

# PacsOne Server Installation Guide

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## GLOSSARY

PACS	Picture Archive and Communication System
DICOM	Digital Imaging and Communications in Medicine
HTML	Hyper-Text Mark-up Language
HTTP	Hyper Text Transfer Protocol
PHP	PHP: Hypertext Preprocessor
NEMA	National Electrical Manufacturers Association
AE	Application Entity
WAMP	Windows versions of Apache, MySQL and PHP
HL7	Health Level Seven
TLS	Transport Layer Security
PDO	PHP Data Objects
AWS	Amazon Web Services
AWS S3	Amazon Simple Storage Service
SSL	Secure Sockets Layer

## Table of Contents

<b>1</b>	<b>REVISION .....</b>	<b>6</b>
<b>2</b>	<b>REFERENCE DOCUMENTS.....</b>	<b>7</b>
<b>3</b>	<b>INTRODUCTION .....</b>	<b>8</b>
<b>4</b>	<b>PLATFORMS.....</b>	<b>8</b>
<b>5</b>	<b>INSTALLATION GUIDE .....</b>	<b>8</b>
5.1	MySQL Database Server .....	8
5.1.1	MySQL Server Default Configurations.....	9
5.1.1.1	MySQL Server 8.0 Or Later Releases.....	9
5.1.2	Verify MySQL Database Server Installation.....	9
5.2	Oracle Database Server (Premium Edition Only).....	9
5.3	PacsOne Server .....	10
5.3.1	Windows Platforms: .....	10
5.3.1.1	Windows Vista Platforms .....	12
5.3.1.2	Windows 64-Bit Platforms (Premium Edition Only).....	12
5.3.2	Linux Platform (Premium Edition Only).....	12
5.3.3	Mac OS X Platform (Premium Edition Only) .....	12
5.3.4	Security Context for Linux/MacOS platforms (Premium Edition Only).....	13
5.3.5	DICOM Specific Configurations:.....	13
5.3.6	Database Specific Configurations:.....	14
5.3.7	Storage Specific Configurations:.....	14
5.3.8	HL-7 Message Listener Configurations (Optional):.....	14
5.3.9	Installing Multiple Instances of PacsOne Server (Premium Edition Only) .....	15
5.3.9.1	Configuring Multiple Instances on Windows Platforms.....	15
5.3.9.2	Configuring Multiple Instances on Linux Platform .....	15
5.3.9.3	Configuring Multiple Instances on Mac OS X Platform.....	15
5.3.10	Trouble-Shooting PacsOne Server Installation .....	16
5.4	Apache HTTP Server and PHP Engine.....	16
5.4.1	HTTPD.CONF (Windows Platforms) .....	17
5.4.2	HTTPD.CONF (Linux or Mac OS X Platform) .....	18
5.4.3	PHP.INI .....	19
5.4.4	PHP4TS.DLL – PHP 4 Windows Users Only.....	20
5.4.5	LIBPHP4.SO – PHP 4 Linux Users Only.....	20
5.4.6	PHP5TS.DLL – PHP 5 Windows Users Only.....	20
5.4.7	PHP7TS.DLL – PHP 7 Windows Users Only.....	20
5.4.8	PHP8TS.DLL – PHP 8 Windows Users Only.....	20
5.4.9	LIBPHP5.SO – PHP 5 Linux or Mac OS X Users Only .....	20
5.4.10	LIBPHP7.SO – PHP 7 Linux or Mac OS X Users Only.....	20
5.4.1	LIBPHP8.SO – PHP 8 Linux or Mac OS X Users Only .....	20
5.4.2	SELinux Label – Linux Users only .....	20
5.4.3	Trouble-shooting Apache and PHP Installations .....	21
5.5	PHP Configuration File.....	21
5.5.1	PHP.INI – PHP 4 Windows Users Only.....	21
5.5.2	PHP.INI – PHP 5.0.x Windows Users Only.....	22
5.5.3	PHP.INI – PHP 5.1.x Windows Users Only.....	22
5.5.4	PHP.INI – PHP 5.2.x Windows Users Only.....	23
5.5.5	PHP.INI – PHP 5.3.x Windows Users Only.....	23
5.5.6	PHP.INI – PHP 5.4.x Windows Users Only.....	24
5.5.7	PHP.INI – PHP 5.5.x Windows Users Only.....	25

5.5.8	PHP.INI – PHP 5.6.x Windows Users Only .....	26
5.5.9	PHP.INI – PHP 7.x Windows Users Only .....	26
5.5.10	PHP.INI – PHP 8.x Windows Users Only .....	27
5.5.11	PHP.INI – For Windows Users Who Have Installed Version 7.2.1 or later releases of PacsOne Server .....	28
5.5.12	PHP.INI – For Users Who Are Using Oracle Database instead of MySQL .....	28
5.5.13	PHP.INI – Linux or Mac OS X Users Only .....	29
5.5.14	PHP Magic Quotes .....	30
5.5.15	PHP <code>SESSION.SAVE_PATH</code> Variable .....	30
5.5.15.1	Windows Platforms: .....	30
5.5.15.2	Linux or Mac OS X Platform: .....	31
5.6	ImageMagick PHP Module .....	31
5.6.1	Copy ‘php_imagick.dll’ – PHP 4.x Windows Users Only .....	31
5.6.2	Copy ‘php5_imagick.dll’ – PHP 5.0.x Windows Users Only .....	32
5.6.3	Copy ‘php5.1_imagick.dll’ – PHP 5.1.x Windows Users Only .....	32
5.6.4	Copy ‘php5.2_imagick.dll’ – PHP 5.2.x Windows Users .....	32
5.6.5	Copy ‘php5.3_imagick.dll’ – PHP 5.3.x Windows Users .....	33
5.6.6	Copy ‘php5.4_imagick.dll’ – PHP 5.4.x Windows Users .....	33
5.6.6.1	Copy of ‘php5.4_imagick.dll’ – PHP 5.4.x Windows IIS Users .....	34
5.6.7	Copy ‘php5.5_imagick.dll/php5.6_imagick.dll’ – PHP 5.5/5.6 Windows Users .....	34
5.6.7.1	Copy of ‘php5.5_imagick.dll/php5.6_imagick.dll’ – PHP 5.5/5.6 Windows IIS Users .....	35
5.6.8	Copy ‘php7.x_imagick.dll’ – PHP 7.x Windows Users .....	35
5.6.8.1	Copy of ‘php7.x_imagick.dll’ – PHP 7.x Windows IIS Users .....	36
5.6.9	Copy ‘php8.x_imagick.dll’ – PHP 8.x Windows Users .....	36
5.6.10	Copy ‘imagick.so’ – PHP 4.x Linux Users Only .....	36
5.6.11	Copy ‘imagick.so’ – PHP 5.0.x Linux Users Only .....	37
5.6.12	Copy ‘imagick.so’ – PHP 5.1.x Linux Users Only .....	38
5.6.13	Copy ‘imagick.so’ – PHP 5.2.x Linux/Mac OS X Users .....	39
5.6.14	Copy ‘imagick.so’ – PHP 5.3.x Linux/Mac OS X Users .....	39
5.6.15	Copy ‘imagick.so’ – PHP 5.4.x Linux/Mac OS X Users .....	40
5.6.16	Copy ‘imagick.so’ – PHP 5.5/5.6 Linux/Mac OS X Users .....	41
5.6.17	Copy ‘imagick.so’ – PHP 7.x Linux Users .....	41
5.6.18	Copy ‘imagick.so’ – PHP 8.x Linux Users .....	42
5.6.19	Thread-Safe (ZTS) Builds of ‘imagick.so’ .....	43
5.6.20	Ghost Script Standard Fonts – Linux or Mac OS X Users Only .....	43
5.6.21	Trouble-shooting ImageMagick PHP Extension .....	44
5.6.22	Login to PacsOne .....	44
5.7	WAMP Server Installations .....	44
5.8	Web-based Dicom Image Viewers .....	45
5.8.1	CornerStone Viewer (Default) implemented via HTML5/JavaScript .....	45
5.8.2	AiViewer implemented via Java Applet .....	45
5.8.3	Other Open-Source/Commercial Web-based Viewers .....	45
<b>6</b>	<b>UPGRADE PROCEDURES .....</b>	<b>45</b>
6.1	Upgrading from Version 3.1.8 or earlier versions of PacsOne Server Premium Edition: .....	46
6.2	Windows Platforms: .....	46
6.2.1	Potential Issue Starting PacsOne Server Service After a Windows Upgrade .....	46
6.3	Linux Platform (Premium Edition Only): .....	47
6.4	Mac OS X Platform (Premium Edition Only): .....	48
6.5	Trouble-shooting Upgrade Issues .....	49

## List of Figures

Figure 1 - Running Setup.exe for PacsOne Server Installation .....	11
Figure 2 - Security Permissions for PHP Session Directory (Windows Platforms) .....	31

## List of Tables

Table 1: Revisions .....	7
Table 2: Reference Documents.....	7

# 1 Revision

Date	Revision	Author (s)	Reason
1/3/2004	1.0	Xiaohui Li	Initial version
7/15/2004	1.1	Xiaohui Li	Added Notes about PHP 5
8/1/2004	1.2	Xiaohui Li	Added sections for PHP 5 support
11/15/2004	2.1	Xiaohui Li	Added sections for Linux support
12/27/2004	2.2	Xiaohui Li	Support MySql 4.1.x releases
02/08/2005	2.3	Xiaohui Li	Added MySQL/PHP dependencies
04/02/2005	2.4	Xiaohui Li	Update MIME type for PHP scripts in HTTPD.CONF configuration
05/30/2005	2.5	Xiaohui Li	Fixed typos and add notes about stand-alone ImageMagick distributions
11/6/2005	2.6	Xiaohui Li	Remove references to Linux shared libraries that are no longer required
01/05/2006	2.7	Xiaohui Li	Support PHP 5.1.x releases
05/11/2006	4.0.1	Xiaohui Li	Added optional HL-7 Listener module
11/20/2006	4.1.3	Xiaohui Li	Support Apache 2.2/PHP 5.2 releases
04/12/2007	5.1.1	Xiaohui Li	Added sections for Mac OS X support
07/15/2007	5.1.2	Xiaohui Li	Added notes about WAMP Server
01/28/2008	5.1.4	Xiaohui Li	Added notes about Windows Vista
11/08/2008	6.1.3	Xiaohui Li	Added section about PHP Magic Quotes
06/02/2009	6.2.1	Xiaohui Li	Added references to Oracle database
01/28/2010	6.2.2	Xiaohui Li	Added support for PHP 5.3.x
04/18/2010	6.2.3	Xiaohui Li	Added notes about checking for MySQL socket name in PHP.INI configuration file for Linux/MacOS platforms
7/4/2010	6.2.4	Xiaohui Li	Added notes about running PacsOne Server service under user-specified User/Group context for Linux/MacOS platforms
6/28/2011	6.3.2	Xiaohui Li	Added Microsoft Visual Studio 2008 (VC9) build of the ImageMagick PHP extension (“php5.3_imagick.dll”).
1/28/2012	6.3.3	Xiaohui Li	Added notes about including Microsoft Visual C++ 2005 Redistributable Run-time Library package for Windows platforms
9/18/2012	6.3.5	Xiaohui Li	Added support for PHP 5.4.x
4/28/2013	6.3.7	Xiaohui Li	Added note for non-ThreadSafe (NTS) Visual Studio 2008 (VC9) build of the ImageMagick PHP extension for PHP 5.4.x
9/28/2013	6.3.8	Xiaohui Li	Added note for configuring the “ <b>pacson</b> e” Alias in the HTTPD.CONF configuration file for Apache 2.4.x or later releases
1/28/2014	6.4.1	Xiaohui Li	Added note about loading the COM extension DLL for Windows PHP 5.4.x users who want to use the <b>Tools→Transcription Template</b> feature; Added note about 64-bit Windows platforms
9/18/2014	6.4.3	Xiaohui Li	Added note about the default non-Thread Safety (NTS) builds for the latest PHP 5.4.x and 5.5.x releases for Linux platforms
1/28/2015	6.4.4	Xiaohui Li	Added support for PHP 5.6.x
1/28/2016	6.5.1	Xiaohui Li	Added section for supported web/browser-based

			Dicom image viewers
9/28/2016	6.5.3	Xiaohui Li	Added note about obsolete Windows platforms (e.g., Windows XP, Windows 2003 Server, etc.)
1/28/2017	6.6.1	Xiaohui Li	Added note about PHP 7.x not yet supported; Update Linux kernel version requirement
9/28/2017	6.6.3	Xiaohui Li	Added support for PHP 7.1
1/23/2018	6.7.1	Xiaohui Li	Added ' <b>mbstring</b> ' PHP extension for support of DicomWeb RESTful services
1/28/2019	6.8.1	Xiaohui Li	Replaced ' <b>Mcrypt</b> ' with ' <b>Sodium</b> ' PHP extension as ' <b>Mcrypt</b> ' has been deprecated starting from PHP 7.2
9/26/2019	6.8.2	Xiaohui Li	Added note about PHP not yet supporting the new ' <b>caching_sha2_password</b> ' default plug-in in MySQL 8.x
9/2/2020	7.1.1	Xiaohui Li	Added sections for the Dicom Transport Layer Security (TLS) option
1/28/2021	7.2.1	Xiaohui Li	Added sections about switching from the MySQL Improved (' <b>mysqli</b> ') to the PHP Data Objects (PDO) for MySQL extension (' <b>pdo_mysql</b> ') when connecting to MySQL/MariaDB databases
9/16/2022	7.2.7	Xiaohui Li	Added sections about the Thread-Safe ( <b>ZTS</b> ) builds and SELinux configurations for Linux platforms; Added URL link to download Ghost Script Standard Fonts
9/20/2023	7.3.1	Xiaohui Li	Added note about required PHP <b>mbstring</b> and <b>sodium</b> extensions for AWS S3 long-term storage option
1/28/2024	7.3.2	Xiaohui Li	Added note about potential issue where PacsOne Server service may not start properly after a Windows Upgrade

Table 1: Revisions

## 2 Reference Documents

No.	Standards	Date	Description
1.	Digital Imaging and Communications in Medicine (DICOM) Version 3.0	2009	Part 1 through Part 16 of the 2008 DICOM 3.0 Standard
2.	PacsOne User's Manual	2023	PacsOne Server User's Manual

Table 2: Reference Documents

## 3 Introduction

PacsOne is a DICOM 3.0 compliant Picture Archive and Communication System (PACS) application, which consists of the following components:

- ◆ A DICOM protocol server for servicing requests for image storage, query and retrieval.
- ◆ MySQL, MariaDB or Oracle databases for managing image records and related patient, study, series, worklist information.
- ◆ A HTTP server such as Apache 2.x or Microsoft IIS, and PHP scripting engine for presenting a web-based user interface for managing and navigating through database records.
- ◆ ImageMagick PHP module for displaying Dicom images through client's web browsers.

## 4 Platforms

PacsOne Server Premium Edition supports the following platform (s):

- ◆ Windows 2008/2012 Server, 2008/2012 Server R2, 2016 Server, 2019 Server
- ◆ Windows Vista/Windows 7/Windows 8/Windows 10
- ◆ Linux (kernel version 2.6.32 or higher) 32-Bit or 64-Bit
- ◆ ~~Mae OS X (Release 10.4 or later) for Intel/AMD x86 or x86\_64 processors - discontinued~~

## 5 Installation Guide

Because PacsOne Server requires many third-party/open-source components, which are not bundled as a single installation package, **it is mandatory that the following installation procedures be followed in the order specified below, in order to avoid potential issues during PacsOne Server installation.**

### 5.1 MySQL Database Server

PacsOne Server requires MySQL database server release 3.23.53 or higher. The latest released version of MySQL can be downloaded from:

<http://www.mysql.com/downloads/index.html>

NOTE: On Windows NT/2000/XP/2003 Server (these platforms are now obsolete and therefore NOT recommended for use with PacsOne Server), the older MySQL setup programs might NOT install MySQL as a service automatically. If this is the case, you need to run the following command manually from a command shell to make sure MySQL is installed to run as a service:

```
shell> {MySQL_Executable_Path}\mysqld --install
```

where {MySQL\_Executable\_Path} is the pathname to MySQL executables. (e.g., C:\mysql\bin\)

After installing MySQL Server successfully, the super-user '**root**' needs to be setup for MySQL:

- ◆ Since the initial password for '**root**' is empty, it's recommended to setup a non-empty '**root**' password first for security reasons:

```
shell>mysqladmin -u root password NEW_PASSWORD
```

where NEW\_PASSWORD is the new non-empty password for '**root**'.

The super-user '**root**' and password are required to create a MySQL built-in username/password for PacsOne Server installation below, and create web user accounts or setup user privileges through the PacsOne Web User Interface.

### 5.1.1 MySQL Server Default Configurations

The following default configuration settings are recommended for MySQL Server:

- ◆ MySQL Server Default Character Set – "**latin1**"
- ◆ Default Storage Engine – **InnoDB**

The above settings can be configured via the "**my.ini**" configuration file under the data folder where MySQL Server is installed.

#### 5.1.1.1 MySQL Server 8.0 Or Later Releases

For users who want to install MySQL 8.0 or later releases, the default authentication plug-in has been changed to the new '**caching\_sha2\_password**' plug-in (instead of '**mysql\_native\_password**' ), which is not yet supported by any PHP release prior to PHP 7.4. So if you want to install MySQL 8.0 or later releases, you need to either select the "**Use Legacy Authentication Method (Retain MySQL 5.x Compatibility)**" option instead of the default authentication option, or if MySQL 8.0 or later release has already been installed with the default authentication option, you need to add the following entry in the "[**mysqld**]" section in the MySQL Configuration File ("**my.ini**"):

```
[mysqld]
default-authentication-plugin=mysql_native_password
```

### 5.1.2 Verify MySQL Database Server Installation

Follow the procedures below to verify MySQL database server has been installed successfully:

On Windows platforms:

- ◆ Open a Windows command shell (Start→Run→cmd)
- ◆ Change directory to where MySQL executables are installed, e.g., C:\mysql\bin

On Linux or Mac OS X, open a terminal window (xterm or GNOME Terminal):

- ◆ Login in to MySQL as root:

```
shell>mysql -u root -p
```

- ◆ Try creating a test database:

```
mysql>create database dummy;
```

- ◆ If the above command is successful, your MySQL installation is fine. Otherwise, refer to MySQL installation documentation to trouble-shoot where the problem is.
- ◆ Remove the test database and logout:

```
mysql>drop database dummy;
mysql>exit;
```

## 5.2 Oracle Database Server (Premium Edition Only)

PacsOne Server Premium Edition requires Oracle database server release 10.2.0.3 or later, although earlier releases may also work but they have not been tested with PacsOne Server. The latest released version of Oracle can be downloaded from:

<http://www.oracle.com/technology/software/products/database/index.html>

## 5.3 PacsOne Server

After MySQL database server has been installed successfully, you can proceed to install PacsOne Server by running the self-extracting Installer downloaded from our website for the following platforms:

### 5.3.1 Windows Platforms:

The Windows version of PacsOne Server installation packages include a Microsoft Visual C++ 2005/2008 Redistributable Run-time Library package, which will be installed as a prerequisite of PacsOne Server. This package can also be downloaded and installed manually from Microsoft:

<http://www.microsoft.com/download/en/details.aspx?id=26347>

The following is a snapshot of running PacsOne Server installation program with the detailed specification about all configurable parameters:

The screenshot shows the 'PACS ONE Installer' window with the following configuration sections:

- DICOM**
  - Application Entity Title: PacsOne
  - Server Port: 1234
  - Log File Directory: D:\Program Files\PacsOne\log
  - Enable TLS/SSL Option
    - TLS Port: 5678
    - SSL Certificate: D:\Program Files\PacsOne\ssl\PacsOne\PacsOne.cer (Browse...)
    - SSL Private Key: D:\Program Files\PacsOne\ssl\PacsOne\PacsOne.k (Browse...)
- Database**
  - Database Host: localhost
  - Database Port: 3306
  - Database Name: PacsOne
  - Username: dicom
  - Password: \*\*\*\*\*
- Storage**
  - Default Archive Directory: D:/Archive/
  - Archive Format: DicomPart10 (Default)
  - Enable AWS S3 Bucket Option
- HL-7 Message Listener Option**
  - Enable HL-7 Message Listener Option
  - HL-7 Listener Port: 7777
  - HL-7 Message Persistence: 90 Days

Buttons at the bottom: Upgrade, Install, Uninstall, Cancel

Figure 1 - Running Setup.exe for PacsOne Server Installation

### 5.3.1.1 Windows Vista Platforms

Due to a known issue with the MySQL client library (<http://bugs.mysql.com/bug.php?id=33031>), PacsOne Server may not run properly as a service under Vista platforms under the Windows default **Local System** account. The work-around is to run PacsOne Server under a local Administrator account instead. So you may need to click on Control Panel→Administrative Tools→Services→PacsOne Server Premium Edition→Log On As, and select one of the local Administrator's accounts to run PacsOne Server.

### 5.3.1.2 Windows 64-Bit Platforms (Premium Edition Only)

The 64-bit Windows version of PacsOne Server supports **ONLY** 64-bit Windows platforms (x86\_64), and it's compatible with only the 64-bit version of the following components:

- ◆ MySQL
- ◆ Apache, IIS or any other web server which supports PHP
- ◆ PHP

If you want to run WAMP Server (<http://ww.wampserver.com>) with the 64-bit version of PacsOne Server, make sure you download and install the **64-bit** versions of WAMP Server instead of the 32-bit versions.

### 5.3.2 Linux Platform (Premium Edition Only)

The Linux version of PacsOne Server Premium Edition requires the Linux kernel version **2.6.32** or higher, as well as the **libtool** package for installation of PacsOne Server.

PacsOne Server Premium Edition Linux distribution is packaged in a gzipped tarball, e.g., `pacstone-2.1.1.tar.gz`. To install the downloaded PacsOne Server Linux package, switch user to the administrator's account (`'root'`), copy the package to a designated directory (or create a new one) and extract the package.

For example:

```
# mkdir /home/pacsone
# chmod 644 /home/pacsone
# cp pacstone-2.1.1.tar.gz /home/pacsone
# cd /home/pacsone
# tar xvfz pacstone-2.1.1.tar.gz
# ./install.sh
```

The PacsOne Server installation script will configure automatic startup and shutdown scripts in `/etc/rc3.d/`, `/etc/rc5.d/`, and `/etc/init.d/`, configure required shared libraries in `/usr/local/lib/`, and then run the text-version of the PacsOne Server installer program `'Setup.exe'`. If the installation is successful, PacsOne Server will be started automatically at the end of the installation.

### 5.3.3 Mac OS X Platform (Premium Edition Only)

The Mac OS X version of PacsOne Server Premium Edition requires the Mac OS X Release **10.4** or later and x86 processors, as well as the **libtool** package for installation of PacsOne Server.

PacsOne Server Premium Edition Mac OS distribution is packaged in a gzipped tarball, e.g., `pacstone-5.1.1-Darwin-i686.tar.gz`. To install the downloaded PacsOne Server Linux package, switch user to the administrator's account (`'root'`), copy the package to a designated directory (or create a new one) and extract the package.

For example:

```
# mkdir /home/pacsone
# chmod 644 /home/pacsone
# cp pacsone-5.1.1-Darwin-i686.tar.gz /home/pacsone
# cd /home/pacsone
# tar xvfz pacsone-5.1.1-Darwin-i686.tar.gz
# ./install.sh
```

The PacsOne Server installation script will configure automatic startup and shutdown scripts in `/Library/StartupItems/`, configure required shared libraries in `/usr/local/lib/`, and then run the text-version of the PacsOne Server installer program `Setup.exe`. If the installation is successful, PacsOne Server will be started automatically at the end of the installation.

### 5.3.4 Security Context for Linux/macOS platforms (Premium Edition Only)

Since the Apache web server service needs to read from the Archive Directories where PacsOne Server stores the received Dicom images in order to convert them into thumbnail/full-size JPG/GIF images for the client web browsers, the Apache web server service needs to run under either the same user or group context as the PacsOne Server service, so that Apache can read from the sub-folders created by PacsOne Server to convert the received Dicom images into thumbnail/full-size JPG/GIF images for the web browsers.

By default, all instances of PacsOne Server run under the `“root/root”` User/Group context. User can configure an instance of PacsOne Server to run under specific User/Group context, by adding the following directive to the `“${AeTitle}.ini”` configuration file under the directory where PacsOne Server is installed. For example:

```
RunAsUser = pacsone
RunAsGroup = pacsone
```

The above 2 directives will configure this instance of PacsOne Server to run as `“pacsone/pacsone”` User/Group context, instead of the default `“root/root”` context. Once this is configured, users can then configure the Apache web server security context (default is `“www-data/www-data”`) to match with the `“pacsone”` Group, by adding User `“www-data”` to the `“pacsone”` Group, so that Apache web server can read from the sub-folders created by PacsOne Server when converting received raw Dicom images into browser-friendly JPG/GIF images.

### 5.3.5 DICOM Specific Configurations:

#### ◆ APPLICATION ENTITY TITLE:

This is the Application Entity Title used by PacsOne Server when it services requests from other DICOM compliant clients or application entities.

#### ◆ SERVER PORT:

The TCP port number PacsOne Server listens to for incoming Dicom associations. It should be set it to a value larger than 1024 (default is port 1234) to avoid conflicts with reserved ports.

#### ◆ TLS PORT (optional):

If the Dicom TLS option is enabled, this is the TCP port number PacsOne Server listens to for incoming Dicom TLS connections. It should be set it to a value larger than 1024 (default is port 5678) to avoid conflicts with reserved ports.

#### ◆ SSL Certificate/Private Key (optional):

If the Dicom TLS option is enabled, this set of SSL Certificate/Private Key will be used to identify PacsOne Server when it tries to establish Dicom TLS connections with a remote peer. By default, PacsOne Server includes a set of private/self-signed SSL Certificate/Private Key under the directory where it is installed:

- PacsOne.crt (private/self-signed SSL Certificate)
- PacsOne.key (private/self-signed SSL Private Key)

And they can be replaced by a set of official SSL Certificate/Private Key issued by a public Certificate Authority (CA) if the remote peer requires SSL Certificate Authentication.

◆ LOG FILE DIRECTORY:

Directory where PacsOne Server writes its log files. The value defaults to the 'log' sub-directory where PacsOne Server was installed.

### 5.3.6 Database Specific Configurations:

◆ DATABASE HOST, DATABASE NAME, USERNAME and PASSWORD:

These are the MySQL/Oracle database host, database name, username and password configured for PacsOne Server. If the specified MySQL/Oracle username/password does not yet exist (for example, when setting up PacsOne Server for the first time), the setup program will prompt you for the password of the System Administrator/super-user ('root' for MySQL or 'SYSTEM' for Oracle) and create a new MySQL/Oracle user using the specified username and password. If the specified MySQL/Oracle database does not yet exist but the <Install> push button is pressed, then it will be created replacing any existing database with the same name.

◆ [N]ew Installation or [U]pgrade (Linux Platform):

This is the equivalent of the <Install> and <Upgrade> push buttons in the Windows Installer window. Typing 'N' or 'n' will start a new installation where any existing database tables will be removed. Typing a 'U' or 'u' will perform an upgrade where existing database tables will be preserved and updated.

### 5.3.7 Storage Specific Configurations:

◆ DEFAULT ARCHIVE DIRECTORY:

This is the default directory PacsOne Server stores its received images if it doesn't know where to store it based on the application entity title of the requesting client. Refer to PacsOne Server User's Guide for details about Managing the Application Entity table through the web interface.

◆ ARCHIVE FORMAT:

There're two (2) available formats for storing received images: DICOM Part 10 (Default) or Native (without Part 10 header). **NOTE: The "Native" format is NOT recommended due to the lack of Dicom Part-10 Meta-Information header. Images encoded in the Native format may have compatibility issues with other Dicom devices/applications.**

Once the above entry fields are configured, press the <Install> button to install PacsOne Server. The setup program will display any error with specific error messages and possible source of the errors. If everything has been configured properly, the setup program will display a message box "Installation Successful" before exiting.

### 5.3.8 HL-7 Message Listener Configurations (Optional):

Users can optionally enable the HL-7 Message Listener in order to receive and send HL-7 messages.

◆ HL-7 Listener Port (Default: 7777):

The TCP port number the HL-7 Message Listener process listens to. It should be set to a value larger than 1024 to avoid conflicts with reserved/well-known ports.

◆ HL-7 Message Persistence (Default: 90 days):

This is the purge interval for received HL-7 messages. All HL-7 messages are received and will be kept in the database for this many days. After this period, they will be aged and removed from the database to make room for new messages.

### 5.3.9 Installing Multiple Instances of PacsOne Server (Premium Edition Only)

By default, the PacsOne Server trial license only allows one PacsOne Server instance, so if you need to configure multiple instances of PacsOne Server, please contact <mailto:license.info@pacsone.net> to request a special PacsOne Server trial license that supports multiple instances.

If you have purchased PacsOne Server license for multiple server instances, you can install multiple PacsOne Server instances on the same machine but running as different AE titles and different TCP listen ports. This feature is useful if you want to setup PacsOne Server to service images transmitted from multiple image modalities transparently as multiple virtual PACS servers, or if you want to service multiple groups of PACS users by using separate PACS databases on the same machine.

#### 5.3.9.1 Configuring Multiple Instances on Windows Platforms

To install multiple instances of PacsOne Server, run the 'Setup.exe' program located in the directory where PacsOne Server is installed. Be sure to enter a different AE title and TCP listen port number for each server instance. If you specify the same MySQL database name for all PacsOne server instances, then the database tables will be shared among all server instances, i.e., a single PacsOne database configuration. If you specify different MySQL database names for different PacsOne server instances, then the database tables in each database are independent of each other and so are the server instances, i.e., multiple independent PacsOne databases configuration.

#### 5.3.9.2 Configuring Multiple Instances on Linux Platform

The easiest way to configure multiple instances of PacsOne Server on Linux platform is to clone the existing instance. For example, if you have configured your current PacsOne Server as AE title 'pacsone', all configurations for this server instance are saved in the file 'pacsone.ini' under the directory where PacsOne Server is installed. For example, if the AE Title for the new server instance is 'pacsone2', you can simply configure more instances by cloning the 'pacsone.ini' file:

```
# /etc/init.d/pacsone stop
# cp /home/pacsone/pacsone.ini /home/pacsone/pacsone2.ini
```

You will need to modify the cloned '.ini' files to assign the new AE title, a different TCP listen port number for each server instance. If you specify the same MySQL database name for all PacsOne server instances, then the database tables will be shared among all server instances, i.e., a single PacsOne database configuration. If you specify different MySQL database names for different PacsOne server instances, then the database tables in each database are independent of each other and so are the server instances, i.e., multiple independent PacsOne databases configuration.

After you are done with cloning the '.ini' files, you can start PacsOne Server again:

```
# /etc/init.d/pacsone start
```

#### 5.3.9.3 Configuring Multiple Instances on Mac OS X Platform

The easiest way to configure multiple instances of PacsOne Server on Linux platform is to clone the existing instance. For example, if you have configured your current PacsOne Server as AE title 'pacsone', all

configurations for this server instance are saved in the file 'pacsone.ini' under the directory where PacsOne Server is installed. For example, if the AE Title for the new server instance is 'pacsone2', you can simply configure more instances by cloning the 'pacsone.ini' file:

```
# /sbin/SystemStarter stop "PacsOne Server Premium Edition"  
# cp /home/pacsone/pacsone.ini /home/pacsone/pacsone2.ini
```

You will need to modify the cloned '.ini' files to assign the new AE title, a different TCP listen port number for each server instance. If you specify the same MySQL database name for all PacsOne server instances, then the database tables will be shared among all server instances, i.e., a single PacsOne database configuration. If you specify different MySQL database names for different PacsOne server instances, then the database tables in each database are independent of each other and so are the server instances, i.e., multiple independent PacsOne databases configuration.

After you are done with cloning the '.ini' files, you can start PacsOne Server again:

```
# /sbin/SystemStarter start "PacsOne Server Premium Edition"
```

### 5.3.10 Trouble-Shooting PacsOne Server Installation

In addition to the potential error messages generated from the setup program, you can also check the following for helpful hints:

- ◆ Log Files:

Underneath the 'log' sub-directory of where PacsOne Server is installed, you can check the following log files depending on the type of installation you have selected:

1. 'db\_install.log' if you have pressed the 'Install' push button
2. 'db\_upgrade.log' if you have pressed the 'Upgrade' push button

- ◆ Window Registry (Windows Platforms):

You can check and compare the values of the following Windows Registry key with the values you have entered through the setup program:

```
HKEY_LOCAL_MACHINE\Software\Rainbowfish Software\Pacsone\{AETITLE}\
```

Where AETITLE is the Application Entity Title you configured using the setup program.

- ◆ .INI Files (Linux or Mac OS X Platform):

All server settings for PacsOne Server are saved in {AETITLE}.ini file under the directory where PacsOne Server is installed. You can open the text file and check for any discrepancies against the information you entered during PacsOne Server installation.

## 5.4 Apache HTTP Server and PHP Engine

PacsOne Server requires Apache Web Server 2.0.44 or higher and PHP release 4.3.1 or higher. More recent releases of MySQL may require the installed PHP versions to be more up-to-date, for example, if you have installed MySQL 4.1.x, you will need to install PHP 5.x instead of PHP 4.x.

**For users who have installed Apache 2.2 releases, PHP 5.2.x/5.3.x is required to work with the Apache 2.2 releases.**

NOTE: PacsOne should work with any HTTP server which supports PHP engine, including Microsoft IIS, OmniHTTP Server, etc. The documentation in this section only covers the installation and configuration of the Apache server and PHP.

The latest released version of Apache 2.x Server can be downloaded from:

<http://httpd.apache.org/download.cgi>

For Windows installations of the Apache 2.x Server, it is recommended to download the **MSI** (Microsoft Installer) package instead of the **ZIP** package since it is easier to install.

The latest released version of PHP (**ZIP** package only, not the **MSI** package) can be downloaded from:

<http://www.php.net/downloads.php>

It's recommended to run PHP as an Apache module instead of CGI executables due to both performance and security reasons.

NOTE: For 64-bit **MacOS X** platforms running Snow Leopard or later releases, Apache/PHP packages are built with Universal-Architecture binaries by default, i.e., they contain compiled binaries for multiple CPU architectures, e.g., i386 (32-bit), x86\_64 (64-bit), PowerPC, etc. Since PacsOne Server runs only as 32-bit application on MacOS X platforms, you may need to strip out the other pre-built binaries and leave only the 32-bit architecture for the Apache/PHP package bundled with MacOS X 64-bit platforms, in order for Apache/PHP to load the ImageMagick PHP extension successfully which is 32-bit only for MacOS X platforms.

#### 5.4.1 HTTPD.CONF (Windows Platforms)

This is the main Apache configuration file, the following lines should be added or modified in corresponding sections to configure PHP as an Apache module:

\*\*\*\*\* **BEGIN: "HTTPD.CONF" Windows Platforms** \*\*\*\*\*

For Users who have installed PHP 4:

\*\*\*\*\* **BEGIN: Loadable Modules – PHP 4 Users Only** \*\*\*\*\*

```
#
# Loadable modules
#
LoadModule php4_module "{PHP4_INSTALL_DIR}/sapi/php4apache2.dll"
***** END: Loadable Modules – PHP 4 Users Only *****
```

For Users who have installed PHP 5:

\*\*\*\*\* **BEGIN: Loadable Modules – PHP 5 Users Only** \*\*\*\*\*

```
#
# Loadable modules
#
LoadModule php5_module "{PHP5_INSTALL_DIR}/php5apache2.dll"
```

For Users who have installed Apache 2.2.x, please enter the following line instead:

```
LoadModule php5_module "{PHP5_INSTALL_DIR}/php5apache2_2.dll"
***** END: Loadable Modules – PHP 5 Users Only *****
```

For PacsOne Server specific configurations, you will need to make the following additional changes to the HTTPD.CONF file as the following:

\*\*\*\*\* **BEGIN: TypesConfig Module** \*\*\*\*\*

```

#
# TypesConfig describes where the mime.types file (or equivalent) is
# to be found.
#
TypesConfig conf/mime.types

AddType application/x-httpd-php .php

***** END: TypesConfig Modules *****

***** BEGIN: Aliases *****

#
# Alias
#
Alias /pacsonone "{PACSONONE_INSTALL_DIR}/php"
<Directory "{PACSONONE_INSTALL_DIR}/php">
    Options MultiViews
    AllowOverride None
    # comment out the following 2 lines for Apache 2.4.x or later releases
    #Order allow,deny
    #Allow from all
    # Un-comment the following line for Apache 2.4.x or later releases
    Require all granted
</Directory>
***** END: Aliases *****

***** END: "HTTPD.CONF" Windows Platforms *****

```

where:

- ◆ PHP4\_INSTALL\_DIR is the directory where PHP 4 is installed or
- ◆ PHP5\_INSTALL\_DIR is the directory where PHP 5 is installed.
- ◆ PACSONONE\_INSTALL\_DIR is the directory where PacsOne Server is installed.

## 5.4.2 HTTPD.CONF (Linux or Mac OS X Platform)

The PHP distribution on Linux platform does not have the required **mysql**, **zlib** modules compiled by default (unlike the Windows distributions), neither does it build the Apache 2 PHP module by default. So you will have to build these modules manually by following instructions in the **INSTALL** file included with your PHP distribution package. For example:

```

# ./configure --with-apxs2=/usr/local/apache2/bin/apxs --with-mysql --with-
zlib
# make
# make install

```

For users who have installed MySQL 4.1.x or higher releases, the MySQL Improved PHP extension (**MYSQLI**) should be used instead of the regular MySQL PHP extension (**MYSQL**). The option “--with-mysql” above should be changed to “--with-mysqli” when configuring the above PHP build environments.

If the above ‘make install’ command runs successfully, the PHP module for Apache 2 (‘libphp4.so’ or ‘libphp5.so’) should have been installed automatically in /usr/local/apache2/modules/, and your HTTPD.CONF file should have been modified automatically to include the PHP module. If not, you will need to manually edit the HTTPD.CONF file as the following:

```

***** BEGIN: "HTTPD.CONF" Linux Platform *****

```

For Users who have installed PHP 4:

```
***** BEGIN: Loadable Modules – PHP 4 Users Only *****
#
# Loadable modules
#
LoadModule php4_module modules/libphp4.so
***** END: Loadable Modules – PHP 4 Users Only *****
```

For Users who have installed PHP 5:

```
***** BEGIN: Loadable Modules – PHP 5 Users Only *****
#
# Loadable modules
#
LoadModule php5_module modules/libphp5.so
***** END: Loadable Modules – PHP 5 Users Only *****
```

For PacsOne Server specific configurations, you will need to make the following additional changes to the HTTPD.CONF file as the following:

```
***** BEGIN: TypesConfig Module *****
#
# TypesConfig describes where the mime.types file (or equivalent) is
# to be found.
#
TypesConfig conf/mime.types

AddType application/x-httpd-php .php

***** END: TypesConfig Modules *****
```

```
***** BEGIN: Aliases *****
#
# Alias
#
Alias /pacstone "{PACSTONE_INSTALL_DIR}/php"
<Directory "{PACSTONE_INSTALL_DIR}/php">
    Options MultiViews
    AllowOverride None
    # comment out the following 2 lines for Apache 2.4.x or later releases
    #Order allow,deny
    #Allow from all
    # Un-comment the following line for Apache 2.4.x or later releases
    Require all granted
</Directory>
***** END: Aliases *****
```

```
***** END: "HTTPD.CONF" Linux Platform *****
```

where:

- ◆ PACSTONE\_INSTALL\_DIR is the directory where PacsOne Server is installed.

### 5.4.3 PHP.INI

This is the main PHP configuration file and it should be copied to:

- ◆ Either the Apache installation directory or the %SystemRoot% system path on Windows platforms
- ◆ /usr/local/lib (default PHP path if installed from source packages) on Linux platform

#### 5.4.4 PHP4TS.DLL – PHP 4 Windows Users Only

The PHP for Apache 2.x module (**php4apache2.dll** above in Section 5.3.1 HTTPD.CONF configuration) depends on this DLL, and it should be copied to either the same directory as where **php4apache2.dll** is located or %SystemRoot%\System32 directory so that it can be loaded properly when Apache starts.

#### 5.4.5 LIBPHP4.SO – PHP 4 Linux Users Only

The PHP for Apache 2.x module (**libphp4.so** above in Section 5.3.2 HTTPD.CONF configuration) should have been configured automatically when you run the ‘make install’ command for your PHP distribution. If not, you will need to manually copy the file to /usr/local/apache2/module/ directory.

#### 5.4.6 PHP5TS.DLL – PHP 5 Windows Users Only

For Users who have installed PHP 5 instead of PHP 4, this DLL is located in the same directory where the Apache 2 Module **php5apache2.dll** is located, so it does NOT need to be copied, unlike its counterpart in the PHP 4 version.

#### 5.4.7 PHP7TS.DLL – PHP 7 Windows Users Only

For Users who have installed PHP 7.x instead of PHP 4 or PHP 5, this DLL is located in the same directory where the Apache 2 Module **php7apache2.dll** is located, so it does NOT need to be copied, unlike its counterpart in the PHP 4 version.

#### 5.4.8 PHP8TS.DLL – PHP 8 Windows Users Only

For Users who have installed PHP 8.x instead of PHP 4 or PHP 5, this DLL is located in the same directory where the Apache 2 Module **php8apache2.dll** is located, so it does NOT need to be copied, unlike its counterpart in the PHP 4 version.

#### 5.4.9 LIBPHP5.SO – PHP 5 Linux or Mac OS X Users Only

The PHP 5 for Apache 2.x module (**libphp5.so** above in Section 5.3.2 HTTPD.CONF configuration) should have been configured automatically when you run the ‘make install’ command for your PHP source distribution. If not, you will need to manually copy the file to /usr/local/apache2/module/ directory.

#### 5.4.10 LIBPHP7.SO – PHP 7 Linux or Mac OS X Users Only

The PHP 7 for Apache 2.x module (**libphp7.so** above in Section 5.3.2 HTTPD.CONF configuration) should have been configured automatically when you run the ‘make install’ command for your PHP source distribution. If not, you will need to manually copy the file to /usr/local/apache2/module/ directory.

#### 5.4.1 LIBPHP8.SO – PHP 8 Linux or Mac OS X Users Only

The PHP 8 for Apache 2.x module (**libphp8.so** above in Section 5.3.2 HTTPD.CONF configuration) should have been configured automatically when you run the ‘make install’ command for your PHP source distribution. If not, you will need to manually copy the file to /usr/local/apache2/module/ directory.

#### 5.4.2 SELinux Label – Linux Users only

For Linux platforms with SELinux enabled (“**Enforcing**” mode), in addition to setting up the security permission modes for the directory where PacsOne Server is installed, you also need to configure the SELinux context for the “**pacson**” website alias so that Apache Web Server service can access all the files and sub-folders of that directory successfully (otherwise the client browsers will get the “**Permission Denied**” error). For example:

```
# semanage fcontext -a -t httpd_sys_content_t "/home/pacsone(/.*)?"
# restorecon -R -v /home/pacsone
```

### 5.4.3 Trouble-shooting Apache and PHP Installations

- ◆ After Apache HTTP Server has been installed successfully, you can verify that Apache is running properly by accessing the following URL from a web browser on the same machine Apache is installed:

<http://localhost/>

- ◆ If you don't see the "Powered by Apache" logo or "It works!" message successfully, there is something wrong with your Apache installation. Refer to the Apache documentation below for trouble-shooting information:

<http://httpd.apache.org/docs-2.0/>

- ◆ To check if your PHP installation is successful, access the following URL from a browser on the same machine Apache, PHP and PacsOne are installed:

<http://localhost/pacsone/Hello.php>

- ◆ If your PHP is configured properly, you will see the current PHP configurations from the HTML output of the PHP script above.

- ◆ Otherwise, your PHP is not configured properly. Refer to the PHP documentation below for trouble-shooting information:

<http://www.php.net/manual/en/>

## 5.5 PHP Configuration File

It is recommended to use the `php.ini-production` file included with the PHP zip package as a template, for the subsequent modifications as described below.

### 5.5.1 PHP.INI – PHP 4 Windows Users Only

The PHP configuration file `PHP.INI` needs to be modified as follows:

```
***** BEGIN: "PHP.INI" *****
```

```
***** BEGIN: Extension Directory *****
```

```
    ; Directory in which the loadable extensions (modules) reside.
    extension_dir = {PHP4_INSTALL_DIR}\extensions
```

```
***** END: Extension Directory *****
```

```
***** BEGIN: Windows Extensions *****
```

```
    ;Windows Extensions
    extension=php_mbstring.dll
    extension=php_mysql.dll
    extension=php_imagick.dll
```

```
***** END: Windows Extensions *****
```

```
***** BEGIN: Session.Save_Path – Refer to Section 5.5.14 *****
    session.save_path = {SESSION_PATH}
***** END: Session.Save_Path *****

***** END: "PHP.INI" *****
```

Where:

- ◆ PHP4\_INSTALL\_DIR is the directory where PHP 4.x is installed

## 5.5.2 PHP.INI – PHP 5.0.x Windows Users Only

The PHP configuration file PHP.INI needs to be modified as follows:

```
***** BEGIN: "PHP.INI" *****

***** BEGIN: Extension Directory *****

    ; Directory in which the loadable extensions (modules) reside.
    extension_dir = {PHP5_INSTALL_DIR}\ext

***** END: Extension Directory *****

***** BEGIN: Windows Extensions *****

    ;Windows Extensions
    extension=php_mbstring.dll
    extension=php_mysql.dll
    extension=php5_imagick.dll

***** END: Windows Extensions *****

***** BEGIN: Session.Save_Path – Refer to Section 5.5.14 *****
    session.save_path = {SESSION_PATH}
***** END: Session.Save_Path *****

***** END: "PHP.INI" *****
```

Where:

- ◆ PHP5\_INSTALL\_DIR is the directory where PHP 5.0.x is installed

## 5.5.3 PHP.INI – PHP 5.1.x Windows Users Only

The PHP configuration file PHP.INI needs to be modified as follows:

```
***** BEGIN: "PHP.INI" *****

***** BEGIN: Extension Directory *****

    ; Directory in which the loadable extensions (modules) reside.
    extension_dir = {PHP5.1_INSTALL_DIR}\ext

***** END: Extension Directory *****

***** BEGIN: Windows Extensions *****
```

```
;Windows Extensions
extension=php_mbstring.dll
extension=php_mysql_i.dll
extension=php5.1_imagick.dll
```

\*\*\*\*\* **END: Windows Extensions** \*\*\*\*\*

\*\*\*\*\* **BEGIN: Session.Save\_Path – Refer to Section 5.5.14** \*\*\*\*\*

```
session.save_path = {SESSION_PATH}
```

\*\*\*\*\* **END: Session.Save\_Path** \*\*\*\*\*

\*\*\*\*\* **END: "PHP.INI"** \*\*\*\*\*

Where:

- ◆ PHP5.1\_INSTALL\_DIR is the directory where PHP 5.1.x is installed

## 5.5.4 PHP.INI – PHP 5.2.x Windows Users Only

The PHP configuration file PHP.INI needs to be modified as follows:

\*\*\*\*\* **BEGIN: "PHP.INI"** \*\*\*\*\*

\*\*\*\*\* **BEGIN: Extension Directory** \*\*\*\*\*

```
; Directory in which the loadable extensions (modules) reside.
extension_dir = {PHP5.2_INSTALL_DIR}\ext
```

\*\*\*\*\* **END: Extension Directory** \*\*\*\*\*

\*\*\*\*\* **BEGIN: Windows Extensions** \*\*\*\*\*

```
;Windows Extensions
extension=php_mbstring.dll
extension=php_mysql_i.dll
extension=php5.2_imagick.dll
```

\*\*\*\*\* **END: Windows Extensions** \*\*\*\*\*

\*\*\*\*\* **BEGIN: Session.Save\_Path – Refer to Section 5.5.14** \*\*\*\*\*

```
session.save_path = {SESSION_PATH}
```

\*\*\*\*\* **END: Session.Save\_Path** \*\*\*\*\*

\*\*\*\*\* **END: "PHP.INI"** \*\*\*\*\*

Where:

- ◆ PHP5.2\_INSTALL\_DIR is the directory where PHP 5.2.x is installed

## 5.5.5 PHP.INI – PHP 5.3.x Windows Users Only

For Windows users who want to install PHP 5.3.x, please download (<http://windows.php.net/download/>) and install the following:

- ◆ VC6 x86 Thread Safe **ZIP** packages - For running Apache 1.x/2.x as the web server
- ◆ VC9 x86 Thread Safe **ZIP** packages - For running Microsoft IIS/Apache 2.2.x as the web server

The PHP configuration file PHP . INI needs to be modified as follows:

```
***** BEGIN: "PHP.INI" *****
***** BEGIN: Extension Directory *****

; Directory in which the loadable extensions (modules) reside.
extension_dir = {PHP5.3_INSTALL_DIR}\ext

***** END: Extension Directory *****

***** BEGIN: Windows Extensions *****

;Windows Extensions
extension=php_mbstring.dll
extension=php_mysql.dll
extension=php5.3_imagick.dll

***** END: Windows Extensions *****

***** BEGIN: Session.Save_Path – Refer to Section 5.5.14 *****
session.save_path = {SESSION_PATH}
***** END: Session.Save_Path *****

***** END: "PHP.INI" *****
```

Where:

PHP5 . 3\_INSTALL\_DIR is the directory where PHP 5.3.x is installed

### 5.5.6 PHP.INI – PHP 5.4.x Windows Users Only

For Windows users who want to install PHP 5.4.x, please download (<http://windows.php.net/download/>) and install the following:

- ◆ VC9 x86 Thread Safe **ZIP** packages - For running Apache 2.x as the web server
- ◆ VC9 x86 Non-Thread Safe **ZIP** packages - For running Microsoft IIS as the web server

The PHP configuration file PHP . INI needs to be modified as follows:

```
***** BEGIN: "PHP.INI" *****
***** BEGIN: Extension Directory *****

; Directory in which the loadable extensions (modules) reside.
extension_dir = {PHP5.4_INSTALL_DIR}\ext

***** END: Extension Directory *****

***** BEGIN: Windows Extensions *****

;Windows Extensions
extension=php_mbstring.dll
extension=php_mysql.dll
extension=php5.4_imagick.dll
```

```
    ;enable the following extension for Transcription Template
    extension=php_com_dotnet.dll
    ;enable the following if Dicom TLS option is enabled
    extension=php_openssl.dll
```

\*\*\*\*\* END: Windows Extensions \*\*\*\*\*

\*\*\*\*\* BEGIN: Session.Save\_Path – Refer to Section 5.5.14 \*\*\*\*\*

```
    session.save_path = {SESSION_PATH}
```

\*\*\*\*\* END: Session.Save\_Path \*\*\*\*\*

\*\*\*\*\* END: "PHP.INI" \*\*\*\*\*

Where:

PHP5.4\_INSTALL\_DIR is the directory where PHP 5.4.x is installed

### 5.5.7 PHP.INI – PHP 5.5.x Windows Users Only

For Windows users who want to install PHP 5.5.x, please download (<http://windows.php.net/download/>) and install the following:

- ◆ VC11 x86 (32-bit) Thread Safe **ZIP** packages - For running Apache 2.x as the web server
- ◆ VC11 x64 (64-bit) Thread Safe **ZIP** packages - For running Apache 2.x as the web server
- ◆ VC11 x86 (32-bit) Non-Thread Safe **ZIP** packages - For running Microsoft IIS as the web server
- ◆ VC11 x64 (64-bit) Non-Thread Safe **ZIP** packages - For running Microsoft IIS as the web server

The PHP configuration file PHP.INI needs to be modified as follows:

\*\*\*\*\* BEGIN: "PHP.INI" \*\*\*\*\*

\*\*\*\*\* BEGIN: Extension Directory \*\*\*\*\*

```
    ; Directory in which the loadable extensions (modules) reside.
    extension_dir = {PHP5.5_INSTALL_DIR}\ext
```

\*\*\*\*\* END: Extension Directory \*\*\*\*\*

\*\*\*\*\* BEGIN: Windows Extensions \*\*\*\*\*

```
    ;Windows Extensions
    ; enable the following extension for DicomWeb RESTful services
    extension=php_mbstring.dll
    extension=php_mysql.dll
    extension=php5.5_imagick.dll
    ;enable the following extension for Transcription Template
    extension=php_com_dotnet.dll
    ;enable the following if Dicom TLS option is enabled
    extension=php_openssl.dll
```

\*\*\*\*\* END: Windows Extensions \*\*\*\*\*

\*\*\*\*\* BEGIN: Session.Save\_Path – Refer to Section 5.5.14 \*\*\*\*\*

```
    session.save_path = {SESSION_PATH}
```

\*\*\*\*\* END: Session.Save\_Path \*\*\*\*\*

\*\*\*\*\* **END: "PHP.INI"** \*\*\*\*\*

Where:

PHP5.5\_INSTALL\_DIR is the directory where PHP 5.5.x is installed

### 5.5.8 PHP.INI – PHP 5.6.x Windows Users Only

For Windows users who want to install PHP 5.6.x, please download (<http://windows.php.net/download/>) and install the following:

- ◆ VC11 x86 (32-bit) Thread Safe **ZIP** packages - For running Apache 2.x as the web server
- ◆ VC11 x64 (64-bit) Thread Safe **ZIP** packages - For running Apache 2.x as the web server
- ◆ VC11 x86 (32-bit) Non-Thread Safe **ZIP** packages - For running Microsoft IIS as the web server
- ◆ VC11 x64 (64-bit) Non-Thread Safe **ZIP** packages - For running Microsoft IIS as the web server

The PHP configuration file PHP.INI needs to be modified as follows:

\*\*\*\*\* **BEGIN: "PHP.INI"** \*\*\*\*\*

\*\*\*\*\* **BEGIN: Extension Directory** \*\*\*\*\*

```
    ; Directory in which the loadable extensions (modules) reside.
    extension_dir = {PHP5.6_INSTALL_DIR}\ext
```

\*\*\*\*\* **END: Extension Directory** \*\*\*\*\*

\*\*\*\*\* **BEGIN: Windows Extensions** \*\*\*\*\*

```
    ;Windows Extensions
    ; enable the following extension for DicomWeb RESTful services
    extension=php_mbstring.dll
    extension=php_mysql.dll
    extension=php5.6_imagick.dll
    ;enable the following extension for Transcription Template
    extension=php_com_dotnet.dll
    ;enable the following if Dicom TLS option is enabled
    extension=php_openssl.dll
```

\*\*\*\*\* **END: Windows Extensions** \*\*\*\*\*

\*\*\*\*\* **BEGIN: Session.Save\_Path – Refer to Section 5.5.14** \*\*\*\*\*

```
    session.save_path = {SESSION_PATH}
```

\*\*\*\*\* **END: Session.Save\_Path** \*\*\*\*\*

\*\*\*\*\* **END: "PHP.INI"** \*\*\*\*\*

Where:

PHP5.6\_INSTALL\_DIR is the directory where PHP 5.6.x is installed

### 5.5.9 PHP.INI – PHP 7.x Windows Users Only

For Windows users who want to install PHP 7.x, please download (<http://windows.php.net/download/>) and install the following:

- ◆ VC14 x86 (32-bit) Thread Safe **ZIP** packages - For running Apache 2.x as the web server
- ◆ VC14 x64 (64-bit) Thread Safe **ZIP** packages - For running Apache 2.x as the web server
- ◆ VC14 x86 (32-bit) Non-Thread Safe **ZIP** packages - For running Microsoft IIS as the web server
- ◆ VC14 x64 (64-bit) Non-Thread Safe **ZIP** packages - For running Microsoft IIS as the web server

The PHP configuration file `PHP.INI` needs to be modified as follows:

```
***** BEGIN: "PHP.INI" *****
***** BEGIN: Extension Directory *****

; Directory in which the loadable extensions (modules) reside.
extension_dir = {PHP7.x_INSTALL_DIR}\ext

***** END: Extension Directory *****

***** BEGIN: Windows Extensions *****

;Windows Extensions
; enable the following extension for DicomWeb RESTful services
extension=php_mbstring.dll
extension=php_mysqli.dll
extension=php7.x_imagick.dll
;enable the following extension for Transcription Template
extension=php_com_dotnet.dll
; enable the following extension for PHP 7.2.x or later
extension=sodium
;enable the following if Dicom TLS option is enabled
extension=openssl

***** END: Windows Extensions *****

***** BEGIN: Session.Save_Path – Refer to Section 5.5.14 *****
session.save_path = {SESSION_PATH}
***** END: Session.Save_Path *****

***** END: "PHP.INI" *****
```

Where:

`PHP7.x_INSTALL_DIR` is the directory where PHP 7.x is installed

### 5.5.10 PHP.INI – PHP 8.x Windows Users Only

For Windows users who want to install PHP 8.x, please download (<http://windows.php.net/download/>) and install the following:

- ◆ VC14 x86 (32-bit) Thread Safe **ZIP** packages - For running Apache 2.x as the web server
- ◆ VC14 x64 (64-bit) Thread Safe **ZIP** packages - For running Apache 2.x as the web server
- ◆ VC14 x86 (32-bit) Non-Thread Safe **ZIP** packages - For running Microsoft IIS as the web server
- ◆ VC14 x64 (64-bit) Non-Thread Safe **ZIP** packages - For running Microsoft IIS as the web server

The PHP configuration file `PHP.INI` needs to be modified as follows:

```
***** BEGIN: "PHP.INI" *****
```

```

***** BEGIN: Extension Directory *****

; Directory in which the loadable extensions (modules) reside.
extension_dir = {PHP8.x_INSTALL_DIR}\ext

***** END: Extension Directory *****

***** BEGIN: Windows Extensions *****

;Windows Extensions
; enable the following extension for DicomWeb RESTful services
extension=php_mbstring.dll
extension=php_mysqli.dll
extension=php8.x_imagick.dll
;enable the following extension for Transcription Template
extension=php_com_dotnet.dll
; enable the following extension for PHP 7.2.x or later
extension=sodium
;enable the following if Dicom TLS option is enabled
extension=openssl

***** END: Windows Extensions *****

***** BEGIN: Session.Save_Path – Refer to Section 5.5.14 *****
session.save_path = {SESSION_PATH}
***** END: Session.Save_Path *****

***** END: "PHP.INI" *****

```

Where:

PHP8.x\_INSTALL\_DIR is the directory where PHP 8.x is installed

### 5.5.11 PHP.INI – For Windows Users Who Have Installed Version 7.2.1 or later releases of PacsOne Server

For users who have installed PacsOne Server Version 7.2.1 or later releases, the PHP Data Objects for MySQL extension (**PDO\_MYSQL**) should be used instead of the MySQLi PHP extension (**MySQLi**) for prior releases. The above PHP configuration file PHP.INI needs to be modified as follows:

```

***** BEGIN: "PHP.INI" *****

***** BEGIN: Windows Extensions *****

;Windows Extensions
;extension=mysqli          ; Comment out this line
extension=pdo_mysql        ; Uncomment this line
***** END: Windows Extensions *****

***** END: "PHP.INI" *****

```

### 5.5.12 PHP.INI – For Users Who Are Using Oracle Database instead of MySQL

For users who have installed Oracle database server instead of MySQL, the **OCI8** PHP extension should be loaded instead of the MySQL extension DLLs:

```

***** BEGIN: "PHP.INI" *****

```

```
***** BEGIN: Windows Extensions *****

;Windows Extensions
; enable the following extension for DicomWeb RESTful services
extension=php_mbstring.dll
;extension=php_mysql.dll      ; disable MySQL extension
;extension=php_mysqli.dll    ; disable MySQL Improved extension
extension=php_oci8.dll       ; enable Oracle extension
extension=sodium             ; enable for PHP 7.2.x or later
;enable the following if Dicom TLS option is enabled
extension=openssl
***** END: Windows Extensions *****

***** END: "PHP.INI" *****
```

### 5.5.13 PHP.INI – Linux or Mac OS X Users Only

The PHP configuration file `PHP.INI` needs to be modified as follows:

```
***** BEGIN: "PHP.INI" *****

***** BEGIN: Extension Directory *****

; Directory in which the loadable extensions (modules) reside.
extension_dir={PHP_INSTALL_DIR}/ext

Where:

◆ PHP_INSTALL_DIR is the directory where PHP is installed, e.g., /usr/local/lib/php/

***** END: Extension Directory *****

***** BEGIN: Loadable Modules *****

;Loadable Modules
extension=mbstring
; the ImageMagick extension below is required
extension=imagick.so
; enable the following extension for PHP 7.2.x or later
extension=sodium
; enable the following extension for PacsOne Server 7.2.1 or later
extension=pdo_mysql
; otherwise enable the following for versions earlier than 7.2.1
;extension=mysql
;enable the following if Dicom TLS option is enabled
extension=openssl
***** END: Loadable Modules *****

***** BEGIN: Session.Save_Path – Refer to Section 5.5.14 *****
session.save_path=/tmp
***** END: Session.Save_Path *****
```

For users who have installed Version 7.1.1 or prior releases of PacsOne Server and configured MySQL to run on a non-default socket name or TCP port, you would need to configure the following line (s) in the `'mysql/mysqlcli'` Section to match with what are currently configured as the MySQL socket name and TCP port:

```
mysqli.default_port = /var/run/mysqld/mysqld.sock
mysqli.default_socket = 3306
```

Hint: You can run the following command from a local shell to find out the current MySQL socket name/TCP port being used:

```
# ps -elf|grep mysqld (for Linux platforms)
# ps aux|grep mysqld (for MacOS X platforms)
```

For users who have installed Version 7.2.1 or later releases of PacsOne Server, you would need to disable the `'mysql/mysqli'` extension and enable the `'pdo_mysql'` instead:

```
;extension=mysqli          ; disable MySQL Improved extension
extension=pdo_mysql        ; enable PDO for MySQL extension
```

Configure the following line (s) in the `'pdo_mysql'` Section to match with what is currently configured as the MySQL socket name:

```
pdo_mysql.default_socket = /var/run/mysqld/mysqld.sock
```

```
***** BEGIN: openssl *****
openssl.cafile=/usr/local/ssl/cert.pem
***** END: openssl *****
```

For users who have enable the AWS S3 as Long-term Storage option, a valid SSL certificate needs to be configured via the above setting for OpenSSL, as the AWS PHP SDK uses the OpenSSL library to connect to the AWS S3 backend for secured/encrypted connections.

```
***** END: "PHP.INI" *****
```

### 5.5.14 PHP Magic Quotes

PHP Magic Quotes should be **Disabled** via the following directive in the PHP . INI file:

```
; Magic quotes for incoming GET/POST/Cookie data.
magic_quotes_gpc = Off
```

This Magic Quotes feature has proved to cause more problems than it solved, and will be obsolete in PHP 6.x or later releases, so it is highly recommended to have this feature **Disabled** via the above PHP . INI directive.

### 5.5.15 PHP `SESSION.SAVE_PATH` Variable

#### 5.5.15.1 Windows Platforms:

`SESSION.SAVE_PATH` is an existing directory path to store the temporary PHP session files. Since PacsOne uses PHP sessions which may contain MySQL username and password information, it is highly recommended that the security permission for this directory be set to enable access **ONLY** for the local **Administrators** and the Windows **SYSTEM** accounts as illustrated below:

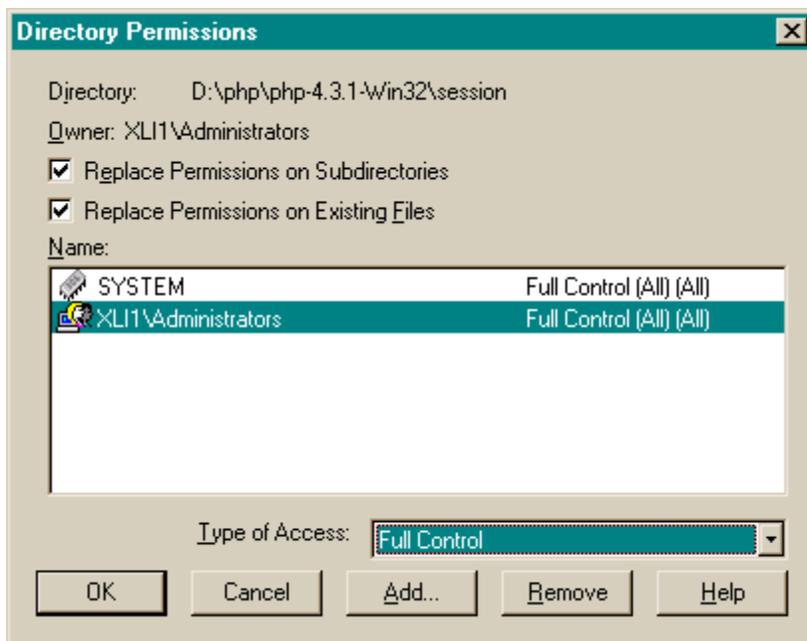


Figure 2 - Security Permissions for PHP Session Directory (Windows Platforms)

### 5.5.15.2 Linux or Mac OS X Platform:

Directory ``/tmp`` is the default value for the `SESSION.SAVE_PATH` variable and you need to make sure that directory does exist.

After `PHP.INI` configuration file is modified, the Apache Web Server needs to be re-started for the changes to take effect.

## 5.6 ImageMagick PHP Module

PacsOne Server uses a customized version of the ImageMagick (<http://www.imagemagick.org/>) libraries for displaying stored Dicom images as converted JPG or GIF images to web browsers. **As a result, you should NOT install any stand-alone ImageMagick package on the same server where PacsOne Server is installed, to avoid any conflicts in configuration settings between PacsOne Server and the stand-alone ImageMagick distribution.**

### 5.6.1 Copy 'php\_imagick.dll' – PHP 4.x Windows Users Only

``php_imagick.dll`` is the PHP 4.x module DLL for ImageMagick, you need to copy the DLL from:

```
{PACSONE_INSTALL_DIR}\ImageMagick\php\vc6\
```

to:

```
{PHP4_INSTALL_DIR}\extensions\
```

Where:

- ◆ `PACSONE_INSTALL_DIR` is the directory where PacsOne Server is installed.
- ◆ `PHP4_INSTALL_DIR` is the directory where PHP 4.x is installed.

For example:

```
C:\>copy C:\Program Files\PacsOne\ImageMagick\php\vc6\php_imagick.dll C:\php-4.4.3\extensions
```

### 5.6.2 Copy 'php5\_imagick.dll' – PHP 5.0.x Windows Users Only

'php5\_imagick.dll' is the PHP 5.0.x module DLL for ImageMagick, you need to copy the DLL from:

```
{PACSONE_INSTALL_DIR}\ImageMagick\php\vc6
```

to:

```
{PHP5_INSTALL_DIR}\ext\
```

Where:

- ◆ PACSONE\_INSTALL\_DIR is the directory where PacsOne Server is installed.
- ◆ PHP5\_INSTALL\_DIR is the directory where PHP 5.0.x is installed.

For example:

```
C:\>copy C:\Program Files\PacsOne\ImageMagick\php\vc6\php5_imagick.dll C:\php-5.0.4\ext
```

### 5.6.3 Copy 'php5.1\_imagick.dll' – PHP 5.1.x Windows Users Only

'php5.1\_imagick.dll' is the PHP 5.1.x module DLL for ImageMagick, you need to copy the DLL from:

```
{PACSONE_INSTALL_DIR}\ImageMagick\php\vc6
```

to:

```
{PHP5.1_INSTALL_DIR}\ext\
```

Where:

- ◆ PACSONE\_INSTALL\_DIR is the directory where PacsOne Server is installed.
- ◆ PHP5.1\_INSTALL\_DIR is the directory where PHP 5.1.x is installed.

For example:

```
C:\>copy C:\Program Files\PacsOne\ImageMagick\php\vc6\php5.1_imagick.dll C:\php-5.1.4\ext
```

### 5.6.4 Copy 'php5.2\_imagick.dll' – PHP 5.2.x Windows Users

'php5.2\_imagick.dll' is the PHP 5.2.x module DLL for ImageMagick, you need to copy the DLL from:

```
{PACSONE_INSTALL_DIR}\ImageMagick\php\vc6
```

to:

```
{PHP5.2_INSTALL_DIR}\ext\
```

Where:

- ◆ PACSONE\_INSTALL\_DIR is the directory where PacsOne Server is installed.

- ◆ PHP5.2\_INSTALL\_DIR is the directory where PHP 5.2.x is installed.

For example:

```
C:\>copy C:\Program Files\PacsOne\ImageMagick\php\vc6\php5.2_imagick.dll
C:\php-5.2.0\ext
```

### 5.6.5 Copy 'php5.3\_imagick.dll' – PHP 5.3.x Windows Users

'php5.3\_imagick.dll' is the PHP 5.3.x module DLL for ImageMagick, which comes with 2 different versions:

- VC6 (Microsoft Visual C++ 6) build – Use this build for Apache 1.x/2.x web servers
- VC9 (Microsoft Visual Studio 2008) build – Use this build for IIS web servers

For VC6 builds, you need to copy the DLL from:

```
{PACSONE_INSTALL_DIR}\ImageMagick\php\vc6
```

to:

```
{PHP5.3_INSTALL_DIR}\ext\
```

Where:

- ◆ PACSONE\_INSTALL\_DIR is the directory where PacsOne Server is installed.
- ◆ PHP5.3\_INSTALL\_DIR is the directory where PHP 5.3.x is installed.

For example:

```
C:\>copy C:\Program Files\PacsOne\ImageMagick\php\vc6\php5.3_imagick.dll
C:\php-5.3.1\ext
```

For VC9 builds, you need to copy the DLL from:

```
{PACSONE_INSTALL_DIR}\ImageMagick\php\vc9
```

to:

```
{PHP5.3_INSTALL_DIR}\ext\
```

Where:

- ◆ PACSONE\_INSTALL\_DIR is the directory where PacsOne Server is installed.
- ◆ PHP5.3\_INSTALL\_DIR is the directory where PHP 5.3.x is installed.

For example:

```
C:\>copy C:\Program Files\PacsOne\ImageMagick\php\vc9\php5.3_imagick.dll
C:\php-5.3.6\ext
```

### 5.6.6 Copy 'php5.4\_imagick.dll' – PHP 5.4.x Windows Users

'php5.4\_imagick.dll' is the PHP 5.4.x module DLL for ImageMagick which is built using VC9 (Microsoft Visual Studio 2008), and you need to copy the DLL from:

```
{PACSONE_INSTALL_DIR}\ImageMagick\php\vc9
```

to:

```
{PHP5.4_INSTALL_DIR}\ext\
```

Where:

- ◆ PACSONE\_INSTALL\_DIR is the directory where PacsOne Server is installed.
- ◆ PHP5.4\_INSTALL\_DIR is the directory where PHP 5.4.x is installed.

For example:

```
C:\>copy C:\Program Files\PacsOne\ImageMagick\php\vc9\php5.4_imagick.dll  
C:\php-5.4.7\ext
```

### 5.6.6.1 Copy of 'php5.4\_imagick.dll' – PHP 5.4.x Windows IIS Users

For users who are running Internet Information Services (IIS) instead of Apache as the web server, it's recommended to run PHP as a FastCGI module. The official PHP website recommends the VC9 Non-Thread Safe (NOZTS) version of PHP for running as an IIS FastCGI module. This implies all PHP extensions are required to be Non-Thread Safe/NOZTS build as well.

If you prefer running PHP as a FastCGI module under IIS, you will need to download and install the non-Thread Safe/NOZTS zip package from the official PHP website, AND you'll need to copy the non-Thread Safe /NOZTS build of the ImageMagick PHP extension DLL from:

```
{PACSONE_INSTALL_DIR}\ImageMagick\php\vc9\nozts
```

to:

```
{PHP5.4_INSTALL_DIR}\ext\
```

Where:

- ◆ PACSONE\_INSTALL\_DIR is the directory where PacsOne Server is installed.
- ◆ PHP5.4\_INSTALL\_DIR is the directory where the non-ThreadSafe/NOZTS version of PHP 5.4.x is installed.

For example:

```
C:\>copy C:\Program Files\PacsOne\ImageMagick\php\vc9\nozts\php5.4_imagick.dll  
C:\php-5.4.12-nozts\ext
```

### 5.6.7 Copy 'php5.5\_imagick.dll/php5.6\_imagick.dll' – PHP 5.5/5.6 Windows Users

'php5.5\_imagick.dll' or 'php5.6\_imagick.dll' is the PHP 5.5/5.6 module DLL for ImageMagick which is built using VC9 (Microsoft Visual Studio 2008), and you need to copy the DLL from:

```
{PACSONE_INSTALL_DIR}\ImageMagick\php\vc9
```

to:

```
{PHP5.x_INSTALL_DIR}\ext\
```

Where:

- ◆ PACSONE\_INSTALL\_DIR is the directory where PacsOne Server is installed.
- ◆ PHP5.x\_INSTALL\_DIR is the directory where PHP 5.5/5.6 is installed.

For example:

```
C:\>copy C:\Program Files\PacsOne\ImageMagick\php\vc9\php5.5_imagick.dll
C:\php-5.5.1\ext
```

### 5.6.7.1 Copy of 'php5.5\_imagick.dll/php5.6\_imagick.dll' – PHP 5.5/5.6 Windows IIS Users

For users who are running Internet Information Services (IIS) instead of Apache as the web server, it's recommended to run PHP as a FastCGI module. The official PHP website recommends the VC11 Non-Thread Safe (NOZTS) version of PHP for running as an IIS FastCGI module. This implies all PHP extensions are required to be Non-Thread Safe/NOZTS build as well.

If you prefer running PHP as a FastCGI module under IIS, you will need to download and install the non-Thread Safe/NOZTS zip package from the official PHP website, AND you'll need to copy the non-Thread Safe /NOZTS build of the ImageMagick PHP extension DLL from:

```
{PACSONE_INSTALL_DIR}\ImageMagick\php\vc9\nozts
```

to:

```
{PHP5.x_INSTALL_DIR}\ext\
```

Where:

- ◆ PACSONE\_INSTALL\_DIR is the directory where PacsOne Server is installed.
- ◆ PHP5.x\_INSTALL\_DIR is the directory where the non-Thread Safe/NOZTS version of PHP 5.5/5.6 is installed.

For example:

```
C:\>copy C:\Program Files\PacsOne\ImageMagick\php\vc9\nozts\php5.6_imagick.dll
C:\php-5.6.4-nozts\ext
```

### 5.6.8 Copy 'php7.x\_imagick.dll' – PHP 7.x Windows Users

'php7.x\_imagick.dll' is the PHP 7.x module DLL for ImageMagick which is built using VC14 Microsoft Visual Studio 2015 and you need to copy the DLL from:

```
{PACSONE_INSTALL_DIR}\ImageMagick\php\vc14
```

to:

```
{PHP7.x_INSTALL_DIR}\ext\
```

Where:

- ◆ PACSONE\_INSTALL\_DIR is the directory where PacsOne Server is installed.
- ◆ PHP7.x\_INSTALL\_DIR is the directory where PHP 7.x is installed.

For example:

```
C:\>copy "C:\Program Files\PacsOne\ImageMagick\php\vc14\php7.1_imagick.dll"  
"C:\php-7.1.16-win32-x64\ext"
```

### 5.6.8.1 Copy of 'php7.x\_imagick.dll' – PHP 7.x Windows IIS Users

For users who are running Internet Information Services (IIS) instead of Apache as the web server, it's recommended to run PHP as a FastCGI module. The official PHP website recommends the VC14 Non-Thread Safe (NOZTS) version of PHP for running as an IIS FastCGI module. This implies all PHP extensions are required to be Non-Thread Safe/NOZTS build as well.

If you prefer running PHP as a FastCGI module under IIS, you will need to download and install the non-Thread Safe/NOZTS zip package from the official PHP website, AND you'll need to copy the non-Thread Safe /NOZTS build of the ImageMagick PHP extension DLL from:

```
{PACSONE_INSTALL_DIR}\ImageMagick\php\vc14\nozts
```

to:

```
{PHP7.x_INSTALL_DIR}\ext\
```

Where:

- ◆ PACSONE\_INSTALL\_DIR is the directory where PacsOne Server is installed.
- ◆ PHP7.x\_INSTALL\_DIR is the directory where the non-Thread Safe/NOZTS version of PHP 7.x is installed.

For example:

```
C:\>copy "C:\Program  
Files\PacsOne\ImageMagick\php\vc14\nozts\php7.1_imagick.dll" "C:\php-7.1.16-  
win32-x64-nozts\ext"
```

### 5.6.9 Copy 'php8.x\_imagick.dll' – PHP 8.x Windows Users

'php8.x\_imagick.dll' is the PHP 8.x module DLL for ImageMagick which is built using VC14 Microsoft Visual Studio 2015 and you need to copy the DLL from:

```
{PACSONE_INSTALL_DIR}\ImageMagick\php\vc14
```

to:

```
{PHP8.x_INSTALL_DIR}\ext\
```

Where:

- ◆ PACSONE\_INSTALL\_DIR is the directory where PacsOne Server is installed.
- ◆ PHP8.x\_INSTALL\_DIR is the directory where PHP 8.x is installed.

For example:

```
C:\>copy "C:\Program Files\PacsOne\ImageMagick\php\vc14\php8.1_imagick.dll"  
"C:\php-8.1.16-win32-x64\ext"
```

### 5.6.10 Copy 'imagick.so' – PHP 4.x Linux Users Only

'php4/imagick.so' is the PHP 4.x extension module for ImageMagick, you need to copy the shared library from:

```
{PACSONE_INSTALL_DIR}/ImageMagick/php4/
```

to:

```
{PHP_INSTALL_DIR}/ext
```

Where:

- ◆ PACSONE\_INSTALL\_DIR is the directory where PacsOne Server is installed.
- ◆ PHP\_INSTALL\_DIR is the directory where PHP 4.x is installed.

For example:

```
# cp /home/pacstone/ImageMagick/php4/imagick.so /usr/local/lib/php/ext
```

After the shared-library is copied, you need to verify the shared library dependencies are valid:

```
# ldd /usr/local/lib/php/ext/imagick.so
linux-gate.so.1 => (0xffffe000)
libMagick-5.5.6-Q16.so.0 => /usr/local/lib/libMagick-5.5.6-Q16.so.0
(0x40010000)
libbz2.so.1 => /usr/lib/libbz2.so.1 (0x401a6000)
libm.so.6 => /lib/tls/libm.so.6 (0x401b6000)
libc.so.6 => /lib/tls/libc.so.6 (0x401d8000)
libfreetype.so.6 => /usr/lib/libfreetype.so.6 (0x40300000)
libpthreads.so.0 => /lib/tls/libpthreads.so.0 (0x402ed000)
libdl.so.2 => /lib/libdl.so.2 (0x402fe000)
libz.so.1 => /lib/libz.so.1 (0x40301000)
/lib/ld-linux.so.2 => /lib/ld-linux.so.2 (0x80000000)
```

NOTE: On some Linux distributions, one of the required libraries above: **libfreetype** is not installed by default. If that is the case, you will need to install them either from your Linux installation CD or download the packages from the web.

### 5.6.11 Copy 'imagick.so' – PHP 5.0.x Linux Users Only

'php5/imagick.so' is the PHP 5.0.x extension module for ImageMagick, you need to copy the shared library from:

```
{PACSONE_INSTALL_DIR}/ImageMagick/php5/
```

to:

```
{PHP5_INSTALL_DIR}/ext
```

Where:

- ◆ PACSONE\_INSTALL\_DIR is the directory where PacsOne Server is installed.
- ◆ PHP5\_INSTALL\_DIR is the directory where PHP 5.0.x is installed.

For example:

```
# cp /home/pacstone/ImageMagick/php5/imagick.so /usr/local/lib/php/ext
```

After the shared-library is copied, you need to verify the shared library dependencies are valid:

```
# ldd /usr/local/lib/php/ext/imagick.so
linux-gate.so.1 => (0xffffe000)
libMagick-5.5.6-Q16.so.0 => /usr/local/lib/libMagick-5.5.6-Q16.so.0
(0x40010000)
libbz2.so.1 => /usr/lib/libbz2.so.1 (0x401a6000)
libm.so.6 => /lib/tls/libm.so.6 (0x401b6000)
libc.so.6 => /lib/tls/libc.so.6 (0x401d8000)
libfreetype.so.6 => /usr/lib/libfreetype.so.6 (0x40300000)
libpthread.so.0 => /lib/tls/libpthread.so.0 (0x402ed000)
libdl.so.2 => /lib/libdl.so.2 (0x402fe000)
libz.so.1 => /lib/libz.so.1 (0x40301000)
/lib/ld-linux.so.2 => /lib/ld-linux.so.2 (0x80000000)
```

NOTE: On some Linux distributions, one of the required libraries above: **libfreetype** is not installed by default. If that is the case, you will need to install them either from your Linux installation CD or download the packages from the web.

### 5.6.12 Copy 'imagick.so' – PHP 5.1.x Linux Users Only

'php5.1/imagick.so' is the PHP 5.1.x extension module for ImageMagick, you need to copy the shared library from:

```
{PACSONE_INSTALL_DIR}/ImageMagick/php5.1/
```

to:

```
{PHP5.1_INSTALL_DIR}/ext
```

Where:

- ◆ PACSONE\_INSTALL\_DIR is the directory where PacsOne Server is installed.
- ◆ PHP5.1\_INSTALL\_DIR is the directory where PHP 5.1.x is installed.

For example:

```
# cp /home/pacsone/ImageMagick/php5.1/imagick.so /usr/local/lib/php/ext
```

After the shared-library is copied, you need to verify the shared library dependencies are valid:

```
# ldd /usr/local/lib/php/ext/imagick.so
linux-gate.so.1 => (0xffffe000)
libMagick-5.5.6-Q16.so.0 => /usr/local/lib/libMagick-5.5.6-Q16.so.0
(0x40010000)
libbz2.so.1 => /usr/lib/libbz2.so.1 (0x401a6000)
libm.so.6 => /lib/tls/libm.so.6 (0x401b6000)
libc.so.6 => /lib/tls/libc.so.6 (0x401d8000)
libfreetype.so.6 => /usr/lib/libfreetype.so.6 (0x40300000)
libpthread.so.0 => /lib/tls/libpthread.so.0 (0x402ed000)
libdl.so.2 => /lib/libdl.so.2 (0x402fe000)
libz.so.1 => /lib/libz.so.1 (0x40301000)
/lib/ld-linux.so.2 => /lib/ld-linux.so.2 (0x80000000)
```

NOTE: On some Linux distributions, one of the required libraries above: **libfreetype** is not installed by default. If that is the case, you will need to install them either from your Linux installation CD or download the packages from the web.

### 5.6.13 Copy 'imagemick.so' – PHP 5.2.x Linux/Mac OS X Users

'php5.2/imagick.so' is the PHP 5.2.x extension module for ImageMagick, you need to copy the shared library from:

```
{PACSONE_INSTALL_DIR}/ImageMagick/php5.2/
```

to:

```
{PHP5.2_INSTALL_DIR}/ext
```

Where:

- ◆ PACSONE\_INSTALL\_DIR is the directory where PacsOne Server is installed.
- ◆ PHP5.2\_INSTALL\_DIR is the directory where PHP 5.2.x is installed.

For example:

```
# cp /home/pacsone/ImageMagick/php5.2/imagick.so /usr/local/lib/php/ext
```

After the shared-library is copied, you need to verify the shared library dependencies are valid:

```
# ldd /usr/local/lib/php/ext/imagick.so
linux-gate.so.1 => (0xffffe000)
libMagick-5.5.6-Q16.so.0 => /usr/local/lib/libMagick-5.5.6-Q16.so.0
(0x40010000)
libbz2.so.1 => /usr/lib/libbz2.so.1 (0x401a6000)
libm.so.6 => /lib/tls/libm.so.6 (0x401b6000)
libc.so.6 => /lib/tls/libc.so.6 (0x401d8000)
libfreetype.so.6 => /usr/lib/libfreetype.so.6 (0x40300000)
libpthread.so.0 => /lib/tls/libpthread.so.0 (0x402ed000)
libdl.so.2 => /lib/libdl.so.2 (0x402fe000)
libz.so.1 => /lib/libz.so.1 (0x40301000)
/lib/ld-linux.so.2 => /lib/ld-linux.so.2 (0x80000000)
```

NOTE: On some Linux distributions, one of the required libraries above: **libfreetype** is not installed by default. If that is the case, you will need to install them either from your Linux installation CD or download the packages from the web.

### 5.6.14 Copy 'imagemick.so' – PHP 5.3.x Linux/Mac OS X Users

'php5.3/imagick.so' is the PHP 5.3.x extension module for ImageMagick, you need to copy the shared library from:

```
{PACSONE_INSTALL_DIR}/ImageMagick/php5.3/
```

to:

```
{PHP5.3_INSTALL_DIR}/ext
```

Where:

- ◆ PACSONE\_INSTALL\_DIR is the directory where PacsOne Server is installed.
- ◆ PHP5.3\_INSTALL\_DIR is the directory where PHP 5.3.x is installed.

For example:

```
# cp /home/pacsone/ImageMagick/php5.3/imagick.so /usr/local/lib/php/ext
```

After the shared-library is copied, you need to verify the shared library dependencies are valid:

```
# ldd /usr/local/lib/php/ext/imagick.so
linux-gate.so.1 => (0xffffe000)
libMagick-5.5.6-Q16.so.0 => /usr/local/lib/libMagick-5.5.6-Q16.so.0
(0x40010000)
libbz2.so.1 => /usr/lib/libbz2.so.1 (0x401a6000)
libm.so.6 => /lib/tls/libm.so.6 (0x401b6000)
libc.so.6 => /lib/tls/libc.so.6 (0x401d8000)
libfreetype.so.6 => /usr/lib/libfreetype.so.6 (0x40300000)
libpthread.so.0 => /lib/tls/libpthread.so.0 (0x402ed000)
libdl.so.2 => /lib/libdl.so.2 (0x402fe000)
libz.so.1 => /lib/libz.so.1 (0x40301000)
/lib/ld-linux.so.2 => /lib/ld-linux.so.2 (0x80000000)
```

NOTE: On some Linux distributions, one of the required libraries above: **libfreetype** is not installed by default. If that is the case, you will need to install them either from your Linux installation CD or download the packages from the web.

### 5.6.15 Copy 'imagick.so' – PHP 5.4.x Linux/Mac OS X Users

'php5.4/imagick.so' is the PHP 5.4.x extension module for ImageMagick, which is built with the default PHP Thread-Safety **Disabled** (NTS build). So when compiling or downloading your PHP installation package, make sure you select the default Non-Thread Safety or NTS build in order to match with the ImageMagick PHP extension. You'll need to copy the shared library from:

```
{PACSONE_INSTALL_DIR}/ImageMagick/php5.4/
```

to:

```
{PHP5.4_INSTALL_DIR}/ext
```

Where:

- ◆ PACSONE\_INSTALL\_DIR is the directory where PacsOne Server is installed.
- ◆ PHP5.4\_INSTALL\_DIR is the directory where PHP 5.4.x is installed.

For example:

```
# cp /home/pacsone/ImageMagick/php5.4/imagick.so /usr/local/lib/php/ext
```

After the shared-library is copied, you need to verify the shared library dependencies are valid:

```
# ldd /usr/local/lib/php/ext/imagick.so
linux-gate.so.1 => (0xffffe000)
libMagick-5.5.6-Q16.so.0 => /usr/local/lib/libMagick-5.5.6-Q16.so.0
(0x40010000)
libbz2.so.1 => /usr/lib/libbz2.so.1 (0x401a6000)
libm.so.6 => /lib/tls/libm.so.6 (0x401b6000)
```

```
libc.so.6 => /lib/tls/libc.so.6 (0x401d8000)
libfreetype.so.6 => /usr/lib/libfreetype.so.6 (0x40300000)
libpthreads.so.0 => /lib/tls/libpthreads.so.0 (0x402ed000)
libdl.so.2 => /lib/libdl.so.2 (0x402fe000)
libz.so.1 => /lib/libz.so.1 (0x40301000)
/lib/ld-linux.so.2 => /lib/ld-linux.so.2 (0x80000000)
```

NOTE: On some Linux distributions, one of the required libraries above: **libfreetype** is not installed by default. If that is the case, you will need to install them either from your Linux installation CD or download the packages from the web.

### 5.6.16 Copy 'imagick.so' – PHP 5.5/5.6 Linux/Mac OS X Users

'php5.5/imagick.so' or 'php5.6/imagick.so' is the PHP 5.5/5.6 extension module for ImageMagick, which is built with the default PHP Thread-Safety Disabled (NTS build). So when compiling or downloading your PHP installation package, make sure you select the default Non-Thread Safety or NTS build in order to match with the ImageMagick PHP extension. You'll need to copy this library module from:

```
{PACSONE_INSTALL_DIR}/ImageMagick/php5.5/
```

to:

```
{PHP5.x_INSTALL_DIR}/ext
```

Where:

- ◆ PACSONE\_INSTALL\_DIR is the directory where PacsOne Server is installed.
- ◆ PHP5.x\_INSTALL\_DIR is the directory where PHP 5.5/5.6 is installed.

For example:

```
# cp /home/pacsone/ImageMagick/php5.5/imagick.so /usr/local/lib/php/ext
```

After the shared-library is copied, you need to verify the shared library dependencies are valid:

```
# ldd /usr/local/lib/php/ext/imagick.so
linux-gate.so.1 => (0xffffe000)
libMagick-5.5.6-Q16.so.0 => /usr/local/lib/libMagick-5.5.6-Q16.so.0
(0x40010000)
libbz2.so.1 => /usr/lib/libbz2.so.1 (0x401a6000)
libm.so.6 => /lib/tls/libm.so.6 (0x401b6000)
libc.so.6 => /lib/tls/libc.so.6 (0x401d8000)
libfreetype.so.6 => /usr/lib/libfreetype.so.6 (0x40300000)
libpthreads.so.0 => /lib/tls/libpthreads.so.0 (0x402ed000)
libdl.so.2 => /lib/libdl.so.2 (0x402fe000)
libz.so.1 => /lib/libz.so.1 (0x40301000)
/lib/ld-linux.so.2 => /lib/ld-linux.so.2 (0x80000000)
```

NOTE: On some Linux distributions, one of the required libraries above: **libfreetype** is not installed by default. If that is the case, you will need to install them either from your Linux installation CD or download the packages from the web.

### 5.6.17 Copy 'imagick.so' – PHP 7.x Linux Users

'php7.x/imagick.so' is the PHP 7.x extension module for ImageMagick, which is built with the default PHP Thread-Safety **Disabled** (NTS build). So when compiling or downloading your PHP installation package, make sure

you select the default Non-Thread Safety or NTS build in order to match with the ImageMagick PHP extension. You'll need to copy the shared library from:

```
{PACSONE_INSTALL_DIR}/ImageMagick/php7.x/
```

to:

```
{PHP7.x_INSTALL_DIR}/ext
```

Where:

- ◆ `PACSONE_INSTALL_DIR` is the directory where PacsOne Server is installed.
- ◆ `PHP7.x_INSTALL_DIR` is the directory where PHP 7.x is installed.

For example:

```
# cp /home/pacsone/ImageMagick/php7.1/imagick.so /usr/local/lib/php/ext
```

After the shared-library is copied, you need to verify the shared library dependencies are valid:

```
# ldd /usr/local/lib/php/ext/imagick.so
linux-gate.so.1 => (0xffffe000)
libMagick-5.5.6-Q16.so.0 => /usr/local/lib/libMagick-5.5.6-Q16.so.0
(0x40010000)
libbz2.so.1 => /usr/lib/libbz2.so.1 (0x401a6000)
libm.so.6 => /lib/tls/libm.so.6 (0x401b6000)
libc.so.6 => /lib/tls/libc.so.6 (0x401d8000)
libfreetype.so.6 => /usr/lib/libfreetype.so.6 (0x40300000)
libpthreads.so.0 => /lib/tls/libpthreads.so.0 (0x402ed000)
libdl.so.2 => /lib/libdl.so.2 (0x402fe000)
libz.so.1 => /lib/libz.so.1 (0x40301000)
/lib/ld-linux.so.2 => /lib/ld-linux.so.2 (0x80000000)
```

NOTE: On some Linux distributions, one of the required libraries above: **libfreetype** is not installed by default. If that is the case, you will need to install them either from your Linux installation CD or download the packages from the web.

### 5.6.18 Copy 'imagick.so' – PHP 8.x Linux Users

'php8.x/imagick.so' is the PHP 8.x extension module for ImageMagick, which is built with the default PHP Thread-Safety **Disabled** (NTS build). So when compiling or downloading your PHP installation package, make sure you select the default Non-Thread Safety or NTS build in order to match with the ImageMagick PHP extension. You'll need to copy the shared library from:

```
{PACSONE_INSTALL_DIR}/ImageMagick/php8.x/
```

to:

```
{PHP8.x_INSTALL_DIR}/ext
```

Where:

- ◆ `PACSONE_INSTALL_DIR` is the directory where PacsOne Server is installed.
- ◆ `PHP8.x_INSTALL_DIR` is the directory where PHP 8.x is installed.

For example:

```
# cp /home/pacsone/ImageMagick/php8.1/imagick.so /usr/local/lib/php/ext
```

After the shared-library is copied, you need to verify the shared library dependencies are valid:

```
# ldd /usr/local/lib/php/ext/imagick.so
linux-gate.so.1 => (0xffffe000)
libMagick-5.5.6-Q16.so.0 => /usr/local/lib/libMagick-5.5.6-Q16.so.0
(0x40010000)
libbz2.so.1 => /usr/lib/libbz2.so.1 (0x401a6000)
libm.so.6 => /lib/tls/libm.so.6 (0x401b6000)
libc.so.6 => /lib/tls/libc.so.6 (0x401d8000)
libfreetype.so.6 => /usr/lib/libfreetype.so.6 (0x40300000)
libpthreads.so.0 => /lib/tls/libpthreads.so.0 (0x402ed000)
libdl.so.2 => /lib/libdl.so.2 (0x402fe000)
libz.so.1 => /lib/libz.so.1 (0x40301000)
/lib/ld-linux.so.2 => /lib/ld-linux.so.2 (0x80000000)
```

NOTE: On some Linux distributions, one of the required libraries above: **libfreetype** is not installed by default. If that is the case, you will need to install them either from your Linux installation CD or download the packages from the web.

### 5.6.19 Thread-Safe (ZTS) Builds of 'imagick.so'

By default, PHP for Linux platforms is built with the default Thread-Safety **Disabled** (NTS build) and runs as an Apache Prefork Multi-Processing Module (MPM). But for more recent Linux distributions, a more popular option is to run PHP as an Apache Event MPM instead which is more efficient and more scalable than the traditional Preform MPM. This option will require PHP (and all of its extensions) to be built with Thread Safety enabled (**ZTS** builds), so if you'd like to run PHP with Thread Safety enabled, e.g., via an Apache Event MPM module, **PHP-FPM**, etc, you'll need to install the **ZTS** build of the ImageMagick PHP extension library instead from the "ImageMagick/phpx.y/zts/" sub-folder where PacsOne Server is installed:

For example:

```
# cp /home/pacsone/ImageMagick/php8.1/zts/imagick.so /usr/local/lib/php/ext
```

### 5.6.20 Ghost Script Standard Fonts – Linux or Mac OS X Users Only

ImageMagick on Linux distributions requires the Ghostscript Standard Fonts for annotating texts on top of images. The Ghostscript Standard Fonts are usually installed under:

```
/usr/share/ghostscript/fonts/
```

If your Linux distribution does not have the Ghostscript Standard Fonts installed by default, you will need to install the package either from your Linux distribution CD or download it from our website below:

<https://www.pacsone.net/ghostscript-fonts-std-8.11.tar.gz>

By default, the ImageMagick PHP extension expects to find the Ghostscript fonts under the following directory:

```
/usr/share/ghostscript/fonts/
```

So if the Ghostscript fonts are installed under a different directory from above, you need to modify the "/usr/local/lib/ImageMagick-5.5.6-Q16/type-ghostscript.mgk" configuration file and update the full path to the "**Courier-Bold**" font name accordingly to that directory.

### 5.6.21 Troubleshooting ImageMagick PHP Extension

To verify that the ImageMagick PHP extension can be loaded successfully from PHP, access the follow URL from a browser on the same machine where Apache, PHP and PacsOne are installed:

<http://localhost/pacsone/Hello.php>

- ◆ In the above HTML output, verify that the **'mysql'** PHP extension is loaded successfully. If you have installed MySQL 4.1.x or higher releases, verify that the **'mysqli'** (MySQL Improved) PHP extension is loaded successfully. If you've installed Version 7.2.1 or later releases of PacsOne Server, that the **'pdo\_mysql'** (PDO for MySQL) PHP extension is loaded successfully.
- ◆ Verify that module **'imagick'** is listed in the PHP extension list from the HTML output of the above script. Otherwise, the ImageMagick PHP extension is not configured properly and you need to double-check all the steps performed in this section. You can also check the Apache Error Log (under the directory `/usr/local/apache2/log/`), and the PHP Error Log (configured in your **PHP.INI** file) for troubleshooting information.

### 5.6.22 Login to PacsOne

Congratulations! You have completed PacsOne Server installation successfully and it's ready for use.

After all of the above sections have been completed and verified successfully, you need to login to PacsOne as the System Administrator/Super-user (**'root'** for MySQL or **'SYSTEM'** for Oracle), in order to create user accounts and set up privileges for PacsOne users:

<http://localhost/pacsone/home.php>

You will need to specify the MySQL/Oracle database name, which you configured in Section 5.2.3, and the password for System Administrator/Super-user (**'root'** for MySQL or **'SYSTEM'** for Oracle).

For PacsOne Server Premium Edition user administration, refer to **PacsOne Server User's Manual** for the details about creating PacsOne user accounts and how to navigate through the PacsOne web user interface.

## 5.7 WAMP Server Installations

For Windows platforms, there is a very nice installation package called WAMP (Windows versions of Apache, MySQL and PHP) Server available:



<http://www.wampserver.com/>

where pre-selected versions of Apache, MySQL and PHP are combined into a single package which in-turn will make the installation much easier than installing these packages individually.

NOTE: Newer WAMP Server releases come with both MySQL and MariaDB installation packages and will install both by default. Since PacsOne Server can work with both database backends, we recommend installing the MariaDB package instead of MySQL since MariaDB has more open source/community support.

After the installation of WAMP Server package, the configurations of the corresponding **HTTPD.CONF** and **PHP.INI** files are the same as those described [Section 5.4.1](#) and [Section 5.5.1](#).

## 5.8 Web-based Dicom Image Viewers

PacsOne Server supports a variety of web-based Dicom images viewers (both open-source and commercial) which are listed on our website:

<http://www.pacsone.net/download.htm>

### 5.8.1 CornerStone Viewer (Default) implemented via HTML5/JavaScript

Open-source HTML5/JavaScript based Dicom Viewer developed by [Chris Hafey](#). This is the default web-based Dicom image viewer included with all PacsOne Server installation packages. In case you've switched to another viewer and want to switch back to this default viewer, please follow the instructions below:

- ◆ Open a local command shell on the server where PacsOne Server is running, and change directory to wherever PacsOne is installed
- ◆ If you are running Windows platforms, run the command below from the command shell prompt:

```
C:\Program Files\PacsOne>copy php\applet_CornerStoneViewer.php  
php\applet.php
```

- ◆ If you are running Linux/MacOS platforms, run the command below from the command shell prompt:

```
#cp php/applet_CornerStoneViewer.php php/applet.php
```

### 5.8.2 AiViewer implemented via Java Applet

Modified version of the Dicom Viewer Java Applet originally developed by [Takahiro Katoji and Nagoya Institute of Technology, Japan](#). This viewer is included with all PacsOne Server installation packages and if you want to switch to this Java Applet viewer, please follow the instructions below:

- ◆ Open a local command shell on the server where PacsOne Server is running, and change directory to wherever PacsOne is installed
- ◆ If you are running Windows platforms, run the command below from the command shell prompt:

```
C:\Program Files\PacsOne>copy php\applet_AiViewer.php php\applet.php
```

- ◆ If you are running Linux/MacOS platforms, run the command below from the command shell prompt:

```
#cp php/applet_AiViewer.php php/applet.php
```

### 5.8.3 Other Open-Source/Commercial Web-based Viewers

All other supported web-based Dicom image viewers (open-source or commercial) should include an integration package with PacsOne Server, which will contain at least one file/script - "php/applet.php". This script contains all the customizations required for integration with PacsOne Server. Please follow the instructions provided by the developer/vendor of the particular web-based Dicom image viewer you are installing to apply the integration package, which can be as simple as replacing the "php/applet.php" with the customized version from the integration package or extracting the content of a zip file.

## 6 Upgrade Procedures

PacsOne Server users who have purchased one of the technical support options can upgrade to newer releases of PacsOne Server Premium Edition as they become available, by following the platform specific instructions below:

## 6.1 Upgrading from Version 3.1.8 or earlier versions of PacsOne Server Premium Edition:

As of version 4.0.1, the PacsOne Server license and upgrade password are not backward-compatible with version 3.x or earlier versions, because of the changes in the licensing model for the newer releases. So for those customers who want to upgrade to version 4.0.1 or later from an earlier version 3.x/2.x release of PacsOne Server, please send a copy your current PacsOne Server license or upgrade password to [pacsone@pacsone.net](mailto:pacsone@pacsone.net) before you proceed to the upgrade instructions below, so that we can create a new PacsOne Server license and upgrade password required for upgrading from version 3.1.8 or earlier versions.

## 6.2 Windows Platforms:

Please follow the procedures below when you are upgrading from a previous version of PacsOne Server:

- ◆ Schedule a down time for the upgrade
- ◆ Stop PacsOne Server.
- ◆ Backup current version of PacsOne Server. This step is recommended in case you want to switch back to the previous version of PacsOne Server. You can backup current version of PacsOne Server software by:
  - Copy all files under PacsOne Server installation directory to a backup directory.
  - Using 'regedit.exe' or 'regedt32.exe', save/export following PacsOne Server Windows Registry settings into a registry file to a backup directory:

```
HKEY_LOCAL_MACHINE\Software\Rainbowfish Software\PacsOne\
```

- ◆ Backup MySQL Database Tables for PacsOne. It's recommended that you backup current MySQL database tables before upgrading to the new version, in case you need to revert to the original version.
  - Stop MySQL service from Windows Control Panel or type "**net stop mysql**" from a command shell.
  - Copy all table files under `C:\MySQL\data\{DBNAME}` to a backup directory, where `{DBNAME}` is the MySQL database for PacsOne. If you are using INNODB tables, you also need to copy the data files (`*ibdata*`) to the backup directory.
  - Start MySQL service again from Windows Control Panel or type: "**net start mysql**" from a command shell.
- ◆ Backup PacsOne Server License File – Premium Edition only. If you are upgrading a PacsOne Server Premium Edition to a newer release, it's recommended that you back up this license file in case you need it later.
- ◆ Stop the Apache web server.
- ◆ Run the self-extracting PacsOne Server Installer downloaded, be sure to use the same MySQL database name you were using for the previous version, and press the **<Upgrade>** push button so that the existing database tables can be upgraded instead of dropped and re-created from scratch.
- ◆ If the installation is successful, PacsOne Server will automatically be started and a README.TXT for the new version will be displayed.
- ◆ Start the Apache web server again.

### 6.2.1 Potential Issue Starting PacsOne Server Service After a Windows Upgrade

On certain Windows platforms (e.g., Windows 10, 11, etc) sometimes after an automatic Windows Upgrade, PacsOne Server service may not start properly. If this is the case, you may need to re-register PacsOne Server service by following the procedure detailed below:

1. Open Windows Registry Editor ("REGEDIT.exe") and backup/export the following key into a text file ("\*.reg"):
  - HKEY\_LOCAL\_MACHINE\Software\Rainbowfish Software\PacsOne\

```
HKLM\Software\RainbowFish Software\PacsOne\
```

1. Open a local command shell (“CMD.exe”) and run it as the Administrator.
2. Change directory to where PacsOne Server is installed.
3. Run the following command from the shell to un-register PacsOne Server service:

```
C:\Program Files\PacsOne>PacsOneSrv.exe /UnregServer
```

4. Run the following command from the shell to re-register PacsOne Server service:

```
C:\Program Files\PacsOne>PacsOneSrv.exe /Service
```

5. Open Windows Registry Editor and restore PacsOne Server Registry key by importing from the backup/exported registry file from #1 above.

After that, you should be able to start PacsOne Server service without any trouble.

### 6.3 Linux Platform (Premium Edition Only):

- ◆ Schedule a down time for the upgrade
- ◆ Stop PacsOne Server:

```
# /etc/init.d/pacsone stop
```

- ◆ Backup current version of PacsOne Server. This step is recommended in case you want to switch back to the previous version of PacsOne Server. You can backup current version of PacsOne Server software by:

- Copy all files under PacsOne Server installation directory to a backup directory.

- ◆ Backup MySQL Database Tables for PacsOne. It's recommended that you backup current MySQL database tables before upgrading to the new version, in case you need to revert to the original version.

- Stop MySQL service:

```
# /etc/init.d/mysql stop
```

- Copy all table files under `/var/lib/mysql/{DBNAME}` to a backup directory, where `{DBNAME}` is the MySQL database for PacsOne. If you are using INNODB tables, you also need to copy the data files (`'ibdata*'` ) to the backup directory.

- Start MySQL service again:

```
# /etc/init.d/mysql start
```

- ◆ Backup PacsOne Server License File. If you are upgrading a PacsOne Server Premium Edition to a newer release, it's recommended that you back up this license file in case you need it later.

- ◆ Stop the Apache web server:

```
# /usr/local/apache2/bin/apachectl stop
```

- ◆ Extract the PacsOne Server package tarball into the same directory where PacsOne Server is currently installed and replace all existing files.

- ◆ Run the `'install.sh'` installation program from the directory where PacsOne Server is installed. Be sure to use the same MySQL database name you were using for the previous version, and select the **[U]pgrade** option instead of **[N]ew Installation**, so that the previous database tables can be upgraded instead of re-created from scratch.
- ◆ If the installation is successful, PacsOne Server will automatically be started.
- ◆ Start the Apache web server again:

```
# /usr/local/apache2/bin/apachectl start
```

## 6.4 Mac OS X Platform (Premium Edition Only):

- ◆ Schedule a down time for the upgrade
- ◆ Stop PacsOne Server:

```
# /sbin/SystemStarter stop "PacsOne Server Premium Edition"
```

- ◆ Backup current version of PacsOne Server. This step is recommended in case you want to switch back to the previous version of PacsOne Server. You can backup current version of PacsOne Server software by:

- Copy all files under PacsOne Server installation directory to a backup directory.

- ◆ Backup MySQL Database Tables for PacsOne. It's recommended that you backup current MySQL database tables before upgrading to the new version, in case you need to revert to the original version.

- Stop MySQL service:

```
# /sbin/SystemStarter stop "MySQL Server"
```

- Copy all table files under `/var/lib/mysql/{DBNAME}` to a backup directory, where `{DBNAME}` is the MySQL database for PacsOne. If you are using INNODB tables, you also need to copy the data files (`'ibdata*'`) to the backup directory.

- Start MySQL service again:

```
# /sbin/SystemStarter start "MySQL Server"
```

- ◆ Backup PacsOne Server License File. If you are upgrading a PacsOne Server Premium Edition to a newer release, it's recommended that you back up this license file in case you need it later.
- ◆ Stop the Apache web server:

```
# /usr/local/apache2/bin/apachectl stop
```

- ◆ Extract the PacsOne Server package tarball into the same directory where PacsOne Server is currently installed and replace all existing files.
- ◆ Run the `'install.sh'` installation program from the directory where PacsOne Server is installed. Be sure to use the same MySQL database name you were using for the previous version, and select the **[U]pgrade** option instead of **[N]ew Installation**, so that the previous database tables can be upgraded instead of re-created from scratch.
- ◆ If the installation is successful, PacsOne Server will automatically be started.
- ◆ Start the Apache web server again:

```
# /usr/local/apache2/bin/apachectl start
```

## 6.5 Troubleshooting Upgrade Issues

- ◆ If there is any problem during the upgrade, the 'Setup.exe' Installer will most likely indicate what the problem is and any possible remedy can be taken.
- ◆ The database upgrade will save an upgrade log file named 'db\_upgrade.log' under the 'log' sub-directory of PacsOne Server installation directory. This log file contains the MySQL results from running the upgrade SQL queries and can be checked for any database-related issues.