Figure 1

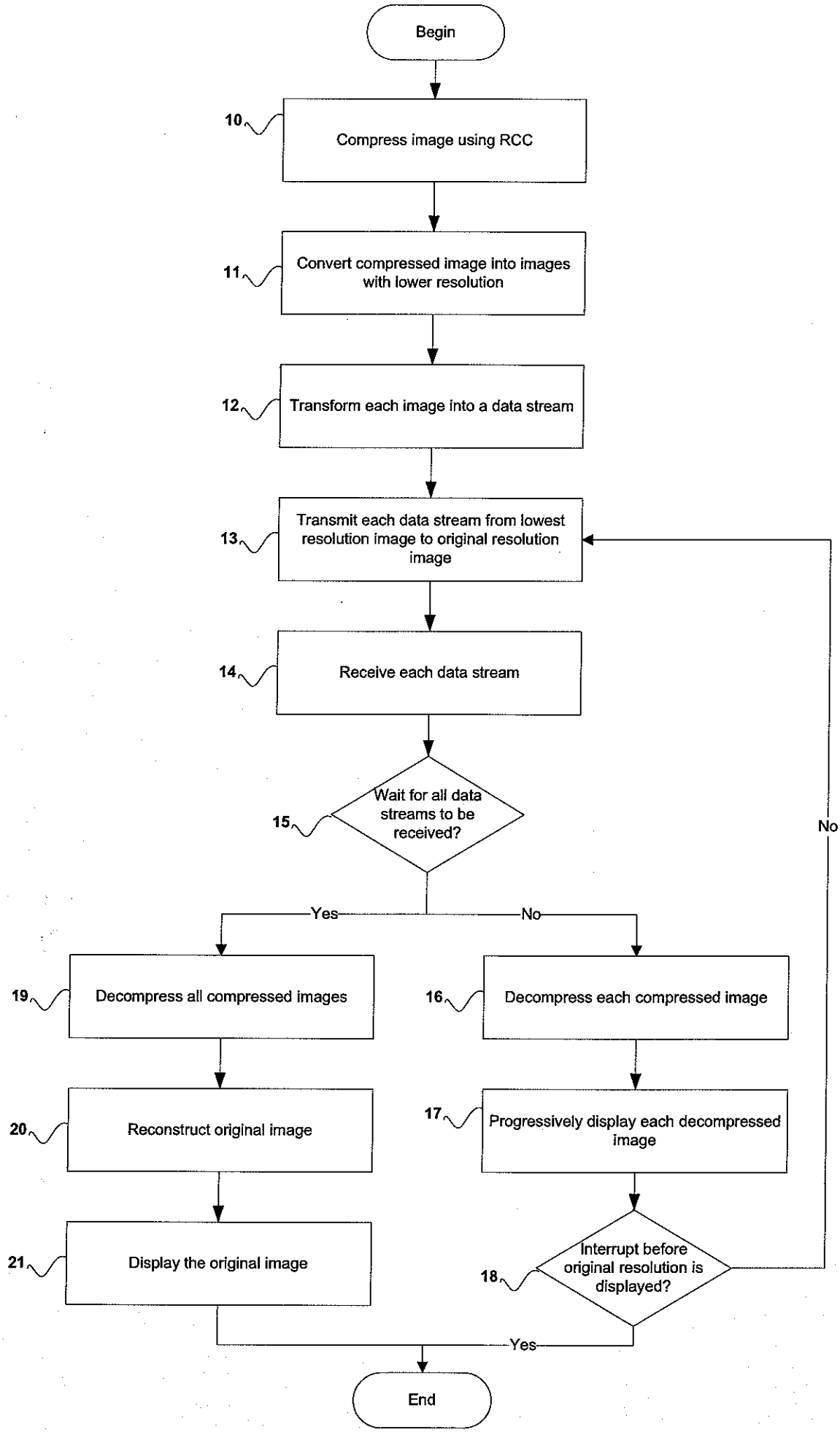

Begin
10
Compress image using RCC
11
Convert compressed image into images with lower resolution
12
Transform each image into a data stream
13
Transmit each data stream from lowest resolution image to original resolution image
14
Receive each data stream
15
Wait for all data streams to be received?
No
Yes
No
19
Decompress all compressed images
16
Decompress each compressed image
20
Reconstruct original image
17
Progressively display each decompressed image
21
Display the original image
18
Interrupt before original resolution is displayed?
Yes
End

Figure 2

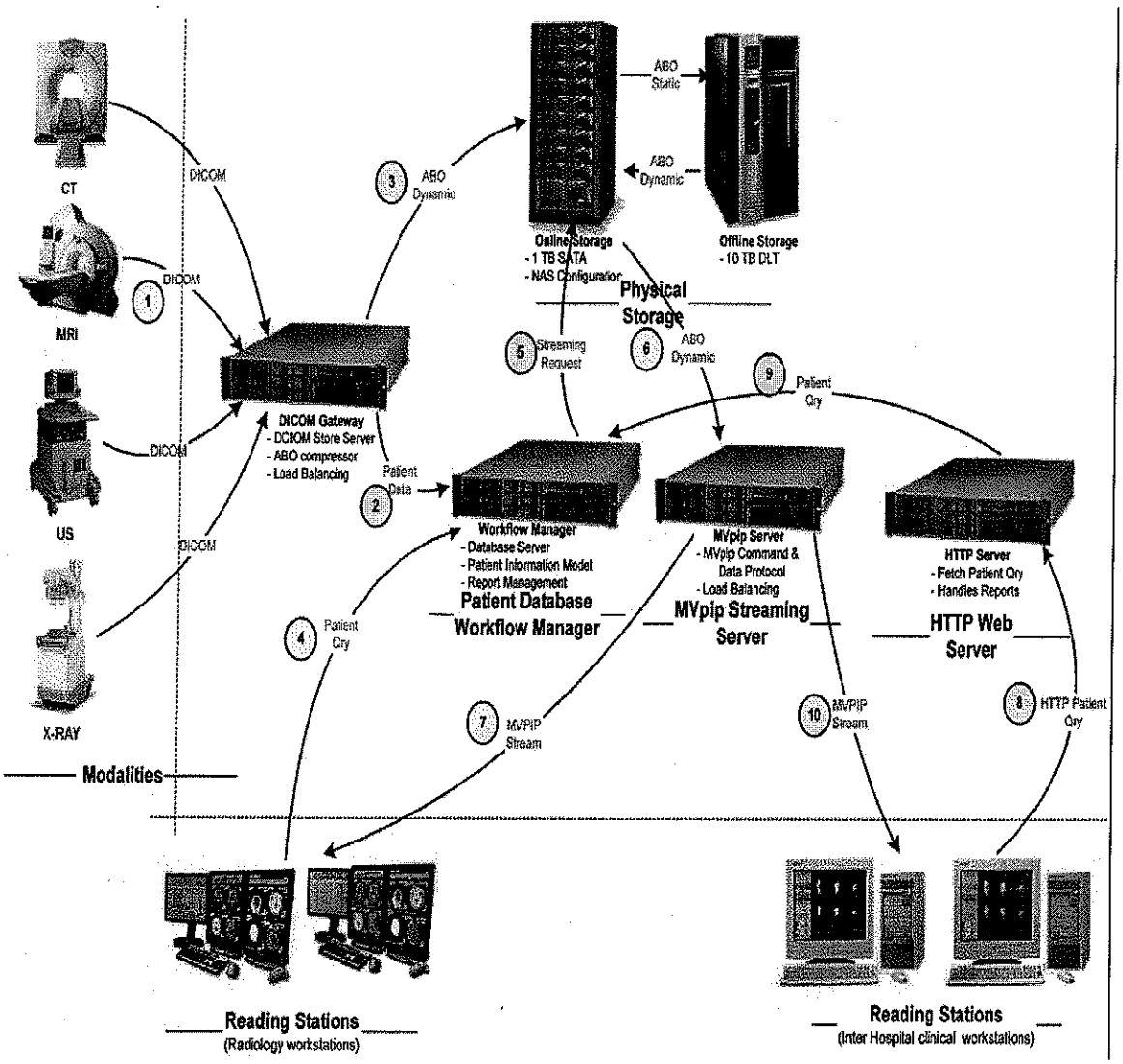

CT
MRI
US
X-RAY
Modalities
DICOM
DICOM
DICOM
DICOM
1
DICOM Gateway
- DCIOM Store Server
- ABO compressor
- Load Balancing
2
Patient Data
3
ABO Dynamic
Online Storage
- 1 TB SATA
- NAS Configurator
ABO Static
ABO Dynamic
Offline Storage
- 10 TB DLT
Physical Storage
5
Streaming Request
6
ABO Dynamic
9
Patient Qry
Workflow Manager
- Database Server
- Patient Information Model
- Report Management
Patient Database Workflow Manager
MVpip Server
- MVpip Command & Data Protocol
- Load Balancing
MVpip Streaming Server
HTTP Server
- Fetch Patient Qry
- Handles Reports
HTTP Web Server
4
Patient Qry
7
MVPIP Stream
10
MVPIP Stream
8
HTTP Patient Qry
Reading Stations
(Radiology workstations)
Reading Stations
(Inter Hospital clinical workstations)

Figure 3

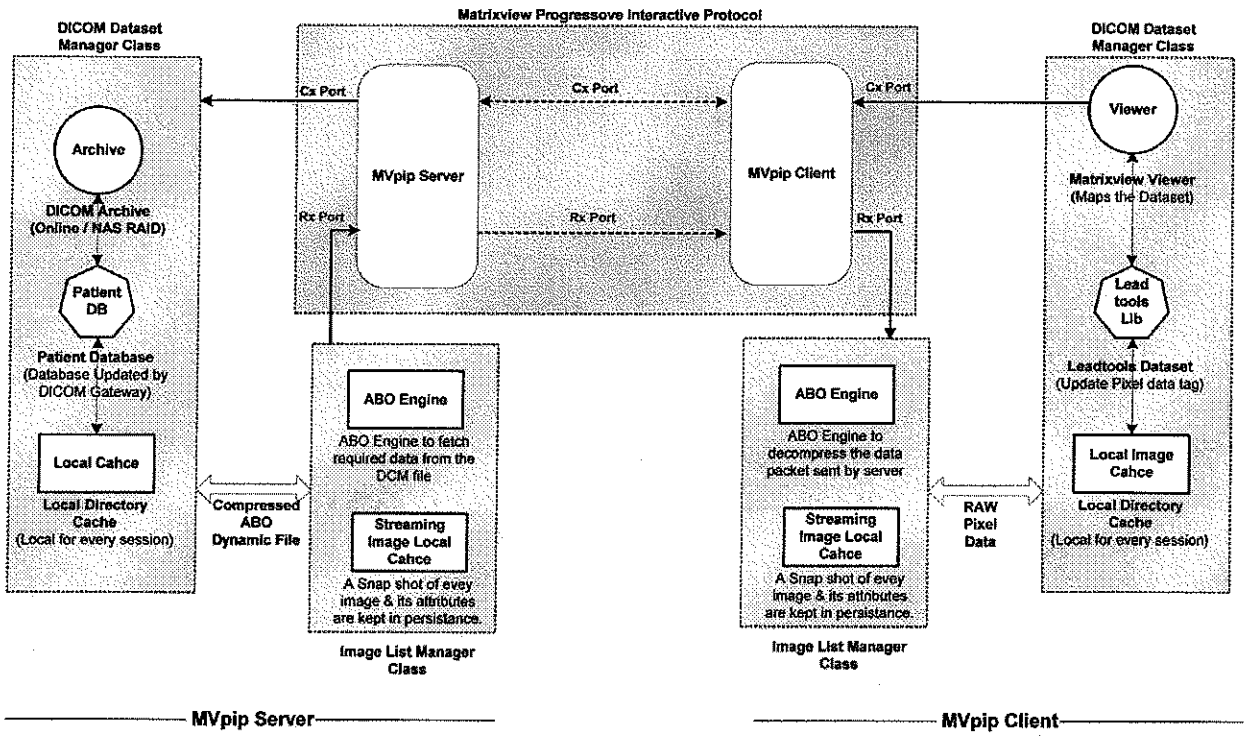

Matrixview Progressove Interactive Protocol
DICOM Dataset Manager Class
Archive
DICOM Archive (Online / NAS RAID)
Patient DB
Patient Database (Database Updated by DICOM Gateway)
Local Cahce
Local Directory Cache (Local for every session)
Cx Port
Rx Port
MVpip Server
MVpip Client
Compressed ABO Dynamic File
ABO Engine
ABO Engine to fetch required data from the DCM file
Streaming Image Local Cahce
A Snap shot of evey image & its attributes are kept in persistance.
Image List Manager Class
ABO Engine
ABO Engine to decompress the data packet sent by server
Streaming Image Local Cahce
A Snap shot of evey image & its attributes are kept in persistance.
Image List Manager Class
RAW Pixel Data
DICOM Dataset Manager Class
Viewer
Matrixview Viewer (Maps the Dataset)
Lead tools Lib
Leadtools Dataset (Update Pixel data tag)
Local Image Cahce
Local Directory Cache (Local for every session)
MVpip Server
MVpip Client

Figure 4

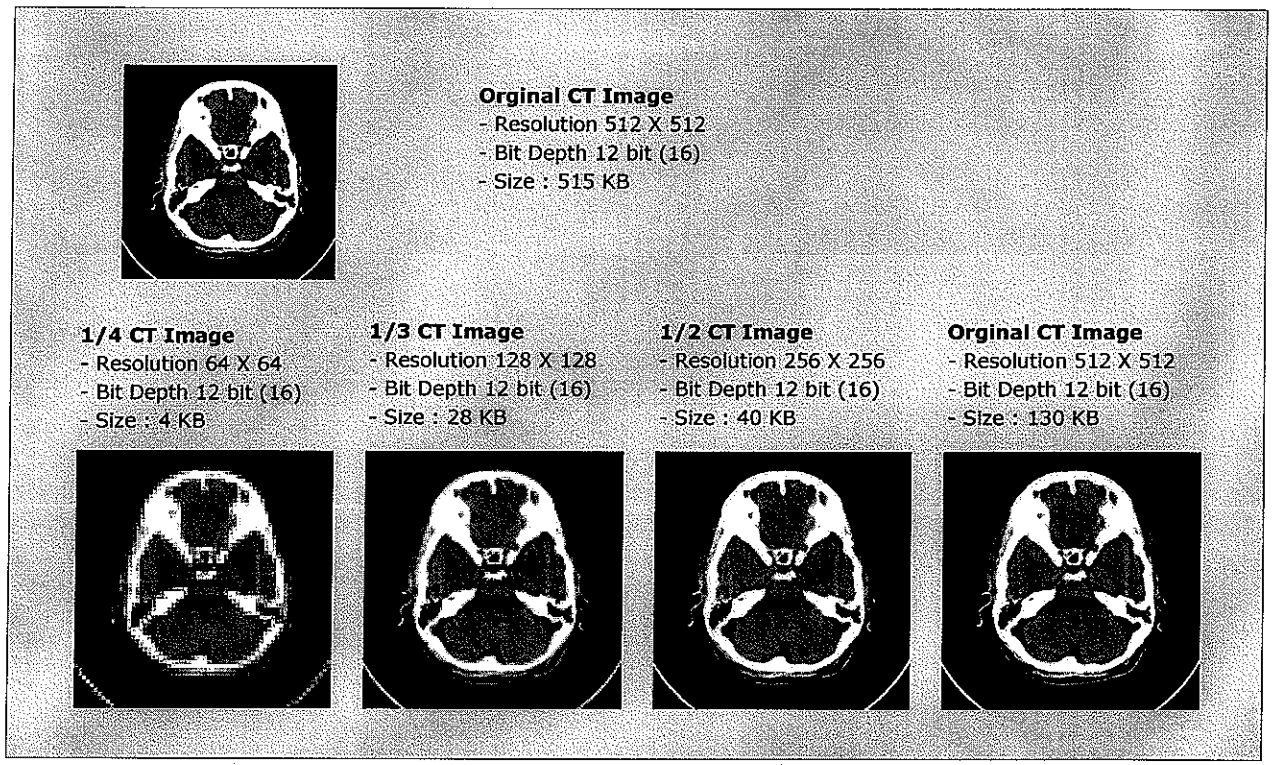

Orginal CT Image
- Resolution 512 X 512
- Bit Depth 12 bit (16)
- Size : 515 KB
1/4 CT Image
- Resolution 64 X 64
- Bit Depth 12 bit (16)
- Size : 4 KB
1/3 CT Image
- Resolution 128 X 128
- Bit Depth 12 bit (16)
- Size : 28 KB
1/2 CT Image
- Resolution 256 X 256
- Bit Depth 12 bit (16)
- Size : 40 KB
Orginal CT Image
- Resolution 512 X 512
- Bit Depth 12 bit (16)
- Size : 130 KB

Figure 5

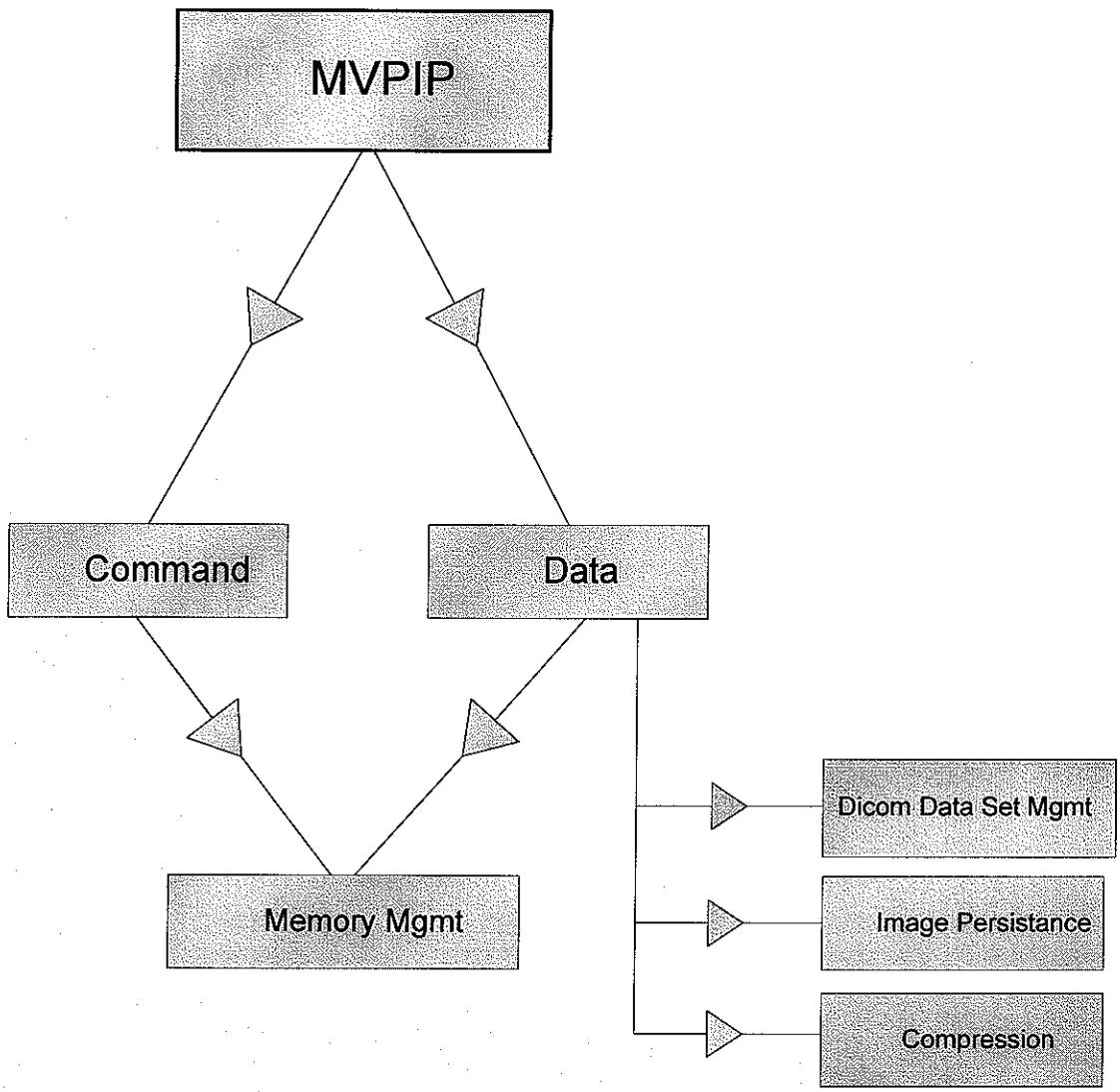

MVPIP
Command
Data
Memory Mgmt
Dicom Data Set Mgmt
Image Persistance
Compression

Figure 6

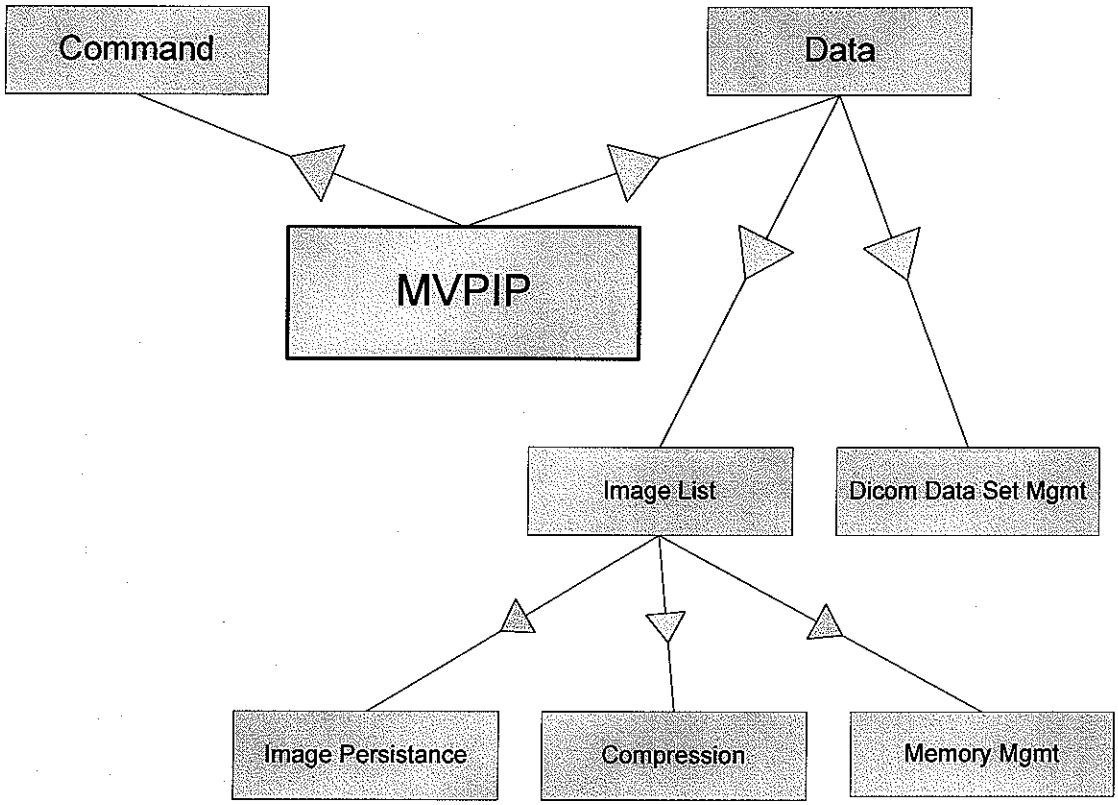

Command
Data
MVPIP
Image List
Dicom Data Set Mgmt
Image Persistance
Compression
Memory Mgmt

Figure 7

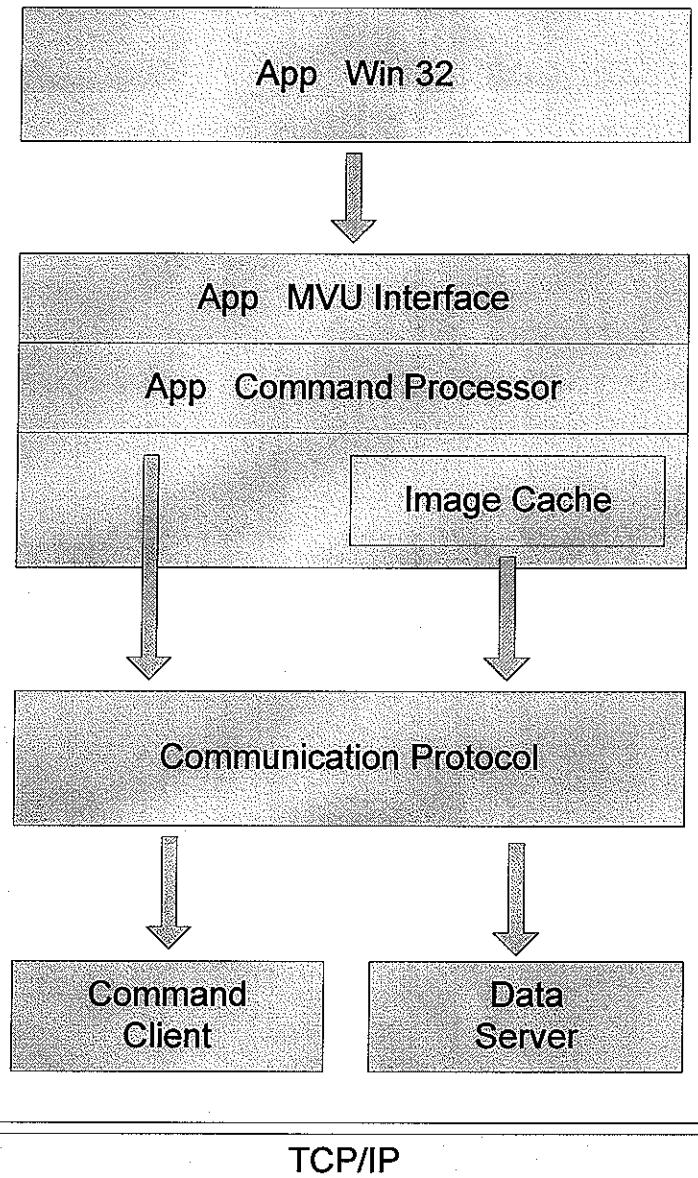

App Win 32
App MVU Interface
App Command Processor
Image Cache
Communication Protocol
Command Client
Data Server
TCP/IP

Figure 8

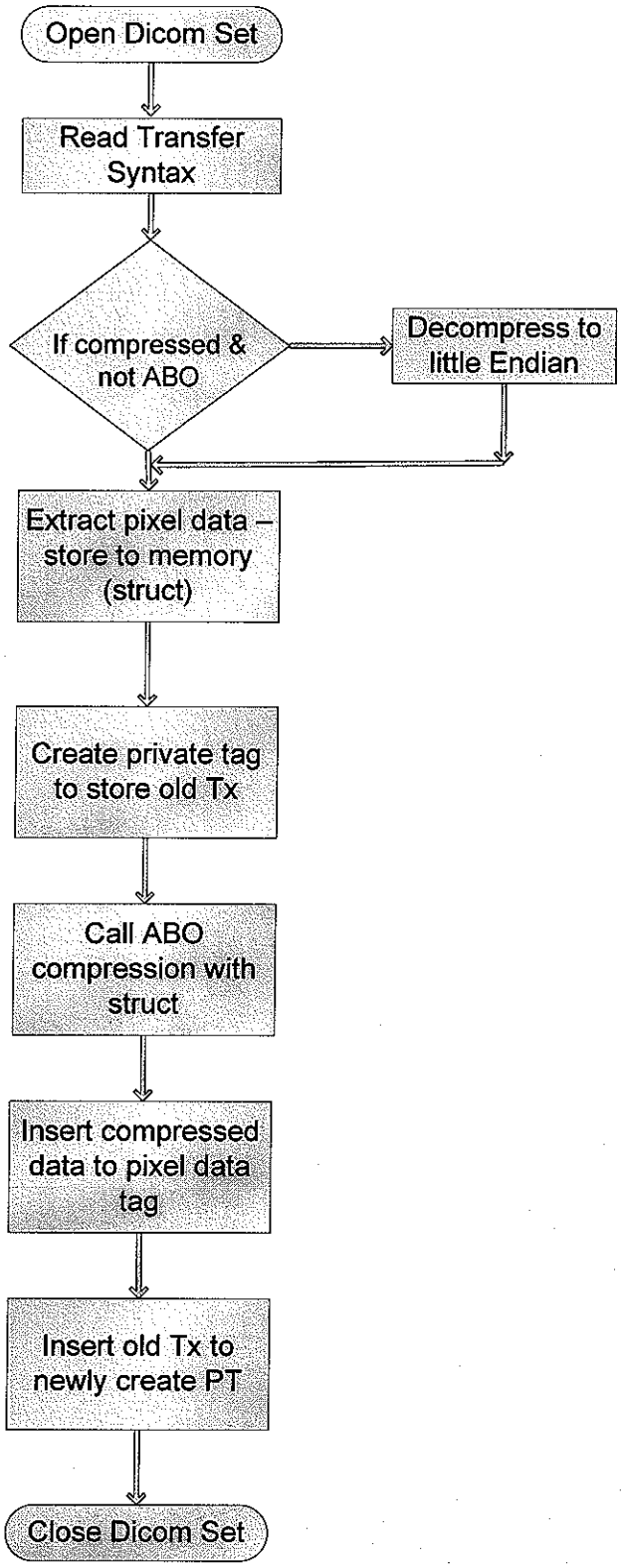

Open Dicom Set
Read Transfer Syntax
If compressed & not ABO
Decompress to little Endian
Extract pixel data – store to memory (struct)
Create private tag to store old Tx
Call ABO compression with struct
Insert compressed data to pixel data tag
Insert old Tx to newly create PT
Close Dicom Set

Figure 9

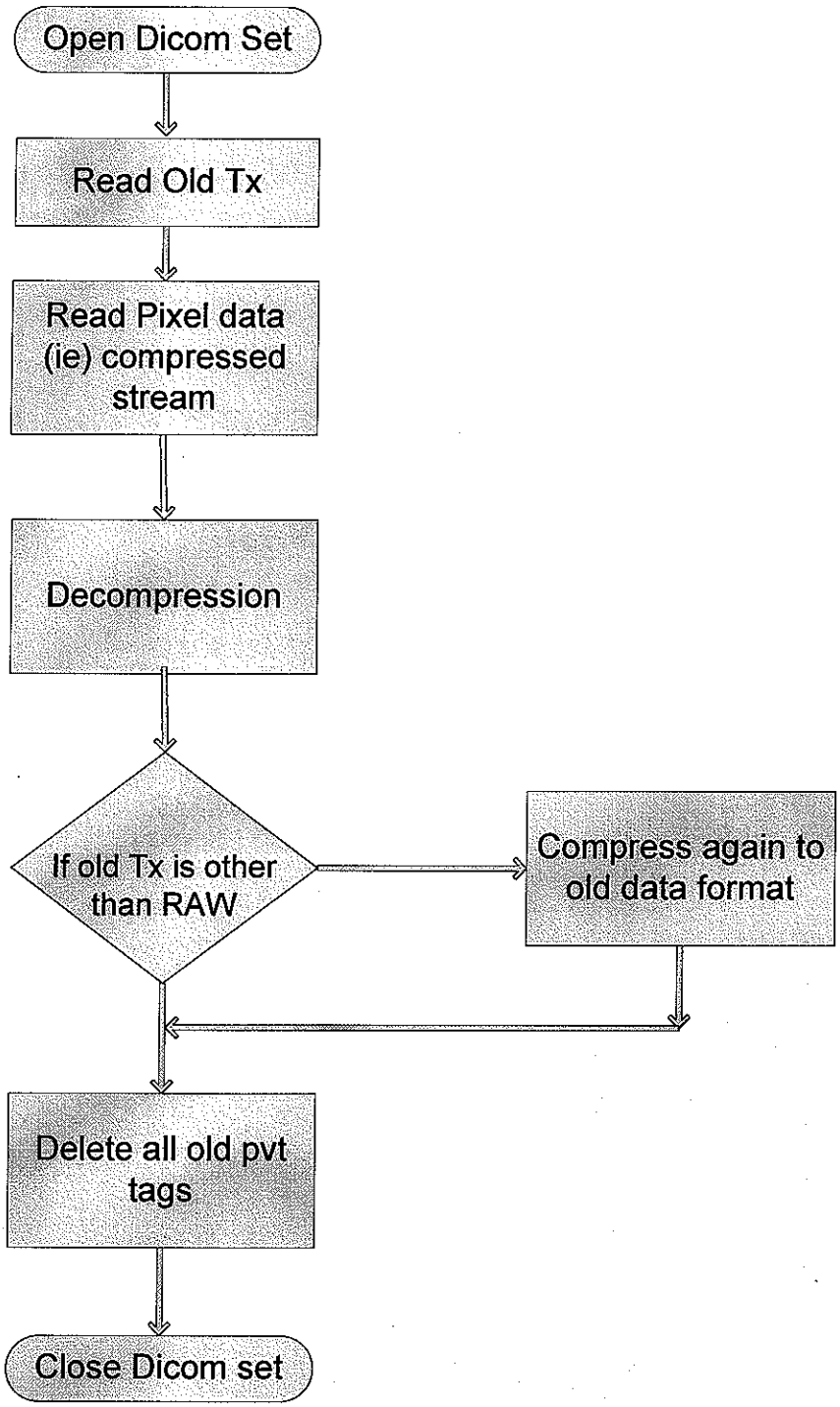

Open Dicom Set
Read Old Tx
Read Pixel data (ie) compressed stream
Decompression
If old Tx is other than RAW
Compress again to old data format
Delete all old pvt tags
Close Dicom set

Figure 10



Figure 11

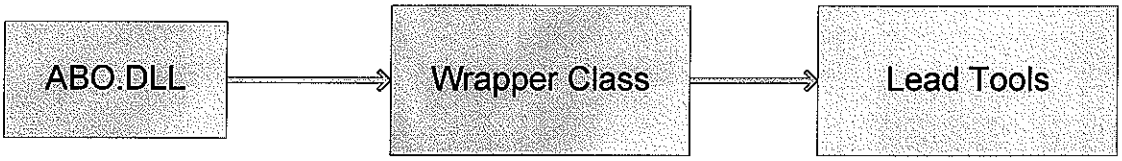


Figure 12

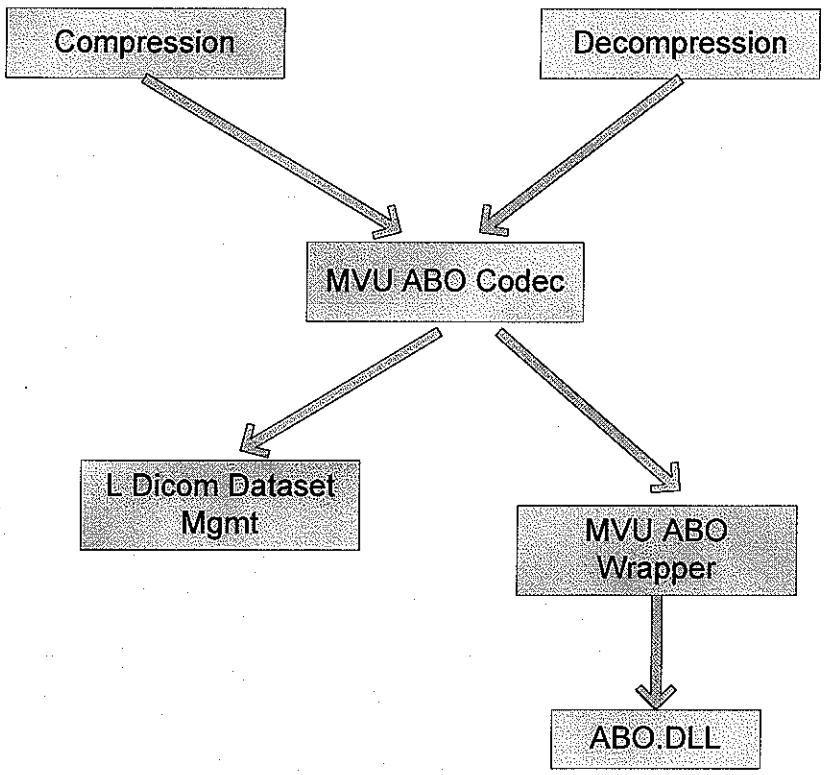


Figure 13

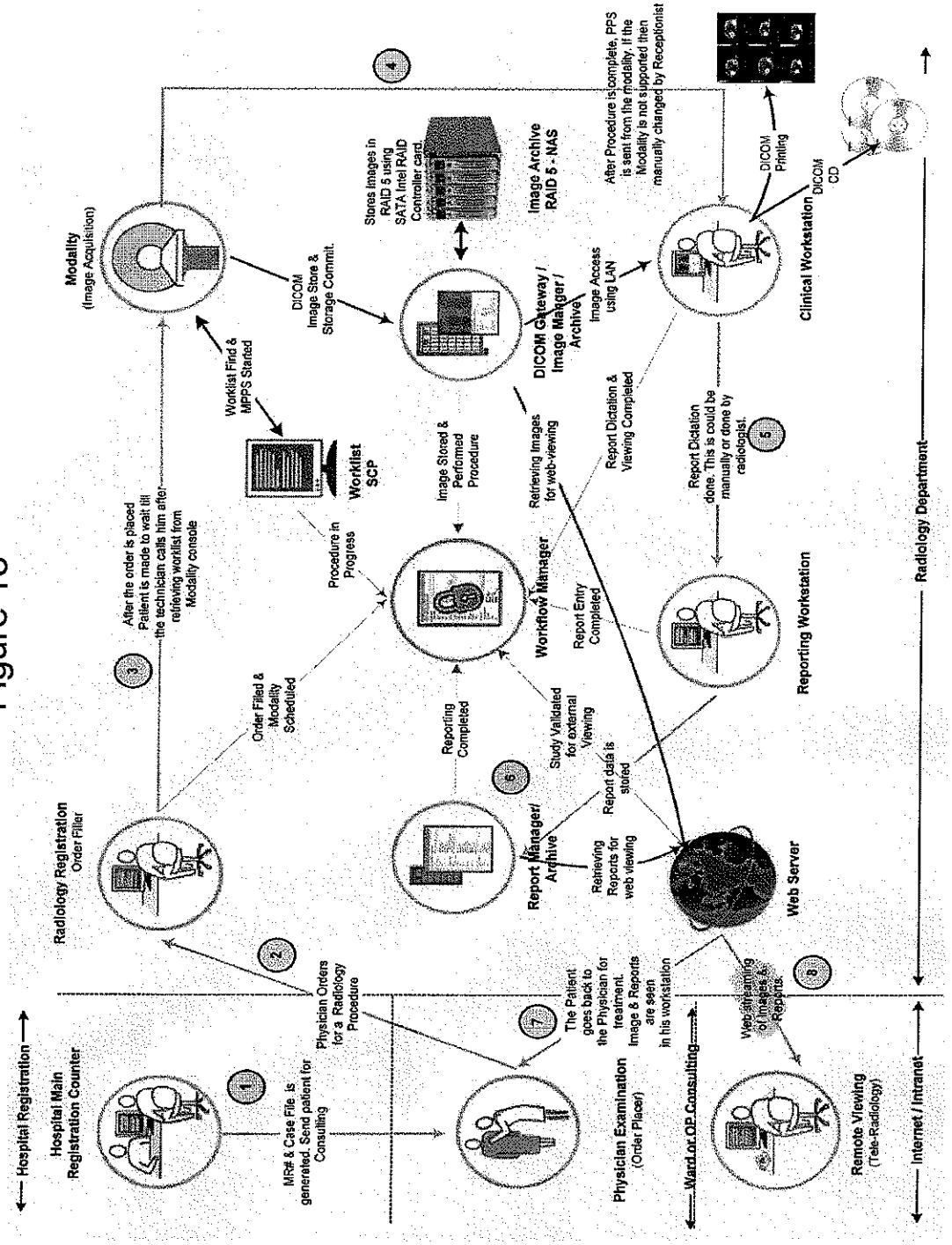

Hospital Registration
Hospital Main Registration Counter
Radiology Registration Order Filler
Modality (Image Acquisition)
Physician Examination (Order Placer)
Ward or OP Consulting
Remote Viewing (Tele-Radiology)
Internet / Intranet
Radiology Department
Worklist SCP
DICOM Gateway / Image Manager / Archive
Image Archive RAID 5 - NAS
Stores images in RAID 5 using SATA Intel RAID Controller card
Workflow Manager
Report Manager/ Archive
Web Server
Clinical Workstation
Reporting Workstation
DICOM Printing
DICOM CD
MR# & Case File is generated. Send patient for Consulting
Physician Orders for a Radiology Procedure
After the order is placed Patient is made to wait till the technician calls him after retrieving worklist from Modality console
Worklist Find & MPPS Started
DICOM Image Store & Storage Commit.
Image Access using LAN
After Procedure is complete, PPS is sent from the modality. If the Modality is not supported then manually changed by Receptionist
Order Filled & Modality Scheduled
Procedure in Progress
Image Stored & Performed Procedure
Retrieving Images for web-viewing
Report Dictation & Viewing Completed
Report Dictation done. This is could be manually or done by radiologist.
Report Entry Completed
Reporting Completed
Study Validated for external Viewing
Report data is stored
Retrieving Reports for web viewing
The Patient goes back to the Physician for treatment. Image & Reports are seen in his workstation
Web streaming of Images & Reports

Figure 14


PACStream Study Browser
File Edit View Go Bookmarks Tools Help
www.pacstream.com/studybrowser.html
Firefox Help Firefox Support Plug-in FAQ
PACStream
Study Browser
User Name
Password
Add to Favourites
Submit
thin.simple.fast
Done
start
Macromedia Dream...
PHPGeek.com Prese...
Start Apache
Adobe Photoshop
1:46 PM

Figure 15

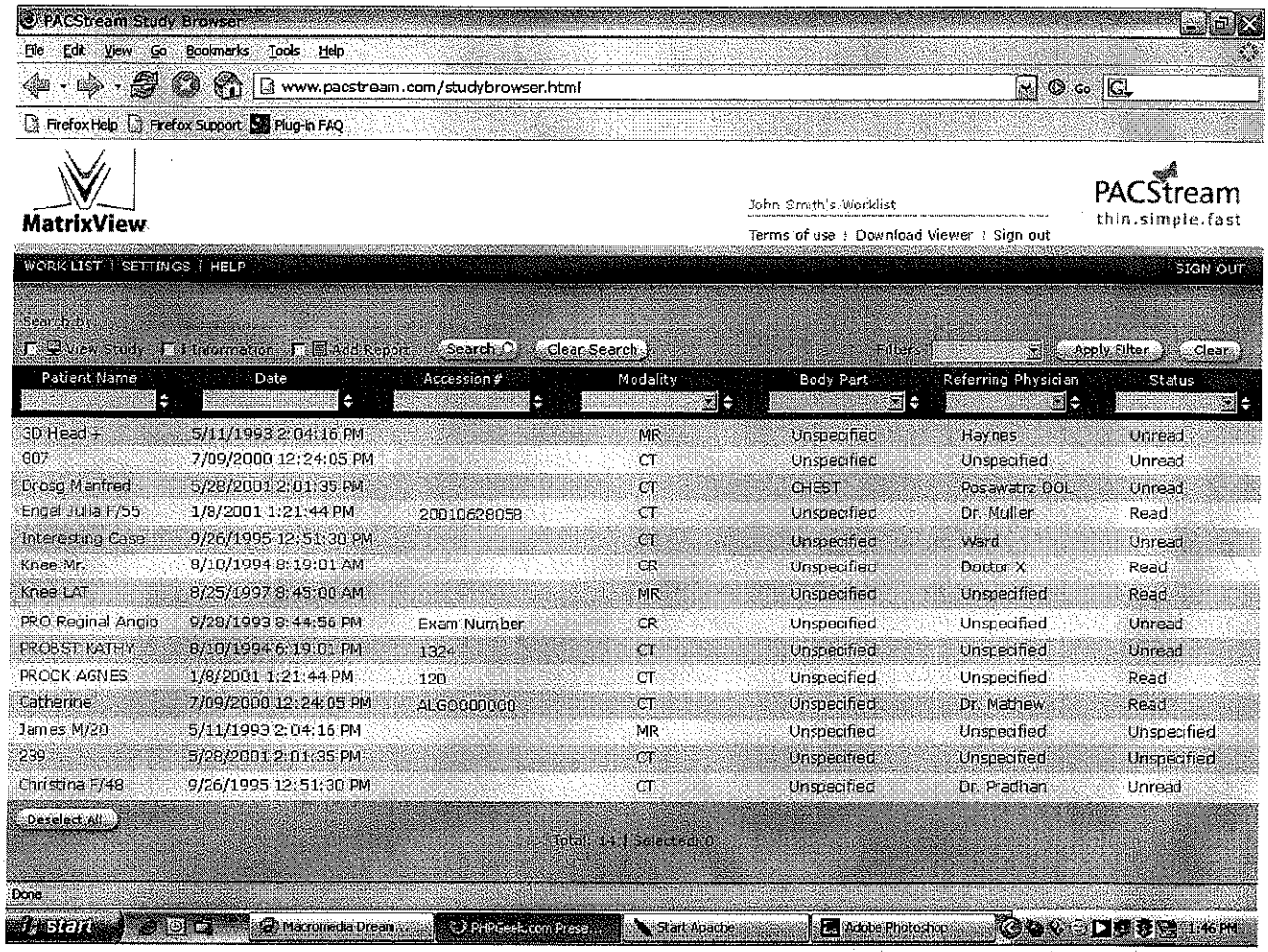
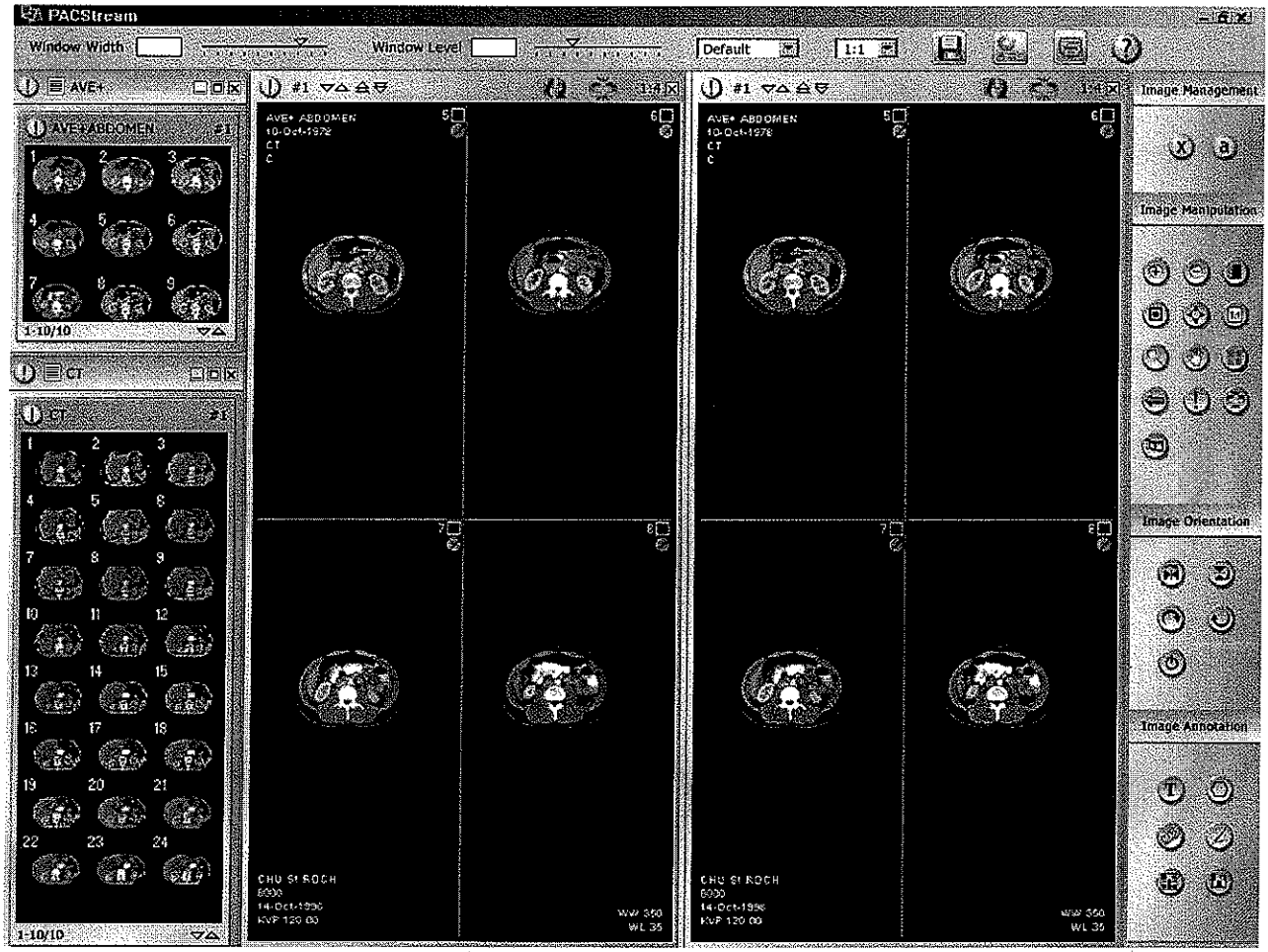

PACStream Study Browser
File Edit View Go Bookmarks Tools Help
www.pacstream.com/studybrowser.html
Firefox Help Firefox Support Plug-in FAQ
MatrixView
John Smith's Worklist
Terms of use : Download Viewer : Sign out
PACStream
thin.simple.fast
WORK LIST | SETTINGS | HELP
SIGN OUT
Search By:
View Study Information Add Report Search Clear Search
Filter: Apply Filter Clear
Patient Name | Date | Accession # | Modality | Body Part | Referring Physician | Status
3D Head + | 5/11/1993 2:04:16 PM | | MR | Unspecified | Haynes | Unread
807 | 7/09/2000 12:24:05 PM | | CT | Unspecified | Unspecified | Unread
Drosg Manfred | 5/28/2001 2:01:35 PM | | CT | CHEST | Posawatrz DOL | Unread
Engel Julia F/55 | 1/8/2001 1:21:44 PM | 20010628058 | CT | Unspecified | Dr. Muller | Read
Interesting Case | 9/26/1995 12:51:30 PM | | CT | Unspecified | Ward | Unread
Knee Mr | 8/10/1994 8:19:01 AM | | CR | Unspecified | Doctor X | Read
Knee LAT | 8/25/1997 8:45:00 AM | | MR | Unspecified | Unspecified | Read
PRO Reginal Angio | 9/28/1993 8:44:56 PM | Exam Number | CR | Unspecified | Unspecified | Unread
PROBST KATHY | 8/10/1994 6:19:01 PM | 1324 | CT | Unspecified | Unspecified | Unread
PROCK AGNES | 1/8/2001 1:21:44 PM | 120 | CT | Unspecified | Unspecified | Read
Catherine | 7/09/2000 12:24:05 PM | ALG0000000 | CT | Unspecified | Dr. Mathew | Read
James M/20 | 5/11/1993 2:04:16 PM | | MR | Unspecified | Unspecified | Unspecified
239 | 5/28/2001 2:01:35 PM | | CT | Unspecified | Unspecified | Unspecified
Christina F/48 | 9/26/1995 12:51:30 PM | | CT | Unspecified | Dr. Pradhan | Unread
Deselect All
Total: 14 | Selected: 0
Done
start
Macromedia Dream...
PHPGeek.com Press
Start Apache
Adobe Photoshop
1:46 PM

Figure 16


PACStream
Window Width
Window Level
Default
1:1
AVE+
AVE+ABDOMEN
CT
Image Management
Image Manipulation
Image Orientation
Image Annotation
1-10/10
CHU ST ROCH