 Association Initiation by Real-World Activity**

#### **A.2.1.2.1 Proposed Presentation Contexts**

Presentation Context Table – Proposed					
Abstract Syntax & configuration		Transfer Syntax		Role	Expanded Negotiation
*Unknown	un,as,n1..n4,uj,nj	Little Endian	1.2.840.10008.1.2	SCU	None
*Unknown	j3..j6	JPEGBaseLine1	1.2.840.10008.1.2.4.50	SCU	None
*Unknown	j3..j6	JPEGExtended2and4	1.2.840.10008.1.2.4.51	SCU	None
*Unknown	j5	JPEGSpectralNH6and8	1.2.840.10008.1.2.4.53	SCU	None
*Unknown	j6	JPEGFullNH10and12	1.2.840.10008.1.2.4.55	SCU	None
*Unknown	j2	JPEGLosslessNH14	1.2.840.10008.1.2.4.57	SCU	None
*Unknown	j1, j2	JPEGLossless	1.2.840.10008.1.2.4.70	SCU	None

**Note:** Due to the morphing nature of the outgoing SSC-SCU engine, the specific Abstract Syntax that is proposed depends upon the nature of the stored image. The actual proposed Transfer Syntaxes depend on the configuration in *acrnama.map* and are the same for each class of stored images.

#### **A.2.1.2.1.2 SOP Specific Conformance Statement for Image Storage SOP Class**

This implementation can perform multiple C-STORE operations over a single association.

Upon receiving a C-STORE confirmation containing a successful status, this implementation will perform the next C-STORE operation. The association will be maintained.

Upon receiving a C-STORE confirmation containing an Error, Refused or Warning status, this implementation will fail the specific IOD in question. If more images need to be sent, they will be sent in the same association.

#### **A.2.1.2.2 Association Acceptance Policy**

##### **A.2.1.2.2.1 Real-World Activity**

This AE accepts associations for the Query/Retrieve (Q/R) SOP using the Patient Root, Study Root, and Patient/Study Only Query Model.

This AE accepts associations for the Image Storage Class using any defined IOD class.

This AE accepts associations for the Verification Service Class.

This AE accepts associations for the Print Service Class.

This AE accepts associations for the WorkList Query Service Class.

##### **A.2.1.2.2.2 Real-World Activity**

This AE is indefinitely listening for Q/R, Storage Class, Verification and Print Management associations

##### **A.2.1.2.2.3 Proposed Presentation Contexts**

Presentation Context Table – Accepted					
Abstract Syntax		Transfer Syntax		Role	Expanded Negotiation
Patient Root Query/Retrieve Info. Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	Little Endian	1.2.840.10008.1.2	SCP	None
Patient Root Query/Retrieve Info. Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Little Endian	1.2.840.10008.1.2	SCP	None
Study Root Query/Retrieve Info. Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Little Endian	1.2.840.10008.1.2	SCP	None
Study Root Query/Retrieve Info. Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Little Endian	1.2.840.10008.1.2	SCP	None
Patient/Study Only Query/Retrieve Info. Model – FIND	1.2.840.10008.5.1.4.1.2.3.1	Little Endian	1.2.840.10008.1.2	SCP	None
Patient/Study Only Query/Retrieve Info. Model – MOVE	1.2.840.10008.5.1.4.1.2.3.2	Little Endian	1.2.840.10008.1.2	SCP	None
Modality WorkList Query	1.2.840.10008.5.1.4.31	Little Endian	1.2.840.10008.1.2	SCP	None
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Little Endian	1.2.840.10008.1.2	SCP	None
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18	Little Endian	1.2.840.10008.1.2	SCP	None
*Unknown	*Unknown	Little Endian*	1.2.840.10008.1.2	SCP	None
Verification	1.2.840.10008.1.1	Little Endian	1.2.840.10008.1.2	SCP	None

**Note:** Due to the morphing nature of the incoming SSC-SCP engine, the specific Abstract Syntax accepted will depend upon the nature of the stored image, and the dgatesop.lst configuration file (of which a default version is automatically created when installing the Conquest DICOM server).

\*The server can accept many transfer syntaxes as configurable by *dgatesop.lst*.

#### **A.2.1.2.2.4 SOP Specific Conformance for Query/Retrieve FIND SOP Class SCP**

The C-FIND response status values are supported as defined in DICOM v3.0 Part 4.

All Required (R) and Unique (U) Study, Series, and Image Level Keys for the Patient Root, Study Root, and Patient/Study Only Query/Retrieve Information Model are supported. Many optional (O) Keys are supported, as described later in this document.

#### **A.2.1.2.2.5 SOP Specific Conformance for Query/Retrieve MOVE SOP Class SCP**

Prioritization of C-FIND & C-MOVE requests is all set to normal - 0.

All images requested in a single C-MOVE will be sent over a single association (the association will not be re-established for each image).

#### A.2.1.2.2.6 SOP Specific Conformance for “Unknown” Storage SCP

The specific Storage SCP classes accepted are programmable (by the user) at runtime, and cannot be explicitly stated here.

No optional elements are discarded.

The duration of the storage is temporary. Least recently added patients are deleted when the disk space is less than the amount specified in the “Cleanup disk space below (MB)” field in the Conquest DICOM server. This amount is run-time configurable. When the DICOM server is connected to a, e.g., jukebox archival system, the duration of storage can be made permanent.

#### A.2.1.2.2.7 Presentation Context Acceptance Criterion

No criterion.

#### A.2.1.3 Transfer Syntax Selection Policies

The server can accept most transfer syntaxes as configurable by *d gatesop.lst*. Outgoing connections can be made over uncompressed, loss-less or lossy JPEG transfer syntaxes. If so, the images are recompressed to conform to the accepted transfer syntax. The configuration is done through *acrnema.map*.

Configuration	Proposed transfer syntaxes	Name
$un^1, as^2, n1..n4^3, nj^4, uj^4$	1.2.840.10008.1.2	ImplicitLittleEndian
j1	1.2.840.10008.1.2.4.70	JPEG Lossless sv1
	1.2.840.10008.1.2	ImplicitLittleEndian
j2	1.2.840.10008.1.2.4.57	JPEG Lossless sv 6
	1.2.840.10008.1.2.4.70	JPEG Lossless sv1
	1.2.840.10008.1.2	ImplicitLittleEndian
j3, j4	1.2.840.10008.1.2.4.51	JPEG extended (12 bits)
	1.2.840.10008.1.2.4.50	JPEG baseline (8 bits)
	1.2.840.10008.1.2	ImplicitLittleEndian
j5	1.2.840.10008.1.2.4.53	JPEG spectral selection
	1.2.840.10008.1.2.4.51	JPEG extended (12 bits)
	1.2.840.10008.1.2.4.50	JPEG baseline (8 bits)
	1.2.840.10008.1.2	ImplicitLittleEndian
j6	1.2.840.10008.1.2.4.55	JPEG progressive
	1.2.840.10008.1.2.4.51	JPEG extended (12 bits)
	1.2.840.10008.1.2.4.50	JPEG baseline (8 bits)
	1.2.840.10008.1.2	ImplicitLittleEndian

**Note:** The transfer syntaxes are listed in order of priority. I.e., if a host is configured as j1 and it accepts JPEG lossless, the image will be lossless JPEG compressed before transmission, even if it was not stored in that way.

- 1) un = uncompressed. Images will be decompressed prior to transmission.
- 2) The configuration "as" will transmit images as-is. Independent of how images are stored on disk (with JPEG or NKI compression), they will be transmitted over an ImplicitLittleEndian connection. This behavior does not conform to the DICOM standard and for many hosts this may therefore not work. NKI clients will work, though.
- 3) Configurations n1..n4 will transmit images with NKI private compression, which can only be read by NKI clients.
- 4) nj = nki compressed, leave jpeg as is; uj = uncompressed, leave jpeg as is

### **A.3. COMMUNICATION PROFILES**

#### **A.3.1 Supported Communication Stacks (parts 8,9)**

DICOM Upper Layer (Part 8) is supported using TCP/IP.

#### **A.3.2 OSI Stack**

OSI stack not supported.

#### **A.3.3 TCP/IP Stack**

The TCP/IP stack is inherited from the Windows/Linux operating System.  
(Conquest addition): We have used the excellent Delphi TCP/IP components from François Piette (<http://www.overbyte.be>) in the CONQUEST user interface.

##### **A.3.3.1 API**

Developers can base client programs on **TEST.EXE** and **DICOMP.EXE** that are included with source code in the **DICOMLIB1414.ZIP** release file. The actual DICOM server (with many options) is **DGATE.EXE** that is included with source code in release file **DGATE1414.ZIP** and **DICOMLIB1414.ZIP**. Source code of the Windows user interface, client DLL and web viewer OCX is *not* included.

##### **A.3.3.2 Physical Media Support**

Any Windows (Linux) supported physical media.

#### **A.3.4 Point-to-Point Stack**

A 50 pin ACR-NEMA connection is not supported.

### **A.4. EXTENSIONS / SPECIALIZATION / PRIVATIZATIONS**

VR (0x7fdf, 0x0010) contains compressed pixel data if NKI compression is used. In the normal configuration, the server will never transmit NKI compressed data, but will compress and decompress the data on the fly. The following presentation contexts have been added to allow NKI private compressed data to be transmitted and to allow retrieval of downsized images for higher speed:

1.2.826.0.1.3680043.2.135.1066.5.1.4.1.2.1.2	PatientRootRetrieveNKI
1.2.826.0.1.3680043.2.135.1066.5.1.4.1.2.2.2	StudyRootRetrieveNKI
1.2.826.0.1.3680043.2.135.1066.5.1.4.1.2.3.2	PatientStudyOnlyRetrieveNKI

These contexts contain sub-classed versions of the standard C-MOVE commands with the following additional optional control parameters (numbers are hexadecimal):



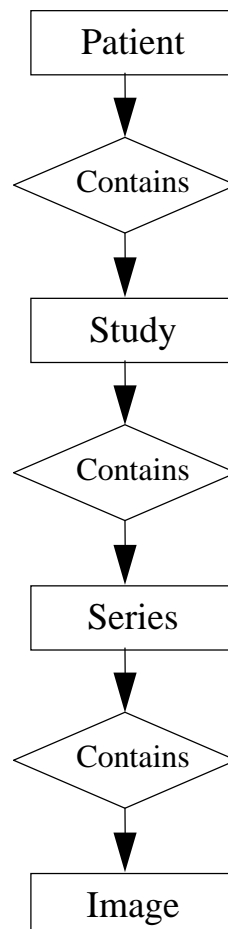
(9999, 0100): MaxVrSize	Do not send VRs larger than this number of bytes
(9999, 0200): MaxRowsColumns	Downsize image to maximal this #rows and columns
(9999, 0300): ConsoleText	Text will be printed to server console
(9999, 0400): Silent	If sent, console does not log transaction
	Also used internally by GUI and WEB interface
(9999, 0500): MaxSlices	Send at most # slices irrespective of query result
(9999, 0600): MaxCompression	Maximum supported compression by NKI client (default 4)
(9999, 0700): Recompression	Recompress style NKI or JPEG (default none)

## SECTION 3 DEFAULT QUERY/RETRIEVE INFORMATION MODEL DEFINITION

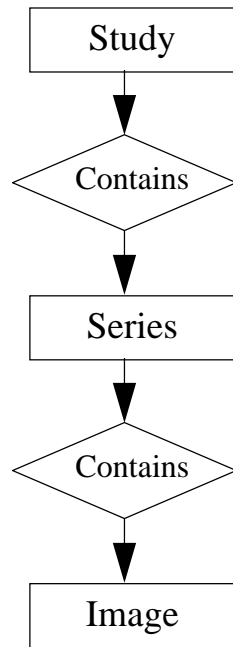
This section describes the subset of the DICOM v3.0 Patient Root, Study Root, and Patient/Study Only, Query/Retrieve Information Model Definition used by this product.

### 3.0 INTEROPERABILITY SCHEMA

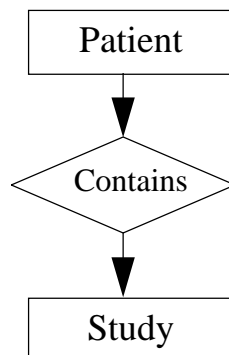
#### 3.0.1 PATIENT ROOT QUERY/RETRIEVE ENTITY RELATIONSHIP



### 3.0.2 STUDY ROOT QUERY/RETRIEVE ENTITY RELATIONSHIP



### 3.0.3 PATIENT/STUDY ONLY QUERY/RETRIEVE ENTITY RELATIONSHIP



## 3.1 ENTITY DESCRIPTIONS

See DICOM Standard Part 4

## 3.2 PATIENT ROOT QUERY/RETRIEVE INFORMATION OBJECT DEFINITION

### 3.2.1 Patient Level Keys for Patient Root Query/Retrieve Information Model

Attribute Name	Element Tag	Type	Notes
Revision: 10 (plus computed items)			
Patient Name	(0010,0010)	R	
Patient ID	(0010,0020)	U	
Patient Birth Date	(0010,0030)	O	
Patient Sex	(0010,0040)	O	Computed* - not database
Number of Patient Related Studies	(0020,1200)	O	
Number of Patient Related Series	(0020,1202)	O	Computed* - not database
Number of Patient Related Instances	(0020,1204)	O	Computed* - not database

\*requires setting EnableComputedFields = 1 in dicom.ini

### 3.2.2 Study Level Keys for Patient Root Query/Retrieve Information Model

Attribute Name	Element Tag	Type	Notes
Revision: 17 (plus computed items)			
Study Instance UID	(0020,000D)	U	
Study Date	(0008,0020)	R	
Study Time	(0008,0030)	R	
Study ID	(0020,0010)	R	
Study Description	(0008,1030)	O	
Accession Number	(0008,0050)	O	
Referring Physician	(0009,0090)	O	
Patients Age	(0010,1010)	O	
Patients Weight	(0010,1030)	O	
Study Modality	(0008,0061)	O	Multiple entry item Computed* - not database
Number of Study Related Series	(0020,1206)	O	
Number of Study Related Instances	(0020,1208)	O	Computed* - not database

\*requires setting EnableComputedFields = 1 in dicom.ini

### 3.2.3 Series Level Keys for Patient Root Query/Retrieve Information Model

Attribute Name	Element Tag	Type	Notes
Revision: 17 (plus computed items)			
Series Instance UID	(0020,000E)	U	
Series Number	(0020,0011)	R	
Series Date	(0008,0021)	R	
Series Time	(0008,0031)	R	
Series Description	(0008,103E)	O	

Modality	(0008,0060)	O	
Station Name	(0008,1010)	O	
Institution	(0008,0080)	O	
Patient Position	(0018,5100)	O	
Contrast Bolus Agent	(0018,0010)	O	
Manufacturer	(0008,0070)	O	
Model Name	(0008,1090)	O	
Body Part Examined	(0018,0015)	O	
Protocol Name	(0018,1030)	O	
Frame of Reference UID	(0020,0052)	O	Computed* - not database
Number of Series	(0020,1209)	O	
Related Instances			

\*requires setting EnableComputedFields = 1 in dicom.ini

### 3.2.4 Image Level Keys for Patient Root Query/Retrieve Information Model

Attribute Name	Element Tag	Type	Notes
Revision: 13			
SOP Instance UID	(0008,0018)	U	
SOP Class UID	(0008,0016)	O	
Image Number	(0020,0013)	O	
Image Date	(0008,0023)	O	
Image Time	(0008,0033)	O	
Echo Number	(0018,0086)	O	Multiple entry item
Number Of Frames	(0028,0008)	O	
Acq Date	(0008,0022)	O	
Acq Time	(0008,0032)	O	
Receiving Coil	(0018,1240)	O	
Acq Number	(0020,0012)	O	
Slice Location	(0020,1041)	O	
Samples Per Pixel	(0028,0002)	O	
Photometric Interpret.	(0028,0004)	O	
Rows	(0028,0010)	O	
Columns	(0028,0011)	O	
Bits Stored	(0028,0101)	O	
Image Type	(0008,0008)	O	Multiple entry item
Image ID	(0054,0400)	O	

## 3.3 STUDY ROOT QUERY/RETRIEVE INFORMATION OBJECT DEFINITION

### 3.3.1 Study Level Keys for Study Root Query/Retrieve Information Model

Attribute Name	Element Tag	Type	Notes
Revision: 17 (plus computed items)			
Patient Name	(0010,0010)	O	
Patient ID	(0010,0020)	O	
Patient Birth Date	(0010,0030)	O	
Patient Sex	(0010,0040)	O	

Study Instance UID	(0020,000D)	U	
Study Date	(0008,0020)	R	
Study Time	(0008,0030)	R	
Study ID	(0020,0010)	R	
Study Description	(0008,1030)	O	
Accession Number	(0008,0050)	O	
Referring Physician	(0009,0090)	O	
Patients Age	(0010,1010)	O	
Patients Weight	(0010,1030)	O	
Study Modality	(0008,0061)	O	Multiple entry item Computed* - not database
Number of Study Related Series	(0020,1206)	O	
Number of Study Related Instances	(0020,1208)	O	Computed* - not database

\*requires setting EnableComputedFields = 1 in dicom.ini

### **3.3.2 Series Level Keys for Study Root Query/Retrieve Information Model**

See Section 3.2.3

### **3.3.3 Image Level Keys for Study Root Query/Retrieve Information Model**

See Section 3.2.4

## **3.4 PATIENT/STUDY ONLY QUERY/RETRIEVE INFORMATION OBJECT DEFINITION**

### **3.4.1 Patient Level Keys for Patient/Study Only Query/Retrieve Information Model**

See Section 3.2.1

### **3.4.2 Study Level Keys for Patient/Study Only Query/Retrieve Information Model**

See Section 3.2.2

### 3.5 MODALITY WORKLIST QUERY INFORMATION OBJECT DEFINITION

#### 3.5.1 Keys for Modality Worklist Query Information Model

Attribute Name	Element Tag	Type	Notes
Revision: 17			
Accession Number	(0008,0050)	O	Primary Key
Patient ID	(0010,0020)	R	
Patient Name	(0010,0010)	R	
Patient Birth Date	(0010,0030)	O	
Patient Sex	(0010,0040)	O	
Medical Alerts	(0010,2000)	O	
Contrast Allergies	(0010,2110)	O	
Study Instance UID	(0020,000D)	O	
Requesting Physician	(0032,1032)	O	
Requested Procedure Description	(0032,1060)	O	
Requested Procedure Code Sequence	(0032,1064)	R	1 instances of this sequence required
>Modality	(0008,0060)	R	
>Requested contrast agent	(0032,1070)	O	
>Scheduled AE	(0040,0001)	R	
>Start date	(0040,0002)	R	
>Start time	(0040,0003)	R	
>Performing Physician	(0040,0006)	R	
>Scheduled Procedure Step Description	(0040,0007)	O	
>Scheduled Procedure Step ID	(0040,0009)	O	
>Scheduled Station Name	(0040,0010)	O	
>Scheduled Procedure Step Location	(0040,0011)	O	
>Premedication	(0040,0012)	O	
>Scheduled Procedure Step Comments	(0040,0400)	O	
Requested Procedure ID	(0040,1001)	O	
Requested Procedure Priority	(0040,1003)	O	

To code this information into a database, the contents of the sequence are unfolded to the same level as the other fields.

## 4.1 FILES

### Installation files (in DicomServer1414.zip):

windowsmanual.pdf	Documentation
DicomConformance_FilesLST_Changes.pdf	More documentation
conquestdicomserver.exe	User interface
dgate.exe	Console mode version of MicroPACS system
dgate.dic	DICOM dictionary for dgate.exe
cqdicom.dll	Conquest DICOM client DLL.
dgateserv.exe	NT service wrapper for dgate.exe
zipdll.dll	ZipMaster DLL for zipping log files
sample.hl7	Example HL7 input file
ActiveFormProj1.ocx	ActiveX web viewer
libmysql.dll	Mysql client dll for 5.0.22
libmysql.txt	Mysql license text
dcmcjpeg.exe	OFFIS DICOM toolkit jpeg compression utility v3.5.4
dcmcjpeg.txt	description of this utility
dcmdjpeg.exe	OFFIS DICOM toolkit jpeg decompression utility v3.5.4
dcmdjpeg.txt	description of this utility
offis.txt	OFFIS copyright notice

**Configuration files (automatically generated):**

dicom.ini	Configuration file
dicom.sql	Database table definition file
acrnema.map	System/IP map file
dgatesop.lst	SOP Class definition file
USE.....	Determines database driver to be installed

**Database files (automatically generated, example for DBASEIII):**

data\dbase\Dicompatients.dbf	patient database table
data\dbase\Dicomstudies.dbf	study database table
data\dbase\Dicomseries.dbf	series database table
data\dbase\Dicomimages.dbf	image database table
data\dbase\Dicomworklist.dbf	worklist database table
data\dbase\XDicompatients.dbf	extract of database table used by browser for dbaseIII
data\dbase\XDicomstudies.dbf	extract of database table used by browser for dbaseIII
data\dbase\XDicomseries.dbf	extract of database table used by browser for dbaseIII
data\dbase\XDicomimages.dbf	extract of database table used by browser for dbaseIII
data\dbase\XDicomworklist.dbf	extract of database table (not used)
data\dbase\testtable.dbf	not used
data\dbase\UIDMODS.dbf	used for changing Patient ID and anonymizing

**Log files (automatically generated):**

Installation.log	information from installation page
Maintenance.log	information from maintenance page
ServerStatus.log	information from server status page or service
PacsTrouble.log	relevant errors
PacsUser.log	all users who accessed the server
ConquestDicomServer.log	log about main actions and server start/stop
logs_YYYYMMDD.zip	automatically zipped set of log files

**Data files (automatically generated – 5678 is the servers port #):**

ExportFailures5678_0	data of failed exports for later retrying
CopyFailures5678	data of failed mirror copies for later retrying
DelayedFetchForwardFailures5678	data of failed delayed forwards
Note: The server deletes these files (or delete manual) to abort retrying	

**Image file (example, for FileNameSyntax parameter set to 3) :**

Dir	PatientID	seriesUID	series	slice	time	counter
Data\QA_phantom\	1.2.840.113619.2.22.287.1.19980710.202026	0001	000006	953798272	0005.v2	

## 4.2 PRODUCT INTERACTION / DESCRIPTION

**dgate.exe:** DICOM MicroPACS AE Main. This is the principal PACS application. It handles all connections (see threading model note in section 4.4 of this part). Contained in this executable are verification, storage, print, and various query and retrieve DICOM SOP classes. This executable interfaces to the PACS database via ODBC-32 v2.0, or using a built-in dBaseIII driver. In the event that disk space is low, it will optionally delete least recently entered patients. This application also contains code for installation, maintenance and archival operations that is used by the Conquest DICOM server. For these purposes a second copy of dgate.exe is started. Type “**dgate -?**” for more information. Finally, the same executable may act as CGI server application. In some rare cases, the dgate process may still be running even though the user interface has closed (after a crash or after killing it with the task manager). The user interface, when restarted, then assumes that the dgate process belongs to a service (and displays “**user interface**” in the caption), but cannot control the running process. Killing the dgate process with the task manager or rebooting will solve this problem. All source code of dgate.exe is included in **DGATE1414.ZIP** and **DICOMLIB1414.ZIP**. However, source code of the built-in JPEG decompressor is not included. To compile dgate.exe (without built-in decompressor) one can best modify and use maktotal.bat.

**dgate.dic:** DICOM dictionary used by dgate.exe.

**dgateserv.exe:** Wrapper for dgate.exe to make it run as a Windows service. May be used (advanced users only) to manually (even remotely) start / stop / install / uninstall service(s). Type “**dgateserv /?**” for more information. Note that DICOM server services are named after the AE of the server. Once dgate.exe is installed as a service, the DICOM server(s) starts automatically when the computer is booted. When the user interface is started it will detect that the server is already running and connect to it. Source code is not included.

**conquestdicomserver.exe:** This executable is the user interface and installation program and contains parts of the print server. See the installation section of this document for its functions. The database browser tries to use the Borland Database Engine. Without BDE, the server will run but with reduced filter options. Source code is not included.

**cqdicom.dll:** This is code for the Conquest DICOM client. It is used here to display the images in the database browser, convert DICOM images for printing, list the image file header and provide query, move and echo actions. The source code of this DLL is not included but it is based on the programs “**TEST.EXE**” and “**DICOMP.EXE**” that are included with source code.



zipdll.dll: This DLL is part of the zipmaster VCL component that is used in the server to automatically zip the log files once a day. Source code is not included.

dcmjpeg.exe: jpeg compression utility from the OFFIS DICOM toolkit DCMTK version 3.5.4. This executable is called by dgate.exe to compress DICOM images in jpeg format. Copyright (C) 1994-2005, OFFIS. This software and supporting documentation were developed by Kuratorium OFFIS e.V. Healthcare Information and Communication Systems Escherweg 2 D-26121 Oldenburg, Germany. This software is made available, as is, and OFFIS makes no warranty regarding the software, its performance, its merchantability or fitness for any particular use, freedom from any computer diseases or its conformity to any specification. The entire risk as to quality and performance of the software is with the user. Copyright of the software and supporting documentation is, unless otherwise stated, owned by OFFIS, and free access is hereby granted as a license to use this software, copy this software and prepare derivative works based upon this software. However, any distribution of this software source code or supporting documentation or derivative works (source code and supporting documentation) must include the three paragraphs of this copyright notice.

dcmdjpeg.exe: jpeg decompression utility from the OFFIS package version 3.5.4. This executable is called by dgate.exe to decompress DICOM images in jpeg format if UseBuiltInDecompressor in dicom.ini is set to 0. See further dcmjpeg.exe.

Libmysql.dll: When present, provides native access to MySQL, both for GUI and the server core. Redistributed because binary compatibility is required between compiled applications and the interface DLL: i.e. this file has to be of a specific version, even if it is used to communicate with MySQL databases of other versions. Comes from <http://downloads.mysql.com/archives/mysql-5.0/mysql-noinstall-5.0.22-win32.zip>

### Web server (place these 5 files in your web server):

Cgi-bin/Dgate.exe: exactly the same dgate.exe as in the server.

Cgi-bin/Dicom.ini: specialized ini file for server running as web(cgi) client.

Cgi-bin/sample.cq: Sample of script-based web page

Htdocs/ActiveFormProj1.ocx: ActiveX web viewer, to be registered manually or downloaded from your web server and installed.

Htdocs/conquest.jpg: Icon for use on the web pages

### 4.3 THREADING ARCHITECTURE

The MicroPACS system was designed to run in two multithreading models. The first model is “Multithreaded”, the second is “Multiprocess”. The Multithreaded model can best be described as a monolithic application. Each incoming DICOM association is allocated a separate thread of execution within the same memory and address space of the master process. These threads share the same code within the single (monolithic) executable. The Multiprocess model is similar to "inet" on UNIX operating systems. There is a controlling application (conquestdicomserver.exe) which handles incoming TCP/IP connections. For each connection, a new copy of the MicroPACS main executable (dgate.exe) is loaded and executed. A separate process that runs in a separate address space from all other associations handles each DICOM association.

The multithreaded application is slightly faster than the multiprocess one; But the multiprocess one is more secure, and should be more reliable. Because each process runs in it's own address space, an association from one connection cannot corrupt or undermine (in any possible way) another simultaneous association. For this reason, the default installation of the MicroPACS was the multiprocess model.

However, extensive testing of the Conquest DICOM server showed that the multiprocess version sometimes failed to work correctly on Windows (some ODBC problem). For this reason, the multithreaded version is currently used with the Conquest DICOM server. Several fixes have increased its speed and made it very reliable.

Also, the built-in DBASEIII driver applies in-memory indexing and depends on the server process staying in memory to achieve a high speed. In the Linux version, the built-in DBASEIII driver, SQLite, PostGres and MySQL are the database drivers available.

## **APPENDIX 1.**

### **Fixes, modifications and extensions of MicroPACS by Marcel van Herk and Lambert Zijp of the Conquest project:**

#### **DICOM.SQL (Database definition):**

19980624	StudyNumber (StudyID in DICOM) is now 64 long Required for correct operation with SQL server
19990109	Made imagenumber 10 characters wide
19991222	Moved MODALITY to the series level (for DICOM-RT)
19990315	Added EchoNumber and NumberOfFrames in image table
20010830	Revision to 4, extended database significantly
20010416	Revision 5: Added patientID in series and images for more efficient querying
20010416	Revision 6: Added frame of reference UID in series table
20020519	Revision 7: Added ImageType in image table, StudyModality to 64 chars, AcqDate to SQL_C_DATE
20021028	Revision 8: Denormalized study table (add patient ID, name, birthdate) to show consistency problems. Revision 9 is a further de-normalized version that is used with the built-in DbaseIII driver.
20030319	Revision 10: Fixed width of ReceivingCoil: to 16 chars
20030907	Note: revisions 9, 11 and 12 refer to the ODBC-less version
20040402	Revision 13: Added ImageID to image database
20040905	Revision 14: Added WorkList database with HL7 tags
20080124	Revision 15: Added patient position to denormalized image table for built-in DBF driver');
20080124	Revision 16: Moved Stationname and InstitutionalDepartmentName to series table');
20080818	Revision 17: EchoNumber, ReqProcDescription to 64 characters; StudyModality, EchoNumber, ImageType to DT_MSTR; use Institution instead of InstitutionalDepartmentName');

#### **DGATE.CPP (main of DGATE.EXE):**

19980327:	Disable logfile for speed and save disk
19980327:	-! Enables logging to Personal pacs console; RunServer works; -p breaks
19980327:	All printf's to systemdebug
19980320:	Integrated dumppacs code here for convenience
19980320:	Fixed -p option; SaveToDisk returns filename, printed in stats
19980320:	Documented and added print of usage (-? option)
19980404:	Added test options, ODBC config option and command line specified console pipe / udp logging
19980409:	added FileCompressMode option; use local save to disk code instead of pdu member
19980409:	Return on failed GenerateFileName in SaveToDisk
19980409:	Cleaned up NKI private compression code and allow >15 bit differences
19980410:	Added run length encoding for equal pixels to compressor; fix 3-byte case

19980415: Cleaned up the messages; -! does not enable debug; do not enable accessupdates (use aroute)  
 19980618: Some work on manual and database layout listing  
 19980621: Added -z option: zap patient  
 19980624: Comm test also produces systemdebug and long text output; added \n to some output  
 19980625: SaveDicomDataObject in loadddo.cpp supports NKI private compression  
 19980704: Added some test code for counting disk space and renaming device for patient  
 19980705: Added CACHE devices in free store check; added FindPhysicalDevice (searches for file)  
 19980709: Added archiving options: -as, -au, -ab, -ac, -ad  
 19981217: Temporary use PDU.Save... code for testing DICOM objects (does not compress)  
 19981218: Temp use Pdu.Load as well (no compression)  
 19981228: Disabled ljz's code until it has been completed  
 19990108: Reenabled ljz's code: Replace uncompressed by compressed pixeldata VR in SaveToDisk (it seemed to work anyway...)  
 19990109: Removed some commented out code; added comments for alternative load and save routines. Added Regen of specified device  
 19990110: Added n, for MAGn, as parameter in -as and -ab archiving options (default all). Use exit(1) on failure  
 19990111: Fixed exit code on -ar option  
 19990117: If the filename is \*.dcm (depends on FileNameSyntax) use uncompressed chapter 10 format  
 19990317: Added NKI-private stuff  
 19990628: Temporary enabled debug in -!nnnn option  
 19990630: Added MIRROR option; disabled debug in -!nnnn option  
 19990707: Fixed MIRROR option; added MIRROR message; added check on FindPhysicalDevice result  
 19990817: Added ability to spawn ExportConverters at the end of SaveToDisk  
 19990827: Optimized read of slices: cache a DB to pass to GetFileName (10% faster)  
 19991117: Added parameter FileCompressMode to in nki\_private\_compress call  
 20000318: Added private command object 9999, 0300 = print to console  
 Added private command object 9999, 0400 = force C-Echo to be 'silent' (no log). Display C-Move Destination; print time info about threads  
 20000323: Serious fix: MainThread 'hangs' when several associations occur simultaneously, caused by compiler-optimization. Solution: DriverApp.Lock should be 'volatile'.  
 20000329: On request by ljz: designed crash of server if silent VR receives 'DEAD'  
 20000501: Compare dicom modality with UPPER-case ini-file setting (ExportConverters)  
 20000621: Initialize TroubleLogFile and UserLogFile; log C-STORE and C-MOVE  
 20000703: Logging of trouble now starts with '\*\*\*'  
 20000703: Exclude archival messages from trouble log; removed force dcm code  
 20001104: Added WINAPI to thread routines

20001105: Replaced malloc by new where a mix could occur (vr->data)  
Made compilable for MSC and BC and WC using some #ifdefs  
Changed order of verification and store; better localized  
new/delete DDO more

20001106: Run-time load odbcinstr routine for BC and WC, use spawn...  
i/s/o \_spawn...

20001106: Use delete [] operation for vr->Data

20010328: Added -av: verify mirror disk

20010415: Added DeleteSeries, DeleteStudy and DeleteImage routines  
and -f options

20010416: Added -f options: -feFile = enter MAGN file into DB, -fdFile =  
delete file from DB -faFile = add (also makes copy) file into  
server, -f?=ask UID of file, -fu = generate UID, -  
fcNEWPATID,file = modify patient ID of image file (moves  
file!). NOTE: -fc is irreversible in the sense that if a portion of  
a study/series is changed and changed back it winds up as a  
different study/series. This occurs because the UIDs must be  
changed for each image modification. This problem does not  
occur when a whole series or study is changed

20010417: Simplified code to change uids to allow easy extension to  
referenced SOPs. Check after load on common UIDs to avoid  
accepting dropped non-dicom files. NOTE: ChangeUIDinDDO  
should also change sequences and referenced SOPs  
(0008,1155)

20010418: Fix in above change

20010418: Changed names of database fields in UIDMODS - did not work  
on MsAccess

20010419: Added -fk option: copy image file to other patient ID (as -fc but  
no delete). Added version number 1.3.9 to command line help

20010429: Added -fz option: zap file from server and database

20010430: Some work on read ahead thread: note that thread must not use  
any pointer copy!

20010502: Made read ahead thread working; fixed thread counter; fix odbcinstr  
option: strings too short

20020506: Fixed handle leak in read ahead thread

20020507: Fixed memory leak in read ahead thread; kbhit() test #ifdef  
DO\_LEAK\_DETECTION

20010509: Added RenameDevice is -ae option

20010730: Replaced parameter argv[0] of ExportConverters to proper  
value.

20010829: Added ExportStationName as export filter; default Export...  
value set to "\*"; Made export comparisons case insensitive;  
added special 'forward to AE' ExportConverter; Version to  
1.3.10

20010831: Added extended syntax for exportconverters with %f=filename,  
%m=modality, %s=stationname, %b=file base name, %p=file  
path; Also allows 'copy %f destination', but for windows NT  
only (uses cmd.exe). Added ExportFilter option that uses an  
SQL statement to filter.

20010901: Added a simple queue to process exportconverters  
asynchronously; Create a queue for each converter; queue  
mirror copy requests

20010902: Added %o = SOP; %n = newline; added the following hard  
coded converters: append "text" to file; write "text" to file;  
copy file to file; copy file to dir

20010904: Re-entered change of 20010730  
 20010905: Fix: After 'SaveToDisk', do not free pDDO  
 20011109: Fix: made ExportConverter stuff case insensitive  
 Note: empty filter tests for empty contents - this is not the same as '\*'  
 20011110: Note: in release 1.3.10, the " to " in e.g., write "%f%n" to file must be lowercase  
 20011115: Made " to" case insensitive; Added \*\*\* before some error messages for better logging. Removed cache db: would hang the server if SQL has gone down and up. Now use one DB per thread which is passed to the read ahead thread = fast too!  
 20011207: Added extra error message when creation of datasource fails  
 20020109: Disabled this code for watcom or borland (instead of run-time loading an address)  
 20020314: Implemented ignore of C-CANCEL request for ADAC NM (was error before). Blocked out SQLInstallerError call; does not compile on clinical MS4.2  
 20020413: Added some notes about thread safety and db's: The serverchild is not thread safe when reading and writing is done on the same association.  
 20020415: Added -atDEVICE option: sanity check of images on disk; version to 1.3.11  
 20020416: Made UID generator configurable through UIDPrefix in dicom.ini; made time print unsigned  
 20020422: Sleazy fix of ModifyPatID: time(null) created same UID: now wait 1 s per changed file  
 20020426: Generate filename no longer gives an error: is done at higher level  
 20020428: Only serious error messages use \*\*\* in message  
 20020428: Added FAILSAFE\_STORAGE: tries to save incoming files even when DB errors occur  
 20020429: Put SaveToDisk in myUnknownStorage: pass DB failures to caller; Disabled FAILSAFE\_STORAGE: any storage failures should now be detected by client  
 20020508: Do not rewrite image not on MAG but it is not an error (warning is generated earlier)  
 20020520: Added -gSERVER,DATE option: grab images on date from remote server  
 20020521: fix displaying junk filename when rewriting image not on MAG  
 20020522: Fix in SetStringVR: strings must be padded with a space  
 20020529: -i and -r now have mode parameter (0=normal and default, 1=simple, e.g., for DBASEIII)  
 20020531: In 'QualifyOn', support case-sensitive call to 'GetACRNema', but make AE-Title uppercase after retrieving IP and port.  
 20020613: Better handling of Compression ON/OFF in 'SaveToDisk'  
 Fixed crash in DeleteImageFile (twice free of VR->Data)  
 20020613: compress to specified mode, check (de)compress result, decompresses data before forward; added 'export compressed to AE' export; -fa has optional ,NEWPATID syntax;  
 20020802: Simplified rmdir code and allow multiple subdirectories in rmdir and mkdir code. Version to 1.3.12 (unreleased)  
 20020804: Use PATHSEPCHAR where possible  
 20020807: Changed SaveToDisk order: only make patientdir when DB save succeeded

20020812: Added skeleton of printer support  
 20020816: Added color imagebox; Save incoming print DDO as file  
 20020819: UUIDs of imageboxes end on rows.cols.position for easy print handling  
 20020819: Fix in delete nonexistent mirror files for changepatientUID  
 Extract pixel data from sequence in ImageBox; added sleep(10) in -fk option  
 20020819: Added better UID generation (but gets close to 64 chars)  
 20020821: Fix printer UID generation; display page orientation and film #; shorter info  
 20021016: Added (indexed) patid to exportfilter query and getfilename for speed; The option tests for rev5 db or higher; increase 64 strings to 66; Note: GrabImagesFromServer option does not yet pass patid to the query (i.e., will be slow with non-odbc driver)  
 20021017: Control NeedPack from here; added -c option: set UID counter at startup. Removed Sleep from anonymize options; do not re-create UIDMODS  
 20021018: Pass NoKill through GenerateFilename for interactive DGATE  
 20021028: Fix query on study in PatientStudyOnlyQuery (did an image query)  
 20021105: Revamped read-ahead thread logic to try fix rare crash where ratd->DDOOutPtr became NULL  
 20021115: Use Generic style retrieve classes with NKIqrsop code instead of older qrsop code. Advantages: read ahead thread used, and allows print of error messages from C-MOVE. Required changes such that ratd->pcdo can be NULL.  
 20021121: Disabled read-ahead thread for time being  
 20021212: Also loop ServerApp.Server(Port) in threaded mode server  
 20021213: Re-entered fix by Hanne Kooy: compressed forwarding had extra ;  
 20021213: Re-enabled use of generic query classes with read-ahead thread; but made read-ahead thread configurable with "EnableReadAheadThread". Made grab query faster by including date - note grab is independent of FixPhilips  
 20021215: Found read-ahead thread problem reported by Aaron Cann - missing Sleep in wait for slices  
 20021223: Version to 1.4.1 pre-release; added in dgatefn forbidden filename chars suggest by Thomas Buerer  
 20030113: Removed loop ServerApp.Server(Port): gave endless loop error messages  
 20030120: Added cleanup-code when DO\_LEAK\_DETECTION is defined for easy leak checking  
 20030205: Fix bug found by Frank-Andre Siebert: read ahead thread crashed when ID or SOP is missing. Also fix 2 other potential missing VR problems  
 20030228: Fixed bug reported by Jeff Babcock: series retrieve from E-film crashed (patid not passed)  
 20030424: Changed calls to obsolete PDU.Write(&DDO). In 'SaveToDisk' the call to PDU.SaveDICOMDataObject now has parameter DICOM\_CHAPTER\_10\_EXPLICIT (which writes IMPLICIT files if not compressed)  
 20030606: Fixed incremental counter when creating UUIDs or generating filenames Fix: QueryRetrieveLevel is mandatory for a QueryResponse  
 20030625: Fix NGET of BasicPrinterSOPClass

20030625: Fix in above fix

20030627: Adapted for MSC4.2; Finally really fix NGET of BasicPrinterSOPClass (wrong UID used)

20030629: Added -nd, -nc, -jd and -jc options: (de)compress NKI; (de)compress JPEG (used OFFIS executables)

20030630: Started on compression for dropped, incoming, transmitted; NKI vr 0x9999,0x700=custom compression. Added 'forward compressed as xx to ...'

20030701: QualifyOn now also has compression parameter

20030703: Moved compression code to nkiqrsop; dgate -j-xx and -j\*xx = test compression options. Removed "forward compressed to" because "forward compressed as .. to" is better. Note that FileCompressMode is now obsolete. KNOWN BUG: JPEG compressed images may be rewritten as V2 (when written originally as NKI) which are then not correctly read.

20030704: Made that FileCompressMode parameter still works even though is obsolete. Moved faulty delete DDO after SOPUnknownStorage.Read

20030705: Added check of Transfer Syntax next to extension for save type; ProcessDDO takes \*\*DDO

20030706: Use dgate.dic; Attach VRType to PDU's for implicit little endian support; small fix in dump code

20030709: Printer support fix; version to 1.4.2; Added SendUpperCaseAE parameter (default 0)

20030730: Force ImplicitLittleEndian, ExplicitLittleEndian and ExplicitBigEndian objects that must be stored in Chapter10 format, to ImplicitLittleEndian.

20030815: Version to 1.4.3

20030905: Allow longer filenames

20030910: Added check on rights to write (trouble) log file and printer\_files in MAG0

20030921: Allow write to any MIRROR if MAG is full; added -ff# option: delete until # MB free

20030922: Added StorageFailedErrorCode (default 0x110 = 272 decimal = failed processing)  
Added ExportCallingAE and ExportCalledAE export filters (also %u=SCU, %c=calledAE in converter)

20030401: Version to 1.4.4; pass status pointer to compress routines

20040402: Delete DDOptr when SaveToDisk cannot write but does not give an error; Added "Cannot rewrite jpeg/rle image in v2 format" check; Use system DSN for ODBC (easier login)

20040406: Always use EXPLICIT syntax for jpeg, fix v2 always use DUMP

20040426: Version to 1.4.4a

20040520: Version to 1.4.4b

20040523: Added patient ID to speed GetFileName for single slice move

20040528: Set NeedPack (controls DbaseIII indexing) for regen, archive, maintenance; Version to 1.4.4c

20040528: Added built-in maintenance commands through silent VR in ECHO; pass patid in DeleteImageFile

20040530: extract (DBF only) to database like XDicomImages in same directory; Version to 1.4.5

20040601: Added deletestudy, deleteseries and packdbf maintenance commands

20040602: Fix: 'forward compressed as' always failed



20040605: packdbf maintenance command sets NeedPack to 3: forces pack

20040606: fix rewrite to not MAG (JUKEBOX) was NOT ignored

20040607: Merged fix ljz 20040602; do not allow rename and delete with empty name

20040610: Added maintenance server tasks for archival and regeneration

20040612: Added indexdbf maintenance server task

20040614: dgate command line maintenance options use NeedPack=5: non-threaded index generation. Added -am option: move(all) device data; for selected data use -amMAG0.Archiving,MAG1

20040624: Version to 1.4.5a

20040626: Pass study and series UID to getfilename; version to 1.4.5b; Fixed leak of pats array

20040713: Version to 1.4.6

20040805: Fix in C-MOVE for single file (from jlz); version to 1.4.6b

20040909: Increased length of ExportFilter (was 64, now 510)

20041020: Added mergeseries(file) and mergestudy(file) maintenance commands, silenttext to 1024

20041101: Added deletesopfromdb maintenance command; version to 1.4.7

20041103: called, e.g., AE~nj overrides IncomingCompression to nj

20041108: Added \$c test compression mode (alt-drop files with \$c as patient ID tests compression modes)

20041109: Added \$tSERVER test compressed forward; some fixes in forward compressed to (server name read wrong)  
\$s tests all filename syntaxes

20041112: Added \$rN N times repeated entry test, and \$tN which enters image N time each on its own thread

20041128: Added -^file: log to file (timestamped) instead of to server console; -#file: same with debug

20041129: Added silent commands debuglog\_on and log\_on to set logging to UDP or file; Added silent command read\_amap to re-read acrnema.map without restarting the server

20050102: Small modifications to allow compile through total.cxx

20050107: Added code to hold and retry queued forwards and mirror copies when failed: After failed export/copy, start storing entries in file ExportFailuresN (CopyFailures). If a new export/copy is requested >1 minute after last failed one, try again; if queue is empty, >100 seconds after last fail, try export/copy stored ones. Processing queued entries has priority over processing stored entries.

20050107: Version to 1.4.8; modifications for linux compile

20050108: Added server PORT# to fail files, so that multiple servers on different ports do not share files

20050109: Added configurable TCPIPTimeOut, FailHoldOff, RetryDelay and QueueSize

20050109: Adapted thread code for linux; still need to implement WaitForSingleObject

20050111: Added ctype.h (for mingw)

20050118: Linux: crudely implemented WaitForSingleObject; detach pthreads to avoid leaks; crudely implemented export converter apps

20050119: Added grabimagesfromserver, regendir and makespace server commands; dgate -- sends server commands to other running server; adapted manual

20050121: Small updates to manual

20050124: Replaced BackgroundExec with simpler system() for Linux; added query server command, e.g., dgate "--query:DICOMpatients|patientid,patientname,patientsex|patients ex='F'|%s %s %s|t.t"; Added read\_ini: server command to reread dicom.ini; changes most config except: TCPPort (busy), UseBuiltInDecompressor (cached) and FileNameSyntax (cached)

20050130: added get\_param, get\_freestore, get\_amap, get\_sqldef that respond through echo-response; also: get\_sop, get\_transfer, get\_application, get\_localae, get\_remoteae, get\_dic, forward. added: dump\_header (to file), convert\_to\_gif (to file); adapted query (to file) where file="cgi" for stdout in cgi/mime mode, file="" to send to stdout as is; most GUI commands can now pass PatientID|SOPInstanceUID instead of filename of dicom object; added put\_amap, write\_amap, put\_sop, put\_transfer, put\_application, put\_localae, put\_remoteae, put\_param. Note: get/put\_param work through disk (read\_ini activates), get/put\_amap through memory (write\_amap writes to disk), get/put\_sop etc read from memory and write to mem and disk.

20050204: Added delete\_param, delete\_amap and fix cgi out (double \n)

20050204: most GUI commands can now pass PatientID|?\*:SOPInstanceUID; added delete sop etc commands More fixes in cgi data passing VR vr() is mostly wrong; use VR \*vr=new VR()

20050205: Allow up to 16 output fields in query:, repeat queried fields over all 16 outputs. Added counters for server status; start on display\_status server command

20050206: More work at display\_status, renamed testtable to xtesttable: default not opened. Access ObjectFile and DeviceName through query instead of with GetFileName up to 3 x faster!! Also fixes potential leak in read ahead thread: pats, series and studies not always freed. Allow up to 32 cgi query outputs, tidied dump layout, start on web interface (put dgate and ini in cgi-bin)

20050207: Added query2 option: limits number of output rows as asked; gui command not counted as association. Some more work for web interface

20050210: Adapted web interface queries such that they run on sql server

20050212: Removed need for thread local storage; automatically adapt dgate extension in cgi scripts depending in OS

20050213: Added more parameters to server configuration web page

20050214: Added update button to server config (updateconfig page to be implemented)

20050215: Fix in LoadForGUI: Drag 'n' drop of files in the server did not work anymore. Fixed dgate crash in case of failure in 'recompress()' (pDDO=NULL when OFFIS failes). Merged

20050327: Added rudimentary gz unzip support for dropped files (uses 7za.exe)

20050401: Start on Modality WorkList Support

20050404: List End/Start sequence db types (only supported for worklist)

20050411: Fix incorrect space after filename and device in C-MOVE internal query

20050414: Added addrecord server command: for now only option to enter worklist entries

20050603: Fix servercommand query(2) for empty where part  
 20050825: Fix web interface queries for sql server (were OK for dbase)  
 20050826: More work on web interface and added worklist there;  
 deleterecord command  
 20050827: Fixes in addrecord and query commands,  
 editworklist,saveworklist,deleteworklist  
 20050829: More fixes in web interface, disable caching for most/all? of it  
 20050831: Allow command line length of up to 4096, allow edit all  
 worklist database fields  
 20050901: Removed invalid cache-control: cache; added  
 WorkListMode:0= off, 1=optional, 2=compulsory  
 20050902: Read db config for worklist edit page in web interface; use  
 generic webpages for db edit. Added HL7Tag in DumpDD  
 20050903: Added 'simple' loadhl7: server task implementation and HL7-  
 >DICOM translation. Also addimagefile will enter HL7 files  
 into the server, i.e., drag and drop works  
 Fix some web queries for sql server with denormalized tables  
 20050904: Some more tweaks to hl7 code; max query formats to 48; max  
 format to 8192  
 20050905: Auto split HL7 subfields and repeats without using a list  
 20050907: Merged change by Hans-Peter Hellemann: fixes extension  
 problem for linux web interface for some browsers  
 20050908: Protect convert\_to\_gif when file not found  
 20051121: Recompute SQLResultLength because it does not work in  
 PostGres BindField  
 20051123: put in #ifdef POSTGRES  
 20051208: put in #if 0 (fixed in odbci.cpp); start on virtual server: will  
 grab images from other server as needed in read-ahead thread:  
 when in db but not on disk; for now use R.A.T also for single  
 image access to avoid code duplication  
 20051209: Start on virtual query: image (!) query is passed to other server,  
 results populate db  
 20051210: Added "vX" incomingcompression (stores dbf but not image;  
 forwarding disabled). Added virtual queries on all queries and  
 moves: now works as transparant file cache. Added  
 VirtualServerFor0..9 configuration entries: server merges own  
 data with these AE's. Added CacheVirtualData control; if set  
 data not deleted after use (db kept for now)  
 20051211: Fix: override query level in virtual query  
 20051212: Store virtual server # in device; saved on query, used when  
 retrieving, stripped when storing  
 20051214: Use different sleep lenghts under linux - not all sleep(0); small  
 fix in virtual server  
 20051215: Implemented a linux version of Sleep using nanosleep  
 20051217: Use new VR::ReAlloc method to replace data in VR; added  
 quit: command  
 20051218: Use ReplaceVR instead of Push in anonymize etc; also changes  
 in sequences. Version to 1.4.10; show version and exe date in  
 startup log. Do not start mirror copy queue unless it is needed;  
 show some thread startup info. Added -b = NOTHREAD: run  
 server as single process, useful for debugging and profiling.  
 Fixed doc of --regendir: command  
 20051219: Fixed several small leaks - as tested with Linux malloc\_stats  
 20051222: Started on bypass server for virtual query - not functional yet  
 (cleanup required)

Removed debugVR logic: errors should now list DCO  
 20051228: Fix virtual device logic for VirtualServerFor0;  
 Cleanup vr's and duplicates when bypassing server for virtual  
 query, seems functional  
 20051229: NonDestructiveDumpDICOMObject now also list sequences;  
 DebugLevel>0 lists DCO, >1 lists query DDO; fixed leaks in  
 virtual query and some others  
 20051230: Added --debuglevel: command, small fix in  
 NonDestructiveDumpDICOMObject  
 20060103: Small fix in virtual query; disabled virtual query for worklist;  
 debuglevel 3 shows some query results  
 20060123: Added patient/study/seriesfinder (server parameter ignored for  
 now, later for virtual servers etc)  
 20060125: Added serieslister (server parameter ignored for now, later for  
 virtual servers etc)  
 20060128: Renamed to imagelister, added serieslister  
 20060131: Sort filenames from imagelister on ImageNumber (0020,0013)  
 20060226: Version to 1.4.11  
 20060228: Small fix in isxdigit thanks to ljz  
 20060311: Use ReplaceVR in virtual query - level was sent twice (thanks  
 David Lang)  
 Added WEBReadOnly flag  
 20060317: Support calledae and callingae in filenamesyntax - for  
 virtualquery called is always MYACRNEMA  
 20060324: Strip group 2 from outgoing c-stores if not compression "as" or  
 "is"  
 20060328: Improved forwarder, always propose Verification and use  
 IsAbstractSyntaxAccepted(iUID) to test if host accepts image  
 20060402: Fix hang condition when a file failed to read in the read-ahead  
 thread  
 20060402: Do not remove transfer syntax prior to dcmdjpeg/dcmjpeg  
 (here in test recompress only)  
 20060405: Tried fix for multiple moves on same assoc (thanks Andrej  
 Savelov)  
 20060405: Added message when IOD fails to read  
 20060603: Fix crash when started as dgate -v: empty statbuf  
 20060607: Finally fixed multiple moves on same assoc (thanks Andrej  
 Savelov and Fred Röhner)  
 20060618: Renamed dfilecopy and define ODBC\_ADD\_SYS\_DSN if  
 needed  
 20060619: Set version to 1.4.12alpha1  
 20060621: Added clonedb: command; transfer FULL db from other server  
 to this one using virtualquery  
 20060628: AddToDatabase has JustAdd parameter: skip one unnecessary  
 query  
 20060701: Speeded filter string handling  
 20060702: Pass DB to GenerateFilename to avoid zillions of db open and  
 closes  
 20060704: Print number of records found in all queries  
 20060708: Set version to 1.4.12alpha  
 20061126: Moved servertask temporary files to MAG0/printer\_files;  
 protected query: and query2 against empty input  
 20061126: Experimental forwarding on same association: close unused  
 association after 5 seconds. Clean collected sopclasses after one  
 hour of inactivity.

- Note 1: there is a problem with AReleaseRQ: do not use in this task
- Note 2: maximal 20 forwarders have a remaining association
- 20061127: Added ForwardAssociationLevel (PATIENT, SERIES, STUDY, IMAGE, SOPCLASS; default STUDY), ForwardAssociationRefreshDelay (default 3600 s), and ForwardAssociationCloseDelay (default 5 s). Limit maximum number of ExportConverters to MAXExportConverters=20 (for static arrays used in forwarders). Forwarders keep association open as long as UID at ForwardAssociationLevel does not change. Show filename in forward log; document where fixkodak should operate for virtual queries
- 20061128: Added ForwardAssociationLevel GLOBAL: use association until timeout or incompatible  
Close ForwardAssociation after send when ForwardAssociationLevel is IMAGE
- 20061129: VirtualServerForN may be "server, FIXKODAK" to clean queries (add 0) and their response (remove 0)  
Hardcoded filters for exportconverters (modality, called, calling, station) can now match e.g., RT\*
- 20061130: Pass series and study in virtualserver outgoing c-move
- 20061213: Fixed nasty bug in query2 and TestFilter: Query without bindfield overwrites previous bound strings!  
Maybe was problem causing crash on linux with query2: and problem with option -g reportedly stopping incorrectly
- 20061219: Version to 1.4.12
- 20061231: Added ForwardAssociationRelease to allow testing reconnect problem (default 0 = just hangup)
- 20070103: FixKodak blocks \*xxxx wildcard virtual queries on date (not allowed in Kodak)
- 20070103: Version to 1.4.12b; start on ImportConverters e.g., <set 0008,1040 to "%V0008,0080">
- 20070104: ImportConverters %QP %QS %QE %QW; <destroy> <delete xxxx,yyyy> <save to filename>  
Added %% and %i to Export and Import converters
- 20070105: <set 0008,1040 if "...">, <setifempty 0008,1040 to "...">, <setifempty 0008,1040 if "...">  
Import/export converters only report when syntax OK and report when action is void  
Added %Vxxxx,yyyy to export converters and %d(date/time) to import and export converters  
An import/export converter can thus be used to extensively log incoming images  
Added import converters: <stop>, <if "string">, <ifempty "string">, <nop> (also export)  
Added general purpose variables x, y, z (read as %x, %y, %z) to import converters  
Definition of number of ImportConverters now unnecessary.  
Note: importconverter and exportconverter strings may be changed run-time in dicom.ini
- 20070105: Some fixes in dgate --archiving options manual; fixed dgate --restoremagflags:
- 20070107: Fix web access broken by change in odbci for dbaseIII; query must now always include spaces around =

20070113: Do not store NKI compressed data in v2 format: decompress and give error message  
Recompress to NKI format now enables StripGroup2; Tested with \$c server debug command

20070117: Allow multiple rules per Export or ImportConverter separated by ; and zero or more spaces  
<nop> statement prints itself on console: useful for logging anything that follows

20070117: Now maintain multiple connections per ExportConverter line (max 20x20 forwards)  
Added <stop>, <silentstop>, <if> and <ifempty> to ExportConverters; but they only affect single rule (while these would cross over to the subsequent rules in ImportConverters)

20070122: Now also show free space on mirror devices

20070123: Fixed TestFilter for patientid with '

20070125: Removed <if> and added <ifnotempty>, <ifequal>, <ifnotequal>, <ifmatch>, <ifnotmatch>, <ifnumequal>, <ifnumnotequal>, <ifnumgreater>, <ifnumless> as im/exportconverters  
Added %xxx[first,last] substring operator; and protect it against overrange  
<ifxxx> no longer crosses over importconverters; added { } block for im/exportconverters  
E.g.: ifequal "%V0008,0020[0,3]", "2004"; { forward to CONQUESTSRV3; forward to CONQUESTSRV4; } nop test  
Note: 1) all (also ifxxx) statements end with ; 2) statements may begin with { or };  
3) extra spaces only allowed after ;{ } and single space after ,

20070127: Fix { } in exportconverters. Release 1.4.12b to fix more or less critical odbci error

20070131: Fix in TestFilter (quotes double); Version to 1.4.12c

20070201: Added <storage MAGn> import converter: sets device to store this (new) image to (default MAG0). Fixed importconverters stop and destroy: did not break current line

20070204: Added extra format starting with # to ImageFileLister: e.g. #%s:%s prints MAG0:filename

20070206: Added create database: dgate -esapw name user password

20070207: Fix query string bug on applyworklist found by capolan1

20070207: dgate -e name root <blank> works for mysql: root is used as admin and login  
Also implemented dgate -esapw name sa sapw where sapw may be empty

20070210: Added CheckDuplicates to UpdateOrAddToTable; added @ in imagefilelister: replace \ by /  
Start on ocx based viewer integrated in cgi interface; used dicom over http:  
Small change in gif export; added \* as separator in query/2

20070211: Added WebScriptAddress (default http://server/cgi-bin/dgate), WebMAG0Address (defaults http://server/mag0) and WebServerFor (default 127.0.0.1). Fix in cgi query parser: now loads dsize and size correctly  
Version to 1.4.12d

20070212: Added WebCodeBase, show version in status\_display, added config of which dicom server the web server

- connects to, added [webdefaults] section, added iconsize parameter
- 20070213: Added : as format in imagefilelist: use to list pat:sopuid  
Fixed sorting problem by using adapted imagefilelist for seriesviewer  
Fixed default for WebCodebase; Version to 1.4.12e;  
Use correct case of sql table names in cgi interface: required by mysql on linux  
Unsolved: n3 does not always decompress correctly in dview.pas see p20401977:i47, changed default to n4
- 20070215: Fixed logging and added \*\*\* Association rejected message when association is rejected
- 20070304: Added <defer> exportconverter: retry later as if connection unavailable
- 20070305: Note: n3 problem fixed in dview.pas, version to 1.4.13alpha  
Allow merging of up to 1000 UIDs: set SilentText to 64000 and \*uids[1000] (thanks mp)  
Allow named pipes for log\_on and debuglog\_on
- 20070307: Work on extending extract: allow e.g. SQLite -> dbaseIII
- 20070308: Made changes for big endian and Apple's DARWIN
- 20070314: Finished extract: allow e.g. SQLite -> dbaseIII in directory MAGO dbase
- 20070315: Merged DARWIN stuff; Set TCPIPTimeOut for PDU that moves images
- 20070316: Display defer import converter; Clumsily added <compression> import converter and improved <storage> import converter; Made <storage> thread safe. Failed recompress() no longer reason to fail drag and drop; add convert\_to\_bmp. Use | instead of , to separate patientid from file in addimagefile:  
Distributed , code to each of the server commands to make it more , safe. Note: it is NOT a good idea to use a , in a flexible filenamesyntax. Added level & window to convert\_to\_gif and convert\_to\_bmp; longer log lines for dump VR
- 20070317: <prefetch> using new prefetch\_queue, mayprocess and into\_queue\_unique, <prefetch>, <preget>
- 20070324: preget now <preretrieve> and avoids looping by checking orgmessageid!=0xfbad I.e., data collected by <preretrieve> does not go through import/exportconverters. Added delayed exportconverters <forward patient>, <forward study>, <forward series> with optional compression  
Removed "forward compressed to" (without as section) as is never used. Version to 1.4.13beta; delay to 10 minutes
- 20070326: Fixed leak in <forward patient> etc. preretrieve also checking orgmoveae
- 20070330: Change by Mark Pearson: read dicom.ini from same dir as exe in unix mode; merged more Darwin stuff. Also taken over bcb's fix for the finder: studymodality was asked at patient level. Also put in a more ENxxxx as command and messageid
- 20070404: Added CommaInFilenameWorkAround()
- 20070407: Use reentrant ctime\_r when available; moved static SOPPatientRootQuery etc to stack to fix reentrancy problem: concurrent outgoing c-move of CT and MRI on different associations would share PDU causing sopclass not accepted on one. Also seems to reduce linux crash problems on multiple

inbound (4 or more) C-stores. Also moved CreateBasicFilmSessionRequest etc to fix potential reentrance problem for printing.

20070410: Merged CommaInFilenameWorkAround()

20070413: "extract:" will just create dbase III clone of full patient DB; added "prefetch" server command

20070415: Added Prefetcher option to dicom.ini: is set will aggressively preread queried patient or studies

20070416: Prefetcher prints more information; use windows calls in windows for faster preread

20070705: extract: uses DT\_DBASEIIINOINDEX to disable indexing and packing when extracting from e.g. sqlite to dbaseiii  
Note: extract: non dbaseIII goes to MAG0\dbase, dbaseIII goes to DataSource

20070706: Added <between "9", "17"> (9:00 to 16:59) or <between "17", "9"> (17:00 to 08:59) import/exportconverter

20070709: Fixed print of clone db done

20070720: Fixed problem where waiting "forward ... to " task caused high CPU load

20070901: Added dgate --checklargestmalloc:

20071027: Added ForwardCollectDelay for delayed forwarding (default 600 sec)

20071030: Fill in called and calling AE for SaveToDisk for e.g., dropped files etc. Fix %u and %c in Export and ImportConverters: called and calling AE. Log flow control Export and ImportConverters only in debug mode. Added retrying to delayed forwards or prefetches

20071102: SetDicomErrorHandler: orderly shutdown of server on serious DICOM library errors. Fixed a bug in ForwardAssociationLevel: last UID was lost when reading INI file to szTemp. Added MaximumExportRetries and MaximumDelayedFetchForwardRetries (default=0 is no maximum)

20071103: Version to 1.4.13; defer resets queue fails -> keeps on retrying

20071104: Use local as AE for imagelister in web page instead of CONQUESTSRV1; Enable remote servers (use AE instead of 'local') in finder and lister commands; Fix crash when dgate --option gets empty filename: now lists to stdout

20071114: Put --checklargestmalloc: in dgate -?

20071118: Adapted for 64 bits (use SQLLEN for BindField)

20071120: Fixed KodakFixer for empty patient ID (crashed on 64 bits only). Added [modality xx] and [date yyyyymmdd-yyyyymmdd] clauses to export [patient|study|series] to AE

20071121: Added %V\*GGGG,EEEE: search VR in any sequence; version to 1.4.13a; Added [now -ddd+ddd] and [age -ddd+ddd] clauses to export [patient|study|series] to AE. No retry on remote dicom error in forward xxx to: would retry zero records response  
Use study date for data, age and now clauses

20071123: Made forward command case insensitive; added forward image; added get [patient|study|series|image] from AE. The latter option makes preretrieve obsolete

20071124: Added [sop xxx] clause to [forward|get]. Reorganized exportconverter code: all converters now do % substitution; reduced code duplication. Added reading of sequence items



like in % V/300c,0060.0/0008,1155 or  
% V/300c,0060/0008,1155

Real life example (must all be one line, max 512  
characters):

```
ifnotequal "%m", "RTPLAN"; stop;
nop "tests modality = RTPLAN";
ifnotequal "% V*300a,00b2[0,1]", "A2"; stop;
nop "test machine name = A2";
forward to XVI_A2;
nop "forwards the current recieved RTPLAN";
get study modality CT from NKIPACS;
nop "collects associated CT";
get study modality RTSTRUCT sop V/300c,0060.0/0008,1155
from NKIPACS;
nop "collects associated RTSTRUCT";
forward study modality CT imagetype *AXIAL* to XVI_A2;
nop "forwards associated CT";
forward study modality RTSTRUCT sop
% V/300c,0060.0/0008,1155 to XVI_A2;
nop "forwards associated RTSTUCT";
```

- 20071125: Fixed syntax for % V/gggg,eeee.i/\*gggg,eeee (search all groups under a specified one)
- 20071126: Start on StorageCommitment (unfinished)
- 20080103: Switched to ms7 compiler; fixed forward and get date, modality, sop filters: would not supress the UIDs
- 20080107: Fixed malformed web viewer header: worked for IE but not for other browsers. Check presence of dicom.sql in web pages that need it. Deal with spaces in patient IDs in web pages
- 20080126: Check presence of dgate.dic when starting server
- 20080129: Fix KodakFixer: wrote one byte outside VR data (pr)
- 20080129: Added [imagetype xxxx] clause to [forward|get] (pr)
- 20080130: Small fix in above
- 20080205: Added experimental PadAEWithZeros flag; version to 1.4.14alpha
- 20080210: Added experimental IgnoreOutOfMemoryErrors;  
Added "delete [patient|study|series|image] [date yyyymmdd-yyyymmdd] [now -ddd+ddd] [age -ddd+ddd] [modality mm] [sop xxxx] [imagetype xxxx]" export converter
- 20080221: Added [seriesdesc xxxxx] filter and "process [patient|study|series|image] [by command]"
- 20080222: Small fix in imagetype filter code; process by clause not part of unique check
- 20080302: Fixed case of DICOM table names
- 20080316: Added dgate --deletestudies:date(range) and dgate --movepatient/study/studies/series
- 20080318: Added [series xxxx] and [study xxxxx] filters; work on web page --deleteseries/study and --moveseries/study allow patid:uid as parameter  
Web interface can now push and delete on series and study level, but delete is disabled in readonly web interface  
Version to 1.4.14beta
- 20080319: Delete in browsers fixed?; added %v(desc)desc: search VR in given sop of same patient. Example:  
% V(/300c,0060/0008,1155)/3006,0010/3006,0012/3006,0014/0

- 020,000e Gives referenced CT series UID in referenced structure set from forwarded RTPLAN
- 20080321: Fixes in browser; added graphic web setting; may be gif or bmp for now; Fix %V for non-existing items
  - 20080322: Added dgate --anonymize that uses general scripting
  - 20080323: Small fix in (local) for DcmMove: overwrote destination
  - 20080404: Fixes in series and study filter (rethink naming)  
added value\* match for in match() routine
  - 20080618: Added extra logging in IARQ()
  - 20080620: Only show extra logging in IARQ when assoc rejected
  - 20080816: IARQ shows which sops are accepted; and differentiates no sop from connection terminated
  - 20080817: Small layout fixes; <process with> import converter; show PDU length in log. Check saving of file succeeded (thanks Jeff Bellamy and Alberto Smulders)
  - 20080819: Added experimental DT\_MSTR: multi-value entry, e.g. query on 'PET' matches 'PET\CT'
  - 20080819: added --get\_ini\_param (same as get\_param) and get\_ini\_num to list parameter by index
  - 20080819: Added get\_ini to list all parameters in DICOM.INI
  - 20080819: Added code by map but kept original get\_param for old web cgi client compatibility; Version to 1.4.14
  - 20080820: Solaris 10 fixes, and general UNIX fixes (map): configfiles may not be in current dir
  - 20080821: Default of ForwardAssociationRelease to 1; added sleep export converter
  - 20080823: Added study UID search to PatientStudyFinder; fixed DcmMove: would call local when remote addressed; Added rudimentary query/move web pages
  - 20080825: query/move looks better; added "thumbs" column to local series lister; config patched to readonly; added background color and display of icon (to be placed in WebCodeBase)
  - 20080826: One more fix in DcmMove, still called wrong server sometimes  
Do not use 0xfbad as message ID for DcmMove from web page; webreadonly defaults to true; CGI viewer configurable: seriesviewer, seriesviewer2, noviewer, aiviewer
  - 20080827: Added slice number and repeat output data in ImagefileLister and SeriesUIDLister for more flexible formatting; Added flexviewer: reads code from dicom.ini in web server directory
  - 20080831: Translate yyyy and yyyyymm to date range in finder; further only accept valid date and date ranges; Added dgate --get\_amaps: lists all non wildcard entries from acrnema.map; Fixed handling of patient ID with spaces in ImageFileLister mode :: All undefined cgi modes can come from the cgi dicom.ini; added special and cgi script variables; Lines can start with -- to start dgate, with # as comment, any other passed as HTML; Added source parameter: flex pages can be read from script file; Added serversideviewer: requires javascript only, nothing to install
  - 20080901: Fixed some leaks in printing and --commands; fixed --get\_ini: formatting
  - 20080902: Added header option for web scripts; added some CGI environment variables

**DGATE.HPP (part of DGATE.EXE):**

19980705: Added CACHEDevices and JUKEBOXDevices,  
FindPhysicalDevice  
 19990108: Added LoadImplicitLittleEndianFile and NKI  
PrivateCompeession algorithms  
 19990109: Regen has extra parameter  
 19990317: Changed parameters of LoadImplicitLittleEndianFile  
 19991117: Added parameter FileCompressMode to prototype of  
nki\_private\_compress  
 20000629: Added TroubleLogFile and UserLogFile  
 20010415: Added KeepImages flag to RemoveFromPacs: clear from DB  
only Added SubDir parameter to regen to allow regen of one  
directory only  
 20010416: Added ChangeUID routine and RegenFile - to allow  
modification of images  
 20010429: Changed decompressor: now has extra parameter  
 20020529: InitializeTables now has mode parameter (0=normal, 1=simple)  
 20021018: GenerateFileName has NoKill option (for interactive dgate  
tasks)  
 20030120: Added prototype of FreeDeviceTables  
 20030701: compression parameter for amap  
 20030703: Added prototypes of recompression functions +  
ArchiveCompression  
 20030706: Optional filename parameter for recompress  
 20030706: Export VRType for implicit little endian support  
 20030921: Added DEVICE\_TYPE\_MIRROR  
 20040401: Added Changed and ActualMode flags to compress routines  
 20040626: Added study and series UID to getfilename interface  
 20040930: Adapted return type of SetString; added maxlen to  
BuildSearchString  
 20041013: Added MAXQUERYLENGTH  
 20041029: Added MergeUIDs  
 20041108: Added Syntax input to GenerateFileName  
 20050108: Adapted for linux compile  
 20050109: Added configurable TCPIPTimeOut  
 20050129: Added optional FILE to DumpVR, added  
CheckFreeStoreOnMIRRORDevice  
 20050401: Added QueryOnModalityWorkList, WorkListTableName,  
WorkListDB  
 20050404: Added DT\_START/ENDSEQUENCE to code sequence in  
WorkList table  
 20050902: Made space for HL7Tag in DBEntry  
 20051229: Added iDepth to DumpVR  
 20060317: Added called and calling to GenerateFilename  
 20060324: Added StripGroup2 option to recompress  
 20060628: AddToDatabase has JustAdd parameter: skip one unnecessary  
query  
 20060702: Pass DB to GenerateFilename to avoid zillions of db open and  
closes  
 20070122: Added MIRRORDevices  
 20070201: Added DebugLevel  
 20070207: Added MakeTableString  
 20080818: DbaseIII check now uses DB flags, not PATHSEP in  
datasource name; Added DT\_MSTR

### **LOADDDO.CPP (part of DGATE.EXE):**

19980409: added NKI private decompression engine VR 0x7fdf,0x0010  
19980410: added run length encoding of zero differences  
19980410: Fix 16 bit absolute value decode  
19980415: Fix leak on decompress  
19980625: Added compression in SaveDicomDataObject(C10)  
19980703: Made DObjectSerialize thread save (removed statics)  
19990105: Fix: SaveDICOMDataObjectC10 created VR 0x0002 0x0013 twice. Added comment in SaveDICOMDataObjectC10; Cleanup. Put the nki-routines also in dgate.hpp. Added LoadImplicitLittleEndianFile  
19990317: Decompression removed from LoadImplicitLittleEndianFile; added a VR-sizelimit of that reader  
19990827: NOTE: LoadImplicitLittleEndianFile allocates 100 MB and crashes when passing chapter 10 file (happens when extension is wrongly .v2)  
19990830: Fixed problem above: 'LoadImplicitLittleEndianFile' uses 'PDU.LoadDICOMDataObject' in such cases.  
19991117: Added parameter FileCompressMode to in nki\_private\_compress call  
20000629: Logging of trouble now starts with '\*\*\*'  
20001104: Renamed \_LittleEndianUID to \_LittleEndianUID\_space  
20001105: Fixed where malloc and new were mixed (vr->data)  
20001106: Use delete [] operation for vr->Data  
20001128: Fix in 'Implicit length' code in LoadImplicitLittleEndian  
20010429: Use faster and safer decompressor  
20020412: Added class CBufferedIO for faster reading from DVD (stream functions do not seem to be caching.)  
20020415: Removed diagnostic time code (did not compile on ms4.2). Made buffer size dependent on iVrSizelimit (i.e, use smaller for regen, slightly faster)  
20030706: Attach VRType to PDU's for implicit little endian support  
20041130: Documented crash on win2000 server in code - remains to be fixed – rare crash related to read error of DVD  
20050107: Adapted for linux compile  
20051219: Use ReAlloc instead of new BYTE[] to fill VR data  
20070308: And little/big endian.

### **DGATEFN.CPP (part of DGATE.EXE):**

19980326: changed file name generator to ensure correct sorting of image files by external applications  
19980327: Added FileNameSyntax option in dicom.ini; 0=original, 1=allow sorting by name  
19980407: avoid /;<>| in filename; for Philips: allow up to 9999 series and 999999 slices  
19980409: do not free passed DDOPtr on failure: crashed the lot  
19980415: Error messages to operatorconsole  
19980620: Check error flag from GetDevice (for out of disk message)  
19981005: Added FileNameSyntax 2: filename starts with SeriesUID\_  
19981005: Replaced size%64 by min(size, 63) for correct truncation  
19981217: FileNameSyntax 3: same as 2 but accept errors  
19981220: Fixed FileNameSyntax code

19990117: FileNameSyntax 4: same as 3 but .dcm extension (forces ch10 format)

19990117: Avoid attempts to rewrite image that is not on MAG store (e.g., on CD)

19990315: Do not allow '.' in directory name. In Syntax 3 directory name is now patient ID only (better for ACRVIEW). Better unique filenames by using time + counter.

20000127: FileNameSyntax 4 now does not truncate patid, as 3 already did

20000131: FileNameSyntax 4 has patient ID only as directory name (same as 3)

20000701: Added MaxFileNameLength option: truncates from start

20010419: FileNameSyntax 5 on request of Jason Foster - uses patientname as dir

20011109: Made MAG name check case insensitive

20020416: Made filename counter 4 digits for when writing >100 files/s

20020416: Made all instances of time() unsigned

20020426: Cannot rewrite image not on MAG store is now a message without \*\*\*

20020508: The above message will not lead to a fail of GenerateFileName

20020802: Added FileNameSyntaxes 6..9; cleaned FileNameSyntax code a bit

20020804: Truncate patient ID to 32 chars for mode 6 and 8 (make sure len<255)

20021016: Pass indexed patid to GetFilename for speed

20021018: GenerateFileName has NoKill option (for interactive dgate tasks)

20021223: Added forbidden chars \*, ?, " and : (comment from Thomas Buerer)

20030401: Overrule 'v2' filenames with '.dcm' when object is not ImplicitLittleEndian

20030522: Replaced 'static int counter' by 'unsigned int gl\_iCounter'

20030606: Fixed incremental counter when creating UIDs or generating filenames

20030730: Overrule v2 only when not ImplicitLittleEndian, ExplicitLittleEndian ExplicitBigEndian (c.f. 20020401)

20030819: Allow longer filenames

20030921: Added DEVICE\_TYPE\_MIRROR TO GetDevice call

20040129: Added FileNameSyntax 10 = all files in one directory

20040301: Small fix for FileNameSyntax 10

20041108: Added Syntax input to GenerateFileName (overrides ini setting)

20050107: Adapted for linux compile

20050126: FileNameSyntax 11: StudyUID\SeriesUID\SOPUID.dcm

20050131: Changed root to 'name' for FileNameSyntax 11

20051210: Clear root output string when image already in database

20060312: FileNameSyntax 12: similar to 11 but uses Modality\_StudyID as dir

20060312: Checked it:  
12=name\_ID\Modality\_StudyID\SeriesUID\SOPUID.dcm

20060314: 12=name\_ID\Modality\_StudyID\SeriesID\SOPUID.dcm

20060314: new filenamesyntax, e.g.,  
%name\_%id%\%modality\_%studyid%\%seriesid%\%sopuid.dcm

20060317: Added calledae and callingae to GenerateFilename flexible syntax

20060325: imagenum is image number as text, fix imageid, accept all errors  
 20060402: Fix potential problem when patient ID not there  
 20060701: Speeded string handling in new filenamesyntax  
 20060702: Pass DB to GenerateFilename to avoid zillions of db open and closes  
 20070125: Fix %modality; add %studydate and substring (year = %studydate[0,3])  
 20071027: Extended length of FileNameSyntz parameter to 256  
 20071027: Stripped spaces of called and calling in flexible filenamesyntax  
 20071030: Small fix in the above  
 20071104: Added %series: 4 digit series number

#### **DEVICE.CPP (part of DGATE.EXE):**

19980620: Setting MAGDeviceThreshHold to 0 causes out of disk error below 10 MB without cleanup  
 19980620: Implemented PanicKillOff thread here as alternative to spawning killer.exe  
 19980702: Started support functions for maintaining/determining amount of used space on device  
 19980704: NOTE: JukeBox code only TruncateFieldNames compatible for now; used mp's filecopy  
 19980709: Finished first version of archive options: prepare, undo, copy, compare, delete  
 19980721: Set default # cache and jukebox devices to 0  
 19990110: Made strings longer since got truncated, fixed some messages  
 19990110: Archive one MAG device or MAG?; fixed SQL syntax for update; speeded 0x7ffffff. Return False if SelectLRUForarchival selects no data  
 19990111: Reset archive flag reports to operator console; protected against illegal device#  
 19990113: Run up to 10 patient further to try and fill CD more exact; max patients = 10000  
 19990114: Added quick routine MakeListOfPatientsOnDevice and used instead of 0x7ffffff  
 19990117: Accept any, not only \*.v2, for computing patient size, assume max file size=30 Mb  
 19990630: Added support for MIRROR devices (e.g., try MIRROR1 if MAG1 fails)  
 19990707: Fixed default MIRRORDevices (now 0)  
 19990708: NOTE: archiving should make use of mirror device if required as well!  
 19990712: Fixed that MagRampage thread was started over and over again (fixed for WIN32 only)  
 19990831: Fix: Several BOOL functions returned -1, which is TRUE !!  
 20000621: Changed layout of this update-history  
 20000629: Logging of trouble now starts with '\*\*\*\*'  
 20001104: Fixed aDB.Close -> should be aDB.Close(); added WINAPI to MagRampage thread  
 20010328: Added verify mirror disk  
 20010329: DeleteBunchAfterBurning also deletes data on MIRROR0 if it exists; verify mirror disk keeps on going after error but does return error

20010312	Check if we already selected some patients for archiving from the device
20010509	Added RenameDevice
20010522	Do not call RestoreMagFlags if something goes in wrong in PrepareBunchForBurning
20011114	Replaced slow updates for magdevice by much faster ones. The update that now no longer has the IN part might not work for ACCESS or DBF. So: for jukebox purposes, SQL server is required
20011115	Replaced 'LIKE' by faster '=' in query strings; fixed previous fix
20020412	PanicKilloff will delete now delete 5 MB data at a time. (high water = low water + 5)
20020415	Added TestImages: sanity check of images on disk
20020416	Reversed read order for TestImages and VerifyMirrorDisk: MRU first
20020802	Allow multiple subdirectories in rmdir and mkdir code
20020804	Cleaned up a bit
20021018	GenerateFileName has NoKill option (for interactive dgate tasks); moved ALERT warning
20021020	Simplified and speeded queries for archiving using ImagePat field (requires rev5+ of db); Removed " and added [ in MakeSafeString; hand-code one query for built-in dbase driver; Changed SQL construct in SelectLRUForArchival for compatibility with built-in driver
20030120	Added FreeDeviceTables
20030702	Start on ArchiveCompression; for now KB is specified - before!- compression
20030705	Replaced ProcessDDO by more correct DecompressNKI to check pixel data
20030706	Attach VRType to PDU's for implicit little endian support
20030724	Fix in GetKBUsedForPatient: missing %s in printf
20030819	Allow longer filenames
20030905	Allow longer filenames when reading device paths
20030921	Added DEVICE_TYPE_MIRROR in GetDevice; allow PanicKillOff to be called with variable threshold
20031217	Fix: Support harddisks bigger than 2 GigaByte!!! in CalcMegsOnDevice (Thanks to Clifford Sweet)
20040403	Moved ArchiveCompression to SelectLRUForArchival -> fills disks correctly
20040614	Added MoveDataToDevice
20050107	Adapted for linux compile (no threads yet, no check of disk space on device)
20050109	Added threads for linux
20050118	Detach thread after starting it to avoid leaks
20050119	GetKBUsedOnDevice is not used --> no problem to return -1 under linux
20050414	Fix CalcMegsOnDevice for relative path
20050421	Fix: MAGThreshHold is space for largest file != space for cleanup. Now set to 30 MB independent of MAGDeviceThreshHold
20050901	Fix free space check for unc paths (error counting \)
20060311	When GetDiskFreeSpaceEx fails allow storing data anyway (fix for Marius Petruc)
20061213	Fixed nasty bug in MakeListOfPatientsOnDevice: Query without bindfield overwrites previous bound strings!

20070316 Cleanup now starts at MAGDeviceThreshHold to MAGDeviceThreshHold+1000, was start on 30 to MAGDeviceThreshHold; Allow both MAG0 and MAG0.Archiving as input for PrepareBunchForBurning

20071027 Protect MakeListOfPatientsOnDevice on MAXPATIENTS; LRU selection now configurable using routine MakeListOfOldestPatientsOnDevice. E.g. if LRUSort = StudyDate, deletes or archives least recent scanned patients first. The default "" means that the original sort order on db entry date is kept

20071031 Catch out of memory errors and return error status if so

20071118 Adapted for 64 bits (use SQLLEN for BindField)

20071128 Fix by kamil.krasnik of Cache device disk space test for UNIX Also fix Cache and Mirror for UNC paths

20080126 Fixed bug reported by Ali: second move to MAG1 of more data if same patient would fail on delete. Added new logic: attempt to delete file from MAG0 that is not in MAG0 but is in MAG1 is OK. Similar attempt to delete file from MAG0 that is in MAG0 but not in MAG1 is an error

20080302 Fixed case of DICOM table names

20080317 Fixed deletebunchafterburning change (Ali)

20080604 Modified device searching order when file not found: JUKEBOX now also searches other JUKEBOX

20080617 Fixed bug in above: second jukebox not accessed correctly

20080818 DbaseIII check now uses DB flags, not PATHSEP in datasource name

#### **DBSQL.CPP (part of DGATE.EXE):**

19980321: Changed ObjectFile and DeviceName field length to 250 for dbf compatibility

19980321: Added define TRUNCATEFIELDNAMES for DBF compatibility (apply in makefile)

19980322: Added run-time check on DbaseIII (should also be added in parse.cpp somehow)

19980325: Added TruncateFieldNames entry in dicom.ini to allow DBF compatibility

19980327: Made MaxFieldLength configurable

19980327: Set default event notification to UDP (for personal pacs)

19980407: Added FileCompressMode config

19980409: Check vr!=NULL in MakeSafeString, MakeSafeDate

19990630: Remove also files from MIRROR disks

19990707: Added UpdateOrAddToTable to refresh database contents without first removing

19990707: Cache Updates; and AccessTime with ~31 to allow update times to be the same

19990707: Added fix for Philips PATID; fix cleaning of MIRROR device

19990708: Added (and disabled) stress code for SQL server

19990712: Fixed FIX\_PHILIPS; atoi failed sometimes because vr->data not zero terminated

19990827: Added creation of key and link indices

19991117: Added a check on ini-file value of FileCompressMode

20000621: Changed layout of this update-history. Fix: In 'SetString', type DT\_UINT32 was treated as DT\_UINT16 Added TroubleLogFile and UserLogFile



When updating PatientRecord, verify the new Name and BirthDate

20000629 Logging of trouble now starts with '\*\*\*'

20000701 Remove \*all\* trailing spaces in MakeSafeString before enters database

20000703 Merged changes: made patient change verification table and record name independent and extended to other databases as well; removed trailing before comparison; show patid on all error messages

20000705 refuse inconsistent update of link: show error on operatorconsole

20000707 fixed above addition

20001104 Replaced \_rmdir by equally valid rmdir

20001106 Use delete [] operation for vr->Data

20001128 Fix: protected 'GetFileName' with a critical section.

20010415 Added KeepImages flag to RemoveFromPacs: clear from DB only

20010416 Added ChangeUID routine and UIDMODS table - to allow modification of images

20010418 Changed names of database fields in UIDMODS - did not work on msaccess

20010429 Renamed genuid routine and variables to allow compile in one big file

20010713 Reduced devicename to 32 chars to space space

20010902 Improved UpdateCache to be thread safe and made it longer, no test on image db.

20011109 Made MAG check and database field consistency check case insensitive.

20011115 Replaced 'LIKE' by faster '=' when possible

20011116 Fixed error handling of db entry. It was possible that db entry failed without any message!

20011121 Create indices on ImagePat and SeriesPat if these fields exist

20020403 Do not overrrule the PatientTable with: empty data, or birthdate xxxx0101, or sex other than MmFf.

20020409 made LastPatid non-static

20020409 Removed non-thread safe caching of LastADBE

20020409 Moved entry into UpdateCache to after succesful Update

20020412 Made NCACHE configurable and changed it from 16 to 1024 (8 MB); Set lastfield (limit of #fields) to 20 (was 16)

Added checksum code in update cache to make it faster

20020412 Made key fields unique. Reversed writing of db's. In this case a db write fail will still result in a valid db. The db write code is not multi-user safe. A new record may be written at the same time by two processes -> fail

20020413 Set NCACHE to 256, enough for single thread regen

Modified another non-thread safe construct

20020415 Fix display of PatientID in 'Inconsistent' error message

20020416 Made UID generator configurable through UIDPrefix in dicom.ini. Made all instances of time unsigned. Note: accesstime in the db is signed int: problem around 2038

20020418 Added TimeStamp, Flags, and Spare fields on all dbs for future use

20020430 Fix in spare fields: name was reserved in some odbc implementations

20020515 Process all db fields; enter (1) Modality into StudyModality

20020517 Modality is merged into StudyModality without size limit (enforced by sql server)

20020518 Skip missing VR's again; max nr fields to 30; fix reading of NULL fields (clear s[][])

20020519 Also skip writing empty VR's (vr->Length==0); made FixPhilips configurable (default 1). Remove / from date to allow writing mm/dd/yyyy into sql server

20020522 Test on empty Modality vr

20020529 Added PRIMARY KEY to key DB fields (needed for replication)

20020529 InitializeTables now has mode parameter (0=normal, 1=simple)  
Do not make Index for primary keys (is done automatically)

20020609 Added compression modes 3 and 4

20020802 Simplified rmdir code and allow multiple subdirectories

20020804 Use PATHSEPCHAR where possible

20020806 Fix: cleanup entries of refused item in database

20020819 Added better UID generation

20021016 Use patid in SaveToDatabase and GetFileName query (both test for rev5 or higher of the database)

20021017 Allow set of UIDpostfix from extern (-c option of dgate)  
Removed creation of unused tables

20021020 Added [ to MakeSafeString; removed "  
Note: VR's containing ', ? give spurious inconsistency warning when rewritten

20021028 Also removed dropping of unused tables; reversed table search to image..pat in FindDBE. Made inconsistent birtdate a severe error message (added \*\*\*)

20021110 Made date range inclusive (bug reported by Aaron Cann)

20030113 Added PatientQuerySortOrder etc overrides for sorting

20030205 Fix potential empty patient ID and SOP problems in GetFilename

20030321 Extra check on vr!=NULL in SaveToDatabase

20031104 Added \\ to MakeSafeString

20040301 Do not double \\ when already doubled

20030425 Added DoubleBackSlashToDB control for \\

20040528 Pass patient ID in RemoveFromPacs and Enable KeyOnAll

20040529 Implemented faster delete from database

20040530 Pass a field to query in delete - obligatory for sql server

20040601 Removed enable KeyOnAll - added some more checks in NewDeleteFromDB

20040609 Check for DB revision for fast delete from database queries

20040610 Truncate too long VR's before putting into db; log to pacstrouble

20040623 Fix for non-DBASE datasources in 'UpdateOrAddToTable'

20040626 Added study and series UID to getfilename interface

20040713 Added FixKodak: replace pat 0nnnnnnnn with nnnnnnnnn

20040722 Defaults for FixKodak and FixPhilips to 0 (!)

20040930 Added multiple UID matching: UID\UID\UID in BuildSearchString (list truncates at maximum length)  
SetString now returns a char \* which is newed (with lots of extra space for MakeSafeString which is done in-place) if Max length is passed 0. DICOM2SQLQuery has no max length anymore

20041003 Truncated printf's of SqlStatement

20041029 Added MergeUIDs routine

20041101	Added NewDeleteSopFromDB
20041220	Fix: in 'RemoveFromPACS', an even PatientID was not zero-terminated !!
20050109	Adapted for linux compile
20050111	Added ctype.h (for mingw)
20050205	Added counters for database activity
20050206	Allow empty DBE in ConstructVRFromSQL: used to get ObjectFile and Device in query
20050401	Added WorkListDB and WorkListTableName
20050404	Dicom types DT_START/ENDSEQUENCE are ignored during table creation/adding to table
20050414	Allow undefined worklist database; Delete patient will delete worklist entries as well (but needs at least one image)
20050417	Delete from DB will also delete worklist as patient goes
20050826	Added mode 2 for initializetables: clear/create worklist only
20050831	Mode 0 and 1 will now not delete worklist if it contains data
20050831	VerifyIsInDBE will not return DT_START/ENDSEQUENCE
20050901	Do not call FixImage in SaveToDataBase: is done in SaveToDisk before
20051121	Enabled SQLRealSize because SQLResultLength does not work in PostGres BindField
20051123	Fixed it, and only enable it when #ifdef POSTGRES
20051204	Disabled it, fixed postgres driver instead
20051210	GetFilename returns FALSE for an image that has no filename or device set
20051212	Clear update cache when any records deleted - drastic but safe
20051216	Small fix in above
20051217	Use new VR::ReAlloc method to replace data in VR
20051218	Fix study modality when DoubleBackSlashToDB=1; changed modality search
20051228	Truncate invalid trailing spaces (>1) from patient ID. Fiximage warns to SystemDebug
20060210	Removed order: first remove spaces and then fix the patient ID because patient ID consisting of 14 spaces caused huge troubles
20060220	Check max 50 fields when update; fix Inconsistent check for DoubleBackSlashToDB
20060607	Fix character translation for entering *?%[' into sql using MakeSafeStringValue. Fix consistency check for these characters as well (thanks Robert Chrzan)
20060607	Added "not null" to "PRIMARY KEY" to satisfy Sybase (thanks Marcin Litoborski)
20060618	Added not null to UIDmods as well, unified case of DICOMWorkList table name (may be done for other tables as well) (thanks Marcin Litoborski)
20060618	Remove " added by MakeSafeStringValue prior to inconsistency check (thanks Robert Chrzan)
20060621	Increased size of s from [50][255] to [51][256] in UpdateOrAddToTable fixes VirtualQuery crash
20060628	AddToDatabase has JustAdd parameter: skip one unnecessary query
20060706	Replaced faulty new vr construct when doing consistency check: faulted on Linux
20061213	Protect Clear_UpdateCache with critical section

Fixed nasty bug in NewDeleteFromDB. MergeUIDs, NewDeleteSopFromDB: Query without bindfield overwrites previous bound strings!

20070123 Fixed GetFileName for patientid with '  
Recoded some of the inconsistency checking: now no failure on patient ID (link) with '

20070131 Fixed GetFileName for all patientid's ;->>>>

20070201 Fixed (unused) UpdateAccessTimes for weird patient IDs

20070210 Added CheckDuplicates to UpdateOrAddToTable: used on DicomStudies to catch inconsistent patientID  
Enabled KeyOnAll on UpdateOrAddToTable: only delete exact records (needed if inconsistent patientID)

20070308 Changed to set patient ID to 0 for anonymized patients

20070315 Merged; also noted that changed possible use of AND at start of sql where

20071027 Also truncate too long date fields with error message; added AllowTruncate: if sql name in comma separated list: warning only else \*\*\*error

20071118 Adapted for 64 bits (use SQLLEN for BindField)

20080302 Fixed case of DICOM table names

20080319 Fixed typo in above change; fixed worklist delete for patients with space in ID

20080817 Added WorkListReturnsISO\_IR\_100 flag (default 1)

20080818 DbaseIII check now uses DB flags, not PATHSEP in datasource name; Added experimental DT\_MSTR: multi-value entry, e.g. query on 'PET' matches 'PET\CT' if studymodality is given type DT\_MSTR instead of DT\_STR. Note: not implemented for DBASEIII

20080819 Added warning when querying DT\_MSTR field on dbase

20080902 added EnableComputedFields (default 0)

### **VRTOSQL.CPP (part of DGATE.EXE)**

20000629 Logging of trouble now starts with '\*\*\*'

20010330 Added a few debug printf's

20010420 Fixed memory leaks in all query levels

20020519 Clear BindField result strings before reading (NULL does not read)

20021028 Restructured queries to give lowest level of de-normalized databases. Fixed sorting on PatientName in denormalized study query

20021030 Reversed this again apart from study level because SQL server becomes very slow

20030113 Added PatientQuerySortOrder etc overrides for sorting

20030114 Added in querycolumns (even if already present); tested for SQL server, requires testing for other datasources

20030122 Remove unused entries from Tables string in queries

20040930 Started adapt such that query strings etc and not limited in length. For now: query string max 8192 (here and in odbci.cpp); sql statement max 16384 (in odbci.hpp)  
Enough for query with one multiple values UID of about 100 images (list truncated if too long). Added safestrcat protection of SearchString

20041003 Truncated debug prints, malloc strings at image level.  
Analysed string lengths; limited 'records =' debug log

20041013	Used MAXQUERYLENGTH
20050107	Removed UNIX flags: solve difference in database interface
20050206	Image query can send filename and device in 0x9999,0x800 / 0x0801
20050401	Added QueryOnModalityWorkList; - todo - put selected items into sequence 0040,0100
20050404	Take query for Scheduled Procedure Step from sequence, put results into sequence
20050414	Made sequence unfolding for worklist more generic - accepts any number of and nested N=1 sequences. This is correct behavior for query input, but limited for query results
20050417	Removed unused variable
20050831	Fixes in worklist code: is ok for all OFFIS tests except 1 (empty seq not returned) and 10 (undef non-empty seq takes one entry from higher level) - good enough for initial release?
20050901	Fix for test 10: allow undefined sequence in query
20050907	Merged change by Hans-Peter Hellemann: fix missing max() macro
20051229	Debug log show records of all queries. DumpVR only left in worklistquery and shows sequence layout
20051230	Removed 2 forgotten dumpvr's
20050103	Added debug info from testing phase inside nested sequences for modality query
20050211	Added empty required modality sequences 8,1110 and 8,1120 when not there
20050224	Fixed modality worklist query: empty result sequences were not handled correctly (Thanks Tony Tong)
20050311	Worklist change was tested OK with Agfa (thanks Frank Grogan), cleaned debug log a bit
20060607	Fix crash when coding empty sequence as last item in worklist query (thanks Francois Piette)
20061219	Small fix in layout debug log
20071118	Adapted for 64 bits (use SQLLEN for BindField)
20080817	Fixed bug found by larc: worklist sql syntax error (fields start with ,) when 1st item is sequence; Fixed bug found by Alberto Smulders: sometimes sequence level in response would not come down; The problem was that a higher levels the reported sequence level was inconsistent with the 1st level; Changed CodeSequence stop criterium and level coding for deeper levels; now works with varies sequence combination; Added WorkListReturnsISO_IR_100 flag (default 1)
20080818	DbaseIII check now uses DB flags, not PATHSEP in datasource name
20080901	Implemented 'Number of Patient Related Studies' (0x0020, 0x1200) etc
20080902	Fixed that option for VirtualServers; added EnableComputedFields

#### **DPRINTF.CPP (part of DGATE.EXE):**

20000211	Removed MajorEvent and MinorEvent instances of 'Debug'. Cosmetics. Added UserLog and TroubleLog. Added timestamp option. Added CriticalSection when printing to file or stdout.
20011110	Post release 1.3.10: keep log files closed while working

20021027	Avoid crash when logfile cannot be opened
20041003	Note: max 1200 chars (use %.1000s to print long strings)
20060618	Define _SH_DENYNO if needed
20070105	Added timestamp for linux users (thanks, Mark Pearson)
20070406	Use reentrant ctime_r and localtime_r when available
20070408	Protected entire .printf() with global critical section
20070712	Closed/opened critical section where recursive call to printf would hang linux version with sqlite
20071120	Use fputs instead of fprintf at end: otherwise % removed
20080821	Fix for Solaris SUNWsprow compiler

### **REGEN.CPP (part of DGATE.EXE):**

19980327:	put messages in one SystemDebug for UDP message layout
19980415:	changed messages to OperatorConsole
19980605:	Need to add regen for optical devices and cachedevices !!!!!
19981218:	temp use pdu.load
19990108:	Replaced PDU.Load by LoadImplicitLittleEndian in RegenToDatabase
19990109:	Set HeaderOnly flag for LoadImplicitLittleEndianFile to TRUE. Added regen of CACHE and JUKEBOX devices; NOTE: full regen imposes name restrictions on JUKEBOX and CACHE directories
19990117:	Filenames with .v2 are assumed raw; added extension .dcm for chapter 10 format
19990317:	Parameters of LoadImplicitLittleEndianFile have been changed
19990521:	.img files react same as .dcm files
20000629:	Logging of trouble now starts with '***'
20010415:	Added SubDir parameter to regen to allow regen of one directory only
20010416:	Added RegenFile - to allow modification of images
20011109:	Made file extension checking case insensitive
20020409:	Experimental multithread version.
20020413:	Made NTHREADS variable and tested. Time to regen 6900 files about 3 min and 40 s.
20020415:	Tested with new loaddo code by ljz. Note: multithread works and has allowed fixing MT some errors in other modules. However, due to a problem in concurrent db writing (in UpdateOrAddToTable) it should not be used clinically.
20020613:	Removed some warnings
20020802:	Simplified regen code; traverse subdirectories recursively (allow e.g., e-film data format)
20020804:	Use PATHSEPCHAR where possible
20021014:	Exclude directory PRINTER_FILES during regen (contains slices without ID and such)
20030120:	Removed some warnings
20030706:	Attach VRType to PDU for implicit little endian support
20030819:	Allow longer filenames
20040614:	Do not regen CACHE devices; first regen JUKEBOX then MAG (e.g., in historical order)
20050118:	Adapted for LINUX compile
20060628:	AddToDatabase has JustAdd parameter
20070210:	Increased maxvrsiz for regen v2 files from 0x400 to 0x4000 - > UIDs were sometimes not found
20070308:	Ignore .DS_Store for DARWIN

### **PARSE.CPP (part of DGATE.EXE):**

19980321: Added define TRUNCATEFIELDNAMES for DBF compatibility (apply in makefile)  
19980325: Added TruncateFieldNames entry in dicom.ini to allow DBF compatibility  
19980327: Added MaxFieldLength entry in dicom.ini to allow DBF compatibility  
20001105: Renamed some enums and variables to allow compile in one big chunk  
20010713 Renamed DT\_UINTxx to DT\_INTxx as temp fix for bug in LEX.CPP  
20010829 Undone above change as LEX.CPP has been fixed by ljz  
20050107 Added include file gpps for GetPrivateProfileString  
20050401 Added WorkList Support  
20050404 Added DT\_START/ENDSEQUENCE to code sequence in WorkList table  
20050902 Added HL7 column to be used for WorkList table  
20050908 Fixed pointer error that crashed linux version  
20080818 Added DT\_MSTR

### **LEX.CPP (part of DGATE.EXE):**

20000822 Created  
20000823 Support cases where the input-file is empty or contains only white-space.  
20010716 Fix: Allow TOKENs that are substrings of other TOKENs.  
20050103 Changed include file to lower case (for linux)  
20050108 Removed window.h for linux compile  
20050118 GNU C++ knows BOOL etc, do not redefine

### **NKIQRSOP.CXX (part of DGATE.EXE):**

19990317 NKI-specific code moved here  
19990903 Implemented NKI MaxRowColumn VR in DCO  
19990906 Improved implementation of MaxRowColumn  
19991022 Changed the root of NKI-made UIDs to the official one supplied by Medical Connections(UK):  
1.2.826.0.1.3680043.2.135.1066.xxxxxxxxxx  
19991122 Added NKI-CompressionMode 2: safer, with CRC checks  
20000131 Regardless the FileCompressMode in Dicom.ini, always send images compressed (mode=2) when communicating with an NKI application.  
20001105 Fixed where malloc and new were mixed (vr->data)  
20001106 Use delete [] operation for vr->Data  
20001106 Temporary fix of BC leak in CompressNKI and DecompressNKI  
20001120 Fix bug - vr->data was reallocated without changing vr->length  
20001127 Fix: Crashes happened when more than one ServerChildThread' was active. m\_pDCO is wrongly shared by all threads !!  
20010424 Plugged in faster and safer decompress  
20010426 Fixed leak when connection is aborted

20010429 Interleaved CRC computation with compress code (factor 2 faster) Added GetADD0 to allow read ahead within calling program

20010501 Merged ljz's change of 20010426

20010502 Added extrabytes pointer to Read and RetrieveOn

20010502 Added vr(9999,0300)=SliceLimit: send at most so many slices

20010502 Changed this vr to (9999,0500)=SliceLimit

20011219 Added extra check in case other manufacturers than NKI use VR (0x7fe0, 0x0010), such as ACUSON

20020317 Replace true by TRUE

20020415 Added error handling on ProcessDDO

20020429 fixed reporting of number of complete slices (now starts with 1) return cancel status if C\_STORE failed

20020609 Added compressor modes 3 and 4

20020609 Added VR (9999,0600): MaxCompressionLevel (default 2)  
Note: This level (max of 4) is also used when downsizing

20020613 Exported DecompressNKI and CompressNKI

20020619 Damn! ELSCINT uses (0x7fe0, 0x0010) too (see modification on 20011219). Extra check on zero-length pixeldata

20020930 Fixed SliceLimit VR

20021016 Removed \_\_BORLANDC\_\_ language construct - to fix downsize with BC55

20021115 Added Generic style retrieve classes; print error messages from c-move

20030522 Added function ComputeCRC

20030605 Fix in DecompressNKI: dgate crashed when DCMTK's 'storecu.exe' wants to send an NKIcompressed image to dgate; it refuses to send the pixeldata!

20030701 QualifyOn now also has compression parameter; transfer syntax work in progress

20030703 Tested recompress functions

20030704 Disabled decompression in ProcessDDO for non-nki clients; is done by recompress. When downsizing use DecompressImage(); also supports JPEG; Removed MaybeRecompress. Recompression for NKI clients only when downsizing; otherwise as specified in acrnema.map

20030705 Moved recompression out of ProcessDDO into StandardRetrieveNKI::Read. Skip recompression to same level as incoming

20030706 Optional filename parameter for recompress (not used yet); set env for offis tools

20030706 Attach VRType to PDU's for implicit little endian support

20030709 Removed DCMDICPATH; is not needed

20030819 Allow longer filenames

20030905 Note: recompressfile; DecompressImageFile and CompressJPEGImageFile do not allow spaces in filename

20040401 Added Changed and ActualMode flags to compress routines; only give compress message if something changed

20040401 Set maxcompression to 4 for NKI send

20040403 Added own SaveDICOMDataObject as in dgate.cpp

20040406 Also copy TypeCode in DecompressNKI when converting (0x7fdf, 0x0010) to (0x7fe0, 0x0010); Make TypeCode of (0x7fdf, 0x0010) OW instead of OB, because OFFIS refuses to compress OB



20040406 Always use EXPLICIT syntax for jpeg, fix v2 always use DUMP; Use -F +ti option for dcmdjpeg for writing to v2: creates raw dump, implicit; Refuse to jpeg compress V2 files and images != 16 bits; \n is all messages; Fix error handling of CompressJpegImage

20040530 Removed unused variable

20040722 Added "nj" compression: leaves JPEG as is; else MAXNKICOMPRESSION

20041101 Added built-in JPEG and RLE decompressor

20041102 Fix problem with external JPEG compression: clear transfer syntax prior to save for OFFIS tools with DICOM\_CHAPTER\_10\_EXPLICIT

20041103 Added k1,k2,k4,k8 compressors: downsize to 1024,512,256,128 pixels if bigger to start with

20041112 Called AE SERVER~xx in C-MOVE lets xx override outgoing compression as well (e.g., call CONQUESTSRV1~k4 to always get images downsized to 256x256)

20050102 Added NOINTJPEG flag to allow compile through total.cxx

20050103 Changed include file to lower case (for linux)

20050108 Adapted for linux compile (work in progress)

20050109 Added configurable TCPIPTimeOut

20050118 replaced thread local storage under linux with variables in object

20050119 added rudimentary support to start external (de)compressors under linux

20050121 Changed filename to lower case

20050122 Improved external jpeg support under Linux: load dictionary, wait until ready

20050130 Added To8BitMonochrome and ToGif

20050204 Small fix in ToGif for non-square images; also interpret RescaleIntercept as float

20050205 Added counters for compression activity

20050206 Optimized downsizing: do not decompress if no downsizing to occur

20050206 Note: replaced thread local storage under linux with variables in object is incorrect. Under linux, the server now can also serve one at a time. Fix for color to gif; added limited auto scaling in 16 bits to gif.

20050211 Now really removed need for thread local storage

20051210 Added "vX" compression (same as as is)

20051217 Use system() to call on offis apps in linux (now works)

20051217 Use new VR::ReAlloc method to replace data in VR; fixed 2 float warnings

20051229 Fixed several leaks in (jpeg)compression code; changed alloc for nki compression

20051230 Added +sr option to dcmjpeg: compress without changing rescaleslope/intercept  
This option is required for our viewers: slices must all have same rescale

20060219 Removed warning in writgif

20060222 Added extra checks (not on ID strings) to pass as NKI compressed data

20060311 dcmjpeg opts string got truncated (thanks Rainer Libowski) fixed unused CompressJPEGImageFile (wrong exe called)

external decompress temporary files now in printer\_files  
(thanks Rainer Libowski)

20060324 Added StripGroup2 option to recompress; strip group 2 from outgoing c-stores if not compression "as" or "is"

20060328 Use IsAbstractSyntaxAccepted(iUID) to test if host accepts image

20060402 Fix crash when receiving or dropping jpeg compressed color images. Consider not removing transfer syntax (0x0002, 0x0010) prior to dcmdjpeg/dcmcjpeg. Would fix problem with external decoding color jpeg images

20060402 Changed IsAbstractSyntaxAccepted(iUID) test back (thanks Andrej Savelov)

20060405 That was not the problem

20060618 Tested IsAbstractSyntaxAccepted - seems to work. Removed need for min()

20060619 Do not remove transfer syntax before decompression (20060402 suggestion). Maintain original object when decompression fails, changed wording of message. Only complain about internal decompressor for jpeg

20070104 Export automatic SaveDICOMDataObject

20070113 Never delete transfer syntax (was left in CompressJpegImage, solves coding error in jpeg store). Tested with \$c server debug command

20070210 Export MaybeDownsize and check on 0 for passed size

20070307 Added several debug prints in retrieve, e.g. at bail out because connection dropped

20070308 removed #include <wait.h> from DARWIN

20070314 Send 0000,1030 (MoveOriginatorAE) and 0000,1031 (MoveOriginatorMessageID) in SS->Write as result of Move

20070315 Merged bcb DARWIN stuff; Set TCPIPTimeOut for PDU that moves images

20070316 Added (color) ToBMP for convert\_to\_bmp; added level and window to ToGif and ToBMP

20070407 Use ~p1..9A..Z to override C-MOVE port (adds 1..36 to port number)

20070902 WriteGif now cpp

20071027 Added quotes around filenames passed to dcmdjpeg and dcmcjpeg: avoids errors with spaces in paths

20071101 Enabled JPEG compression and decompression of non-16 bit data

20071104 Added DecompressNon16BitsJpeg (default TRUE)

20071105 Restore image when dcmc/djpeg failed to start

20080103 Added mode 'uj': leave jpeg as is, otherwise uncompress  
Added DecompressImage to recompress()

20080820 Solaris fix (do not use variable name SS)

#### **NKIQRSOP.HPP (part of DGATE.EXE):**

19990317 NKI-specific code

20001128 Fix: Crashes happened when more than one ServerChildThread' was active. m\_pDCO was wrongly shared by all threads !!

20010429 Added GETADDO to allow optional read ahead withing calling program

20010502 Added extrabytes pointer to Read and RetrieveOn

20020415	ProcessDDO now returns status (to allow compression error check)
20020613	Added prototypes for DecompressNKI and CompressNKI
20021115	Added Generic retrieve classes
20030522	Added prototype of ComputeCRC
20030701	QualifyOn now also has compression parameter
20030702	added ExtendedPDU_Service
20030704	Changed ProcessDDO parameter to **DDO (for recompress)
20050118	replaced thread local storage under linux with variables in object
20050121	Changed filename to lower case
20050211	Removed need for thread local storage

### **ODBCI.CPP (part of DGATE.EXE):**

19980415	Blocked one error message
19990628:	experimental locking call
19990628	temp defined DB_DEBUG and introduced experimental statement options
19990707:	Undefined DB_DEBUG and removed statement options
19990827:	Added CreateIndex
20000629	Logging of trouble now starts with '***' */
20001105	Run-time load ODBC routines for BC and WC
20001128:	Added InitializeCriticalSection in 'Open' and DeleteCriticalSection in 'Close'
20010829:	Enabled DB_DEBUG to show db errors in verbose mode
20020412	Use SQLExecDirectWithRetry to retry in case of any error (deadlock=1205). Added CreateUniqueIndex function, and GetLastError. Ignore error from unique index to make multi-user safe.
20020413:	<b>NOTE: A SINGLE DB MAY NOT BE USED BY MULTIPLE THREADS.</b>
20020417:	Extended deadlock wait time to about 1 min for safety
20021014:	Added built-in dbf support for stable ODBC less-operation Note: requires fully de-normalized database; notes: in dbsql, first bind row not set; in vrtosql; debug query print with %s in search crashes
20021016:	Added about 1 MB of in-memory hashed index in patient ID for all tables; speed OK to 10.000 objects; pack db on server start (for speed it is wise to keep DBF files on local harddisk)
20021017:	Made NeedPack a global for control from dgate; fix base_trunc; fix in Updaterecords; fix first num field in AddRecord
20021020:	Made querymodes an array, so that each query field can be key, key% or %key% ; Use querymode also when hashing the entries (part of db entry); Fix process_escape for " and \[ and also use it before dbase_write
20021028:	Set open retries shorter for normal readonly access
20021030:	Match alternative patientID fieldname such that built-in DBF queries work
20021113:	Added <= comparison in dbase_query (used for date comparison)
20030113:	Do not use () in sort order when multiple columns specified
20030128:	Added alternative field names for series

20030321	Also handle 'write lock' for M\$Access (NativeError 1205 for sql-server equals -1102 in M\$Access). Other dbf-drivers???
20030819	Allow longer filenames
20031104	Added \\ to process_escape
20030425	Added DoubleBackSlashToDB control
20030520	Speedup by fix dbaseIII hashing, setting hashfield was wrong
20030523	Implemented in-memory index to speed dbase queries; added IndexDBF and PackDBF settings
20040528	Fix built-in DbaseIII for > 2 GB; index fixed at 10.000.000 records; Fix problem when spaces in patient ID in index generation
20040528	Added ExtractRecords (dbase III only); fix update/delete for record 0
20040530	IndexDBF gives MB extra to allocate; skip dbf files starting with X; convert normal queries in SeriesInstanceUID or StudyInstanceUID to indexed ones
20040601	Added LongQueryDBF flag: report if query took longer than LongQueryDBF ms (default 1000); Min 20 MB index during regen; allow pack on command (NeedPack=TRUE; DB.Open) Increase query buffer size to 16384 (often reread), pack buffer to 65536
20040605	Optimize speed for huge files, extract max 100000 records; made lockstart __int64; Do not lock for read in extract (is very slow for huge files); Record lock no longer on physical bytes but on rec#; attempt to speed memory index; NeedPack==3 -> force pack
20040606	Fix lock whole file; fix index patient ID database; fix in dbcreate for test
20040609	Implemented fast in-memory locking and enabled for all shared files
20040610	on dbase_create set indexcount to 0; dbase_trunc truncs indexcount
20040612	Put index creation in a thread; server runs (but does not find non yet indexed records) during indexing; implemented indexdbf command NeedPack=4
20040614	Added NeedPack=5: create non-threaded index (for archival options)
20040615	Added warning when index is full; keep indices when creating db
20040930	Added multiple value query; protect length of copy of where string
20041003	Reused very long SQLStatement string for wheres string For lenghts see dbsql.cpp; truncated debug printf's set cols length to 4096; malloc tmp in query at 310000; for length calculation see dbsql.cpp
20041013	Used MAXQUERYLENGTH
20041029	Fixes in multiple query (query string truncated + mode mix problem)
20041101	DB is read only while in-memory indexing of DbaseIII active
20050102	Small modifications to allow compile through total.cxx
20050107	Export NumIndexing to tell dgate when indexing is done
20050116	Adapted for use with LINUX (built-in dbase driver only) Notes: 1) delay poorly implemented; 2) no support for >2 GB
20050118	Detach pthreads to avoid leaks
20050119	Documented rare crash in Fill_Memory_Index

20050124	Added support for huge files under Linux (not suitable for ext2 filesystem); Allow = without spaces in query
20050205	Added counters for db activity
20050206	Small fixes to counters; allow "&" instead of " and " for CGI use
20050905	Postgres code by Piotr Filipczuk checked by mvh, will not affect other operations, but not tested yet (postgres will not compile on my linux system)
20050907	Merged change by Hans-Peter Hellemann: lseek64 not always defined, should be mapped by unistd.h
20050909	Put check for = in query below >=: date range matching failed (Thanks Paolo Marcheschi)
20050911	Removed postgres print statements
2005112	Fixed BindField for postgres - now returns actual and not reserved length
20051217	Maximum locks in dbaseIII driver from 1000 to 100 to speed up qunlock (20% regen speed)
20051218	Respond to -b = NOTHREAD: run server as single process, useful for debugging and profiling
20051219	Fixed slow leak of queryfields for built-in dbase driver
20051230	Put index of DicomWorkList on AccessionNumber
20060219	Start on native mysql driver
20060220	Some more work: get correct length in bindfield; todo: user and password
20060226	Runtime load MYSQL in WIN32
20060313	Use username and password for mysql
20060402	Start index threads with a short delay to give GUI priority to test startup
20060607	Changed escape char processing for sql values (not queries) to match dbsql.cpp change
20060618	Fix for Borland C++ builder
20060628	Moved location of disabled query logging
20060630	Speeded dbaseIII AddRecord lots and linux string handling
20060701	Added and use mysql_fetch_lengths; protect query result
20060702	Tested native mysql driver: does not like fast open/close: clonedb crashed after 4000 or so (avoided now)
20061212	Found critical error in built-in dbase driver sql parser: Adding patient with ID containing certain character sequences will immediately overwrite the whole patient database. Queries with these sequences will return too many records (less dangerous). Issue not yet really fixed but greatly reduced its likelihood
20061213	Fixed issue by replacing spaces inside strings in sql statement with non-breaking spaces. Only match on keywords and field names which include spaces; replace with normal spaces in process_escape
20070123	clear NativeError, State and Msg on db.open (e.g. for dbf that does not use them but prints)
20070126	Added missing break in non breaking space field of process_escape: failed on multiple spaces in string
20070201	DebugLevel 4 prints all sql activity\
20070203	Fixed >2GB file support in linux: use O_LARGEFILE and lseek64() - sorry Hans-Peter Hellemann
20070206	Added CreateDatabase (created db and login)

20070207	Removed creation of login from CreateDatabase for mysql and postgres
20070210	Moved debug prints to SystemDebug; removed double log in QueryDistinct for dbaseIII
20070218	Added SQLite (win32 dll version): seems to run now; very slow when sync, very fast async
20070307	Made database type flag local, added Database(type) creator
20770308	Fixed DARWIN ifs, made DARWIN/MySQL auto start.(MySQL is included with DARWIN )
20070315	Merged; changed two nested ifs that had an else that would be wrong
20070406	Use reentrant rand_r and localtime_r when available
20070507	Native mysql does not correctly return empty fields (Steini)
20070702	Fixed above fix; test version for Stephan Winter
20070703	Removed test version code; display mysql connection errors on OperatorConsole
20070705	Added DT_DBASEIIINOINDEX: disables indexing and packing; #define USESQLITE_DLL to load DLL; otherwise use statically linked sqlite3.c; Extended max number of dbf files to 20
20070709	Fixed crash when mysql not started: format error in the error print
20070711	Some fixes to compile with sqlite under linux
20070715	Removed debug print statements for sqlite
20071027	Maybe fix postgres error handling: reset ntuples
20071030	More fixes to postgres error handling: missing returns in PrintLastError
20071115	Fixed SQL database creation for SQL server 2005
20071118	Adapted for 64 bits (use SQLLEN for BindField)
20071124	Removed dangling WHERE and ORDER in SQL server interface when passing "" instead of NULL

### **ODBCI.HPP (part of DGATE.EXE)**

19990827	Added CreateIndex
20001128	Added CRITICAL_SECTION member of 'Database'
20020415	Added error info, GetNativeError, SQLExecDirectWithRetry and CreateUniqueIndex
20021020	Added built-in dbf support (for stable operation without ODBC) Note: requires de-normalized database
20030120	Ignore Micro\$oft complaint C4200
20030321	Enlarged buffer for SqlErrorMessages (Database->Msg)
20030819	Allow longer filenames
20040528	Added ExtractRecords (dbase III only)
20040530	Added InternalQuery (for converting normal to indexed queries)
20040605	Made lockstart __int64
20040612	Made lockstart in again - now pure record#; added TotalRec, MBExtra
20041003	Statement length set to 310 kb (see dbsql.cpp for explanation)
20041013	Malloc SQLStatement instead
20050109	Adapted for linux compile
20050905	Postgres code by Piotr Filipczuk checked by mvh, will not affect other operations
20060219	Start on native mysql driver

20060220	Include all required mysql defines here
20060226	Runtime load MYSQL in WIN32
20060628	Use mysql.h proper (for datastructures) even when runtime loading (sorry for the hard include path)
20060701	Added mysql_fetch_lengths
20070206	Added CreateDatabase
20070218	Added SQLite
20070307	Made database type local, added Database(type) creator
20070705	Added DT_DBASEIIINOINDEX: disables indexing and packing; Extended max number of dbf files to 20
20071115	Static mysql use <mysql.h>
20071118	Adapted for 64 bits (use SQLLEN for BindField)
20080107	Removed double declaration of SQLLEN
20080821	Fix for SUNWspro compiler

#### **AMAP.CPP (part of DGATE.EXE):**

19990827:	added (limited) wildcard mapping in GetACRNema: AE, port or IP may end on '*'
20001105:	replaced m-alloc by new
20011109:	Made AE mapping case insensitive
20020524:	In function 'GetACRNema', first try case SENSITIVE then INSENSITIVE
20030701:	Added compression column (with this code is this column is not optional!)
20030703:	KNOWN BUG: number of columns may not be 3 (crashes)
20030709:	Solved above problem; rewritten parsing of Acnema.map
20030709:	known bug: trailing spaces lead skip of next line
20030711:	Fixed trailing spaces in acnema.map
20031118:	Fixed leak InitACRNemaAddressArray

#### **XVGIFWR.C (part of DGATE.EXE):**

20050129	Adapted for use in the Conquest DICOM server (see //)
20050130	Made it ansi C
20050826	Made it reentrant to avoid gif file corruption in server
20051219	Fixed leak
20070902	Made cpp

#### **WINTYPES.HPP (part of DGATE.EXE, Linux only):**

20050111	added SWORD and UWORD
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#### **NPIPE.CPP (part of DGATE.EXE, Linux only):**

20050111	Blocked out sys/conf.h; compiles with linux but gives linker warning: fattach not implemented and will always fail
20051217	Return (unsigned) 0xFFFFFFFF instead of signed -1
20070308	Change things for BSD and DARWIN.
20070316	Some more fixes

#### **NPIPE.HPP (part of DGATE.EXE, Linux only):**

20070308	Added changes for BSD and DARWIN
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### **GPPS.CPP (part of DGATE.EXE, Linux only):**

20040111      Fixes: defaults now work, allow DOS files, case insensitive  
20070330      Change by Mark Pearson: also allow tabs instead of spaces  
                around =

### **KILLER.CPP (main of KILLER.EXE, which is not part of this release of the Conquest DICOM server ):**

19980619:      Added some doc on command line options and modes  
                Fixed -L option (moved db.close)  
19980620:      Made code suitable for external calling; copied some of it to  
                device.cpp. Killer.exe is not needed anymore with NKI  
                Dgate.exe except as sleeper task because the alert task has been  
                integrated into Dgate.exe  
20030702:      Adapted because of compression externals required by  
                device.cpp  
20030706:      Attach VRType to PDU's for implicit little endian support  
20050129:      Adapted dummy for DumpVR  
20071118:      Adapted for 64 bits (use SQLLEN for BindField)

### **AAAC.CXX (part of DICOM core library):**

19980327:      Removed evaluation of Count without initialization in  
                ReadDynamic  
20001106:      Use memcpy instead of ByteCopy  
20030122:      Fixed initialization of AAssociateAC  
20050108:      Fixed for linux compile  
20080203:      Added experimental ConfigPadAEWithZeros  
20080313:      Removed some warnings

### **AARQ.CXX (part of DICOM core library):**

20001106:      Use memcpy instead of ByteCopy  
20001128:      Removed two warnings  
20030122:      Fixed initialization of AassociateRQ  
20060618:      Added definition of min()  
20080203:      Added experimental ConfigPadAEWithZeros  
20080313:      Removed some warnings

### **AARQ.HPP (part of DICOM core library):**

20001106:      Use memcpy instead of ByteCopy

### **CCTYPES.H (part of DICOM core library):**

20001107:      Fixed to allow compile with BC  
20010705:      Fixed to allow compile with MSVC 6 (see note below)  
20040111      Fix for \_\_GNUC\_\_  
20040117      Fix for linux  
20070308      Added for DARWIN apple endian defs  
20070902      Changed INT32 and UINT32 from long to int for ms7/ms8  
                compile

### **ENDIAN.CPD (part of DICOM core library):**



20001106: removed unneeded (and sometimes uncompileable)  
XE\_UINTX::XE\_UINTX (int x)

**ENDIAN.HPD (part of DICOM core library):**

20001106: removed unneeded (and sometimes uncompileable)  
XE\_UINTX::XE\_UINTX (int x)

**ENDIAN.CXX (part of DICOM core library):**

20070330 Merged bcb stuff

**DICOM.HPP (part of DICOM core library):**

20071102: Define SetDicomErrorHandler etc  
20080203: Added experimental ConfigPadAEWithZeros

**RTC.HPP (part of DICOM core library):**

19980331: Added prototype for writing binary RTCs

**TRNSYN.CXX (part of DICOM core library):**

19980409: Fixed possible transition between presence and absence  
of TypeCodes in 'Dynamic\_ParseRawVRIntoDCM'  
19990904: Treat type UN same as OB,OW and SQ when reading Explicit  
files.  
20001106: Replaced == operator by strcmp  
20010905: Several fixes: UCDCM should NOW be able to read  
ExplicitBigEndian files  
20011220: Fixes in Sequence and Item delimiters  
20030122 Fixed small leak in Dynamic\_ParseRawVRIntoDCM  
20030205 Support new datatype 'UT' (unlimited text). Thanx to William  
Peterson  
20030424 Changed prototype of ParseDCMIntoRawVR. Fixed huge bug  
in sending of ExplicitLittleEndian sequences  
20030627 Fix for MSC 4.2  
20030725 Keep GroupLength for group 0x00 (Radworks 6.0 was choking  
in this)  
20040406 Make TypeCode 'UN' if not known, and conversion to Explicit  
is wanted  
20050112 Fixed huge bug in Explicit\_ParseDCMIntoRawVR, causing  
data-loss. Thanx to Goran Peros.  
20051217 Use new VR::ReAlloc method to replace data in VR  
20051218 Use memcpy to enter UID (extra 0 will be available: end of  
string)  
20051219 Use ReAlloc instead of new BYTE[] to fill VR data  
20051229 Moved Push in ParseRawVRIntoDCM so that not done when  
VR exists  
20070308 Added big endian stuff  
20071031 Removed some commented out code  
20071108 In Dynamic\_ParseDCMIntoRawVR(), let group 0x08 behave  
the same as all other groups greater than 0x02.

20071118 NOTE: previous change is not in release 1.4.13  
20071128 Add TypeCodes if needed using AttachedRTC->RunTimeClass

#### **RTC.CXX (part of DICOM core library):**

19980330: Added an RTC memberfunction for loading the dicom library from memory (e.g. a resource).  
19980331: Added function for writing binary RTCs (function was originally implemeted in 'makebrtc.cxx')  
19980414: Added RTC::GetGroupElement memberfunction, to retrieve the Group and Element numbers using a library keyword.  
20071128 Do not remove existing TypeCode if new one is unknown

#### **DEIVR.HPP, DEIVR.CXX (part of DICOM core library):**

19990318 Added 'DICOMObject::DeleteVR'  
20001106 Used delete [] operator for vr->Data  
20010426 Fixed small leaks in 'DICOMObject::DeleteVR'  
20010730 Added 'DICOMObject::ReplaceVR'  
20010802 Added 'VR::GetSpecialValueCodeOfVR'  
20011121 Added VR\_SPECIAL\_RGB\_TO\_MONO. Used by a conversion-tool to change ultrasound Kretz RGB images to monochrome that VariSeed (brachytherapy) understands.  
20011121 Added VR\_SPECIAL\_RGB\_TO\_MONO\_PLUS. Same as above, but tries to preserve colored drawings.  
20051217 Added 'VR::ReAlloc'  
20051217 Use malloc/free instead of new char[] and delete []  
20051229 Removed unnecessary reset() in DeleteVR  
20071031 Temp printf memory error messages  
20071102 Send allocation errors to DicomError  
20080313 Removed some warnings

#### **SOCKET.CXX (part of DICOM core library):**

20010426 Added 'setsockopt' in 'Listen' and 'Open'  
Call 'shutdown' before closing a socket  
20010720 Changed 'print' to 'fprintf(stderr,...)'  
20050116 Adapted for LINUX compile  
20050119 Blocked out SOCKET END ERROR message  
20070406 Use reentrant gethostbyname\_r when available  
20070415 Small fix there for windows

#### **SAFEMEM.CXX (part of DICOM core library):**

20010720 Changed 'printf' to 'fprintf(stderr,...)'

#### **DIMSEN.CXX (part of DICOM core library):**

19990415 Removed static on TranslateUIDToVR  
20020822 Use instead of DIMSEN.CPP  
20071118 Removed faulty overloaded 'NGetRQ::Write'

#### **DIMSEN.HPP (part of DICOM core library)**

20020822 Cleanup layout

### **DIMSEC.CXX (part of DICOM core library):**

20030219      Removed MessageID and Priority from the 'write' functions of CStoreRSP, CFindRSP and CMoveRSP  
20030606      Added parameter 'QueryRetrieveLevel' to CFindRSP::Write  
20030811      Do not send DDO in CMoveRSP::Write (DicomEye and OFFIS do not like that).  
20050129      Added Write with extra vr to CEchoRSP  
20051222      Do not add query level if already exists  
20070308      Made changes for big endian  
20070314      Allow send of 0000,1030 (MoveOriginatorAE) and 0000,1031 (MoveOriginatorMessageID) in CStoreRQ  
20070330      Merged bcb's Darwin and Endian stuff  
20080203      Added experimental ConfigPadAEWithZeros

### **DIMSEC.HPP (part of DICOM core library):**

20030606      Added parameter 'QueryRetrieveLevel' to CFindRSP::Write  
20050129      Added Write with extra vr to CEchoRSP  
20070314      Allow send of 0000,1030 (MoveOriginatorAE) and 0000,1031 (MoveOriginatorMessageID) in CStoreRQ

### **UNIQ.CXX (part of DICOM core library)**

19990511      Fix: All routines wrongly used '%' instead of '&'

### **MAKEBRTC.CXX (part of DICOM core library)**

19990415      Note: requires changelog

### **PDU.CXX (part of DICOM core library):**

19980322      Blocked one remaining printf statement "comparing ..."  
19990202      Added PDU memberfunction 'IsAbstractSyntaxAccepted'  
19990415      Merged both versions  
20000322      Fix in search for PresentationContext when identical AbstractSyntaxes occur (e.g. GECT-scanner). Do not break out of the inner loop in PDU\_Service::InterrogateAAssociateAC.  
20000322      Fix of PresentationContextID in PDV: in routines PDU\_Service::Write(DICOMObject\*, UID\*), set PresentationContextID to TempByte, not to TempByte1.  
20000911      Removed two warnings  
20020316      Added GetLocalAddress and GetRemoteAddress  
20030306      Fix: Huge bug in 'InterrogateAAssociateRQ'  
20030424      Blocked out obsolete PDU.Write(&DDO)  
                Some work on offering other TransferSyntaxes than ImplicitLittleEndian when running in SCU mode  
                (Note: when running in SCP mode, 'dgatesop.lst' is used)  
                Fix: CommandObjects are always ImplicitLittleEndian  
20030627      Fix for MSC4.2; re-enabled obsolete write calls for test.cxx  
20030710      Adjusted test.cxx, and disabled obsolete calls again  
20080816      ValidPresContexts is now a global: how many incoming connection can handle

### **PDU.HPP (part of DICOM core library):**

19990202	Added PDU memberfunction 'IsAbstractSyntaxAccepted'
20020316	Added GetLocalAddress and GetRemoteAddress
20030424	Changed prototype of ParseDCMIntoRawVR
20030627	Fix for MSC4.2
20030905	Removed spurious ;
20080816	ValidPresContexts is now public: how many incoming connection can handle
20080819	CanYouHandleTransferSyntax is now public; use BOOL not bool

**FILEPDU.CPP (part of DICOM core library):**

20000420	Fix in MakeChapter10: type of AffectedSOPClassUID and RequestedSOPClassUID
20030205	Fixed FileMetaInformationVersion for big-endian machines
20030424	Put the correct TransferSyntaxUID in chapter10 files
20041108	Fix strdup memory access problem (found using \$c drop file test mode)
20051229	Fixed LEAK of 68 bytes when 0002,0010 not defined
20060618	Added definition of _SH_DENYNO

**BUFFER.CXX (part of DICOM core library):**

20001106:	Use memcpy instead of ByteCopy
20071031:	Temp printf allocation errors
20071102:	Send allocation errors to DicomError

**VERSION.H (part of DICOM core library):**

200107017	Changed ImplementationClassUID to a valid UID: the Agfa dicom validation tool protested against the original 'UID'. Changed ImplementationVersion from "0.1B/WIN32" to "1.01/WIN32"
20020416	Changed IMPLEMENTATION_VERSION_STRING to 1.3.11/WIN32
20021018	Changed IMPLEMENTATION_VERSION_STRING to 1.4.0/WIN32
20020208	changed IMPLEMENTATION_VERSION_STRING to 1.4.1/WIN32
20030424	changed IMPLEMENTATION_VERSION_STRING to 2.0.1/WIN32
20030709	changed IMPLEMENTATION_VERSION_STRING to 1.4.2/WIN32
20030815	changed IMPLEMENTATION_VERSION_STRING to 1.4.3/WIN32
20030402	changed IMPLEMENTATION_VERSION_STRING to 1.4.4/WIN32
20040530	changed IMPLEMENTATION_VERSION_STRING to 1.4.5/WIN32
20040713	changed IMPLEMENTATION_VERSION_STRING to 1.4.6/WIN32
20041101	changed IMPLEMENTATION_VERSION_STRING to 1.4.7/WIN32

20050901	changed IMPLEMENTATION_VERSION_STRING to 1.4.9/WIN32
20060103	changed IMPLEMENTATION_VERSION_STRING to 1.4.10/WIN32
20060311	changed IMPLEMENTATION_VERSION_STRING to 1.4.11/WIN32
20060708	changed IMPLEMENTATION_VERSION_STRING to 1.4.12/WIN32
20070307	changed IMPLEMENTATION_VERSION_STRING to 1.4.13/WIN32
20080831	changed IMPLEMENTATION_VERSION_STRING to 1.4.14/WIN32

**FLPDU.CXX (part of DICOM core library):**

20050130	Allocate 1 item longer lists to allow configuration from GUI
20050213	Fix to allow windows created file as input under linux
20060618	Added definition of _SH_DENYNO

**FLPDU.HPP (part of DICOM core library):**

20050129	Made tables public for config
20080819	Made CanYouHandleTransferSyntax public

**VERIFY.CXX (part of DICOM core library):**

20050129	Added ReadRequest and WriteResponse, allows extra response vr
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**VERIFY.HPP (part of DICOM core library):**

20050129	Added ReadRequest and WriteResponse
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**QRSOP.CXX (part of DICOM core library):**

20020429	Fixed reporting of number of complete slices (now starts with 1); return cancel status if C_STORE failed
20030606	Added parameter 'QueryRetrieveLevel' to CFindRSP::Write
20050401	Added ModalityWorkListQuery
20051222	Added pADD0 to Query::Write method - answer appended to pADD0 if set
20080820	Solaris fix (do not use variable name SS)

**QRSOP.HPP (part of DICOM core library):**

20030606	Added member-variable 'QueryRetrieveLevel' to StandardQuery
20050401	Added ModalityWorkListQuery
20051222	Added pADD0 to Query::Write method - answer appended to pADD0 if set

**STORAGE.CXX (part of DICOM core library):**

20020429	check status of C-STORE RSP and return FALSE if failed
20030922	Added PDU_Service to CheckObject call

20070307	Added more debug error messages to retrieve
20070314	Allow send of 0000,1030 (MoveOriginatorAE) and 0000,1031 (MoveOriginatorMessageID) in StandardStorage : Write
20070315	Blocked out printf statements

#### **STORAGE.HPP (part of DICOM core library):**

20030922	Added PDU_Service to CheckObject call
20050108	Fixed for linux compile
20070314	Allow send of 0000,1030 (MoveOriginatorAE) and 0000,1031 (MoveOriginatorMessageID) in StandardStorage : write

#### **PRINTSOP.CXX (part of DICOM core library):**

20020814	Added some comments and block-out mvh's debug code
20020816	Fix in 'AbstractPrintManagementMeta::Write'

#### **CQSERVER.CPP (Part of conquest interface DLL):**

1998xxxx	Creation. This file contains DicomServer code. A 'DicomServer' is an application that receives images, and is called a server because it 'provides' disk-space!? All code is reached by the routine 'ReceiveThread' at the end of this file. The ReceiveThread is launched by the exported function 'DcmMoveHere' in CqDicom.cxx. Communication with the mainthread is done by using global variables (sorry).
19990318	Added support for MultiFrame modalities
19990407	Swapped priority of VRs 0020-0050 and 0020-1041; now the slicelocation is preferably deduced from 0020-1041.
19990915	FillSliceInfo now also indicates whether pixeldata are 'unsigned'.
19991028	Fix (in cases that went wrong anyhow): changed 'free' to 'DllFree'.
19991029	Added 'Signed_compute' to convert unsigned short pixeldata
19991122	nki_private_decompress now supports Mode=2
20000131	Fix: Replaced an instance of free by DllFree
20000321	FillSliceInfo now also retrieves 'BitsStored'
20000405	Added CheckRangeOfCT, to Calibrated CT-values to Hounsfield + 1024, and to cut the values below 0.
20000418	Fix: crash on (INVALID !!) Siemens demo-data on RSNA 1994(CR images of RXDpat1-1994). PixelRepresentation tag was empty!
20000530	Use different pixelspacing tag for RTIMAGE
20010123	Moved code to GetSliceCoord; added static keywords
20010410	Improved communication between MainThread and ServerThread
20010411	Do not 'sleep' the ServerThread, but let it terminate
20010426	Again improved communication between MainThread and ServerThread
20010508	Replaced nki_private_decompress by a faster version
20010717	Added 'CheckRTDoseScaling'
20010720	Made Dummy::printf do nothing
20010905	Added 'CheckModalityLUT'
20020227	Support US pixelspacing (hiding in SequenceOfUltrasoundRegions)

20020425	Added exported funtion 'ComputeCRC'
20020609	Pasted extended decompressor from NKIQRSOP.CXX
20020613	Moved MkTypedDicomObject to here
20020620	Guess SliceLocation in multi-frame images.
20021028	Support multiframe dose-grid in 'CheckRTDoseScaling', and slice-positions in 'GridFrameOffsetVector' NOTE: Varian multiplies and Helax divides by the DoseGridScalingFactor !!!
20021113	Guess SliceLocation in multi-frame images (SliceThickness).
20021213	Adjusted field-coordinates of RTIMAGE
20030122	Support various Ultrasound pixel spacings
20030127	FillSliceInfo now also retrieves 'PhotometricInterpretation'
20030128	Support for 3D TimeSequences, resulting in 4D 4-space output scans
20030213	Fixed bug in change above
20030624	Workaround for Varian Vision 7.1 multiframe dosegrids Support for integer dosegrids and very small DoseGridScaling
20030904	Improved workaround for Helax DoseGridScaling
20041119	Added support for 4D object in slices
20051219	Use vr->ReAlloc
20060515	Also apply RescaleSlope and NEXT_VOXEL_DOUBLE to modality PT
20060704	Don't apply yet...
20060913	Work on Philips MR: get PixelSpacing and PatientPosition from deep inside sequences. Replaced GetFloatsFromKey call by GetFloatsFromVR calls
20070404	Heavily optimized InsertSlice: first transpose then insert biggest gain (10 s) Uncompress during read gains 2 s
20070506	Added optional prealloc data pointer to CreateOutputField If LargeScan (>256 MB) decompress later to save memory
20070522	In CheckRTDoseScaling() take PLATO negative dose into account
20070704	Fixed InsertSlice(): non-square slices went totally wrong
20070730	Dirty fix for CMS RTDOSE
20071127	Fixed bug in AddToOutputField (affects multiframe slice positions)
20080313	Removed some warnings
20080410	Fix: In CheckRangeOfCT(), unsigned CT pixels were ill-treated.
20080818	Added support for philips 3D US (200d, 3303)

#### **CQDICOM.CXX (part of conquest interface DLL):**

19980330	Creation
19980331	Added exported DcmMkBinaryLib
19980414	Restricted the HeaderDump to max 4096 data, and the number of bytes on one line to 256.
19980416	Added sequence support in HeaderDump
19980420	Fixed last written line in multiple line sequence dump. Added functions DcmFind, DcmMove and DcmMoveHere
19980526	Added DcmCreateBitmap
19980610	Changed BGR to RGB in DcmCreateBitmap. Added DcmMoveHeaderHere
19980629	Fix: DimX and DimY were reversed. Improved efficiency when loading one slice.

19980630	Fix: last change caused crashes
19980707	Removed some checks to allow non-standard Philips images. Added DcmSetProgressHook
19980708	Added DcmReplaceInHeader, which can be used for anonymization of dicom images.
19980709	Added C-CANCEL command object when a ProgressHook stops or aborts a DcmMove operation. Added support for NkiPrivateCompressed images in DcmMoveHere.
19980826	Added #pragma pack(1) in Field.h
19981105	Added DcmReadHeader
19981127	Added DcmGetLastXfms
19990108	Updated the dictionary for DICOM-RT support
19990114	Slices are sorted on coord. When duplicate coords exist, the last received slice eliminate previous ones. Included changed SOP-list by MvH
19990318	Added three xxxRetrieveNKI PresentationContextSOPs in the function DcmMoveHere
19990407	Swapped priority of VRs 0020-0050 and 0020-1041; now the slicelocation is preferably deduced from 0020-1041.
19990511	Added DcmSetLocal(char* pszLocalAE, char* pszLocalPort)
19990628	Fix: DcmCreateBitmap did not like MultiFrame dicom files
19990826	Added DcmSetFreeHook and DcmMoveFilesHere
19990906	Added DcmSetExtraParams to support (amongst others in the future) transmission of downsized Dicom images between NKI stations.
19990913	Private VRs of unknown type, will possibly be shown in the headerdump as character strings.
19990915	Fix in ParseLine of headerdump. Added support for unsigned pixeldata in DcmCreateBitmap.
19991019	Allow multiple slices with the same or without a coordinate, if this is the case for ALL slices (e.g. multiple scout-views in one series)
19991022	Changed the root of NKI-made UIDs to the official one supplied by Medical Connections(UK): 1.2.826.0.1.3680043.2.135.1066.xxxxxxxxxxx
19991028	Converted unsigned short pixels to signed int pixels
19991122	Added DcmStoreFiles
20000126	Fix in WorldXfm (bug introduced on 19991019)
20000128	Fake slice-coords when a '3D volume' consists of e.g. multiple scout-views (Siemens MR produces such series). Prevents viewer-crash when loading a second volume into it.
20000321	Convert unsigned short to integer ONLY if all 16 bits of the pixeldata are used. Better contrast-stretch in DcmCreateBitmap.
20000327	Added C-ECHO command
20000405	Calibrated CT-values to Hounsfield + 1024. Cut-off below 0.
20000707	Added DcmSetCacheAddress
20000829	Added an ErrorMessage
20001128	Replaced 'Oh shit!' errormessage by 'Cannot find related scan'.
20010123	Added static keywords. Moved code to GetSliceCoord; this routine checks besides tags (0x0020,0x1041) and (0x0020,0x0050) also (0x0020, 0x0032). This last tag (ImagePositionPatient) had to be used for Philips MR scanners.
20010302	Fix: improved temporary filename



20010410 Improved communication between MainThread and ServerThread. Again improved temporary filename...

20010411 Kill ServerThread only if it is not responding

20010413 Fix: allways close the threadhandle

20010426 Again improved communication between MainThread and ServerThread

20010508 Adjusted call of nki\_private\_decompress to a faster version

20010619 Fix in GetFloatsFromKey (crashed on PatID 1234567890 NuclearMedicin testpatterns)

20010717 Adjusted DcmMoveHere for RTDose post-processing

20010802 DcmReplaceInHeader now also supports replacements inside sequences; Added export DcmVersion

20010808 Fix: SetStringVR appended a NULL byte to strings with uneven characters. This is correct for UIDs, all other strings should have a space appended.

20010824 Updated 'soplist.txt' resource to DICOM 1999 final text.

20010905 Fix: Headerdump was incomplete when a VR consists of more than one short or int; Start implementation of ModalityLUT

20011121 Replaced 'SetStringVR' by 'SetAnyTypeVR' (Used by DcmReplaceInHeader)

20011218 Added DcmWriteKretzFile: extracts a Kretz 3D file from a dicomfile

20020225 Fix for Helax-TMS: when determining XFMs and (0x20, 0x1041) and (0x20, 0x50) are both absent, use (0x20, 0x32)

20020403 Fixed bug when UIDs are 64 bytes long. Some code butifying.

20020411 Added DcmWriteVRToFile

20020502 Added cacheing properties

20020522 Replaced ad hoc field allocation code by 'AVSdata\_alloc'

20020523 Do not give warning for slice-order (DCM\_E\_SLICEORDER)

20020609 Pass MaxCompressionMode that is set to 4

20020620 Adjustment to CalcXfm for multi-frame images.

20020814 Added two Print error-messages

20020930 Added MAXSLICES to optional extraparams

20021028 Exported GetFloatsFromKey. Try te get XFM's of multiframe objects right.

20021105 Get rid of scout-views when loading a volume (in 'SortSliceDDOs')

20021118 Fix in multiframe XFM containing 'GridFrameOffsetVector'

20030122 JPEG pixeldata support; Fixed memory leak

20030128 When SliceCoords are not provided, sort dicom-objects on imagenumber

20030130 Support for 3D private Kretz ultrasound

20030424 Changed all calls to obsolete PDU.Write(&DDO) to PDU.Write(&DDO, uid). Fix in handling of JPEG compressed images. Version to 2.0

20030519 Fix XFMs when ImagePositionPatient contradicts SliceLocation. Now the slicecoord in ImagePositionPatient is preferred (Marconi-fix).

20030523 Fix: above change frustrated coronal and sagittal MRI

20030716 Workaround for sloppy Adac NM multiframe reconstructions (@#\$\$%^&\*)

20041116 Start on time series recognition, now return unsorted

20041117 'proper' time series (with exact N copies of each slice with given coordinate) are sorted on derived frame# (order of image#) then coords; but still returned as 3D. MATPEL and

WRLDMATC know how to make 4D data out of such image data (CONQUEST does not yet).  
This option should read 4D CT (not tested) as well as 4D MRI/DTI (tested) as long as all frames are sent as one series.

20041119 Adjustment in CalcXfm  
20041119 Added support for 4D sliced object, now sent out as 4D field  
20041124 Merged fix ljz 20041119  
20041201 Improved detection of 4D data, now allow fringes, e.g., if slices at certain locations occur NMMMMKL times, N slices at start and K+L slices at end are removed. In this way, both Philips and GE DTI and perfusion data (without fringes, e.g., MMMMMM) and Siemens RCCT data is supported. Note 1: Siemens writes % of cycle in 0018,0022 as 'TP100PC5576', where 100 is the %. Not used for now, 4D data is just ordered based on slice number instead, with coordinates 0, 1, .. Note 2: some localizer series are now returned as 4D as well.

20041221 Fix in 4D reader for out-of order images; first sort on image#, later in index  
20050301 Fix in dubious check on 'Proper4D'  
20050308 One more check on 'Proper4D': at least half of the slices should be Proper4D; Fix in last check  
20050418 Fix in WriteBmp when all pixelvalues are equal  
20050804 Fix in check on 'Proper4D'  
20050905 Added SOP 31 for query: modality worklist query  
20060531 Moved FreeOutputField to field.cpp and field.h  
20060701 Added warning on order of 4D data - MessageBox needs to be replaced  
20060913 Replaced GetFloatsFromKey call by GetFloatsFromVR calls  
20061020 Fixed bug in GetFloatsFromVR  
20061030 SortSliceDDOs crashed on MR scans from Lucas hospital  
20070112 Added exported function DcmReadJpeg  
20070119 Using DcmSetExtraParams SORTMODE=1, slices will be sorted on ascending coordinate, SORTMODE=2 means descending. Fixed bug in SortSliceDDOs.  
20070220 Fixed bug in SetAnyTypeVR; Added an error message  
20070220 Attempt to fix frame reversal - debug code temp off  
20070506 prealloc data pointer during receive to allocate large block first: allows loading larger scans  
20070730 Dirty fix for CMS RTDOSE  
20070902 DcmWriteVRToFile will now also write sequence item to file as raw VR dump; takes Index as extra par  
20071127 Support for multiframe-objects where ImagePositionPatient is located in a DetectorInformationSequence  
20080313 Fix: In SortSliceDDOs(), long ScanOptions could lead to crashes or other undesired behaviour; Removed some warnings  
20080318 In CreateLastPropertiesField(), a few properties that resided deep in sequences for RTDOSE were added.  
20080320 ...and put in a separate function  
20080717 Support of Pinnacle DOSE in CalcXfm()  
20080812 Support of Varian's Eclipse DOSE in CalcXfm()

#### **CQDICOM.H (part of conquest interface DLL):**

19980330 Creation  
19980331 Added exported DcmMkBinaryLib

19980414	Restricted the HeaderDump to max 4096 data, and the number of bytes on one line to 256.
19980416	Added sequence support in HeaderDump
19980420	Fixed last written line in multiple line sequence dump Added functions DcmFind, DcmMove and DcmMoveHere
19980526	Added DcmCreateBitmap
19980610	Changed BGR to RGB in DcmCreateBitmap. Added DcmMoveHeaderHere
19980629	Fix: DimX and DimY were reversed. Improved efficiency when loading one slice.
19980630	Fix: last change caused crashes
19980707	Removed some checks to allow non-standard Philips images Added DcmSetProgressHook
19980708	Added DcmReplaceInHeader, which can be used for anonymization of dicom images.
19980709	Added C-CANCEL command object when a ProgressHook stops or aborts a DcmMove operation. Added support for NkiPrivateCompressed images in DcmMoveHere.
19980826	Added #pragma pack(1) in Field.h
19981105	Added DcmReadHeader
19981127	Added DcmGetLastXfms
19990108	Updated the dictionary for DICOM-RT support
19990114	Slices are sorted on coord. When duplicate coords exist, the last received slice eliminate previous ones. Included changed SOP-list by MvH
19981127	Added DcmTree, DcmPatientList and DcmSetLocal
19990825	Added extended patientlist export: DcmPatientList2
19990826	Added DcmMoveFilesHere
20000824	Added DcmFileGetRtStructNames and DcmFileGetRtStruct
20020425	Added DcmVersion and DcmCreateRtStructFile

### **CQCREATEDCM.CPP (part of conquest interface DLL):**

20020417	Created. All created DICOM stuff should go in here
20020502	DcmCreateRtStructFile seems to work
20041119	Work on DcmCreateSliceFiles
20041128	Tested write new scan on grid (and properties) of existing scan: needs ScanToDicom matrix to correctly compute ImagePositionPatient; writes too many \\\\ in tags; SliceLocation not written; Now write abs slice thickness; Added missing *10 in Z coordinate of ImagePositionPatient; Added a minus to the Z coordinate of ImagePositionPatient: this is a kludge that works only for scans read with CQDICOM without rotations in scanner. Added creation date and time in default series description
20041223	Added XFM parameter to DcmCreateSliceFiles Added DcmCreateRtPlanFileLight Fix: also incorporate ImageOrientationPatient, FrameOfReference, StudyID
20050906	Some fixes in DcmCreateSliceFiles Added 'DcmCreateRtPlanFileLight()'
20051018	Several fixes in DcmCreateSliceFiles: - Required tags KVP and PositionReferenceIndicator were missing - Element numbers of RescaleSlope and

	RescaleIntercept were wrong; Set all MU's to 0 in DcmCreateRtPlanFileLight; added OperatorsName
20060704	Increased stringbuffer in GetContouData() (crashed ridiculously detailed on ESTRO data)
20061018	In DcmCreateSliceFiles, don't insert sequence items.
20070220	Moved UID_ROOT to somewhere else
20070423	In DcmCreateSliceFiles, use scan or extra properties for ImagePositionPatient
20070510	Made GetInterpretedType() more aware of markers.
20070705	Fixed bug in DcmCreateSliceFiles()
20070726	In DcmCreateSliceFiles, don't insert sequence items of ExtraProperties either!
20071018	In DcmCreateRtStructFile(), the created UID is stored in a global for later use
20080416	DcmCreateSliceFiles() also supports 4D and non-CT data
20080603	Few adjustments in DcmCreateSliceFiles()
20080708	Made PixelSize always positive in DcmCreateSliceFiles()
20080717	The filename parameter of DcmCreateSliceFiles() may also contain RemoteAE;RemoteIP;RemotePort for immediate pushing of created slices

#### **CQGLOBAL.H (part of conquest interface DLL):**

19990318	Some cosmetics
19990511	Added a few warnings and prototype of MoveDDOHere
19990915	Added PixelRepresentation (0028,0103) in SLICE_INFO.
19991028	Added prototype of Signed_compute()
19991122	Added errorcode of failed C-STORE-RSP
20000317	Added BitsStored (0028,0101) in SLICE_INFO.
20000405	Added CheckRangeOfCT prototypes
	Added RescaleIntercept (0028,1052) in SLICE_INFO.
	Added RescaleSlope (0028,1053) in SLICE_INFO.
20000530	Added ImagePlanePixelSpacing (3002,0011)
20000707	Added gl_ppvCache
20000710	Added prototype of CacheInitFromSelectionStrings
20000824	Added prototype of CacheSetReferencedStruct
20000828	Added prototype of Dxfrm_compute
20000829	Added an ErrorCode
20010123	Added prototype of GetSliceCoord
20010410	Added gl_hevEndReceive
20010426	Renamed gl_hevEndReceive to gl_hReceiveThreadIsListening
20010508	Changed prototype of nki_private_decompress()
20010629	Added DoseGridScaling (3004,000e) in SLICE_INFO.
20010717	Added gl_pszExtraParams
20010831	Added prototype of CheckModalityLUT
20020418	Added prototypes for cache-ing properties
20020424	Added declaration of field gl_pLastProperties
20020613	Added prototype of MkTypedDicomObject
20020814	Added two Print error-codes
20021028	Added prototype of GetFloatsFromKey
20021213	Added RtImagePosition to SLICE_INFO structure
20030122	Added prototype of DecompressJPEG
20030128	Added 'iNbTimeSequences' and szPhotometricInterpretation to the SLICE_INFO structure
20030129	Added prototype of READ_KRETZ_compute

20041119	Added support for 4D sliced object
20050203	Added prototype of CacheCleanupRtObjectFiles
20050906	Added prototype of CacheGetReferencedProperties
20060913	Added prototype of GetFloatsFromVR
20070130	Added ec DCM_E_INVALID_RTPLAN
20070220	Sdded a few prototypes and an errorcode
20070506	Added optional prealloc data pointer to CreateOutputField
20070522	Added szSoftwareVersions to SLICE_INFO structure
20080717	Added prototype of DcmStoreFiles

### **CQRTOBJECTS.CPP (part of conquest interface DLL):**

19990407	Created. All DICOM RT stuff should go in here
19990404	Added RTSTRUCT
19990511	Added RTPLAN. Still under construction !!!
19990825	Some changes in RTPLAN; still under construction
20000619	Added GetStructInfo to be used by TREE
20000707	Lots of work on RTSTRUCT and RTPLAN
20000828	Structure and beams has wrong XFM when patient is prone
20000829	Added GetRtBeamFromRtImage
20010302	Fix: improved temporary filename
20010410	Again improved temporary filename...
20010619	Added some comments on RTPlan organization.
20010717	Store szReferencedFrameOfReference in STRUCT_TREE_INFO; To do: in 'CalcBeamXfms' the collimator angle is not treated right when the patient is prone.
20000824	Added DcmFileGetRtStructNames and DcmFileGetRtStructFixed two small memory leaks.
20020225	Fixed free-ing twice in 'GetRtStruct'
20020502	Removed some warnings
20020613	Moved MkTypedDicomObject to CqServer.cpp
20030122	Some work on GetRtBeamFromRtImage: still under construction due to world-wide lack of good data!!!
20030520	In GetRtStruct, fail with DCM_E_INTERNAL when there is no cached underlying scan.
20050125	Made beam field output contain short data instead of char data GetRtBeam has an optional string parameter to load a specific segment (= controlpoint); Added GetPlanInfo for TREE building purposes
20050131	Moved MkTypedDicomObject() in GetRtBeam to StoreBeamPropertiesInCache
20050201	Fix: do not delete pDDO in GetRtBeam anymore
20050202	Fix: When settings of a controlpoint do not change, they may be defined only at controlpoint 0.
20050921	Change in CalcBeamXfms for FeetFirst and Prone patient- positions (This change is already in use for two months, and has been approved by Peter Remeijer)
20070705	Gave individual contours instead of organs a unique number (solves the problem of more than one contour in a slice)
20080313	Removed some warnings
20080717	Removed empty structures from the PatientTree in GetStructInfo()

### **CQRTOBJECTS.H (part of conquest interface DLL):**

19990407	Created
20000619	Added prototype of GetStructInfo
20000707	Added more RtObjectXXX prototypes
20000824	Added szReferencedStruct to BEAM_TREE_INFO. To be used in order to get the XFM of a beam IFF RTPlanGeometry equals 'PATIENT'. In the other case (when RTPlanGeometry equals 'TREATMENT_DEVICE'), the the XFM is defined by the 'IEC fixed coordinate system'; this case is not handled in CqDicom.
20000829	Added prototype of GetRtBeamFromRtImage
20010717	Added szReferencedFrameOfReference in STRUCT_TREE_INFO To do: in 'CalcBeamXfms' the collimator angle is not treated right when the patient is prone.

### **CQTREE.CPP (part of conquest interface DLL):**

19990504	Creation: Moved Tree and PatientList from Avs_dcm to here
19990511	Adjustments concerning DcmSetLocal
19990825	Added extended patientlist export: DcmPatientList2
19990826	Implemented DcmPatientList2
19990830	Fix: ParseSelInfo did not handle an 'extra' Key/Value pair in a selection-string.
19990906	Improved Alias-names of Dicom Tree Interface
19991019	Besides CT and MR, the images of modalities US, DR and DS belonging to the same series are grouped into a single volume.
19991026	Use SeriesDescription in tree if no SeriesNumber/SeriesTime available
19991028	MultiFrame images will be treated as '.scan' instead of '.image'.
19991029	Added support for multiple multi-frame images in one series When MovingHere only one image, the C-FIND operation is skipped. Fix: EchoNumber was discarded when retrieving header-info
20000126	Fix: EchoNumber was used even when value is '(empty)', only in cases where EchoNumbers were needed in other parts of the tree.
20000128	Fix: three memory leaks
20000426	Adjustment for difference in response of Borland ODBC and Microsoft SQL: an empty string-field is returned as "" and " " respectively.
20000707	Put structures in the tree under a scan
20000710	Fix: Update cache when TREE has been bypassed
20000717	Fix: XFM's of multiframe-scans were not returned
20000808:	Extra check: SOPInstanceUID must be passed in selection for RT objects;
20000823	Fix: Crash in building of TREE when the move-response of an RT-object was OK, but no DDO was transmitted.
20000828	Fix: Structure and beams has wrong XFM when patient is prone
20000829	Added RTIMAGE properties: 'refmeam', 'refbeamwordxfm' and 'refbeamgantryxfm'
20010420	Added support for PatientID containing '/' or '\\'. Start implementation of RTDose objects.
20010619	
20010717	When RTStructs do not reference a Series, use ReferencedFrameOfReference if possible. Caller may use 'IMAGESONLY=1' in DcmSetExtraParams when grouping of

images into scans is not desired.

20011214 Damn! It now seems best that US images are not grouped together anymore...

20020403 Fixed bug when UUIDs are 64 bytes long. Got rid of two #defs

20020501 Added cacheing properties

20020521 When modality equals PT, combine slices to a volume.

20020613 Always use SeriesDescription in tree

20020619 Split date parts with dots; display studymodality (0008,0061) in study alias

20020620 Merged 20020613 with 20020619. Do not split dates.

20020815 In 'ParseDicomInfo' allow also ':' as a separator

20021011 Fix: When bypassing the TREE, cache was not initialized when retrieving a single image or a multi-frame volume

20021011 Added other query modes (4..9) for DICOM\_LOAD\_PATIENTLIST (CreatePatientList)

20021014 Merged the two versions

20021028 Try to get XFM's of multiframe objects right.

20030128 Support for 3D TimeSequences, resulting in 4D 4-space output scans. Make check on QueryResponse case-insensitive (choked on PatientID Test vs test)

20030130 Support for 3D private Kretz ultrasound

20030213 Above change crashed when in a FIND operation there is US present, and the queried dicomserver did not supply the 'Manufacturer' key.

20030624 Support for multiframe dosegrids

20030710 Additional sorting of C-FIND result on SOPInstanceUID

20040525 Also send PatientID when query/retrieving RT objects

20050126 Made better ALIAS in TREE for RTPLAN  
Made ALIAS in TREE of a series '(empty)' if no good ALIAS can be constructed  
Implemented interface to load individual segments in a beam  
Moved DCM\_PLAN and DCM\_STRUCT typedefs to "CqRtObjects.h"

20050131 Check empty sequences in 'StoreBeamPropertiesInCache', and made DDO a TypedDDO

20050201 Handle possibility of retrieval of beam properties before retrieval of outline in ReadKeys()

20050203 Function GetRtDDO now caches DicomRT files. When a NEW PatientTree is constructed, these files (of a different patient) are deleted. This speeds up things enormously

20051018 Support for Corvus in FixControlPointProperties

20060103 Studydate queries on val instead of \*val\* (kodak could not handle it)

20060531 Added exported function 'DcmGetPlanPois'

20061018 Apply rotations to DcmGetPlanPois when the patient is not HFS

20061101 Recoded 'DcmGetPlanPois' (pretty complicated now...)

20061109 ROI and POI RTStructs from Pinnacle do NOT have exactly the same timestamp

20070112 Extra consistency check in DcmGetPlanPois

20070220 Adjusted DcmGetPlanPois so it can handle 'derived' plans  
Added DcmShiftPlanIsoc

20070419 Fix in PatientTree in presence of long RTPlanName

20070423 Added outputstring pszCreatedUID to DcmShiftPlanIsoc

20070508 Fix: date query on empty mask failed

20070522	Temporary workaround for XVI-upi-bug in DcmShiftPlanIsoc()
20070530	Added DcmGetPlanStructUIDs()
20070530	Fixed bug in DcmGetPlanPois() when more than 1 isoc defined in RTSTRUCT
20071018	Added DcmGetLastCreatedStructUID and DcmSetLastCreatedStructUID. This is a mechanism so that a newly created RTStruct can be referenced in a shifted RTPlan.
20071031	In DcmGetPlanPois(), support 'QUIRT CqDicom' structuresets too. In CreateTree(), treat a marker as a structure
20080313	Support markers; treat them as structures; In DcmGetPlanPois(), the consistency check on isoc in plan and structureset is omitted. We take the isoc from the plan.
20080318	Store RTPLAN properties also in cache, and added 'NumberOfFractionsPlanned'
20080320	In ReadKeys(), also use SOPInstanceUID for RTDOSE
20080717	Moved prototype of DcmStoreFiles to CqGlobal.h
20080818	Made to compile with MS7 (fabs on integer)

#### **CQCACHE.CPP (part of conquest interface DLL):**

20000710	Added CacheInitFromSelectionStrings
20000808	Fix in comparison of selection with cache
20000824	Added ReferencedStruct to cache (used for beams)
20000829	Also store 'image' in cache
20010717	Some work on RTDose objects
20020418	Added cache-ing of properties
20040616	In CacheInit (Called from PatientTree), keep the cache if the tree is from the same patient
20050203	Added CacheCleanupRtObjectFiles. This is done just before a PatientTree of a different patient than last patient is being constructed
20050906	Added 'CacheGetReferencedProperties()'
20050919	Increased MAX_SEL_CACHE from 200 to 2000
20061109	Increased MAX_SEL_CACHE from 2000 to 10000
20080318	RTPLAN properties are now cached too

#### **CQPRINT.CPP (part of conquest interface DLL):**

20020814	Added exported functions 'DcmPrintScan' and 'DcmPrintFile'; Altered 'PDU.AttachRTC' in 'PrintGrayScaleImages'; Tested with OFFIS and Mallinckrodt
20020816	Padded uneven string VR's with space Support of byte images. (RGB does not work yet)
20020823	DcmPrintFile accepts multiple filenames (separated by ;) and decompresses NKI data
20020825	Added DllProgress calls during print (used by server to ensure printing without losing socket data)
20051217	Use nicer method to replace compressed by uncompressed data
20080313	Removed some warnings
20080818	Made to compile with MS7

#### **ERRCODES.H (part of dgate.exe):**

20041221	Moved errorcode to here
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20050901 Renamed errorcodes.h to errcodes.h

**CQJPEG8.CPP (part of conquest interface DLL and dgate.exe):**

**CQJPEG12.CPP**

**CQJPEG16.CPP**

20020301 Created  
20030415 Better exception handling  
20030417 Support for multi-frame images  
20041221 Changed include files  
20050215 Fixed for fragmented frames in a sequence  
20050901 Renamed errorcodes.h to errcodes.h  
20070112 Return Width, Height and BitDepth of the image  
20071001 Output of JPEG error messages to OperatorConsole in server  
20080819 Suppress large amounts of jpeg errors; added \n

**CQJPEG.CPP (part of conquest interface DLL):**

20030123 Created  
20030128 Start work on RLE decompression  
20030415 Fix in determining RLE decompressed size\  
20080313 Removed some warnings

**DICOMP.CXX (sample print program)**

20020816 Fix in (unfinished) main server code  
20020822 Made this sample program part of code base  
20080113 Fixed for MS7 compiler

**TEST.CXX (sample client program)**

19980322: played around; added comments in query client  
19980322: Added command line interface for c-find  
19980323: Added command line interface for c-move  
20000318: Added optional NKI command vr's to echoclient  
20020315: Started on -fe: forwarding server; implemented echo, working on move and find  
20020316: Added cstoreclient -t; load dd.txt as dicom dictionary; -fd=diagnostic mode (logs) Added IARQ; note: cast of PDU to dump() seems to crash sometimes. Forwarder works between QUIRT/conquest apps and conquest dicom server.  
20020317: Made forwarder more general; works between EFilm and Conquest  
20020811: Fixed forwarder such that it works for dicom-print  
Fix: Forwarder did not worked with OFFIS because OFFIS checks message command/data pdv bit 6[1] that is was not set correctly by forwarder (command/data object)  
20020822: Made this sample program part of code base  
20030630: Fixed crash in cast of Dump(PDU) (c.f. 20020316)  
Fixed passing of cmds to Find and Move  
Fixed continuous CechoServer  
Removed calls to obsolete PDU.Write()  
20030721: Fixed SetStringVR (pad uneven strings with a space)  
C-Find and C-Move wildcards "\*" seem not to be valid  
20040711: Fixed forwarder: status=0xff00 loops responses; status==0 keeps association open

- 20040712: Added auto-returner to forwarder - functions with NKI viewers (assumes viewerAE of X%ip or XX%ip).  
You need to set AE and port of return forwarder in your PACS though; see gatewayname, gatewayport, returndump and viewerport for configuration
- 20040713: Attempt to make it multithreaded; however return connection only starts once (supports single client only!)
- 20040713: Split into modes -fp: for printer; -fb: forwards and returns; -fe normal forward; -ff fixing forwards
- 20051217: Use new ReAlloc method to replace data in VR
- 20060618: Allow (and disabled) looping of c-move to test repeated c-move problem in read-ahead thread
- 20061127: Allow (and disabled) looping alternating c-move and c-find to test server
- 20070902: Fixed for ms7 and ms8

#### **TOTAL.CXX (sample for making DGATE.EXE without make file)**

- 20020822 This file compiles to TOTAL.EXE = DGATE.EXE with, e.g., BC55
- 20050102 Added NOINTJPEG flag: jpeg8/12/16 sources cannot be compiled at once
- 20050107 Changed order of compile
- 20050111 Added npipe.cpp and gpps.cpp for LINUX
- 20050118 Documented how to compile under linux and with visual c++
- 20050121 Changed filename to lower case
- 20050130 Added xvgifwr.c
- 20070315 bcb added DARWIN stuff
- 20070330 bcb added DARWIN compile example
- 20080820 Solaris compile example

#### **DGATESERV.DPR (part of dgateserv.exe)**

- 20000316 Created
- 20000326 Close handle on terminate  
Dgate runs via new SlaveProcess mechanism of Uservice

#### **USERVICE.PAS (part of dgateserv.exe)**

- 19990316 Fixed English of some messages  
Added account and password as optional parameters for install
- 19990325 Added option to start/stop/install/uninstall on remote machine  
Works fine with start / stop / uninstall  
Remote install works except for wrong exe path  
Therefore added ExeName property and command line switch
- 19990326 Added service option: makes it a generic installer!  
Made ServiceName and ServiceDisplayName read/write  
Added AllowSlaveProcess: command line can set slave process  
Added SlaveProcess and SlaveProcessArgs: executable to start  
Fixed arguments passing when /start is followed by more /  
Fixed ServiceName: is read as first arg in DoCmdLineStart  
Note: SlaveProcess is killed when service stops

#### **SERVERDRIVER.PAS (part of conquestdicomserver.exe)**

19980405	Created
19980407	Added dgatesop.lst file creation; max AE to 16 chars
19980407	Sorted image list on SOPINSTANC to get correct order
19980412	Added DuplicateHandle code; but still deadlocks
19980413	Threaded mode avoids TCP/IP component (seems to fix deadlock)
19980414	Restart after switching server mode does not always work; Fix application to threaded mode for now. Added compression configuration.
19980415	Some fixes for the first installation code
19980505	Made length of directory field in MAGDEVIC 250 chars
19980608	Replaced TQuirtViewer with TImage => no need to load ntpars.dll
19980614	Merged code with use FPiette tcp components
19980616	All OK with new fpiette code; actually I had to fix my own bug
19980617	Save as bitmap and dump header in popup menu
19980618	Query and Move options for CQDICOM.DLL
19980619	Added header lister; default MagDeviceThreshHold to 10 MB
19980620	MagDeviceThreshHold is now configurable
19980621	Renamed table to MagDevice; use full table names Nicely coded DBF/Access choice; but fixed to DBF Delete patient and refresh database menu options
19980622	Double click query memo to make new query Show on bitmap: patient is being deleted/file not found
19980623	Save bookmarks of tables; move to next record after delete
19980624	DICOM.SQL: StudyNumber (StudyID in DICOM) is now 64 long (Microsoft SQL server does not allow truncation) Update bitmap after loading for fast display Text strings in UDP input to 1024 (for long SQL errors) Default password and user name to 'conquest' PAGETIMEOUT to 600 for better database performance Made DataSource name more or less configurable Made all port numbers more or less configurable Installing a second server on one PC while one server is running works
19980702	Added KBUSED field in MAGDEVICE table
19980703	Some changes in static texts and hints
19980704	Found a handle leak in RunDgate; not fixed yet
19980708	Make anonymous; show progress for move
19980710	Added experimental archive option; fix stopcopying option
19980711	Fix double click query on empty form; use tray icon
19980713	Add Name of server in tooltip of tray icon; fix DiskFree
19980717	Fix crash if directory does not exist
19980721	Clicking tray icon restores window
19981219	Improved error handling display;
19981220	List header of undisplayable object in static Read and save FileNameSyntax; default=3
19981221	Supress display of large files (>1 MB)
19981222	Use FieldByName, added combobox selectors Disable study navigator if only 1 available Moved modality from the study to the series level
19981229	Changed order of TableN.close to avoid side effects
19990104	Fixed MAGDEVICE creation under SQL server (KBused optional)
19990109	Made ImageNumber 10 bytes wide (for GE AdvantageWin)

19990110 Combobox1 is now patient filter and or selector  
Added access to cache and jukebox in browser but with limited support: up to 10 devices (one character)  
Added archiving page; fixed most handle leaks

19990112 Finished first archiving page; -hide command line option  
Added clear database and regen single device buttons  
Clear combobox for each page select  
NOTES: Archive page is configured by editing  
Restore original configuration or restart to load it  
Archiving allows up to 10 Jukeboxes, but only the selected one is used for writing. Only the drive with MAG0 is checked for disk space for automatic archiving. Only device CACHE0 is passed correctly to the burn program. This means: stick to 1 MAG device and 1 CACHE device for now.

19990113 Speeded archiving by selecting MAG0 if there is only 1  
Renamed entry to BurnThresholdMB, made BurnProgramList  
Note: to do - keep log file of archiving operations.  
- add RT objects to default sop file.

19990114 Added date and time formats for burnprograms

19990115 label format burnprograms; no write empty ini  
Sync magdevice0 with DataDir; %% and %p formats

19990315 Added EchoNumber in image table - used to separate PD,T2  
Completed dgatesop.lst with Philips, GE, RT  
Added NumberOfFrames in image table - to find multiframe objects

19990413 truncate QUERY request depending of level

19990510 Allow AEs starting with a digit (Siemens MRI)

19990527 Revision 3 of database layout (birthday, sex, bolus)

19990902 Added load/store of mirror devices and export converters

19990905 Switched word wrap off for memo's  
Added DcmMoveFilesHere on right click of copy; but seems to crash; Problem: if we pass DcmMoveFilesHere servers AE/PORT saving slices from own server will fail. Now pass 'test;1234'

20000127 Hide archiving tabsheet in new install; Add NKI sops to install;

20000128 Added extra GE sop; compressmode 2; disabled movefiles here

20000316 version 1.3.5: Integrates dgate as service operation  
New install does not start dgate right away

20000317 Truncate patient list if too long

20000318 '\$ RESTART' as console message kills and restarts server  
'& DGATE xx' as console message runs dgate with args xx

20000323 Added query sop choices through level dropdown list

20000326 Service supported for more than one server:  
servicename=AE; port passed as /process dgate.exe -!port  
Removed need to enter password for SQL access  
Save and restore user and password in dicom.ini  
Added 'ping' option for remote check of archiving:  
Deletes ConquestDICOMServer.Ping and makes ConquestDICOMServer.response with archive status  
Allow up to four servers at the same time, also as services  
Note: only the first server will start correctly on boot!  
(on boot, the /process parameter is not passed and the default IP message port will be used -!1111); Presence of file USESQLSERVER allows install on SQL server

Presence of file USEMSACCESS allows install using access db  
 20000328 Added tests of local server at key moments  
 added -noconfirmquit option; show VERSION in caption  
 20000402 Install service with startup at right socket  
 Read service socket from registry on startup  
 20000403 Improved socket handling; fixed space in path when not  
 service; space in path blocks service install.  
 Now recognizes installed but not running service  
 Number of servers on one PC is now unlimited.  
 20000417 Fixed MSACCESS ODBC creation  
 20000501 ExportModalityx should be UPPER-case  
 20000528 Added "force display of large image", "remove image from  
 database", "run external viewer" and demoviewer option  
 Removed '.' as workdir from runprogram etc (allow bat files ?)  
 Added democopy option: copy incoming to dir + CallingAE.v2  
 20000529 Merged two changes  
 20000529 Release to 1.3.6  
 20000616 Attempt to create NewInstallForm database selector  
 20000625 Added NewInstallForm database selector; default to  
 MSACCESS  
 Added Send ... To menu items in popupmenu  
 Removed '\*' items from Dicom system selectors  
 Added Send Selected Images for more flexibility  
 Added animated display menu options  
 20000626 Added Send Selected Images selector window  
 20000701 Some adaptations of Send Selected Images;  
 MaxFileNameLength  
 TrimRight strings in query - trailing spaces depend on db  
 20000707 Added Edit Database by Hand menu option  
 20000808 Added ,0 code in timed archiving  
 20000915 Added ListenSocket.Addr (0,0,0,0) in multi-app mode  
 20001107 Added CheckBoxViewIncoming for demo display of  
 incoming images  
 20001108 Display originating server on incoming image;  
 Disable menus when the ViewIncoming option is selected  
 20001129 Added fix so that DICOM.INI may contain UNC path  
 Added menu choice to change ID of selected series  
 Version to 1.3.7  
 20010312 Trimmed remote IP so that hostnames can be resolved in  
 CqDicom.dll  
 20010318 Trim servername and ip;  
 alt-rightclick the service buttons installs service 4 times  
 e.g., at ports 5678, 5679, 5680 and 5681 (all with same data)  
 This may be used for efficiency and to limit the effect of  
 crashes; Version to 1.3.8  
 20010327 Always pass curdir to runprogramxxx and startprogram -  
 required because directoryview changes current directory!  
 20010328 Uppercase account for service; colors for archive status  
 Added verify mirror disk button; burn only once per time  
 Show date and time for archival steps; added KeepAlive  
 Added MirrorVerifyTime (verifies whole MAG0)  
 Added conquestdicomserver.log with major messages  
 20010405 Added comma-separated list option for patid in query page  
 20010406 Ctrl-dblclick adds patid to comma-separated list  
 20010406 All status memo's are now limited in length and save to

separate log files  
 Added (and disabled) simple zip code for log files per day  
 20010409 Do not log query page  
 20010409 Added Tape backup page; replace few GetCurrentDir by CurDir  
 20010410 Added timeouts (10s and 5 hours) to tape backup  
 20010412 Separate tape backup button - some fixes  
 20010416 Improved anonymize and change patient ID using new dgate -f options; Added drag and drop interface to add files to server  
 20010418 Changed description of forced backup set; refuse dropped directories; Version to 1.3.9  
 20010418 Update maintenance memo during drag and drop  
 20010418 Fix: timer4 was enabled if no KeepAlive specified in dicom.ini  
 Hide tape backup page in new installation  
 Added default install button in firstinstall  
 20010419 Added anonymize and change patient ID for study  
 20010502 Added DeleteThisStudy/Series  
 20010830 revision 4 of database definition (extended)  
 Added ExportStationName in dicom.ini  
 Updated dgatesop.lst to conform to DICOM 1999 final text  
 Version to 1.3.10  
 20010903 Suggest .\username as account  
 20010904 Fix: Query was freed twice when a DicomMove failed  
 20011108 Added automatic zipping of log files  
 Make sure that tape backup and archive pages are not shown  
 Added save/restore of ExportFilter settings  
 20011109 Small fixes:  
 do not write empty configuration strings (empty<>default)  
 keep some settings with original case (see sorg)  
 use StrToIntDef to avoid exceptions on invalid settings  
 Added ZipTime as configurable  
 20011127 Added SeriesPat and ImagePat fields to DICOM.SQL  
 Surpress fail message box when using SQL server  
 Version to 1.3.11  
 20020402 Adapted controls.pas: exception handling in finddragtarget and findvclwindow  
 20020409 DB rev 6: added frame of reference UID to series  
 20020416 Store/save UIDPrefix for in dicom.ini  
 When creating dicom.ini, create unique UIDPrefix:  
 '1.2.826.0.1.3680043.2.135.Date.Time  
 Added configurable TestReadTime: regular check of MAG0  
 20020417 Fix: QueryResult has not necessarily 64 char  
 Renamed some data structures  
 20020422 Do not save empty UIDPrefix; fix change patid for study  
 20020424 Added simple weekly checks page; mail ALL failures  
 20020426 Fix in mail sender list; use first e-mail as 'to' address  
 20020428 All recipients show in to: header  
 Only serious error messages have \*\*\* in string  
 Added MailCollectTime and MailWaitTime  
 Avoid starting check more than once  
 20020510 Added CheckDicomSubmits (send mail when users forgot to send images to the PACS)  
 20020513 Checks: empty time runs all day; added log header/footer  
 Updated CONTROLS.PAS: more exception handling  
 Fixed reading of weeklychecks; display CD num in header

20020515 Fix warnings and patient ID checks in CheckDicomSubmits  
 Added ImageType to database (rev 7)  
 Added find missing patients button;  
 allow more than one weekly check time (; separated, not adjacent)  
 20020515 Fix missing pats when query empty  
 Added grab options to weekly checks  
 20020517 Changed StudyModality to 64 chars (e.g., fits :  
 CT\MR\PT\XA\ST\MG\MS\RTIMAGE\RTDOSE\RTSTRUCT\RTPLAN\RTRECORD)  
 20020518 Fix in weeklychecks tag: too many with tag 0  
 20020519 Fix in rev 7 db definition: AcqDate is now SQL\_C\_DATE  
 Added FixPhilips in DICOM.INI  
 20020520 Use DGATE.EXE for grabbing  
 20020522 Fix reading of entries with an '=' in e.g., dicom.ini  
 20020524 Fix acrnema.map problem with new install  
 20020529 Fixed duplicate mailing of messages, added WriteMemo  
 Added archive.log; extra parameter for regen for DBASEII  
 Removed MessageBoxes  
 20020609 Read and write FileCompressMode, default remains 2  
 20020613 Added alt-drop code: enter with new patient ID  
 20020819 Basic printer support; view incoming shows printer data  
 20020819 Process messages as files are dropped  
 Print incoming imageboxes on default printer  
 20020821 Printer accepts landscape and portrait any pictures per page  
 Progressbar shows printer queue activity  
 Note: printer queue is single user (but may be fixed, using film#)!  
 20020823 Added print options in browser - print to local dicom server  
 20020825 Headerlister is modeless - added CTRL-A, CTRL-C, CTRL-F, CTRL-S, F1, F3 end ESC  
 Printer has progress hook - required to avoid socket data loss  
 Selection of print page format; edited info text  
 Added all 1.3.11 fields to edit database by hand  
 20021015 Start deleting patient started delete "=ALL when no patient in list!!!!  
 Protect all pop-up functions for no selection  
 20021016 Better support for copying large #patients, even if one or more missing  
 Added denormalized database option (for DBF without ODBC)  
 Removed obsolete magdevice button  
 20021017 Added "" around dropped filenames; use filter instead of master-detail (requires index) for built-in dbf support  
 Version to 1.4.0; added dropping of directories  
 Added UID counter passed to dgate to avoid UID problems  
 20021018 Fixed browser fail and missing dbase dir after non-odbc install  
 Limit dbase list in browser (alternative to image) to 100 lines  
 20021020 Added Kill and Restart the Server weekly check (packs built-in dbf); Fix reading of database name if not default  
 20021021 Small fix in maintenance memo for very long strings  
 20021028 Also denormalized series database; default de-normalize study (rev 8); Show denormalized study entries in database editor  
 20021029 Fixed query keys transmittal (sent sop when not needed)  
 20021213 Added EnableReadAheadThread as configurable parameter  
 Disabled GECTStorage amd GEMRStorage in dgatesop.lst  
 20030113 Version to 1.4.1; Fixed keepalive option (was never enabled)

20030128 Added PatientQuerySortOrder and such  
 Fix update of headerlist when no image shown  
 Make DBF table links case insensitive  
 20030319 Fix: ImageDB entry 'ReceivingCoil' is 16 bytes (not 12)  
 20030324 Start on 1.4.2: db rev 10: made ReceivingCoil 16 wide  
 20030402 Merged above two changes  
 20030409 Handle DicomPrint error; several path fixes in tape-handling  
 20030613 Catch WM\_QUERYENDSESSION: shutdown disables close dialog  
 20030628 Fix that more than one dropped directory will be loaded  
 20030706 Prepare for release 1.4.2; new dicom.ini; kill server  
 Compression column in acrnema.map  
 20030707 Added manufacturer to denormalized db (rev 11)  
 Write registry key  
 HKEY\_LOCAL\_MACHINE\SOFTWARE\NKI AVL\Conquest\Dicomserver\SERVERNAME  
 with values: directory=path without trailing backslash and  
 laststarted=yyyymmdd. For use by Dicom-works only.  
 Note: servername changes are updated on GUI startup only.  
 20030708 Made JPEG compression configurable (affects dgatesop.lst)  
 20030709 Write version into registry  
 20030710 Install service as system account (no user required)  
 Fix attempt to mail when not wanted  
 ----- release 1.4.2 -----  
 20030717 Fix problems when registry access fails  
 20030809 Will automatically use ADO or MDBF when BDE not installed  
 Set version to 1.4.3  
 20030810 Log used DB engine; Added partial ID matching for MDBF  
 Default enable uncompressed button before install  
 Force user to push 'Save config button'  
 Added some text to install and maintenance pages  
 Do not display images when on jukebox (use force display)  
 20030819 Made max drop filename length longer (256->1024)  
 20030905 Date of zip file is one day before if zip before 8 in the morning  
 Hide external viewer menu directly after install  
 Optional configuration of SendUpperCaseAE added  
 Removed obsolete flush button  
 Do not allow install in directory with spaces in its name  
 Removed faulty extra text from install page  
 20030907 Fix ODBC generation for directory with spaces  
 Just warn against directory with spaces  
 20030909 Test write access to log files prior to startup  
 20030920 Mail messages that contain 'fail' instead of 'failed'  
 Added tape full warning (that will be mailed)  
 Added enables for timed archival (to allow retry/timer disable)  
 Changed order of burn CD message / tape backup  
 Added NextSlotToUse (slot n) next to NextCDToBurn  
 (JUKEBOX0.n); % in burn parameters %n = NextSlotToUse,  
 %c = NextCDToBurn; Manual archive buttons control  
 checkboxes as well  
 20030921 CTRL-Double click "automatic archival label" starts archival  
 CTRL-Double click "weekly checks time" starts check  
 Added NightlyCleanThreshold parameter (clean # MB at  
 01:00)  
 20040401 Added ImageID to database; version to 1.4.4  
 Show ImageID in database editor and browser



20040402 Allow anonymize etc on MAG0..MAG9;  
changed datasource name (now system DSN)

20040425 Added DoubleBackSlashToDB to dicom.ini

20040426 Version to 1.4.4a

20040528 Use built-in servertask commands for maintenance and browser

20040530 Browser for built-in DBASEIII driver uses extract server  
command; Database editor to read only for built-in DBASEIII  
driver; These changes allow efficient use of in-memory index  
for dbaseIII; OK for 10^7 images when patientID, studyUID or  
seriesUID passed in Queries; Added PackDBF and IndexDBF  
to dicom.ini; Reworded some in popup menu; wait for patient  
deletion to finish; Fix refresh for sql server

20040601 Added LongQueryDBF flag

20040605 Fix extract when no patients; kill server stops loop of server  
tasks; start server on activate (after windows shows)  
Pack the Database as Weekly Check Action

20040606 Fix in formactivate; display @ startup

20040610 use servertask to clear index and rebuild it in built-in dbase  
mode

20040614 small fix in keep server alive; added nightlymove option

20040615 small fix in nightlymove option; also reindex after regen device

20040713 Added FixKodak; version to 1.4.6

20040722 Installation defaults for FixPhilips and FixKodak are now 0

20040804 Added \*.lst to zipped log files; added bug report option  
Version to 1.4.7

20041029 Added merge and split series options;  
Process messages during long GUI actions if possible (no DB)

20041030 Modified GUI of merge and split, process messages

20041101 Check for MAG storage for split/merge  
Delete from DB does not use image (for orphaned DB)  
USEDATABASEIIIWITHOUTODBC replaced by Pos('\',  
Datasource)>0 while running

20041102 Added nj compression mode

20041108 Added warning when alt-dropping file(s) with \$.. as Patid  
(debug)

20041128 Fixed wording of delete messages: works on all mag devices  
Fixed problem in DeleteThisSeries, Anonymize, and change  
Patient ID: last series could not be modified/deleted

20041129 Made font size of server status window selectable; Made debug  
log switchable; service will continue to log to file even if  
user interface is closed (but with different date/time layout)  
Now can save and use acrnema.map without server restart  
Fix startup problem when disk 'c' not available

20041201 Backup fail 1..5 files temp logged as ALMOST OK ->  
continues

20050106 Fixed install as four services, fixed nightlymove amount  
Is now nightlymovethreshhold - free space: i.e.,  
attempts to make nightlymovethreshhold MB free space  
Fixed nightlymove: forgot to pass '0' for MAG0  
Also, try move even if select failed to avoid stall  
after partial failed select

20050109 Made backup of and warn when dicom.sql is overwritten  
Added TCPIPTimeOut, FailHoldOff, RetryDelay, QueueSize  
Version to 1.4.8

20050114 On startup ask to delete ExportFailures\*, CopyFailures\*

20050422 Added BurnTime2 (2 dvds per day) and BurnWeekend (all weekend through)

20050429 db rev 14: added worklist support

20050829 recurse directories when dropping files to ease load dicom CD

20050831 Added find modality worklist to dgatesop.lst

20050901 Added clear worklist button, version to 1.4.9, WorkListMode

20050905 Modality worklist query, auto append worklist to dicom.sql

20050907 Avoid dicom.sql message in new install, v\* and s\* in acrnema.map

20050912 Small changes to dicom.ini, dicom.sql, dgatesop.lst; added SQLHost. Small change to mdbf: extra refresh avoids browser failures

20051024 Version to 1.4.9a: recompiled with patched controls.pas

20051230 Version to 1.4.10

Moved clear worklist button and add pack database button

Added warning when worklist is added to dicom.sql: clear worklist required

Added settings: DebugLevel, CacheVirtualData, LargeFileSizeKB, VirtualServerFor#

enable study controls prior to return if same (none) image shown

20060102 Update of hints

20060103 1.4.10 Release

20060201 Added K-Pacs/EZDICOM based viewer

20060312 Keep case of VirtualServerFor; Message buffers from 1024 to 8192; Open k-pacs viewer on correct series; version to 1.4.11

20060314 Added experimental native Mysql access; installs when libmysql.dll is found - uses mysql version 4.1.14

20060315 Keep case of FileNameSyntax

20060328 Updated hints and file version for release 1.4.11

20060618 Set default user for mySQL to root (thanks Chris Muller)

Seems to then also work with mySQL 5.0.22, version to 1.4.12

20060707 Bug reported by Paolo Marchesi: save config loses DBF

Now only set to default when previous does not exist

Use same zipmaster as in previous versions (zipmaster\org)

20061101 Added SeriesDescription to query page

20061129 Added control for debuglevel, and allow queries on UID

Double click queries labels to change mode

20061130 Added new dgate parameters; consolidated debuglevel control and param

Made application forms resizable and set size constraints

Small font control works on all status pages

Double click image to force display it

20061220 Pass Tempfile to kpacs viewer form

20070123 Added processfilter to allow browsing of patients with ' in patientid

20070126 Importconverters stuff and ForwardAssociationRelease in dicom.ini; Version to 1.4.12b

20070201 Version to 1.4.12c

20070204 Fix in generation of UIDPrefix: was not automatically generated on startup

20070206 ODBC buttons will also create database for SQL server

20070207 ODBC button creates database for native mysql

20070211 Native MYSQL did not create indices during install

Fixed selection of DBF (with odbc)

20070221	Started to SQLite (not yet fully functional)
20070305	Version to 1.4.13alpha
20070316	Use   in patid instead of , in drag and drop to allow dropping files with a , in them while changing patientif (not backwards compatible)
20070415	Back to , in patid in drag and drop: ljj fixed it in dgate.exe Added Prefetcher flag in dicom.ini (default 0)
20070520	Fixed missing completed message in regen single device
20070705	Added BrowseThroughDBF: unified browser used for SQLite Works for other datasources but not configured as such Small fixes in completed message in several regen functions Fixed view/edit database second time round (enable)
20070706	Auto create mysql registry settings for native mysql Disallow anonymize and change to empty name Message on end of odbc or db creation Version to 1.4.13beta
20070708	Patched forms.pas for Chad Moser's crash problem. Added BrowseThroughDBF setting in dicom.ini Default 1 for SQLite, 0 for others Use extract: also for dbaseIII: to avoid multi-user problems when browsing and writing at same time
20070709	Small fix in dbf+bde browsing Auto register webserver\ActiveFormProj1.ocx if found Do not use extract: for dbaseIII: browser does not work while indexing
20071030	Also delete DelayedFetchForwardFailures* on startup
20071103	Added LRUSort, AllowTruncate, ForwardCollectDelay, MaximumExportRetries, MaximumDelayedFetchForwardRetries Version to 1.4.13
20071104	Added DecompressNon16BitsJpeg, UseBuiltInDecompressor Made IncomingCompression editable (double click label) Made FileNameSyntax editable (double click label) and allow choice of V2 and DCM through radiobuttons
20071114	Save root password while installing for mysql with password
20071115	Disabled multi-process mode in RunInThreadedModeClick to allow multiple saves of ini file during install (for above password)
20071115	Save password and username for SQL server install as well
20071116	Longer default password for sql server 2005
20080124	Added mailer settings in dicom.ini Disable LittleEndianExplicit on install Added configuration for mode UJ Database revision 16: Moved Stationname and InstitutionalDepartmentName to series table Added extra warning when revision 16 not detected moved Stationname and InstitutionalDepartmentName in view/edit database Version to 1.4.13a
20080126	Automatic add backslash to read MAGDEVICES etc and give a warning message
20080322	Version to 1.4.14beta
20080322	Fix first install bug in test dicom.sql; fix send image crash in UID mode; display selected UIDs in query/move page added PadAEWithZeros and IgnoreOutOfMemoryErrors

20080818	Database revision 17: extended size of EchoNumber and ReqProcDescription to 64; EchoNumber, StudyModality and ImageType are DT_MSTR: multiple values; use Institution (8,80) instead of InstitutionDepartmentname (8, 1040) Added WorkListReturnsISO_IR_100
20080819	Version to 1.4.14
20080831	Default ForwardAssociationRelease to 1

### **SERVERABOUT.PAS (part of conquestdicomserver.exe)**

19980405	Created
19980618	Added reference to Fpiette; use form also as file lister
19980624	Removed line about backdoor
19980721	Removed line about Mark Oskin going away
19990527	Release to 1.3.3
20000128	Release to 1.3.4
20000316	Release to 1.3.5
20000529	Release to 1.3.6
20001129	Release to 1.3.7
20010318	Release to 1.3.8
20010318	Release to 1.3.9; fixed dbaseIII text
20010830	Release to 1.3.10;
20011127	Release to 1.3.11;
20020816	Release to 1.3.12;
20020825	Made Lambert's e-mail address more prominent
20021018	Version to 1.4.0; added release date
20021020	Update release date
20021028	Update release date
20021215	Update release date
20030113	Version to 1.4.1; release date
20030128	new release date
20030303	new release date
20030710	Version to 1.4.2; release date
20030809	Version to 1.4.3
20030810	Added reference to offis, zipmaster, and mitec
20030922	Release date
20040402	Version to 1.4.4
20040406	Release date
20040426	Version to 1.4.4a; Release date
20040615	Version to 1.4.5; Release date
20040722	Version to 1.4.6; Release date
20040805	Version to 1.4.7; Release date
20041129	Release date
20050106	Version to 1.4.7a; Release date
20050109	Version to 1.4.8; Release date
20050303	Release date
20050912	Version to 1.4.9; Release date; worklist info
20051024	Version to 1.4.9a; Release date
20060103	Version to 1.4.10; Release date
20060314	Version to 1.4.11; Release date; new acknowledgements
20060402	Changed fpiette's website; Release date
20060708	Version to 1.4.12alpha; Release date
20061222	Version to 1.4.12; release date
20070126	Version to 1.4.12b; release date
20070201	Version to 1.4.12c; release date

20070706	Version to 1.4.13beta; release date; sqlite reference
20071116	Version to 1.4.13; release date
20080322	Version to 1.4.14beta; release date
20080831	version to 1.4.14; release date

### **SENDSELECTED.PAS (part of conquestdicomserver.exe)**

### **HEADERLISTER.PAS (part of conquestdicomserver.exe)**

20020825: added keyboard interface (see serverdriver.pas)

### **EDITDATABASEFORM.PAS (part of conquestdicomserver.exe)**

### **ABOUTNEW.PAS (part of conquestdicomserver.exe)**

20000625	Added NewInstallForm database selector; default to MS ACCESS
20010418	Changed text; added default install button
20010830	Version to 1.3.10
20011127	Version to 1.3.11
20020816	Version to 1.3.12
20021016	Added DBF without ODBC
20021017	Version to 1.4.0
20021018	Default to USEDBASEIIIWITHOUTODBC
20030324	Version to 1.4.2
20030810	Version to 1.4.3 - removed ODBC DBASEIII choice
20040102	Version to 1.4.4
20040426	Version to 1.4.4a
20040530	Version to 1.4.5
20040713	Version to 1.4.6
20041029	Version to 1.4.7
20050106	Version to 1.4.7a
20050901	Version to 1.4.9
20051024	Version to 1.4.9a
20051230	Version to 1.4.10
20060313	Added experimental native Mysql install when libmysql.dll is found
20060618	Version to 1.4.12
20070126	Version to 1.4.12b
20070201	Version to 1.4.12c
20070305	Version to 1.4.13alpha
20070305	Added experimental (not fully functional) native SQLite install when sqlite3.dll is found
20070706	Version to 1.4.13beta; sqlite always enabled (driver linked in)
20071103	Version to 1.4.13
20080322	Version to 1.4.14beta
20080819	version to 1.4.14

### **DVIEW.PAS (k-pacs viewer part of conquestdicomserver.exe)**

20000625	Added NewInstallForm database selector; default to MS
20060116	Adapted for Delphi 5 compatibility Do not use TFormatSettings; Do not use DelimitedText
20060116	Included NKI decompression (without CRC check)
20060117	Reset NKICompress flag if normal pixel data found

20060117	Fixed AddDelimitedText; fixed for multiframe data
20060117	Fix NKI compression when DCMloadMultipleFiles is true
20060117	Fix Get_ZDimension when DCMloadMultipleFiles is true
20060117	Accept conquest .V2 files as dicom in DCMloadMultipleFiles
20060120	DcmFilename now accepts multiple filenames separated by "*"
20060120	Added new dcmTool kSlice to stack through an image
20060120	New global boolean gNoOffsetList to bypass gOffsetList array
20060121	Reimplemented tiled display (mosaic), set with procedure DCMSetMosaic
20060123	Restored layout to allow windiff, lossy jpeg now gives correct error
20060126	Added support of value representation "UT"
20060126	Improved scaling of text overlay and measurements
20060129	Added option to save image in RAW format
20060129	New OnMouseEnter and OnMouseLeave events and custom cursors for several gTool's
20060129	Added overlay text color option
20060129	Fixed JPEG bug in multifile mode
20060130	Changed mosaic slice# place
20060130	Fixed nki_private_decompress: error for large pixel values (>32768)
20060131	Fixed reading of ELSCINT and ACUSON images that use NKI private tag 7fd:0010
20060201	Improved real-time image zooming through bypassing the SetDimension procedure
20060202	Fixed display of slice numbers in empty fields in multiview mode, fixed mosaic mode for multiframe dicom images
20060204	Enabled saving to TIFF using W. Krug's Bmp2Tiff unit
20060205	Added Tool kShutter
20060223	Changed rescale method to rescale buffer directly after reading pixeldata
20060223	Reverse NKI test: if nki compression mode >4 it is not made by NKI
20060304	Fixed NKI compression of 8-bit and color images; todo: 1966 and some PT images level&window wrong
20060420	Added orientation indicators to text overlay
20060421	Implementation of TdcmOverlay record to describe custom overlay
20060425	Added TRuler class to show spacing
20060502	Implementation of basic VOI_LUT support. Currently only 16bit VOI LUTs are supported.
20060607	Merged changes mvh 20060223 and 20060304
20060608	Need CONQUEST define to enable NKI compression, fix crash in TdView.AdjustOrientChars
20060609	Fixed VOI Lut crash when encoded explicit
20060611	Added PixelPaddingValue and PixelRepresentation to DicomData and fixed an unwanted pixel value correction if pixel padding is out of SS range
20060618	Merged again; added 20060223 and 20060304 changes back in
20060712	fixed wrong orientation label display when ImageOrientation and ImageOrientationPatient string is available
20060728	Added support for non-square Pixel Aspect Ration
20060801	Bitmap overlay support implemented
20060830	3D Cursor function implemented using open source vector math units

20061107	?
20061220	Made compileable again in conquest: stripped html support in conquest mode
20061220	Found endless recursion on double click: IFNDEF conquered
20061222	Tried to restore layout
20070204	Added (dumb) access to http: files
20070216	Important bug fix: allow switch to implicitVR: I found a NKI compressed image with VR length 03544C = 'L', 'T', 3 and LittleEndianImplicit --> length was seen as LT code causing reader to go out of sync see: { mvh 20070216 }
20070216	Fix that magnifier would never return its cursor by setting Screen.Cursor to default when changing modes
20070305	Put downloaded dicom file in TempPath, document download code: note not safe when using multiple controls side by side.

#### **UVIEWER.PAS (wraps k-pacs viewer in conquestdicomserver.exe)**

20060130	Replaced Japanese fonts (never create forms on a japanese laptop ;->>>)
20060304	Set limit to 2000 studies
20060312	Slice with + and -: keep other keys for series browser Added OpenSeries; disallow hor scrollbar in stringgrid
20060618	Removed unused variable; moved slice controls into toolbar
20061220	Replaced viewertemp.\$\$\$ by passed tempfile
20061222	Added some logic for better control of zoom and l&w
20070305	Made mosaic global
20071103	Use DLL way of accessing server to avoid 'server not running' error
20080108	Fixed hard-coded IP port 5678 for K-PACS viewer
20080901	Added flip left-right button; OCX define

#### **UViewerActiveFormImpl1.PAS (wraps k-pacs viewer in activeX control)**

20070305	Created update history
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#### **SQLITE.PAS (TDataset control for GUI access to SQLITE3)**

20070221	Adapted for SQLite3, but not yet fully functional
20070305	Created update history