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MedDream DICOM Viewer

Servicing MANUAL

(version 6.1.1)

Table of Contents

1. Introduction

MedDream DICOM Viewer is a HTML based package for PACS server which is designed to aid professionals in every day's decision making process, connecting all the medical data into a unified and fast performing network. MedDream ensures a fast and reliable way to search, present and analyze the medical data (images and video files) on various devices: computers, smart phones, tablets and so forth.

MedDream covers: radiology, cardiology, oncology, gastroenterology and many other fields of medical application. It seamlessly integrates with various medical imaging devices, such as: ultrasound (US), magnetic resonance (MRI), positron emission tomography (PET), computed tomography (CT), endoscopy (ES), mammography (MG), digital radiography (DR), computed radiography (CR) ophthalmology, and so forth.

Core MedDream DICOM Viewer uses are:

- Replacement of hard copies, e.g. film archives, paper documents, etc.
- Remote access. MedDream provides a possibility to be mobile and work from any place in the world where the Internet is accessible. More than one person can access and view medical records at one time. Such functionality speeds up the collaboration among the professionals. So that a doctor in the hospital and a doctor that is in the different location may view the medical data and discuss about it simultaneously. The patient's medical history, various studies and images are found much faster comparing to the conventional paper-based methods.
- MedDream can be used as a standalone WEB Viewer or integrated into MedDream PACS, PacsOne PACS, dcm4chee Archive, Conquest PACS, ClearCanvas PACS systems. Moreover, MedDream can be adapted to client's PACS system and easily integrated into RIS/HIS workflow.
- MedDream has multiple functions such as search of studies, viewing, analyzing, saving, exporting, forwarding images and videos, etc.

2. Minimal server side requirements

2.1. Minimal hardware requirements

Parameter	Requirement
Processor	2.33GHz or higher x86-compatible
Memory	4 GB
Hard drive	10 GB (RAID 1, RAID 5, RAID 10)
Network Interface	100 Mbit/s

2.2. Minimal memory requirements

Minimal memory requirements for the best performance of the software:

- 8 GB of RAM if you plan to open more than 800 images (CT & MRI, PET-CT).
- 12 GB of RAM for more than 1500 images (multi-slice CT & PET-CT).
- 16 GB of RAM for more than 3000 images (cardiac or functional imaging).

2.3. Minimal software requirements

2.3.1. Supported operating systems

MedDream supports following operating systems:

- Windows Server 2008 (32 bit and 64 bit) and newer
- Windows 7 (32 and 64 bit) and newer
- Linux (32 bit and 64 bit, with glibc version >= 2.7).

2.3.2. Supported WEB servers

MedDream supports Apache HTTP server. Versions from 2.2 are supported. Under Linux operating systems distribution supplier package shall be used. Under Windows operating systems binary packages from third parties (such as XAMPP) may be used or compiled from source.

2.3.3. Supported PHP scripting interpreters

MedDream requires PHP server-side scripting language interpreter integrated into the web server as a SAPI module. PHP versions from 5.3 to 5.6 are supported. Under Linux operating systems, distribution supplier package shall be used. Under Windows operating systems, binary packages from third parties may be used or compiled from source.

Under Windows, a thread-safe (TS) 32-bit PHP build is required. The DLLs included won't work with a 64-bit PHP, like in 64-bit builds of WampServer.

Under Linux, a non-TS PHP build is required. This is related to a more common build of Apache, the "prefork". The "worker" build is incompatible.

PHP 5.3 is built for Windows either with VC6 or VC9 runtime. Take note which version you have, and use a corresponding .dll during installation as explained below. Otherwise you'll get an error message like this one:

```
Module compiled with build ID=API20090626,TS,VC6
PHP compiled with build ID=API20090626,TS,VC9
These options need to match
```

3. General considerations

During an upgrade it's recommended to use the included config.sample-*.php as a template and then update the resulting config.php according to the old one. This will prevent misunderstandings like variable names which were suddenly changed.

MySQL from XAMPP 1.8 for Windows: if the web interface connects to the database very slowly (each attempt takes about 1 second), then try adding `bind-address = ::` to my.ini.

While still in demo mode, you **must** remove the existing meddream.lic after changing computer's host name (any OS), reinstalling the OS (Windows) or changing the MAC of any network card (Linux). A correct file will be created automatically. Otherwise a commercial license generated from your meddream.lic will not work. This also means that Windows must be activated in advance!

Under Linux, the .so file requires glibc library version 2.7 or later.

Starting from 5.5, support for DICOM overlays is on by default and MedDream will attempt to patch the image with data from the (6000,3000) tag. If some images fail to open after upgrade to 5.5 and logs contain the string "Error" related to output of meddream_thumbnail / meddream_convert2, then try to turn off the overlays by adding `meddream.overlays_enabled = 0` to php.ini.

Starting from 6.0, Java 8 is needed regardless of the PACS as parsing of some image types is implemented in a separate Java application. See *Deploying the Java-based core*.

The following instruction assumes that the system already meets prerequisites and runs Apache httpd server with PHP server-side scripting interpreter.

4. Apache configuration

NOTE: the following Apache modules must be loaded: `mod_deflate`, `mod_rewrite`, `proxy_module`, `proxy_http_module` and `proxy_wstunnel_module`.

In particular, if mod_rewrite is missing, you won't be able to open MedDream at all. An HTTP 500 error will be reflected in Apache error log by a message "`Invalid command 'RewriteEngine'`".

4.1. AllowOverride directive

The `<Directory>` clause that defines MedDream installation directory (or some of its parent directories) must allow `All` or at least `FileInfo`:

```
AllowOverride FileInfo
```

NOTE: the *Security considerations* chapter additionally suggests `Limit`/`AuthConfig` and `Options`. When adding them, do not drop `FileInfo`.

4.2. Reverse proxy

A reverse proxy must be set up for Java-based core. The following assumes that MedDream opens as `/meddream`:

```
<IfModule proxy_module>
        <IfModule proxy_http_module>
                ProxyPass /meddream/api http://SERVER_HOSTNAME_OR_ADDR:JAVA_CORE_PORT/api/
↪ nocanon
                ProxyPassReverse /meddream/api http://SERVER_HOSTNAME_OR_ADDR:JAVA_CORE_
↪PORT/api/ nocanon
                ProxyPass /api/study/open ws://127.0.0.1:8787/api/study/open
                ProxyPassReverse /api/study/open ws://127.0.0.1:8787/api/study/open
        </IfModule>
</IfModule>
```

If you prefer IP addresses, then SERVER_HOSTNAME_OR_ADDR should be the external address (not "127.0.0.1" etc).

If MedDream opens as `/`, then just remove the part "`/meddream`" from both lines. Otherwise you might need to change "`/meddream`" to the actual Web path.

If you changed the Application TCP/IP port in the `application.properties` file (see *Deploying the Java-based core*), then "`8080`" above must be updated with the same value.

5. Deployment under Windows operating systems

It is assumed that Apache document root is located at `C:\XAMPP\Apache\htdocs`, and PHP is located at `C:\XAMPP\PHP` and user has administrative permissions.

1. Copy meddream folder to `C:\XAMPP\Apache\htdocs`

   (the result: `C:\XAMPP\Apache\htdocs\meddream`)

   If you are updating an older version of MedDream:

   (a) Please back up the old version (so you can go back any time).

   (b) Please do not replace files you changed in last version. You must carefully synchronize the new version.

2. *(optional)* From `C:\XAMPP\Apache\htdocs\meddream` Copy and Replace applet.php to `C:\XAMPP\Apache\htdocs`.

   It is advised to make a backup beforehand in case you'll need to uninstall MedDream later.

3. From `C:\XAMPP\Apache\htdocs\meddream`

   copy php5.3_meddream-VC6.dll to `C:\XAMPP\PHP\ext` (if you are using PHP 5.3.x, VC6 build)

   copy php5.3_meddream-VC9.dll to `C:\XAMPP\PHP\ext` (if you are using PHP 5.3.x, VC9 build)

   copy php5.4_meddream.dll to `C:\XAMPP\PHP\ext` (if you are using PHP 5.4.x)

   copy php5.5_meddream.dll to `C:\XAMPP\PHP\ext` (if you are using PHP 5.5.x)

   copy php5.6_meddream.dll to `C:\XAMPP\PHP\ext` (if you are using PHP 5.6.x)

4. Add to php.ini file

   `extension=php5.3_meddream-VC6.dll` (if you are using PHP 5.3.x, VC6 build)

   `extension=php5.3_meddream-VC9.dll` (if you are using PHP 5.3.x, VC9 build)

   `extension=php5.4_meddream.dll` (if you are using PHP 5.4.x)

   `extension=php5.5_meddream.dll` (if you are using PHP 5.5.x)

   `extension=php5.6_meddream.dll` (if you are using PHP 5.6.x)

5. Specify date.timezone in php.ini:

```
[Date]
; Defines the default timezone used by the date functions
date.timezone = "America/Chicago"
```

   The list of possible values may be obtained from http://www.php.net/manual/en/timezones.php.

6. Restart Apache

7. Make sure meddream\bin\deleteTemp.bat is run at least every night by Task Scheduler. See chapter "INSTALLATION" in quick_install-Scripts.txt for a recipe. It might be needed to specify the full path to php.exe in deleteTemp.bat.

6. Deployment under Linux operating systems

Following guide assumes that Apache document root is located at `/var/www/html` and PHP configuration is located at `/etc/php` and user has root permissions.

1. Copy the "meddream" directory to /var/www/html so that the result is /var/www/html/meddream.

2. Adjust permissions: no less than

```
chmod 0777 /var/www/html/meddream
chmod 0777 /var/www/html/meddream/log
chmod 0777 /var/www/html/meddream/temp
chmod a+x /var/www/html/meddream/dcm4che/bin/*
```

```
chmod a+x /var/www/html/meddream/*.sh
chmod a+x /var/www/html/meddream/dcmtk/dsr2html
```

3. If you are updating an older version of MedDream:

   Please back up the old version (so you can go back any time).

   Please do not replace files you changed in last version. You must carefully synchronize the new version

4. From `/var/www/html/meddream`:

   copy php5.3_meddream.so to /usr/lib/php/modules (if you are using PHP 5.3.x)

   copy php5.4_meddream.so to /usr/lib/php/modules (if you are using PHP 5.4.x)

   copy php5.5_meddream.so to /usr/lib/php/modules (if you are using PHP 5.5.x)

   copy php5.6_meddream.so to /usr/lib/php/modules (if you are using PHP 5.6.x)

   copy php5.3_meddream-x86_64.so to /usr/lib64/php/modules (if you are using PHP 5.3.x under a 64-bit OS)

   copy php5.4_meddream-x86_64.so to /usr/lib64/php/modules (if you are using PHP 5.4.x under a 64-bit OS)

   copy php5.5_meddream-x86_64.so to /usr/lib64/php/modules (if you are using PHP 5.5.x under a 64-bit OS)

   copy php5.6_meddream-x86_64.so to /usr/lib64/php/modules (if you are using PHP 5.6.x under a 64-bit OS)

5. Add to php.ini file

   `extension=php5.3_meddream.so` (if you are using PHP 5.3.x)

   `extension=php5.4_meddream.so` (if you are using PHP 5.4.x)

   `extension=php5.5_meddream.so` (if you are using PHP 5.5.x)

   `extension=php5.6_meddream.so` (if you are using PHP 5.6.x)

   `extension=php5.3_meddream-x86_64.so` (if you are using PHP 5.3.x under a 64-bit OS)

   `extension=php5.4_meddream-x86_64.so` (if you are using PHP 5.4.x under a 64-bit OS)

   `extension=php5.5_meddream-x86_64.so` (if you are using PHP 5.5.x under a 64-bit OS)

   `extension=php5.6_meddream-x86_64.so` (if you are using PHP 5.6.x under a 64-bit OS)

   Depending from distribution PHP configuration file may be stored in different location. Please consult distribution documentation.

6. Specify date.timezone in php.ini:

   ```
   [Date]
   ; Defines the default timezone used by the date functions
   date.timezone = "America/Chicago"
   ```

   The list of possible values may be obtained from http://www.php.net/manual/en/timezones.php.

7. Restart Apache

8. Make sure meddream/bin/deleteTemp.sh is run at least every night by cron. See chapter “INSTALLATION” in quick_install-Scripts.txt for a recipe.

9. mkisofs is required for the Export command. If your distribution does not provide mkisofs, genisoimage package may be used. In that case a symlink to genisoimage is required:

   ```
   ln -s /usr/bin/genisoimage /usr/bin/mkisofs
   ```

10. To display SR files, we are using a prebuilt binary meddream/dcmtk/dsr2html from DCMTK 3.6.0. If your distribution provides another version of it that works better, then you'll need to replace `dsr2html` and `dicom.dic` with symlinks to your copies. Also please note this is a 32-bit binary, therefore some 64-bit systems might need an additional 32-bit version of glibc (for example, `glibc.686`).
11. ffmpeg is required in order to display thumbnails of MPEG2 DICOM files and non-BD-compatible MPEG4 videos (Transfer Syntax UID 1.2.840.10008.1.2.4.102). If your distribution does not provide ffmpeg, avconv package may be used. In that case symlink to avconv binary is required:

    ```
    ln -s /usr/bin/avconv /usr/bin/ffmpeg
    ```

12. To display videos of any kind, MedDream v5.5+ needs FFmpeg dated not older than 2014-03-08. If yours is older and can't be updated, then you need at least to switch to the legacy behavior by changing `const USE_FFMPEG_SUBFILE = true` in flv.php to an opposite value (false).
13. To display non-BD-compatible MPEG4 videos (Transfer Syntax UID 1.2.840.10008.1.2.4.102), latest version of FFmpeg might be required.
14. Starting from 5.5, MedDream adds the option "-y" to FFmpeg command line when extracting a thumbnail from a video file. If you are forced to use an older version of FFmpeg that doesn't understand this option, then add the following to php.ini:

    ```
    meddream.thumb_ffmpeg_cmdline = "-i ?I -f image2 ?O"
    ```

7. Deploying the Java-based core

7.1. Configuration

The Java application can be found in the folder "services" of the MedDream installation archive. For security considerations this folder should be moved to a location that isn't accessible from Web.

1. Create a file `application.properties` in this folder and add the following configuration parameters:
   (a) Gateway plugins folder

   ```
   com.softneta.pacs.gateway.pluginDir = plugins
   ```

   This is used only with `$pacs='DICOM'` and should remain unchanged in most cases.

   (b) Location of the legacy endpoint "Routes.php"

   ```
   com.softneta.meddream.url = MEDDREAM_URL/Routes.php
   ```

   Java-based core calls legacy backend for metadata etc.

   Example: `com.softneta.meddream.url=http://127.0.0.1/Routes.php`

   (c) Location of meddream.lic

   ```
   com.softneta.license.licenseFileLocation = PATH_TO_MEDDREAM_LIC_FILE
   ```

   The HTML Viewer currently uses the Java-based core for the Register function that updates the file meddream.lic.

   Examples:

   ```
   com.softneta.license.licenseFileLocation = ../meddream
   ```

   ```
   com.softneta.license.licenseFileLocation = /var/www/html/
   meddream.lic
   ```

   ```
   com.softneta.license.licenseFileLocation =
   C:\MedDreamPACS\MedDream\meddream.lic
   ```

(WARNING: If you need to use Windows paths with backslashes, then every backslash must be doubled.)

(d) Application TCP/IP port (optional)

```
server.port = APPLICATION_PORT
```

Allows to choose a different port if the default one, 8080, is occupied. Example: `server.port=8090`.

In this case you'll also need to update the port part of `$core_addr` (config.php) to the same value.

2. Start the Java application manually with a console command "java -jar", for example, `java -jar MedDream-0.3.0.jar`.

NOTE: when starting the application with a 32-bit version of Java, a library "clib" bundled with MedDream must be added:

1. open clib.zip and choose the folder suitable for your operating system. For example, `win-i686`;
2. extract file(s) from that folder to a new folder of your choice. For example, `C:\MedDreamPACS-Premium\services\lib`;
3. Specify the path to this folder in the command that starts Java. The syntax is `-Dlibrary=PATH_TO_FOLDER`. For example, `java -jar MedDream-0.3.0.jar -Dlibrary=C:\MedDreamPACS-Premium\services\lib`.

You should first make sure everything works when the application is started manually. Then follow the next chapter for a more standalone setup.

7.2. Running as a service

7.2.1. Windows

1. In the directory of the Java application, copy MedDream.NET2.exe or MedDream.NET4.exe (depends on installed .NET version) to MedDream.exe;
2. Open the `Command Prompt`;
3. Run the command `MedDream.exe install`;
4. Start the service from the Windows service manager.

NOTE: `MedDream.NET2.exe` is used in case the .NET Framework 2.0 is installed meanwhile the `MedDream.NET4.exe` is used for .NET Framework 4.0.

7.2.2. Linux (System-V init)

Execute the following commands:

```
sudo ln -s {INSTALL_DIRECTORY}/MedDream-0.3.0.jar /etc/init.d/meddream
sudo service meddream start
sudo chkconfig meddream on
```

7.2.3. Linux (systemd)

Create the file /etc/systemd/system/meddream.service with the following text:

```
[Unit]
Description=MedDream Viewer
After=syslog.target

[Service]
WorkingDirectory=/opt/meddream/services/
User=root
ExecStart=/usr/bin/java -Xmx=1024m -jar /opt/meddream/services/MedDream-0.3.0.jar␣
↪SuccessExitStatus=143

[Install]
WantedBy=multi-user.target
```

7.2.4. Linux (upstart)

Create a file /home/{user name}/.config/upstart/meddream.conf with the following text:

```
description "MedDream Viewer"
respawn
exec java -Xmx=1024m -jar {INSTALL_DIRECTORY}/app.jar
```

8. Integration with PACS

8.1. Integration modes

MedDream can access studies from PACS using:

Method	PACS
Direct access to PACS database	PacsOne
	DCM4CHEE
	Conquest
	ClearCanvas
Web Access to DICOM Persistent Objects (WADO)	Any PACS that supports the WADO-URI service
DICOM 3.0 native interface	Any PACS
File system access	Not applicable (a PACS is not necessary)

For best performance, it is recommended to use direct access to PACS database whenever available.

WARNING: In the Direct access to PACS database mode, MedDream must either:

- be installed on the same host as PACS, or
- have access to studies' files.

8.2. Direct access to PACS database mode

8.2.1. PacsOne

8.2.1.1. PacsOne notes

WARNING: PacsOne and Apache must run as the same user because newer versions of PacsOne create subdirectories with permissions too strict for different users. Please ensure that on Linux operating systems PacsOne and Apache services use the same user or belong to the same group.

Under Linux, PacsOne's custom libjpeg conflicts with standard libjpeg needed by the GD2 extension on which MedDream depends heavily at the moment. You will need to disable the antispam image in order to log in to PacsOne web interface (to do that, place an empty file "no.antispam.code" near PacsOne.exe). You also won't be able to view DICOM images in PacsOne; on the other hand, MedDream adds a "Show" button to the web interface and thus can be used instead of the built-in viewer.

PacsOne doesn't have an index on series.modality. If searches with a particular modality are unacceptably slow compared to the default set of checkboxes, then you'll need to use the following MySQL command:

```
ALTER TABLE series ADD INDEX (modality);
```

For the Send to DICOM Library Anonymizer, Java 7 and up is required.

Since 3.06.1103.3003, a DICOMDIR viewer in the subdirectory "DICOMDIR" is automatically included on export. However, an alternative way is to use PacsOne's "Include external viewer" functionality. If you use the latter, and still keep the viewer in the subdirectory "DICOMDIR", MedDream Export function might fail due to same files included twice. The solution is to rename the subdirectory, or move it somewhere outside the MedDream directory tree.

Until 6.0, the HIS integration by Patient ID was using a certain kind of fuzzy matching that includes coerced values of Patient ID. For example, /?patient=12345 will also list studies with Patient ID "12345[some_original_value]". In 6.0 this is turned off by default. If you still need the legacy behavior, then change STRICTLY_MATCH_PATIENT_FROM_ACTION in meddream/pacs/PacsImplPacsone/Search.php as follows:

```
const STRICTLY_MATCH_PATIENT_FROM_ACTION = false;
```

During an upgrade it's recommended to use the included config.sample-pacsone.php as a template and then update the resulting config.php according to the old one. This will prevent misunderstandings like variable names which were suddenly changed.

8.2.1.2. MedDream configuration for PacsOne

1. Perform steps described in paragraphs either *Deployment under Windows operating systems* or *Deployment under Linux operating systems*. It is recomended to use PACSONE_INSTALL_DIR/php as Apache's DocumentRoot.
2. From PACSONE_INSTALL_DIR/php/meddream Copy and Replace applet.php to PACSONE_INSTALL_DIR/php.
3. Edit `APACHE_HTDOCS_DIR/meddream/config.php` file. Use config.sample-pacsone.php as a template. The file contains basic instructions.
4. Navigate to `http://127.0.0.1/pacsone/meddream/home.php` (use PacsOne users to log in) or use the "Show" button in the PacsOne web system.

   If you get an HTTP 500 error, please check *Apache configuration* once more as likely some Apache module is missing.
5. For more supported image types, see *Deploying the Java-based core*.

8.2.2. DCM4CHEE

8.2.2.1. DCM4CHEE notes

WARNING: compatibility was tested only with DCM4CHEE 2.4.17, 4.3.0-Alpha4 and 5.6.0.

WARNING: DCM4CHEE v4 and v5 (dcm4chee-arc) have been tested with MySQL and Oracle only.

WARNING: DCM4CHEE v2 has been tested with MySQL and MS SQL Server only.

WARNING: the integrated Reports functionality is so far implemented only for MySQL and Oracle. There are no schema files for MSSQL and existing queries are incompatible with this DBMS.

For the Send to DICOM Library Anonymizer, Java 7 and up is required.

DCM4CHEE v4 requires that the path prefix (`filesystem.fs_uri`, default value specified in LDAP as `dcmInitFileSystemUri`) contains a URI scheme. MedDream supports the following syntax:

URI	Path	Applicable to operating system
`file:///dir/subdir1`	`/dir/subdir1`	all
`file:/dir/subdir2`	`/dir/subdir2`	all
`file:///<drive>:/subdir1`	`<drive>:/subdir1`	all
`file:/<drive>:/subdir2`	`<drive>:/subdir2`	all
`file://host/share/dir`	`//host/share/dir`	Windows
`file:///host/share/dir`	`/host/share/dir`	Windows
`file:////host/share/dir`	`//host/share/dir`	Windows

MedDream is able to automatically include a DICOMDIR viewer in each disc of exported studies. To use that, simply place the viewer files in a subdirectory named “DICOMDIR”. You must also ensure that a file named “autorun.inf” exists in that directory, otherwise contents won’t be included; an empty autorun.inf is suitable if the viewer somehow doesn’t contain it.

During an upgrade it’s recommended to use the included config.sample-dcm4chee.php or config.sample-dcm4chee-arc.php as a template and then update the resulting config.php according to the old one. This will prevent misunderstandings like variable names which were suddenly changed.

8.2.2.2. MedDream configuration for DCM4CHEE

1. Perform steps described in paragraphs either *Deployment under Windows operating systems* or *Deployment under Linux operating systems*.
2. Edit *APACHE_HTDOCS_DIR*`/meddream/config.php` file. Use config.sample-dcm4chee.php or config.sample-dcm4chee-arc.php as a template. The files contain basic instructions.
3. Add “studynotes” table to DCM4CHEE database from the schema file reports-dcm4chee-mysql.sql if you’re using MySQL. For dcm4chee-arc/dcm4chee-arc-lite and Oracle, use reports-dcm4chee-arc-oracle.sql instead.
4. Add “attachments” table to DCM4CHEE database from the schema file attachments-dcm4chee-mysql.sql if you’re using MySQL. For dcm4chee-arc dcm4chee-arc-lite and Oracle, use attachments-dcm4chee-arc-oracle.sql instead.
5. Navigate to `http://127.0.0.1/meddream/home.php` and use database accounts to log in. With DCM4CHEE 2.x, its internal accounts like “admin” or “user” are supported, too.

   If you get an HTTP 500 error, please check *Apache configuration* once more as likely some Apache module is missing.
6. For more supported image types, see *Deploying the Java-based core*.

8.2.3. ClearCanvas

8.2.3.1. ClearCanvas notes

WARNING: ClearCanvas support was last tested with MedDream 5.4. Pre-release tests with `$pacs = "ClearCanvas"` are rarely performed. Please contact info@softneta.com if you would like to use this integration mode.

WARNING: only the older ClearCanvas v2 is supported. We didn’t test MedDream with ClearCanvas 3+.

Direct integration into IIS is not possible any more, as MedDream still does not support CGI/FastCGI, ISAPI support was removed in PHP 5.3 and we dropped support for 5.2. php5.2_meddream.dll from an older version will not work. Your only option is to host MedDream in Apache (running on a different port) and use IIS as a reverse proxy. Please contact info@softneta.com for instructions.

The traditional php_mssql.dll is officially deprecated and might not work with newer versions of PHP and SQL Server. Its replacement, the “Microsoft SQL Server Driver for PHP” (`$dbms = 'SQLSRV'` in config.php), can be downloaded from Microsoft free of charge. It contains many flavors of the driver; the ones supported by MedDream are non-PDO and TS. The v2.0 driver also requires the “Microsoft SQL Server 2008 R2 Native Client”. Drivers older than v1.1 might be incompatible.

Java must be installed for the Forward and Export/Burn commands. Under Windows, do not forget to update either PATH or JAVA_HOME environment variable accordingly.

MedDream is able to automatically include a DICOMDIR viewer in each disc of exported studies. To use that, simply place the viewer files in a subdirectory named “DICOMDIR”. You must also ensure that a file named “autorun.inf” exists in that directory, otherwise contents won’t be included; an empty autorun.inf is suitable if the viewer somehow doesn’t contain it.

During an upgrade it’s recommended to use the included config.sample-clearcanvas.php as a template and then update the resulting config.php according to the old one. This will prevent misunderstandings like variable names which were suddenly changed.

8.2.3.2. MedDream configuration for ClearCanvas

1. Perform steps described in the paragraph *Deployment under Windows operating systems*.
2. Edit *APACHE_HTDOCS_DIR*`/meddream/config.php` file. Use config.sample-clearcanvas.php as a template. The file contains basic instructions.

   You will likely need to specify a port for database connection, like `localhost,1433`.
3. Navigate to `http://`*server IP address*`:`*Apache port*`/meddream/home.php` (do not forget the actual port that Apache runs on, and use database accounts to log in).

   If you get an HTTP 500 error, please check *Apache configuration* once more as likely some Apache module is missing.

   If the ‘MSSQL’ driver fails to log in, try installing the “Microsoft SQL Server 2008 R2 Native Client”. If even that didn’t help, change `$dbms` to ‘SQLSRV’ and manually install the “Microsoft SQL Server Driver for PHP”. The file that must be added to PHP extensions and php.ini, depends solely on your PHP version as other two choices are “non-PDO” and “TS”.
4. For more supported image types, see *Deploying the Java-based core*.

8.2.4. Conquest

8.2.4.1. Conquest notes

MedDream supports Conquest only with MySQL and SQLite v3 databases at the moment.

MedDream does not support the “V2 (allows NKI compression)” image format. All images that were received by Conquest with this setting on, including those of the example patient “HEAD EXP2”, will be unusable.

Java must be installed for the Forward and Export/Burn commands. Under Windows, do not forget to update either PATH or JAVA_HOME environment variable accordingly.

For the Send to DICOM Library Anonymizer, Java 7 and up is required.

MedDream is able to automatically include a DICOMDIR viewer in each disc of exported studies. To use that, simply place the viewer files in a subdirectory named “DICOMDIR”. You must also ensure that a file named “autorun.inf” exists in that directory, otherwise contents won’t be included; an empty autorun.inf is suitable if the viewer somehow doesn’t contain it.

During an upgrade it’s recommended to use the included config.sample-conquest.php as a template and then update the resulting config.php according to the old one. This will prevent misunderstandings like variable names which were suddenly changed.

8.2.4.2. MedDream configuration for Conquest

1. Perform steps described in paragraphs either *Deployment under Windows operating systems* or *Deployment under Linux operating systems*.
2. Edit *APACHE_HTDOCS_DIR*`/meddream/config.php` file. Use config.sample-conquest.php as a template. The file contains basic instructions.
3. Navigate to `http://127.0.0.1/meddream/home.php` (use database accounts to log in).

   If you get an HTTP 500 error, please check *Apache configuration* once more as likely some Apache module is missing.
4. For more supported image types, see *Deploying the Java-based core*.

8.3. Web Access to DICOM Persistent Objects (WADO) mode

MedDream uses the dcmqr utility from dcm4che2 Toolkit to make all queries to the target PACS. This way any PACS that talks DICOM protocol is supported. DICOM images, however, are downloaded through WADO-URI interface so the target PACS must support it. Additionally, allow_url_fopen (php.ini) must remain enabled.

Java must be installed. Under Windows, do not forget to update either PATH or JAVA_HOME environment variable accordingly.

For the Send to DICOM Library Anonymizer, at least Java 7 is required.

MedDream is able to automatically include a DICOMDIR viewer in each disc of exported studies. To use that, simply place the viewer files in a subdirectory named “DICOMDIR”. You must also ensure that a file named “autorun.inf” exists in that directory, otherwise contents won’t be included; an empty autorun.inf is suitable if the viewer somehow doesn’t contain it.

During an upgrade it’s recommended to use the included config.sample-wado.php as a template and then update the resulting config.php according to the old one. This will prevent misunderstandings like variable names which were suddenly changed.

To configure MedDream query images using WADO mode, following steps must be performed:

1. Perform steps described in paragraphs either *Deployment under Windows operating systems* or *Deployment under Linux operating systems*.
2. Edit `APACHE_HTDOCS_DIR/meddream/config.php` file. Use config.sample-wado.php as a template. The file contains basic instructions.
3. Restart Apache
4. Navigate to `http://127.0.0.1/meddream/home.php` and simply press the “Login” button. There is no password. Any non-empty user name is suitable. The user name “root” additionally enables the settings button.

   If you get an HTTP 500 error, please check *Apache configuration* once more as likely some Apache module is missing.
5. Usually the target PACS must be additionally configured to accept queries from the AET named “MEDDREAM”. You can assign any port, even the default 104, as dcmqr normally does not bind to a particular port and most PACSes do not require one when accepting a connection.
6. For more supported image types, see *Deploying the Java-based core*.

8.4. DICOM mode

MedDream uses the dcmqr utility from dcm4che2 Toolkit to make all queries to the target PACS. DICOM images are downloaded in a similar fashion through the dcmrcv utility. This way any PACS that talks DICOM protocol is supported.

dcmqr identifies itself as “MEDDREAM” and is not required to bind to a particular port (though it’s able to do that). dcmrcv **must** bind to a port (we recommend 11116) and for simplicity it uses the same AET, “MEDDREAM”. In general,

- the target PACS must be configured to accept this AET on port 11116,
- `$db_host` should contain **only** the AET (without IP and port),
- `$dcm4che_recv_aet` must contain a full connection string with AET and port.

The dcmrcv utility will automatically start (if needed) in the background every time when someone logs in. Afterwards it is managed by a particular Apache child process that started it. When this process finishes, dcmrcv will stop as well, therefore concurrent sessions might suddenly encounter the “C-MOVE operation failed” error. This normally occurs only when stopping the entire web server. You should leave MaxConnectionsPerChild (httpd.conf) with a default value (zero), or set it to a large enough value, to maximize the lifetime of dcmrcv.

In 5.x, the RetrieveEntireStudy mode is on by default. When opening a study, if at least one image is missing from the cache, the entire study is downloaded in the background – this is a lot faster. In case the old behavior (download a single image at once) is preferred, you can switch it back on:

1. In php.ini, change or add: `meddream.retrieve_entire_study = 0` (the default value is 1)
2. Restart Apache.

To configure MedDream using DICOM mode, following steps must be performed:

1. Perform steps described in paragraphs either *Deployment under Windows operating systems* or *Deployment under Linux operating systems*.
2. Edit `APACHE_HTDOCS_DIR/meddream/config.php` file. Use config.sample-dicom.php as a template. The file contains basic instructions.

   `$db_host` and `$dcm4che_recv_aet` may contain the same AET. The `@IP:PORT` part must be present in `$dcm4che_recv_aet` only. It is better to avoid it in `$db_host`, however if you need it, then give a different value.
3. Navigate to `http://127.0.0.1/meddream/home.php` and simply press the “Login” button. There is no password. Any non-empty user name is suitable. The user name “root” additionally enables the settings button.

   If you get an HTTP 500 error, please check *Apache configuration* once more as likely some Apache module is missing.
4. Usually the target PACS must be additionally configured to accept queries from, and send images to, the AET named “MEDDREAM” on port 11116. If that port is already used on your system, choose a different one and specify it in `$dcm4che_recv_aet`.
5. For more supported image types, see *Deploying the Java-based core*.

8.5. File system access mode

This MedDream mode allows to view single DICOM files, or directories containing files of a single study. Limitations are as folows:

- The path to a single file, or to a directory, will be relative. Absolute paths are not allowed due to security concerns. It is also not recommended to specify a drive root as a base directory. The simplest form of HIS integration results in paths visible for everyone, hence integration via POST requests is advised.
- If a directory is specified, then DICOM files are collected directly below it (subdirectories are not supported). Contents of the directory are sorted by name in ascending order and then parsed. All files must have the same Study UID; the value in the first file is treated as a reference and remaining files with different UIDs are ignored. Consequently, if the directory contains multiple studies, the outcome depends solely on file names and their collation according to the system-default locale.

- There is no search functionality. **A HIS (or equivalent application) must track studies/images together with corresponding paths, and offer hyperlinks to MedDream.** The interactive login, however, can still be used for the Settings dialog, provided that you log in as “root” (no password required). Alternatively, you can enable the dialog for all users, by changing SHOW_USER in external.php to “root”.
- The “Save Images...” function does not support the “Active Series” choice. However the user interface won’t warn about this, you’ll simply get images.zip which is a text file and contains an error message.

For the Send to DICOM Library Anonymizer, at least Java 7 is required.

During an upgrade it’s recommended to use the included config.sample-filesystem.php as a template and then update the resulting config.php according to the old one. This will prevent misunderstandings like variable names which were suddenly changed.

To configure MedDream using File System mode, following steps must be performed:

1. Perform steps described in paragraphs either *Deployment under Windows operating systems* or *Deployment under Linux operating systems*.
2. Edit `APACHE_HTDOCS_DIR/meddream/config.php` file. Use config.sample-filesystem.php as a template. The file contains basic instructions.

   You must specify `$archive_dir_prefix` – a base directory for all allowed paths.
3. Test the functionality by browsing to

   `http://127.0.0.1/meddream/?file=`*`PATH_TO_YOUR_FILE`*

   For example, the directory `C:\PACS\dcm4chee\server\default\archive` contains DCM4CHEE 2.x archive tree, with deeper levels named like `year\month\day\hour\...` This directory is specified by `$archive_dir_prefix`. Then *`PATH_TO_YOUR_FILE`* could be `2012\2\4\0\43D7AA94\2569DF62\9242C40A` or, in JavaScript code, `2012\\2\\4\\0\\43D7AA94\\2569DF62\\9242C40A`.

   If you get an HTTP 500 error, please check *Apache configuration* once more as likely some Apache module is missing.
4. For more supported image types, see *Deploying the Java-based core*.

9. Image Access from hospital information system (HIS)

9.1. Generic HIS integration

HTTP POST or GET methods can be used to open a study in MedDream. The table below describes attribute types for study query.

Attribute	URI	Availability
Study ID	URL?study=STUDY_UID	Unsupported by File System
Accession Number	URL?accnum=ACC_NO	Unsupported by File System. Supported in external.sample-dcm4chee.php, external.sample-conquest.php, external.sample-pacsone.php, external.sample-rssdimed-pacsone.php
Patient ID	URL?patient=PATIENT_UID	Unsupported by File System
Patient ID and Accession Number	URL?patient=PATIENT_UID &accnum=ACCESSION_NO	Supported only for PacsOne in external.sample-azimuth-pacsone.php
Series ID	URL?series=SERIES_UID	PacsOne and DCM4CHEE only, external.sample-rssdimed-*.php required
Image ID	URL?image=IMAGE_UID	Supported in external.sample-rssdimed-pacsone.php
File Name	URL?file=PATH_TO_FILE	File System only

The most popular example: `http://localhost/meddream/index.php?study=1.2.392.200036.9107.500.110113`

To enable study query from HIS, the following steps must be performed:

1. Among files external.sample-*.php, find the one dedicated to your PACS and rename/copy it to external.php.

   external.sample-FULL.php is not recommended as it gets only compatibility fixes (no feature or security updates). It might be completely removed in the future. Please use a more specific example and email info@softneta.com in case the "FULL" example contains something important to your installation while the more specific one doesn't.

2. Modify first lines of external.php that look similar to these:

```
define("SHOW_ENABLED", true);           // true: HIS integration is enabled;␣
↪false: disabled
define("SHOW_DB", "dbname");            // database name
define("SHOW_USER", "user");            // a database user
define("SHOW_PASSWORD", "password");    // corresponding password
```

3. To open the Flash Viewer instead of HTML Viewer, add `&htmlMode=off` to the URL:

   http://localhost/meddream/index.php?study=1.2.392.200036.9107.500.110113&htmlMode=off

   WARNING: do *not* use an "alternative" form `http://localhost/meddream/swf/index.php?study=...`, as many, or even all, features described in this document will not work.

4. To add the study into the viewer opened in an existing browser tab, use addStudy.php instead of index.php:

   http://localhost/meddream/addStudy.php?study=1.2.392.200036.9107.500.110113&viewer=swf

   http://localhost/meddream/addStudy.php?study=1.2.392.200036.9107.500.110113&viewer=html

   When used this way, the viewer will contain multiple studies as if they were opened from Search without closing the browser tab containing the viewer.

   Copy the following to an HTML file in the MedDream root directory, then update the URL near end of the file.

```
<!DOCTYPE html>
<html lang="lt">
        <head>
                <meta charset="utf-8">
                <title>Eli-MedDream</title>
        </head>
        <body>
```

```
                <button target="_blank" onclick="showImageUUID('1.2.840.
↪113619.2.98.2188.1490859935.0.2857','flash','token')">Vaizdas 1</button>
                <button target="_blank" onclick="showImageUUID('1.2.840.
↪113619.2.98.2188.1490859935.0.2857','html','token')">Vaizdas 2</button>
                <script>
                        function showImageUUID(uuid,n,token) {
                        window.open("http://127.0.0.1/addStudy.php?study=" +␣
↪uuid + "&viewer=" + n + "&token=" + token, "MedDream", "");
                        }
                </script>
        </body>
</html>
```

9.2. Specification of thumbnails service

Provides access to thumbnails of study images via HTTP GET/POST request. One request lists images in the study and the second request fetches a single JPEG image.

IMPORTANT: Will reuse existing login information if MedDream is already open in the same browser (other tab or window). For standalone use, you need to configure external.php.

Definition	Description
URL	MedDream root hyperlink without the query part (e.g., http://localhost/meddream/). It is OK to include index.php or home.php.
image_uid	Value of primary key in the images database table (PacsOne: images.uuid, DCM4CHEE: files.pk, etc). In some PACSes it's *not* the SOP Instance UID but just a database-local integer.
study_uid	Value of primary key in the studies database table (PacsOne: study.uuid, DCM4CHEE: study.pk). In some PACSes it's *not* the Study Instance UID but just a database-local integer.
image_size	Limit of image width and height. The image will be resized so that the larger side won't exceed this value. Default value is 50, allowed range is 50 . . . 4320.
data_result	Choice of images to list: 0 - first image from the first series 1 - first image from every series 2 - all images from the study Default value is 0.

Request: list available thumbnails

`URL/getImageList.php?study=study_uid&size=image_size&result=data_result`

Returns a JSON-formatted array:

```
{
        "studyUID": study_uid,
        "thumbnails": [
                {
                        "imageUID": image_uid_1,
                        "url": URL/getThumbnail.php?image=image_uid_1&size=image_size
                },
                ...,
                {
                        "imageUID": image_uid_N,
                        "url": URL/getThumbnail.php?image=image_uid_N&size=image_size
                }
        ]
}
```

In case of not found study, authentication failure or any other error, will return the HTTP 404 error with an empty Response Body.

Request: get a thumbnail image

`URL/getThumbnail.php?image=image_uid&size=image_size`

Returns the raw JPEG stream with an appropriate Content Type header.

In case of not found image, authentication failure or any other error, will return the HTTP 404 error with an empty Response Body.

9.3. Specification of Live Stream

Addresses of live streams can be defined in the file `liveStreamList.json` in the MedDream installation directory (for example, near the file Routes.php). The configured items will appear in MedDream search results as studies.

IMPORTANT: A live stream address must be valid and accessible via VLC player on every client machine. You must make sure that the address is accessible to the client: port is open, antivirus or firewall software isn't blocking it, etc.

The file liveStreamList.json must contain valid JSON data.

Definition	Description
liveStream	Stream file block. Required.
id	Stream id. Short word. Required.
name	Stream short name.
modality	Set to "LIVE".
description	Detailed description of the stream, a single line.
sourceAE	Full source address that can be played in the VLC player.

Example

```
{
  "liveStream": [
    {
      "id": "1",
      "name": "Room #2",
      "modality": "LIVE",
      "description": "Operating room in 2nd floor\ndasdasd",
      "sourceAE": "rtsp://192.168.1.1:554/session0.mpg"
    },
    {
      "id": "2",
      "name": "Room #3",
      "modality": "LIVE",
      "description": "Operating room in 3nd floor",
      "sourceAE": "rtsp://192.168.1.2:554/session0.mpg"
    }
  ]
}
```

9.4. Further reading

More details can be found in a separate document, quick_install-HIS_integration.txt.

10. Additional software

MedDream can be used in tandem with several external pieces of software that are listed below.

NOTICE: to get the required software, please contact support@softneta.com.

10.1. Browser plugin

A plugin for the Chrome browser that expands a newly opened tab across several monitors. The URL is scanned for a entered keyword and if a match is found, a new window is created and expanded across the selected monitors. The plugin can be added using the Chrome extension tab.

NOTICE: to get plugin, please contact to support@softneta.com

10.2. OpenAM verification service

OpenAM is an open source access management and entitlements server platform. This replaces the standard MedDream verification service. Installation is explained in the next chapter.

NOTICE: to get prepared OpenAM package, please contact to support@softneta.com

11. MedDream and OAuth

MedDream 6.0 and later versions add a possibility to use OAuth for authentication and user rights management. Implementation is based on OpenAM.

The file external-oauth2.php provides client-side integration. It is based on external.sample-pacsone.php and is therefore to be used with `$pacs = 'PacsOne'` (config.php). However if you don't need HIS integration and authentication is enough, then this is a working authentication solution for configurations like `$pacs = 'DICOM'`.

11.1. Installation

Run OpenAM server on embedded Tomcat from the installation folder (OPENAM_HOME):

java -jar openam-server.jar

It will start server on default 8090 port. To run on specific port for example 8088:

java -jar openam-server.jar -port 8088

OpenAM server

http://host:port/openam

Initial setup

Make sure OpenAM server is started. During configuration enter:

OpenAM server url - http://host:port

Redirection URI of OAuth2 provider - http://<meddream_host>:<meddream_port>/index.php

Windows

Run script:

OPENAM_HOME\scripts\config.bat

Linux

Set access rules:

chmod a+x OPENAM_HOME/scripts/*.sh chmod 400 OPENAM_HOME/tools/admin/pwd.txt

Run script:

OPENAM_HOME/scripts/config.sh

Remove configuration

Stop OpenAM server

Windows

Run script:

OPENAM_HOME\scripts\remove-config.bat

Linux

Run script:

OPENAM_HOME/scripts/remove-config.sh

PacsOne users import

“mysql” **must** be accessible from any location.

Windows

Run users extraction script:

OPENAM_HOME\scripts\extract-users.bat <users export file> <db host> <db user> <db password> <db name>

Real example:

OPENAM_HOME\scripts\extract-users.bat OPENAM_HOME\scripts\users 192.168.11.10 root password dev

Run users import script:

OPENAM_HOME\scripts\import-users.bat <users export file>

Real exampple:

OPENAM_HOME\scripts\import-users.bat OPENAM_HOME\scripts\users

Linux

Run users extraction script:

OPENAM_HOME/scripts/extract-users.sh <users export file> <db host> <db user> <db password> <db name>

Real example:

OPENAM_HOME/scripts/extract-users.sh OPENAM_HOME/scripts/users 192.168.11.10 root password dev

Run users import script:

OPENAM_HOME/scripts/import-users.sh <users export file>

Real example:

OPENAM_HOME/scripts/import-users.sh OPENAM_HOME/scripts/users

12. Security considerations

RATIONALE: It is an old dilemma of using “security through obscurity”. As a matter of fact, most MedDream installations tend to have a few security holes due to non-paranoid Web administrators. The very publication of

this knowledge makes every old/unmaintained MedDream installation an easy target. But, we must draw a line one day so that at least new installations are secure.

12.1. Search engines

If MedDream is exposed to the Internet, your installation might be found simply by searching for “MedDream” or “Softneta”. (Rebranding is possible but most customers don’t need it.) Afterwards an attacker can check for typical misconfigurations as explained later in this document.

Solution: set up the robots.txt file.

This file is always hosted as `/robots.txt` (at the website root). If MedDream is also hosted there, the following robots.txt will be sufficient:

```
User-agent: *
Disallow: /

User-agent: AdsBot-Google
Disallow: /
```

A recommended read is http://www.robotstxt.org/robotstxt.html.

12.2. The subdirectory ‘log’

This subdirectory may contain files `php-YYYYMMDD.log` with sensitive patient data. Logs are not enabled by default, but might be needed during troubleshooting which sometimes takes days. Also one might forget to remove them (or disable logging) afterwards.

Solution: disable Web access to this directory altogether.

When using Apache, this is achieved by the following .htaccess file in this directory:

```
Order deny,allow
Deny from all
```

Apache 2.4+ requires a different syntax:

```
Require all denied
```

Reminder: If you need a restrictive `AllowOverride` directive on a related directory, its compatible values are “Limit Options” (first one allows Order/Deny, and the second one is for Options -Indexes in the next chapter). The equivalent for 2.4+ is “AuthConfig Options”. Furthermore, MedDream requires “FileInfo” since 6.1 so you must add this one when changing `AllowOverride All` to a more detailed subset.

12.3. The subdirectory ‘temp’

The subdirectory “temp” is accessed via Web when viewing DICOM MPEG2 (Transfer Syntax UID = `1.2.840.10008.1.2.4.100`) files, and when downloading an .ISO/.burn file after Export function finishes. It might contain temporary files and subdirectories with randomized names and DICOM/JPG/FLV data inside; every such file might reveal sensitive patient information. Some of these files are left undeleted when MedDream crashes, and some are just impossible to delete on time. Scripts deleteTemp.* can be regularly called by the operating system’s scheduler to minimize amount of rubbish, however the latter will not disappear completely.

Solution: disable Web listing of this directory.

When using Apache, this is achieved by the following .htaccess file in this directory:

```
Options -Indexes
```

Alternatively, the entire MedDream directory can be denied listing in the <Directory> configuration block.

Furthermore, if you do not intend to view MPEG2 or use the Export function (or MedDream doesn't support them in your configuration), then simply disable Web access to this directory altogether, as with "log" subdirectory above.

12.4. printVersions.php

This file returns versions of major MedDream components **without requiring authentication**. It is not needed by MedDream itself and is rather dedicated to help investigations by service staff and automated deployments.

If you believe that versions might suggest known vulnerabilities and therefore speed up their search, then at least rename this file to something obscure.

12.5. DCM4CHEE 2.x

Official installation instructions offer some defaults that sometimes are left unchanged.

The default database name for 2.x is "pacsdb". You also might be tempted to call it "dcm4chee". For a knowledgeable attacker, both provide a clear suggestion which PACS is there and what to try next.

After a mindless installation there also will be some default user accounts:

- a database user "pacs" with password "pacs". Perfectly suitable for MedDream;
- an internal user "admin" with password "admin" – suitable for MedDream and DCM4CHEE's web interface;
- an internal user "user" with password "user" – suitable for MedDream and DCM4CHEE's web interface.

Any of these accounts can be used to access sensitive patient data. We suggest to change passwords for all three, as soon as possible after the installation. The first one is used by DCM4CHEE to connect to the database, therefore you will also need to update the file server/default/deploy/pacs-*-ds.xml (name depends on database used).

12.6. The subdirectory 'scripts'

This subdirectory contain files with background jobs and related logs.

Solution: disable Web access to this directory altogether.

When using Apache, this is achieved by the following .htaccess file in this directory:

```
Order deny,allow
Deny from all
```

(Apache 2.2) or

```
Require all denied
```

(Apache 2.4+).

12.7. prepared.php

This file (since 6.1) allows to manage failed preparation jobs, examine DICOM tags and even download entire objects. Access is protected by a password (no user name) that is stored unencrypted in a configuration file. The default password becomes known to everyone who downloads the MedDream installation archive.

Solution: change the password as soon as possible after the installation.

File meddream/scripts/prep/config.php:

```
define('WEB_PASSWORD', 'the new password');     /* used by prepared.php, without␣
↪user name */
```

13. Troubleshooting

13.1. Log files of the legacy backend

The directory *APACHE_HTDOCS_DIR*/meddream/log contains two kinds of log files:

- php-YYYYMMDD.log – log messages from PHP-based core
- YYYYMMDD-HHIISS-PPPPP.log – log messages from the php_meddream module

By default this directory also contains the file enabled_ that is ignored; it will come into effect after renaming to enabled (without the underscore).

The file enabled also configures the log level, specified by a single digit 0 to 4 (more levels might be added in the future):

- 0 – off
- 1 – errors
- 2 – warnings
- 3 – information
- 4 – debug

It is recommended to leave the value “1” in new installations. Currently, however, messages from the lower levels might have not enough context information to be usable.

After changing the level, it is necessary to restart Apache so that php_meddream also reacts to the change. Otherwise only php-YYYYMMDD.log is affected.

13.2. Log files of the Java-based core

In the directory of the Java application, the files MedDream.*.log will be created. MedDream.out.log contains console output of the application.

To control the logging level, add the following line to application.properties:

```
logging.level.root=DEBUG
```

Alternatives to “DEBUG” are INFO, ERROR etc as per Log4j specification.