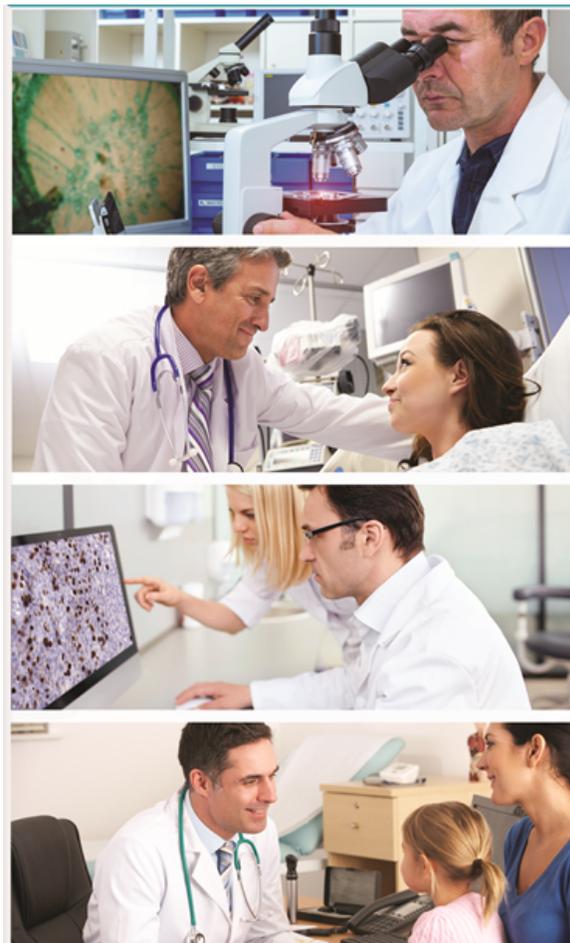


PMA.core 1.2 manual

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PMA.core 1.2 manual

by Angelos Pappas, Yves Sucaet



PMA.core 1.2 manual

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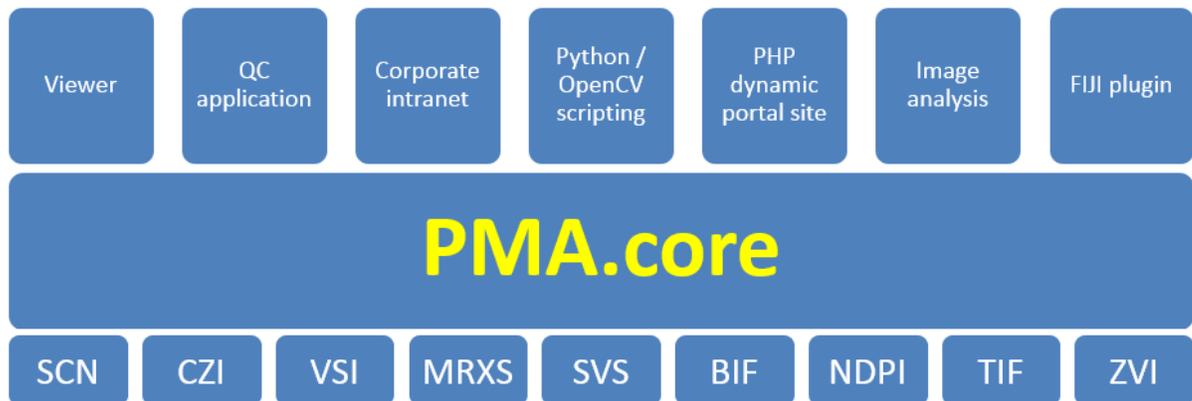
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1 About PMA.core

You are reading the manual for PMA.core, a central component of the Pathomation software platform for digital pathology ("the platform").

PMA.core operates through web protocols and supports a number of file formats, allowing you to manipulate WSI data from different vendors in a standardized manner. This enables efficient management of digital slide images while requiring minimal setup.

PMA.core manages your whole slide images. It is not responsible for viewing and other operations such as annotations, data capture, and image analysis. While PMA.core contains the necessary functions to retain these types of data, it does not provide end-user interfaces to create and manipulate it. The software acts as a broker between the various vendor-dependent file formats on one end, and a variety of different end-user applications on the other:



The end-user applications are typically referred to as "downstream" applications in this manual. They can be other member-components of our platform (PMA.view is an excellent viewer), but they may be completely custom-built by third-parties as well (in which case communication with PMA.core is conveniently facilitated through webservice).

This type of broker-like interaction enables both downstream viewing and analysis. PMA.core allows adopters of WSI to build a context around each slide (on-slide graphical annotations and form-data) and manage this as needed.

1.1 Who should read this

Histotechnicians, pathologists, administrators and software engineers should read this user guide and use it for reference while using the system.

This document is intended for users who need to know how to set up PMA.core, as well as end-users (though the latter will typically interact with downstream applications such as PMA.view).

1.2 What's new in version 1.1

- Targeted and fixed trouble areas to improve overall application stability and deliver an enhanced user experience
- New file type: Nikon .ND2 file
- Improved support for Hamamatsu NDPI files (up to 117% faster reads)
- Improved support for Zeiss CZI fluorescent files
- Improved support for Zeiss ZVI files (brightfield support, multiple uncompressed image formats including grayscale, RGB, and RGBA)
- Support for secure http (<https://>) and SSL certificates
- New file type: DICOM (based on Leica's implementation on the SCN-400 scanner)
- Additional support for DICOM multiple frames
- Additional support for DICOM fluorescent data
- New file type: Sakura SVSlide
- Improved support for Olympus VSI files (when they have only a single scan area)
- Improved support for Olympus VSI files (associated directories can now have different naming conventions)
- Administrative users are no longer locked out when the [concurrent user limit is reached](#)
- Session lifetime can now be monitored in real time
- Improved JPEG2000 support
- Experimental support for OpenLayers 3 rendering framework
- Built-in OpenLayers 3 rendering framework allows for the creation of snapshots (which may have a [copyright notice](#) added to them)
- [Nested root-directories](#) now allow file manipulation operations
- Improved support for TIFF compression algorithms (added Adobe Deflate Compression)
- Improved support for TIFF files: GDAL exports and Nikon exports are now supported, too
- Added fallback support for partially copied 3DHistech MRXS-files
- [Improved usage statistics](#) to allow historical system monitoring and resource planning
- [Additional operating system parameters are available](#) to allow faster GxP validation
- [Integrity report](#) is now more visually appealing and the interface is more userfriendly
- Comprehensive CSS-restyling allow better and more granular customization (for select customers)
- Improved internal database security
- Case insensitive login check implemented during user creation
- Prevent root directories from having the same path or alias but different casing
- Enables CORS in the webservice API (for [https support](#))
- Improved support for SVS files (latest Leica-generated SVS files)
- Known and supported file formats can now be consulted via the user interface
- Slide content can be rendered in PNG format (lossless compression) as well as JPEG format (lossy compression)
- [Access control lists](#) (ACL) for root-directories and users
- Password is no longer visible in user log

1.3 What's new in version 1.2

General improvements:

- LDAP support in the form of pass-through authentication (explicit PMA.core login still required)
- Improved ND2 support (interleaved RGB channels, z-stacks)
- Improved TIFF support (LZW compression)
- Integrated IIS logfile statistics
- Better interaction between form entry and webbrowser autocomplete behavior
- License expiration warnings

- Full support for OpenLayers 3 rendering framework
- Meta-data for forms can now be imported and exported
- Improved manual
- New file format: Aperio CWS

Programmability improvements:

- Heatmap improvements (now available through an exposed view)
- "Caller" argument and tracking allows granular application use monitoring
- More control over tile and region rendering (Format and ImageQuality parameters)

1.4 Release history

| Version | Revision | Released |
|--|----------|---------------|
| PMA.core 1.0.0 (also referred to as 1.0) | 604 | February 2015 |
| PMA.core 1.1.0 | 784 | August 2016 |
| PMA.core 1.2.0 | 883 | October 2017 |

1.5 Supported file formats

PMA.core supports the following file formats:

| <u>Vendor</u> | <u>Extension</u> |
|---------------|------------------|
| 3DHistech | MRXS |
| Aperio | CWS |
| Aperio | SVS |
| Generic | JP(E)G |
| Generic | TIFF |
| Hamamatsu | NDPI |
| Hamamatsu | VMS |
| Hamamatsu | VMU |
| Leica | SCN |
| Nikon | ND2 |
| Philips | TIFF |
| Ventana | BIF |
| Zeiss | ZVI |
| Zeiss | CZI |

2 Installation

In this chapter we show you the software installation steps to go through to get PMA.core successfully up and running on your system. We also explain how our license model works.

2.1 System requirements

System requirements, software prerequisites, and other recommendations are described in a separate document "System Requirements".

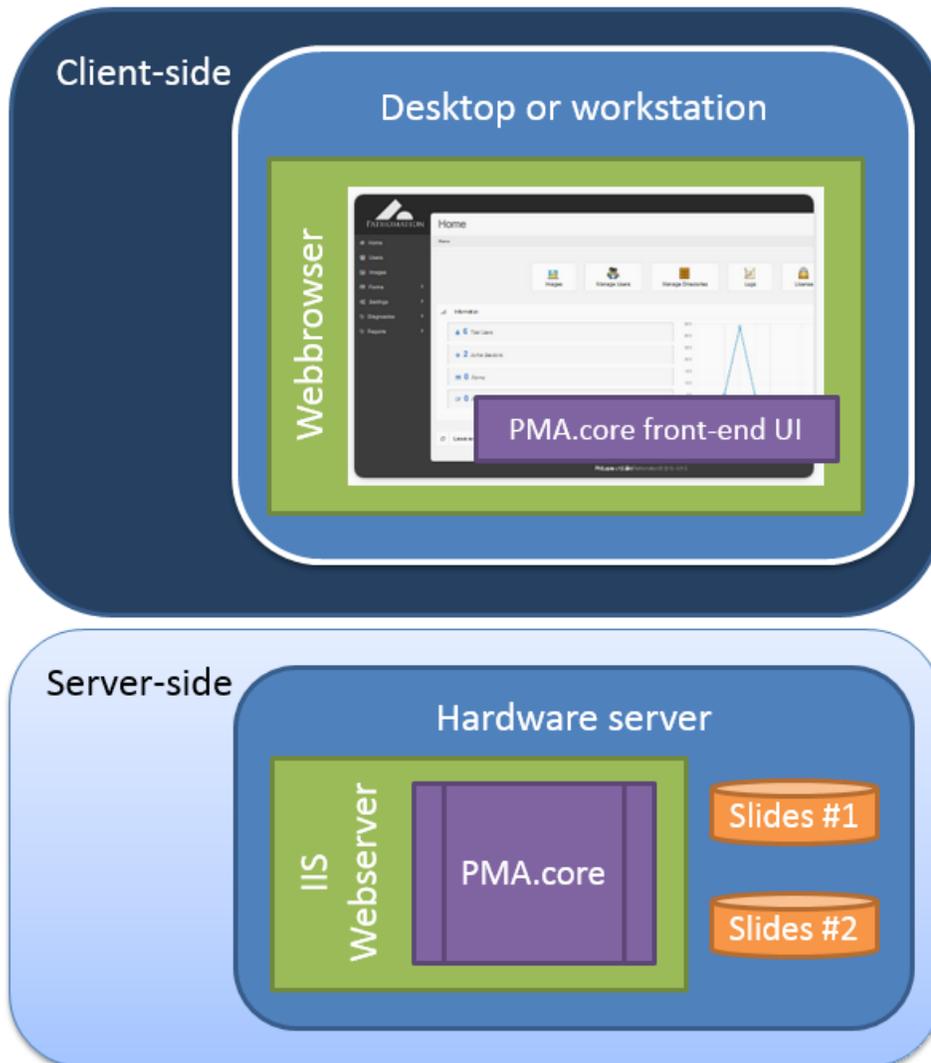
2.2 Installation

Assuming that your setup conforms to our system requirements (defined in a separate document; [contact us](#) if you do not have this document), installation is done by one of Pathomation's support engineers. Installation can occur on-site or from a distance.

If you wish to have setup performed remotely, please advise us at least 48 hours in advance concerning. This gives us sufficient notice to test connectivity settings. We are flexible and are familiar with a number of remote control systems, including but not limited to Remote Desktop (RDP), VNC, WebEx, and TeamViewer. The account provided to use for installation should have sufficient (preferably administrator-level) privileges so we can may install and configure additional Windows components (laid out in the system requirements document).

Installation typically takes about half a day, but may vary depending on the need to download and install additional prerequisites, as well as internet speed provided, and the performance of the hardware setup.

The various components are of PMA.core and the terminology used throughout this manual are outlined in the following schema:



2.2.1 Secure HTTP

PMA.core 1.1 was modified to support both regular HTTP (<http://>) as well as secure HTTP (<https://>).

The following operations should only be performed by experienced users. If you don't know what `web.config` is (or where to find the `web.config` file), you should stop reading and contact somebody more knowledgeable in this area.

You will need to make the necessary changes on the Microsoft IIS side. You will need to purchase and install the proper certificates on the webserver to make everything go smoothly and prevent browser warnings about untrusted sources cropping up. The configuration of these is outside the scope of this manual however. Do [contact us](#) if you need additional support with this.

Changes are necessary to the configuration files of PMA.core 1.1 to make it operate under secure http.

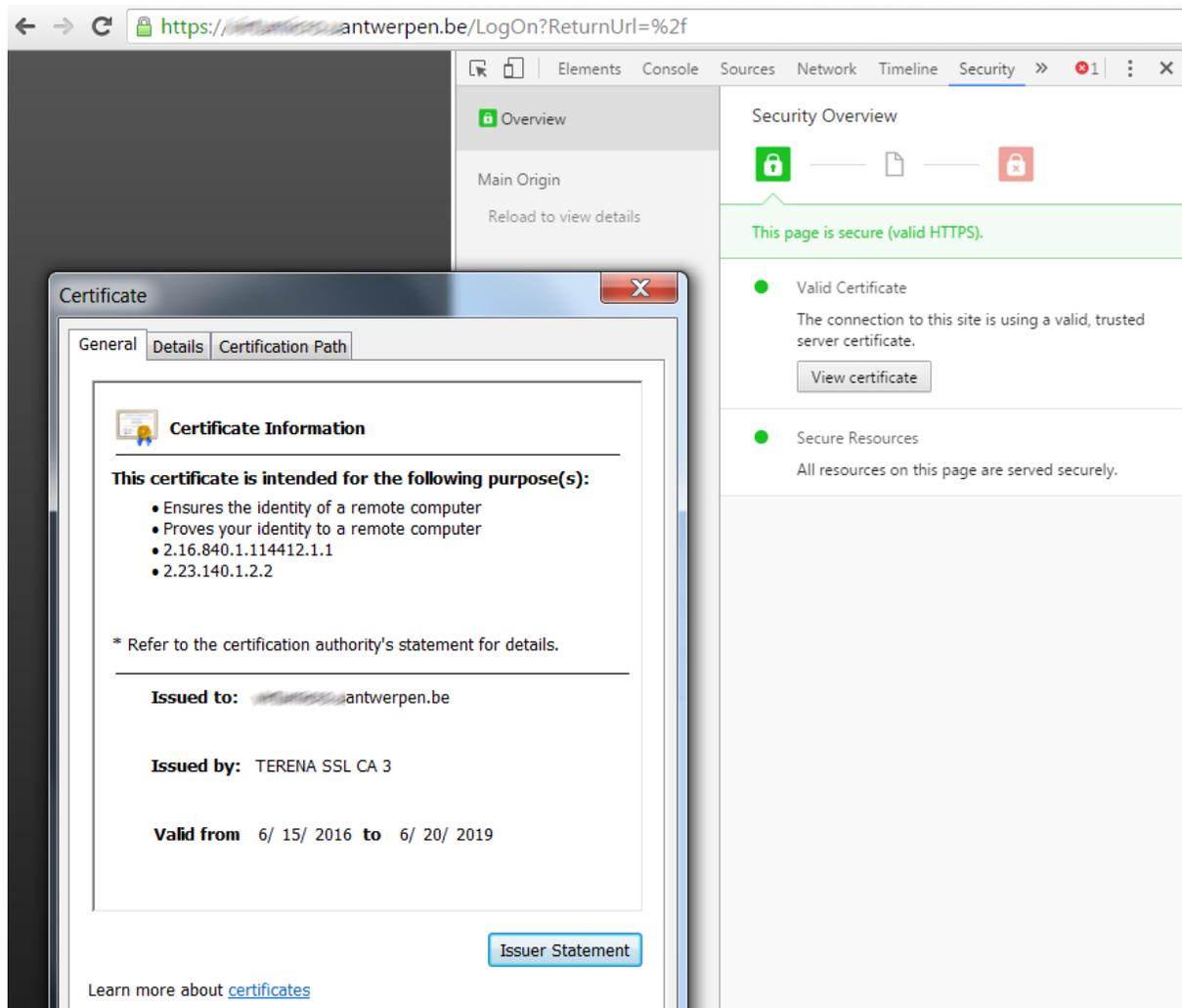
For a http-setup, you will find the following section in the `web.config` file:

```
<basicHttpBinding>
  <binding name="soapBinding">
  </binding>
</basicHttpBinding>
<webHttpBinding>
  <binding name="webjsonHttp">
  </binding>
  <binding name="webpoxHttp">
  </binding>
</webHttpBinding>
```

For secure http, this becomes:

```
<basicHttpBinding>
  <binding name="soapBinding">
    <security mode="Transport">
      <transport clientCredentialType="None"/>
    </security>
  </binding>
</basicHttpBinding>
<webHttpBinding>
  <binding name="webjsonHttp">
    <security mode="Transport">
      <transport clientCredentialType="None"/>
    </security>
  </binding>
  <binding name="webpoxHttp">
    <security mode="Transport">
      <transport clientCredentialType="None"/>
    </security>
  </binding>
</webHttpBinding>
```

When running PMA.core 1.1 under https, you will receive a notification by your browser with the possibility to retrieve extended information about the certification authority (CA):

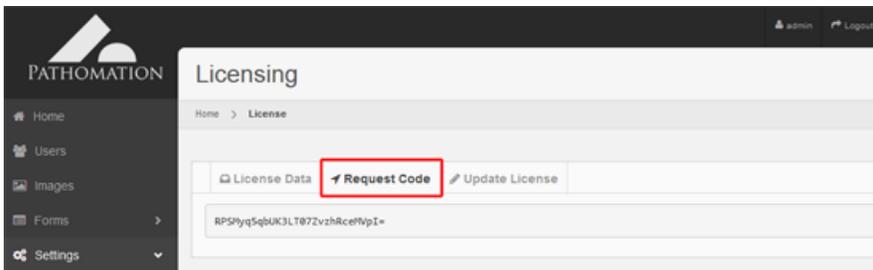
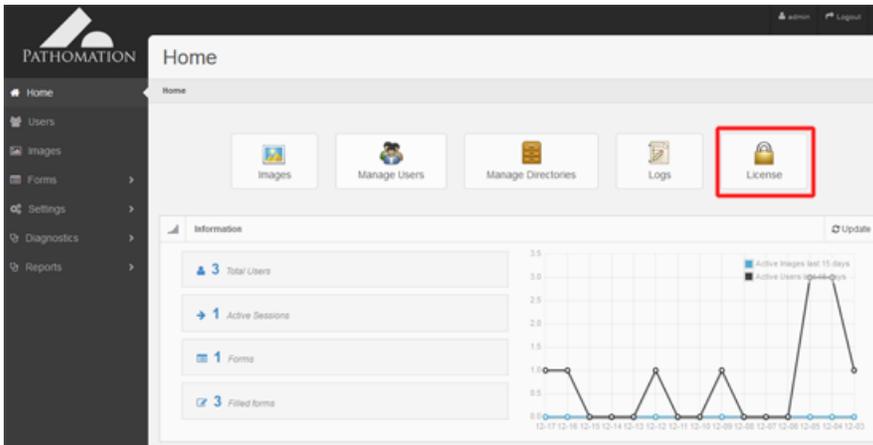


You will need PMA.view 1.1 to retrieve content from PMA.core 1.1 in secure http mode. PMA.View 1.1 can connect to either secure or unsecure tile servers like PMA.core. In summary, the following combinations are possible:

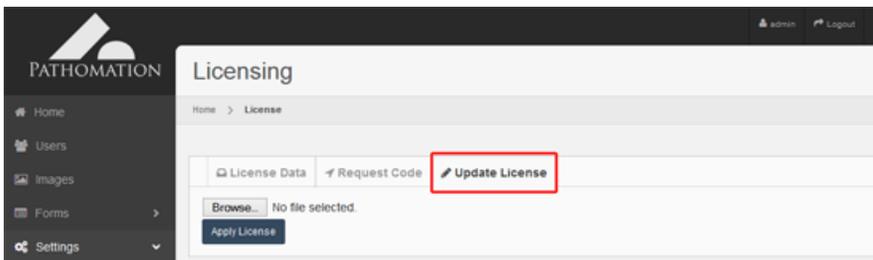
1. PMA.view running in https:// and PMA.core running in http://
2. PMA.view running in https:// and PMA.core running in https://
3. PMA.view running in http:// and PMA.core running in http:// (default behavior of PMA.view 1.0)
4. PMA.view running in http:// and PMA.core running in https://

2.3 License setup

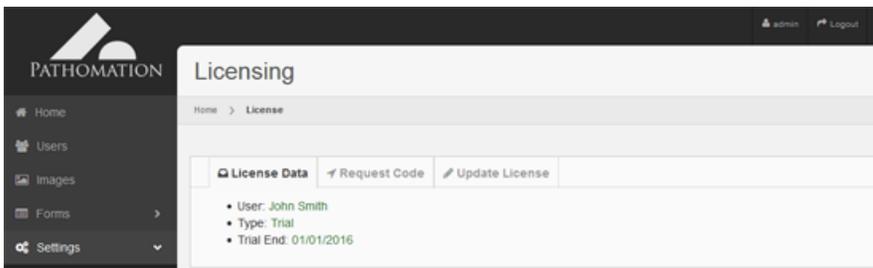
When starting the application for the first time a license will be required. The system will display a section where license information can be found. The user must copy the request code, which can be found in the second tab and send it to the vendor:



The vendor will provide the user with an appropriate license file, which can be installed from within the third tab:

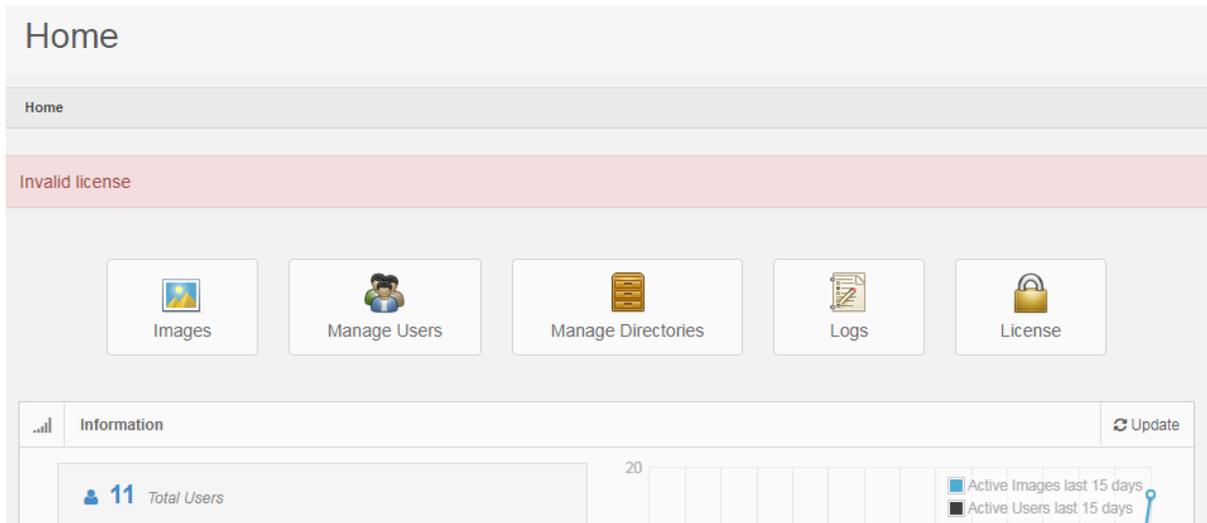


Once the license has been successfully installed, the system will display the appropriate message.

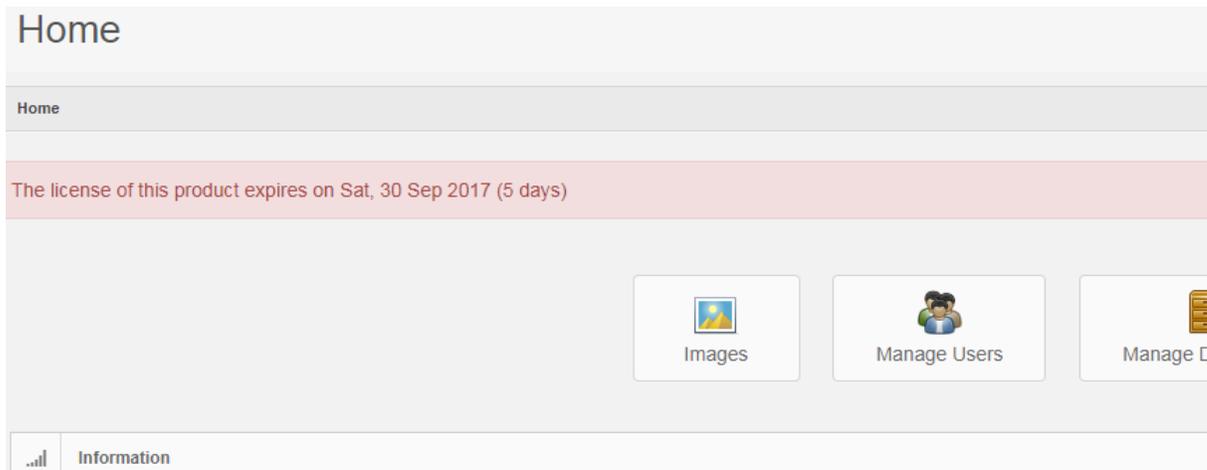


2.3.1 License expiration

When the license is expired, you are notified of this right after logging in:



When license expiration is less than a month away, a warning message appears:



3 Initial setup

There are several steps you should take when you first start to use PMA.core. You must set up the system so it knows where to obtain image (WSI) data, and should define at least one other user besides the administrator.

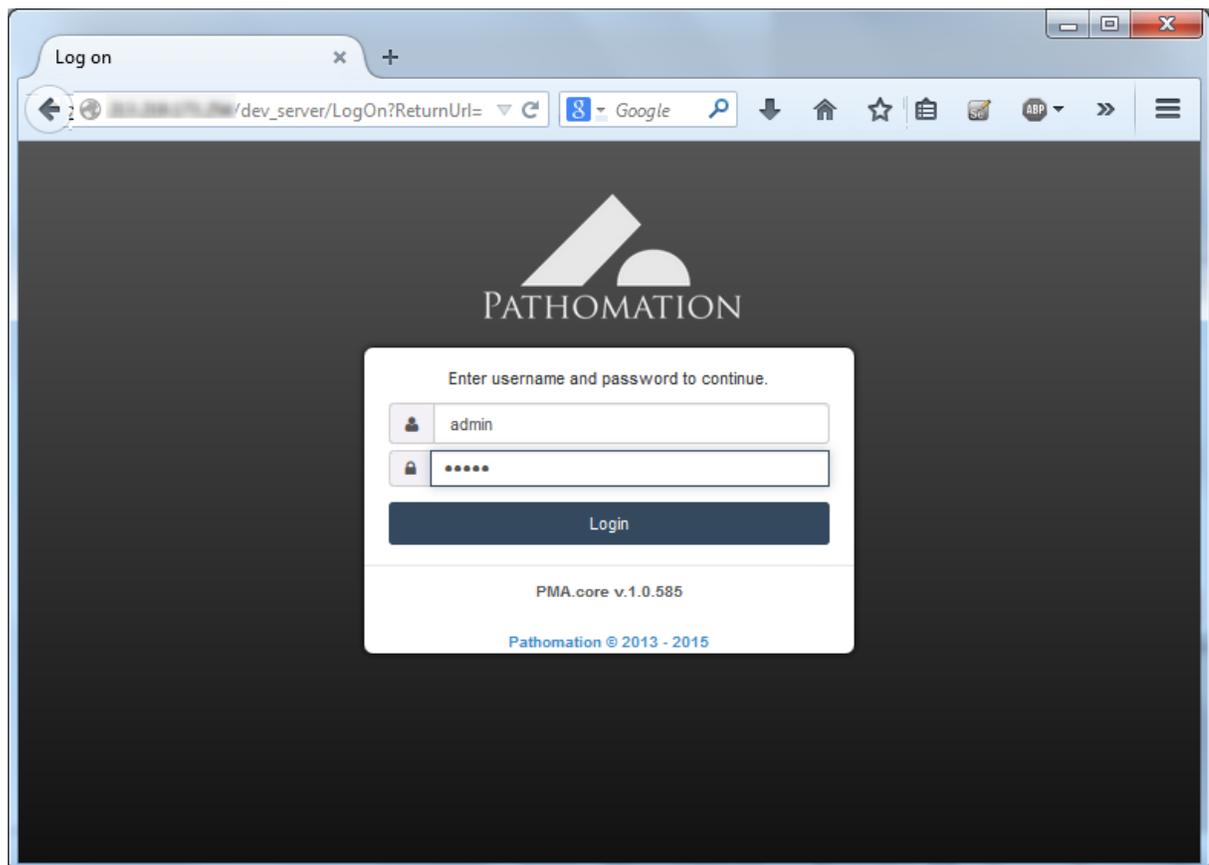
This chapter outlines the initial steps; subsequent chapters elaborate on these basic actions.

We assume that installation was successful, that you have a URL pointing to the location (check with your local system administrator), and that you're familiar using a standard modern webbrowser (see also our system requirements stipulated elsewhere).

3.1 Navigation

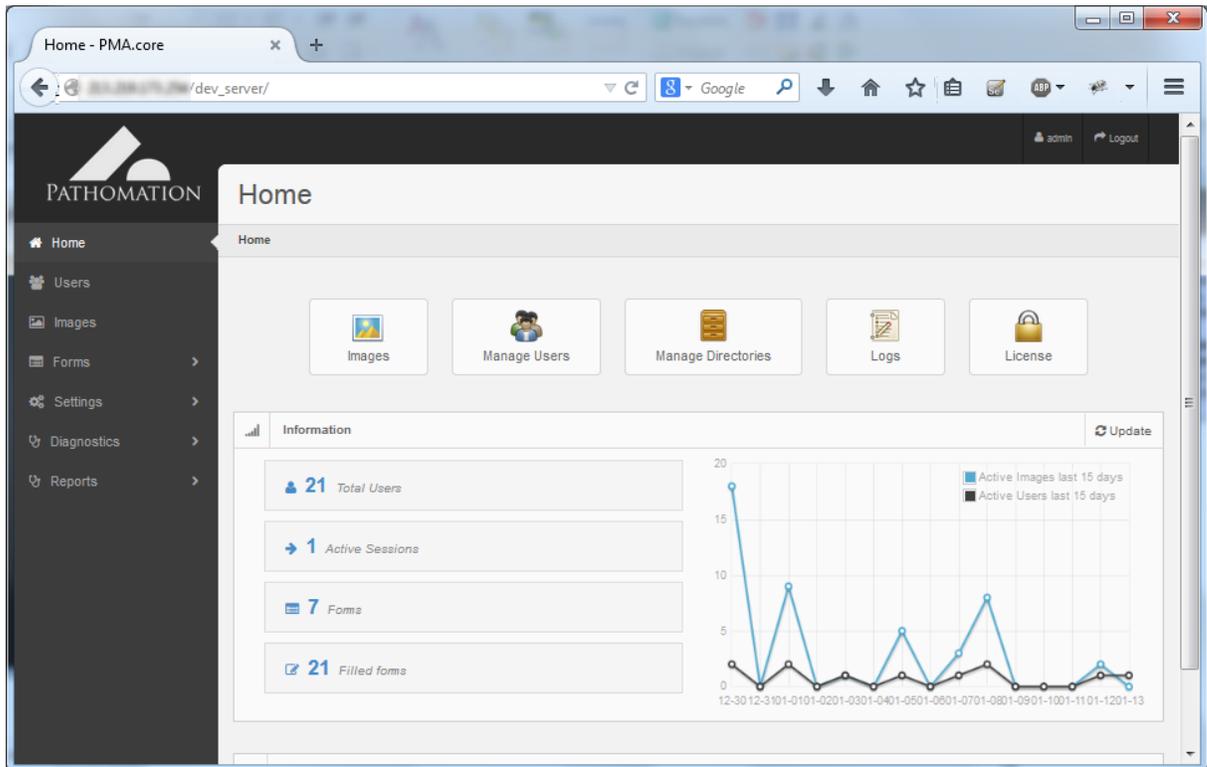
PMA.core is a web-based system running on IIS. Therefore, you'll need a webbrowser and a network-connection to use the system.

During [installation](#) you will have determined the URL through which the application is accessible. When visiting the URL for the first time, you can log on with the default username "admin" and password "admin". The password is case-sensitive, so "ADMIN" or "AdMiN" will fail.



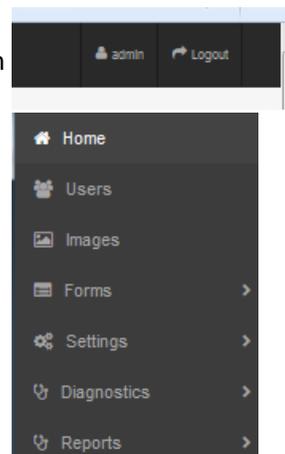
Upon successful login (if unsuccessful, you receive an error message and you're allowed to attempt to

log in again), you see the startpage for the PMA.core administration interface:

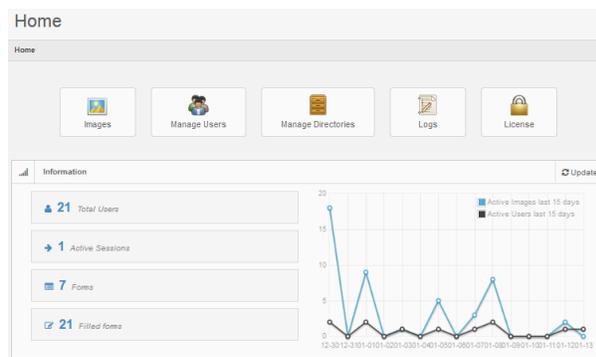


The exact appearance of this page depends on your specific installation and what optional modules are available.

- Identity control: shows what login that was used for authentication, and allows one to log out again (and subsequently switch personas)
- Navigation menu: allows the user to make a selection to administer and monitor different aspects of PMA.core. Some menu-items are collapsible and have additional sub-menus. The specific menu- and submenu-items shown may vary based on your specific installation and license terms.



- Content frame: shows content for the selected menu-option. By default, the "home" selector in the menu is highlighted upon login. Some high-level usage statistics are shown in this, which can be further examined by clicking on them.



3.2 Minimal user management

In order to have an optimal functioning system, there are some minimal housekeeping rules that you should take care of right now. Don't delay, don't let this linger, don't postpone this until later. Do this now; you'll gain some experience with the PMA.core system and have a more secure environment because of what you're about to do (but only if you do it).

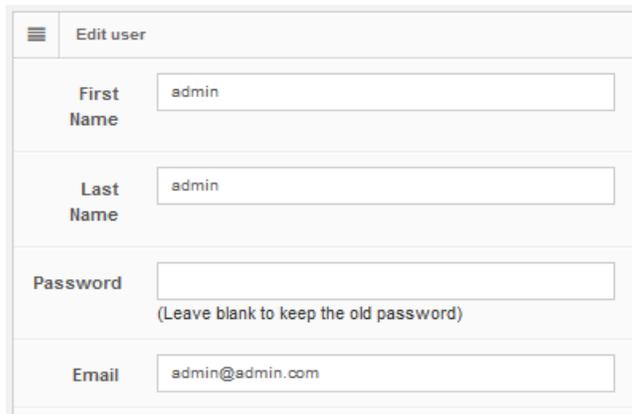
3.2.1 Change the admin password

The initial (default) username and password are explicitly mentioned in this manual. This is done for your ease and convenience as a first-time user. This also means that unless you change this default password, everybody in the world who has access to this manual now also has access to your system (if they know the URL).

Select "Users" from the navigation menu. You should only see one user in the content frame. Depending on your license terms and specific installation, you may see more or less additional columns behind the login. E.g. you may have a restrictive version that doesn't allow you the granularity to determine which users may perform annotations and which ones may not. In that case the column 'Can Annotate' will not be visible for your particular installation. You should contact us if you feel absence of certain features is somehow an error, or if you think anything else is missing (that you were actually expecting to see).

| Login | First Name | Last Name | Email | Last login | Administrator | Can Annotate | Suspended |
|-------|------------|-----------|-----------------|----------------------|-------------------------------------|-------------------------------------|--------------------------|
| admin | admin | admin | admin@admin.com | 1/13/2015 3:55:40 PM | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

After clicking on the "Edit" button, you can change the properties for the account. You should at least modify the password, but you can also update the remaining information with your own personal information:



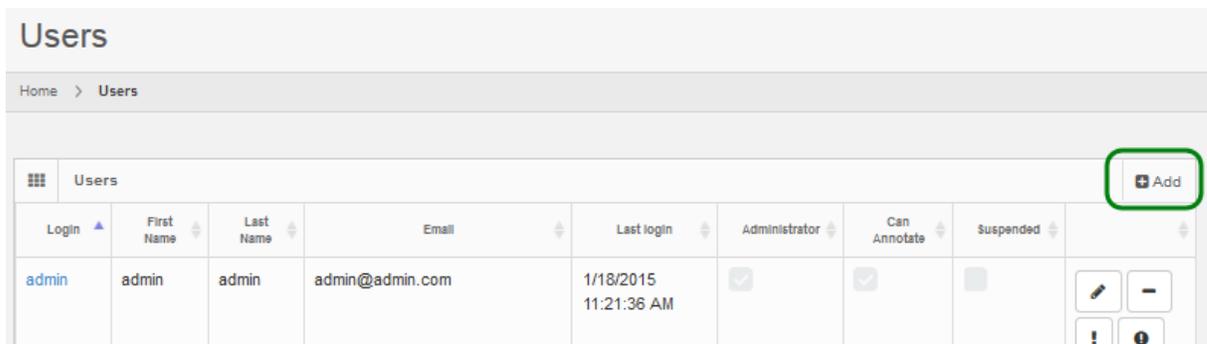
| | |
|--|--------------------------|
| First Name | admin |
| Last Name | admin |
| Password | <input type="password"/> |
| (Leave blank to keep the old password) | |
| Email | admin@admin.com |

Additional options that are shown below these fields can be left on their default values for now. Details for these are elaborated upon in subsequent chapters (they may also vary based on your license agreements and other contracts with Pathomation).

After changing the above fields to fit your particular circumstances, make sure to press the save button to commit your modifications.

3.2.2 Creating a new user

At this point, it's also a good idea to create at least one new user who's not an administrator. For that, go to the user overview frame and click the "Add" button in the top-right corner.



| Login | First Name | Last Name | Email | Last login | Administrator | Can Annotate | Suspended | |
|-------|------------|-----------|-----------------|-----------------------|-------------------------------------|-------------------------------------|--------------------------|------------------------------------|
| admin | admin | admin | admin@admin.com | 1/18/2015 11:21:36 AM | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="button" value="Add"/> |

A blank form appears, and you'll recognize the various fields from when you were editing the administrator's account.

The screenshot shows a form titled "Add user" with the following fields and options:

- First Name:
- Last Name:
- Login:
- Password:
- Confirm password:
- Email:
- Administrator:
- Can Annotate:

You may ignore once again all the fields below the "email" field. Press the "Create" button to finish the new user profile and see it appear in the list of users:

The screenshot shows a table titled "Users" with the following columns and data:

| Login | First Name | Last Name | Email | Last login | Administrator | Can Annotate | Suspended | |
|---------|------------|-----------|-------------------|--------------------------|-------------------------------------|-------------------------------------|--------------------------|--|
| admin | admin | admin | admin@admin.com | 1/18/2015 11:21:36 AM | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| apalmer | Albert | Palmer | albert@palmer.net | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

Note that you just created the "apalmer" user without administrator privileges (default setting). This means that this new user is restricted in what (s)he's allowed to do.

3.2.2.1 Access restrictions

In the above section, you created the "apalmer" user *without* administrator privileges (default setting):

| Login | First Name | Last Name | Email | Last login | Administrator | Can Annotate | Suspended |
|---------|------------|-----------|-------------------|--------------------------|-------------------------------------|-------------------------------------|--------------------------|
| admin | admin | admin | admin@admin.com | 1/18/2015 11:21:36 AM | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| apalmer | Albert | Palmer | albert@palmer.net | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Based on the scheme above, the "admin"-user will be allowed use the PMA.core management interface, whereas the "apalmer"-user will not. When apalmer tries to log in through the main PMA.core login screen with these credentials, (s)he'll be unable to proceed. Since PMA.core is considered a management application for the Pathomation software platform, only users with a checked Administrator flag can log in through here:

Enter username and password to continue.

Login

PMA.core v.1.0.585 Pathomation © 2013 - 2015

Log on failure

However, logging in through a downstream application such as PMA.view should proceed. The following schema illustrates the difference between having the Administrator flag checked or unchecked (when user "admin" and "apalmer" try to gain access to the same respective applications):



In PMA.core 1.1, additional user access rights can be determined through [Access Control Lists \(ACLs\)](#). If access rights do not work out as you intended, check the chapter on user management for troubleshooting an account's properties, or consult the separate PMA.view manual to see that you have the connectivity with the corresponding PMA.core set up appropriately.

3.3 Start hosting your slides

Now that you've created your first user, you still have to be able to show that user some content. In order to do that, you need to set up your first root directory. We elaborate on the concept in a subsequent chapter, but suffice it to say for now that a root directory is a starting location from which your various whole slide images will be hosted.

The reason for working with root directories has two advantages:

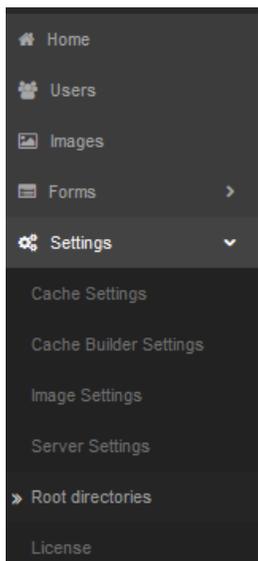
1. You don't have to navigate through a complicated directory structure before reaching the files that you want to work with
2. You can map multiple root directories to organize slides according to different purposes or workflows.

The concept of root directories is not dissimilar to mapped network drives in the Microsoft Windows operating system, where you map a map such as \\myserver\dir\subdir\subsubdir\ to a (much simpler to remember and address) drive letter.

One (minimal) downside of root directories is that you actually have to set them up.

3.3.1 Configuring a new root directory

You can set up a new root directory by going to Settings > Root Directories.



Similar to how you created your first user, you can set up a new root directory by clicking on the "Add" button in the top-right corner of the overview table:

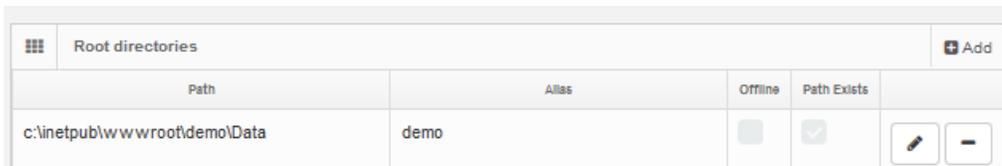


The new form that appears is also not unlike the one you used to add a new user: enter an existing folder on your hard disk, assign it a name that you can use for identification and recognize, and press the "Create" button. You can may ignore the impersonation fields for now; these are explained in detail in the dedicated chapter on root directories.

The folder that you enter *must* exist at this time, or you won't be allowed to proceed:

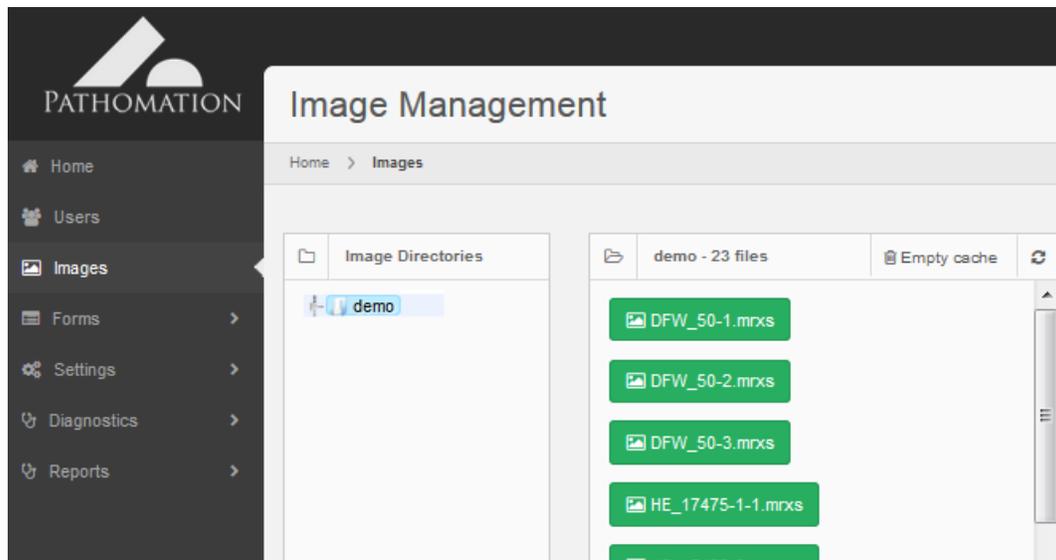


If everything goes right, you should see your first root directory in the list now:

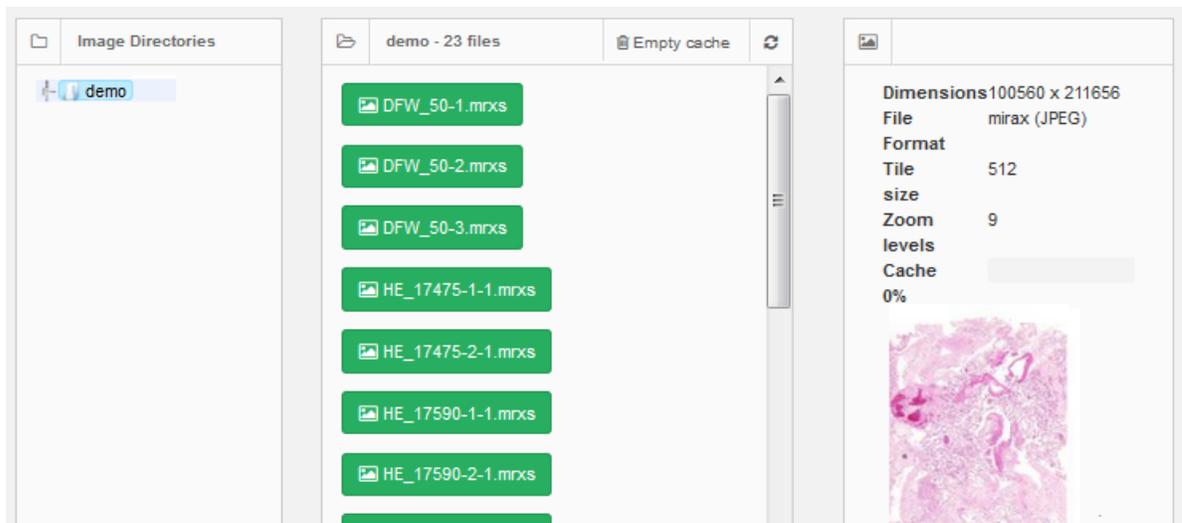


| Path | Alias | Offline | Path Exists | |
|------------------------------|-------|--------------------------|-------------------------------------|---|
| c:\inetpub\wwwroot\demo\Data | demo | <input type="checkbox"/> | <input checked="" type="checkbox"/> |   |

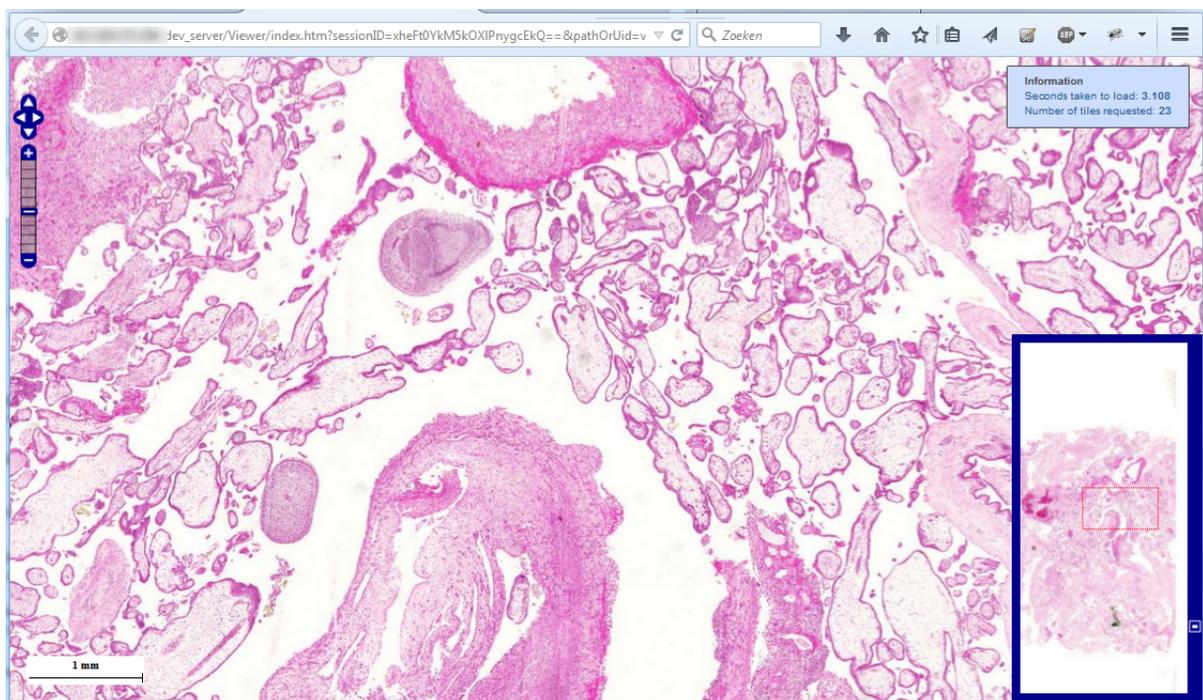
And you can browse the "demo" root directory by going to the Image menu. You'll be able to select from any root directory that you have in your list, and see what files are present in each one.



Furthermore, you may inspect any file in this list by clicking on its filename first, and subsequently on its thumbnail:



The image will then open in a new window, with a rudimentary no-bells-no-whistles interface.



You can find out more about what you can do with images in subsequent chapters, and of course you can have access to a much more advanced viewer in the separate PMA.view application.

3.4 What's next

In this chapter, we've made an attempt to offer you a straight path to have operations up and running. We've shown you the quickest route through a minimum of steps of what it takes to get your server online and ready for action.

You've created your first user account, mapped your first (digital) slide repository, and even looked at

your first slide and experienced the ease of use of our platform, as well as the convenience of no longer having to worry about "which files can I actually see?" or "do I have the right viewer for this?".

In subsequent chapters we elaborate on each of the topics touched upon in this introduction, and introduce you to some new ones along the way.

We sincerely hope you enjoy our software and that this is the beginning of a fruitful collaboration and relationship between you, the customer, and us, your friendly neighborhood digital pathology firm. As always; should you have any comments, questions, or concerns, drop us a line at info@pathomation.com.

4 Working with root directories

The root directories refer to the base directories where the system should look into for whole slide images. All the subdirectories of the root directories are exposed by the application and whole slide images that are discovered are advertised. A root directory may either be a local directory or a UNC share.

| Path | Alias | Offline | Path Exists | |
|------------------|---------------|--------------------------|-------------------------------------|--|
| E:\storage\wsi | Local slides | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| \\WAS\shared\wsi | Shared slides | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |

This section allows the addition of new directories as well as the editing and deletion of existing ones.

Each root directory is given an alias by which it is referred. The alias must be unique, irrespective of its casing. This means that if you have a root-directory with an alias "RoOt", you cannot also have another root-directory with a alias "rOoT".

The path of a directory must be an absolute path accessible by the host computer. Should the path not exist, an error message is shown:

Add Root Directory

Could not find a part of the path 'c:\wsi2'.

Path

You can edit already existing root directories by clicking on the pencil behind each entry in the overview table:

Edit root directory

Home > Root directories > Edit

Edit root directory

Path

Alias

Impersonation username

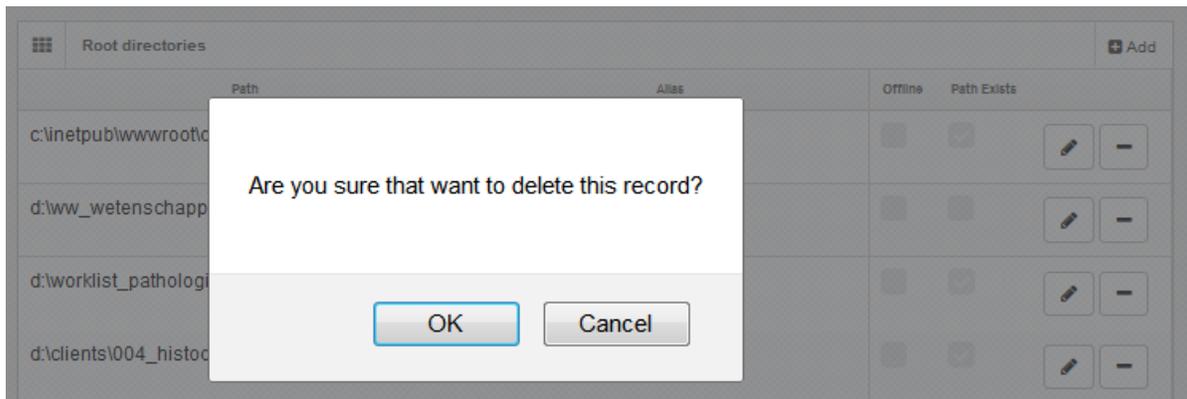
Impersonation password

Impersonation domain name

Offline

[Back to List](#)

Similarly, you may delete root directories by clicking on the delete icon behind each entry. A confirmation prompt at this point will give you one last chance to reconsider:



4.1 Accessing data on a network

It is very possible that WSI data is not stored on the local drive, but on a shared (high-capacity) storage device. There are several reasons why this may be the case:

- This machine may collect files from different locations and/or scanners.
- The system requirements for your file server may also vary significantly from the requirements of PMA.core.
- Last but not least, you may simply want to access data for a temporary project that's stored somewhere else at your company or institute, without having to go through the trouble of copying several terabytes of data.

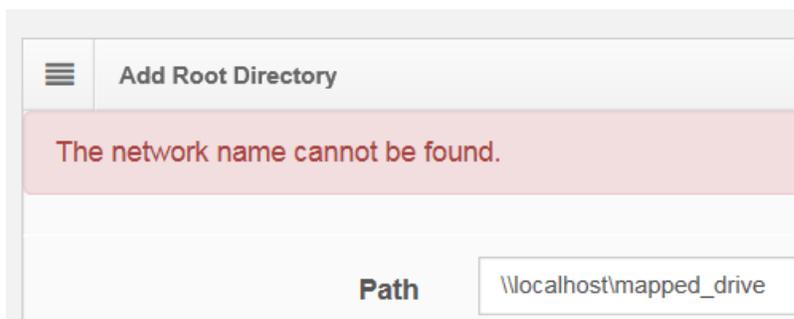
PMA.core therefore lets you map root-directories on a (shared) network drive. A UNC-path to a networked directory looks like `\\servername\sharename\dir\subdir\`. There are three conditions for this:

- The UNC share must exist at the time of creation
- The IIS account running PMA.core must have sufficient access rights to the specified path
- The share may not be accessed through a mapped drive; but only through a fully qualified UNC path

If no immediate access is possible for the share, you may specify impersonation information (which should be provided to you by the system administrator who's responsible for the machine that you're trying to reach). Impersonation information is verified, and the root-directory may only be created if impersonation is successful.

You must specify a domain. If no domain-name was given to you (e.g. on a Samba-share), you may enter "." as a default domain.

When a UNC share does not exist, the following error message is displayed:



Note that you can only map network locations through their UNC path. PMA.core does not allow mapped (network) drives to be referenced directly. If `\\servername\sharename\` is mapped as drive X:, you can not create a root directory with the path reference `x:\dir\subdir\`. The reason for this is twofold:

- A file needs to be traceable to an unambiguous location. There's no way to find out whether `\\servername\sharename\dir\subdir\foo.svs` and `x:\dir\subdir\foo.svs` are the same files (at least not in a simple straightforward manner)
- Since IIS runs as a background service in the OS, it cannot be guaranteed that the x: drive-letter will always be available (especially when no actual user is logged into the system).

4.2 Nested references

Two root-directories are nested if one is contained within another one. There are very good reasons to have this kind of setup: you can have a folder `d:\projects\` with over 100 different subdirectories, but only two or three of those are actually of importance to you at any given time. Nevertheless you may still need to consult occasionally some of the other projects as well, so you really need the following setup:

- One root-directory "projects" pointing to `d:\projects`
- Two other root-directories "project_foo_004" (project 4 for customer foo) and "project_bar_045" (project 45 for customer bar) that offer you quick access to the files in `d:\projects\foo\p0004` and `d:\projects\bar\p0045`.

It is clear that `d:\projects\qcor\p0004` is a subdirectory of `d:\projects` and as such qualifies as a nested directory.

Whether you want to actually allow this is up to you. In PMA.core, the files will be mapped to different locations and therefore will be accessible through different routes. Therefore, we recommend disabling nested root-directories if you plan to do any of the following:

- Move files to other locations using the image manager
- Capture on-slide annotations
- Capture form-data

Nested root-directories are fine to use, as long as you only use PMA.core to host and view WSI content.

4.2.1 Disabling nesting

The following operations should only be performed by experienced users. If you don't know where or how to find a file called "App_Data\Data\PMACore.config", you should stop reading and contact somebody more knowledgeable in this area.

Assuming that you know what you're doing; you can control whether nested root-directories are allowed by modifying the `AllowNestedRootDirectories` switch in `PMACore.config`:

```
<!-- Boolean that indicates if overlapping root directories are allowed -->  
<add key="allowNestedRootDirectories" value="false" />
```

Appropriate error handling is provided. Say that you have the following situation:

- `AllowNestedRootDirectories` is set to false
- A root directory "cases" exists and points to `c:\wsi\worklist\`
- A subdirectory exists `c:\wsi\worklist\case04\`

When trying to map `c:\wsi\worklist\case04` to a separate root directory, an error message shows:

Add Root Directory

Overlapping root directories are not allowed. This entry would overlap with the 'cases' entry.

Path C:\wsi\worklist\case04

Alias case 4

4.3 Access Control Lists

As you have more users and more root-directories, it becomes undesirable that everybody is allowed to see everything.

Therefore, root-directories can be marked "public" or "private":

- When they are marked "public", it means every user has access to them.
- When they are marked "private", it means only select users can see the content

Once marked private, you can select what users are allowed to see the content of the root directory, and which ones aren't. Do this by pressing the "Edit access control list" link after you selected the "private" option:

Edit root directory

Home > Root directories > Edit

Edit root directory

Path e:\teaching\patho

Alias pathologie

Impersonation username sucaet

Impersonation password

Impersonation domain name

Offline

Visibility Public Private [Edit Access control list](#)

Access control list

Available users

- Erica
- FARC
- Irena
- Sr228
- agelosaccountcreatedbywim
- anagsa
- angelos
- anonymous_anapath_studer
- anonymous_anapath_workg
- anonymous_foulis
- anonymous_gepts
- anonymous_mobile
- anonymous_moc
- anonymous_pydio
- apauwels
- aserhan
- biobank
- budveld

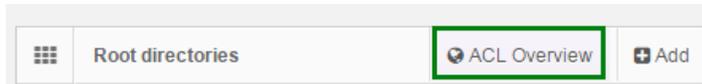
Users with access

- Sucaet
- admin
- silke
- vub
- vub_student
- wwaelput

OK

4.3.1 Overview

As you get even more root-directories and more users, it is useful to get an overview of who has access to what. For that, you can request the ACL report from the root-directories view.



The resulting report looks like this:

Root directories ACL overview

Home > Root directories > Overview

| ✓ Root directories ACL overview | User / Directory | ICON | MOC | Workgroup | _in_aperio | _in_fluo_bd | _in_fluo_nikon | _in_fluo_zeiss |
|---------------------------------|----------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| | Erica | <input type="checkbox"/> |
| | FARC | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| | Irena | <input type="checkbox"/> |
| | Sr228 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| | Sucaet | <input checked="" type="checkbox"/> |
| | admin | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| | agelosaccountcreatedbywiminpydio | <input type="checkbox"/> |
| | anagsa | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | angelos | <input type="checkbox"/> |
| | anonymous_anapath_student | <input type="checkbox"/> |
| | anonymous_anapath_workgroup | <input type="checkbox"/> |
| | anonymous_foulis | <input type="checkbox"/> |
| | anonymous_gepts | <input type="checkbox"/> |
| | anonymous_mobile | <input type="checkbox"/> |
| | anonymous_moc | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Note that this is a read-only interface. You cannot make changes in this view.

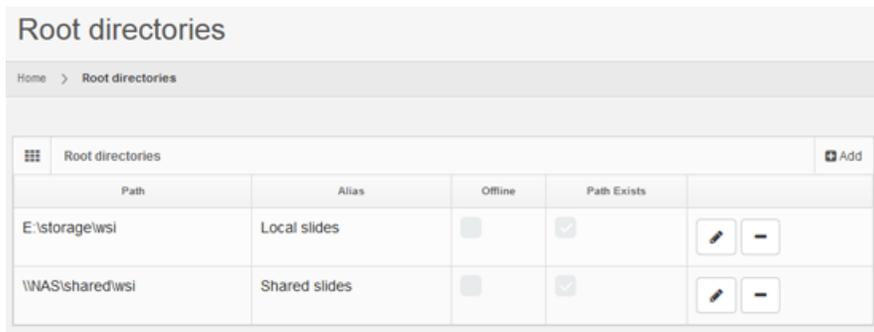
5 Server setup

All the system configuration options can be found from the left menu under the "Settings" section.

Depending on who manages and maintains your Pathomation setup (in-house or third-party), not all entries described in this section may be visible in your particular installation.

5.1 Root directories management

Root directories can be managed by selecting the "Root directories" option under the "Settings" section in the left menu.

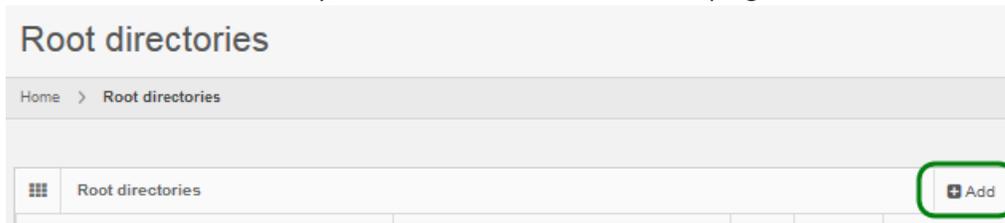


| Path | Alias | Offline | Path Exists | |
|-----------------|---------------|--------------------------|-------------------------------------|--|
| E:\storage\wsi | Local slides | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| \NAS\shared\wsi | Shared slides | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |

The list displays all the configured root directories and provides options to add new, edit and delete entries.

- The "Offline" column indicates whether or not a root directory is enabled. An offline root directory is not advertised by the system and its contents are not available to the users of either PMA.core or PMA.view.
- The "Path exists" column indicates whether or not the system is able to mount a root directory's path and access its contents. For example a root directory that points to a local file system folder, that has been deleted, will not have the "Path exists" column checked.

To add a new root directory, click the "Add" button on the top right of the table.



The following fields can be defined for a root directory:

Add Root Directory

Home > Root directories > Create

☰ Add Root Directory

Path

Alias

Impersonation username

Impersonation password

Impersonation domain name

Offline

[Create](#) [Back to List](#)

| Field | Description |
|---------------------------|---|
| Path | A valid absolute path to a local folder or a UNC share that the server can access |
| Alias | The name by which this root directory will appear in the image manager as well as in PMA.view |
| Impersonation username | Optional username to use to mount a UNC share |
| Impersonation password | Optional password to use to mount a UNC share |
| Impersonation domain name | Optional domain name to log on to, to mount a UNC share |
| Offline | Boolean value that indicates whether or not this root directory is advertised by the system. |

Setting a root directory in offline mode, will cause it to become invisible in the image manager as well as in PMA.view

5.2 Image settings

In the image settings section image compression and tile related values can be configured.

The screenshot shows a web interface for 'Image Settings'. It contains four main configuration rows:

- Tile Size:** A numeric input field with the value '512' and a small up/down arrow icon.
- Image Format:** A dropdown menu currently showing 'Jpeg'.
- Tile Quality (100=best):** A numeric input field with the value '100' and a small up/down arrow icon.
- Image Format Parameters:** An empty text input field.

 At the bottom center of the panel is a dark 'Save' button.

| Field | Description |
|-------------------------|--|
| Tile Size | The size of each side of the served tiles in pixels |
| Image Format | The image format of all the served images (tiles, thumbnails, snapshots etc.). This can be JPEG (lossy compression) or PNG (lossless compression) |
| Image Quality | 1 to 100 value that defines the image quality for lossy compression schemes. Default value is 100 (equal to 100% quality). The parameter does NOT apply when the Image Format is set to PNG. See what impact this has on data traffic. |
| Image Format Parameters | Format specific parameters that may be required |

5.3 Cache settings

In the cache settings section the cache strategy of the system can be defined. In the first tab (Cache Settings), the following fields are available:

The screenshot shows a web interface for 'Cache Settings'. At the top, there's a breadcrumb 'Home > Cache Settings'. Below that are two tabs: 'Cache Settings' (active) and 'File Extension Cache Settings'. The 'Cache Settings' tab contains four input fields: 'Use cache' with a checked checkbox, 'Cache Path' with the text '~/App_Data/Cache', 'Retention Days' with the value '20', and 'Zoom Level' with the value '15'. A 'Save' button is located at the bottom of the form.

| Field | Description |
|----------------|---|
| Use cache | Indicates whether or not the system caches requested tiles. By default, caching is turned off. |
| Cache Path | The directory where cache files are stored. This is a web application relative path. |
| Retention Days | The number of days after which a cache file is automatically erased by the system. |
| Zoom Level | The maximum zoom level for which tiles are stored in the cache. Requests for tiles beyond that level are served normally but not stored in the cache. |

In the second tab (File Extension Cache Settings), settings for specific file types based on their extension can be defined:

Cache Settings

Home > Cache Settings

Cache Settings File Extension Cache Settings

| File Extension | Use cache if file is local | Use cache if file is remote | |
|----------------|----------------------------|-----------------------------|--|
| .svs | False | True |   |

Extension ×

File Extension

Use cache if file is local

Use cache if file is remote

| Field | Description |
|-----------------------------|---|
| File Extension | The extension of the whole slide image type a setting refers to. |
| Use cache if file is local | Boolean value that tells the system whether or not to create and use a cache if the file is located in a local directory. |
| Use cache if file is remote | Boolean value that tells the system whether or not to create and use a cache if the file is located in a UNC share. |

5.4 Cache builder settings

In this section the status of the cache service is displayed. The user can see which image is currently being processed as well as the progress of the cache building. Furthermore, it is possible to control the order by which the service should be the images to process and the zoom levels that it should generate cache for.

Cache Builder Settings

Home > Cache Builder Settings

Service Name

Cache Builder Settings

| Image Path | Created On | Priority | Zoom Level From | Zoom Level To | Is being processed | Current file being cached | Current zoom level being cached | |
|--|-----------------------|----------|-----------------|---------------|-------------------------------------|---------------------------|---------------------------------|--|
| ESCOPIF Bosman Seminar Esophagus 2014/H0718350-1A2.ndpi | 12/17/2014 3:47:20 PM | 0 | 0 | 0 | <input type="checkbox"/> | 0 of 3320 | 0 of 0 | |
| ESCOPIF Bosman Seminar Esophagus 2014/H0801823-1A.ndpi | 12/17/2014 3:47:24 PM | 0 | 0 | 0 | <input type="checkbox"/> | 0 of 12803 | 0 of 0 | |
| ESCOPIF Bosman Seminar Esophagus 2014/H0802083-1A.ndpi | 12/17/2014 3:47:29 PM | 0 | 0 | 0 | <input type="checkbox"/> | 0 of 1837 | 0 of 0 | |
| ESCOPIF Bosman Seminar Esophagus 2014/H0804375-2A.8.ndpi | 12/17/2014 3:47:31 PM | 0 | 0 | 0 | <input type="checkbox"/> | 0 of 644 | 0 of 0 | |
| ESCOPIF Bosman Seminar Esophagus 2014/H0809161-1A.ndpi | 12/17/2014 3:47:34 PM | 0 | 0 | 0 | <input type="checkbox"/> | 0 of 1197 | 0 of 0 | |
| ESCOPIF Bosman Seminar Esophagus 2014/H0811056-1A.2.ndpi | 12/17/2014 3:47:37 PM | 0 | 0 | 0 | <input type="checkbox"/> | 0 of 2654 | 0 of 0 | |
| ESCOPIF Bosman Seminar Esophagus 2014/H0503166-1A.ndpi | 12/17/2014 3:47:17 PM | 0 | 0 | 0 | <input checked="" type="checkbox"/> | 3216 of 5989 | 7 of 7 | |

By clicking the edit icon next to each image, the user can modify the settings for the specific image in the cache queue. The delete button removes the specified image.

Edit cache queue entry

Home > Cache Builder Settings > Edit

Cache queue entry for Seminar Esophagus 2014/H0503166-1A.ndpi created on 12/17/2014 3:47:17 PM

Priority

Zoom Level From

Zoom Level To

[Back to List](#)

| Field | Description |
|-----------------|---|
| Priority | Integer value that designates the absolute order by which this image will be picked by the cache service. Larger values are picked before smaller ones. |
| Zoom level from | The zoom (pyramid) level at which cache generation should start. |
| Zoom level to | The zoom (pyramid) level at which cache generation should stop. |
| | |

5.5 Server settings

In this section the SMTP mail server settings that the PMA.core system should use are defined.

The screenshot shows a web interface titled "Server Settings". At the top, there is a breadcrumb "Home > Server Settings". Below this is a tab labeled "Server Settings". The form contains the following fields:

- SMTP Server URL:** A text input field containing "mail.pathomation.com".
- SMTP Server Username:** An empty text input field.
- SMTP Server Password:** An empty text input field.
- Email Address:** A text input field containing "info@pathomation.com".
- Use SSL:** A checkbox that is currently unchecked.

At the bottom of the form, there are two buttons: a dark grey "Save" button and a blue "Test email" button with an envelope icon.

| Field | Description |
|----------------------|--|
| SMTP Server URL | A resolvable address for the SMTP server |
| SMTP Server Username | Optional username to use to login, if the server requires authentication before sending a message. |
| SMTP Server Password | Optional password to use to login, if the server requires authentication before sending a message. |
| Email Address | The email address that will appear as the sender of the messages. |
| Use SSL | Indicates whether or not the system should use an encrypted connection to connect to the server. |

5.6 License limits and server administration

An administrator can still log into PMA.core even if concurrent users limit is exceeded.

Two common tasks that you may still want to do as an administrator once the number of maximum concurrent users is exceeded are:

- [Remove an active session from the pool](#) so that roaming licences become available to others (e.g. when users don't log out properly)
- [Update the license key](#) as provided by Pathomation after purchasing additional concurrent licenses

6 User management

System users can be managed by selecting the "Users" option from the left menu.

| Login | First Name | Last Name | Email | Last login | Administrator | Can Annotate | Suspended | |
|-----------------------------|------------|-------------------|---------------------------|--------------------|-------------------------------------|-------------------------------------|--------------------------|--|
| admin | admin | admin | info@pathomation.com | 7/25/2016 7:19:01 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| angelos | Angelos | Pappas | angelos@smartcode.gr | 4/22/2016 2:34:21 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| anonymous_anapath_student | anonymous | Anapath Student | wim.waelput@uzbrussel.be | 5/18/2016 10:47:12 | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| anonymous_anapath_workgroup | Anonymous | Anapath Workgroup | wim.waelput@uzbrussel.be | 5/18/2016 12:59:15 | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| anonymous_fouils | Sarah | Richardson | S.Richardson@exeter.ac.uk | 7/25/2016 6:05:28 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| anonymous_gepts | Anonymous | Gepts User | yves.sucaet@usa.net | 7/26/2016 7:59:47 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| anonymous_mobile | Mobile | Anonymous user | yves.sucaet@vub.ac.be | 7/26/2016 7:43:46 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |

Showing 1 to 10 of 60 entries

There are 60 total users.

Previous 1 2 3 4 5 6 Next

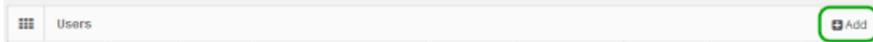
- The "Last login" column displays each user's last successful login date.
- The "Administrator" column indicates whether or not a user can access PMA.core. Non administrator users can only login via PMA.view and therefore cannot perform system management tasks within PMA.core.
- The "Can Annotate" column indicates whether or not a user is allowed to create and edit annotations within PMA.view.
- The "Suspended" column indicates whether or not a user is currently allowed to login to either PMA.core or PMA.view. A suspended login is treated as invalid by the system.
- Clicking on a user's email address launches your default email client.

Next to each entry the following buttons appear:

| Button | Description |
|---------------------------|---|
| Edit | Edits the selected user. This option allows the modification of the user's password, email and name. Furthermore the access level of the user can be changed (administrator or not) as well as whether or not the user is allowed to create and manage annotations. Finally a user can be (un)suspended within this option. |
| Delete | Deletes the selected user |
| Remind password | Sends a notification email to the selected user that contains their password in plain text |
| Reset and remind password | Sets a random password for the selected user |

and sends them a notification email that contains the new password in plain text

To add a user click on the "Add" button on the top right of the table.



The following fields can be defined for each user:

 A screenshot of a form titled 'Add user'. The form contains several input fields and two checkboxes. The fields are: First Name, Last Name, Login, Password, Confirm password, and Email. The checkboxes are for 'Administrator' and 'Can Annotate'.

| Field | Description |
|------------|---|
| First Name | The user's first name |
| Last Name | The user's last name |
| Login | The user's username. The username must be unique, irrespective of its casing. If user "UsEr" is already defined, you cannot also add user "uSeR". |

| | |
|---------------|---|
| Password | The user's password |
| Email | The user's email address |
| Administrator | Boolean value that indicates whether or not the user can login to the PMA.core administration interface |
| Can Annotate | Boolean value that indicates whether or not the user can create annotations for virtual slides |
| Suspended | Boolean value that indicates whether or not the user can login to the PMA.core and PMA.view systems |

6.1 Password restrictions

The password provided needs to be at least 6 characters. If this is not the case, an error is shown:

Password Must be between 5 and 255 characters

Additional restrictions are not enforced. The reasoning behind this is that access to PMA.core is typically granted after already having gained access to (part of) an organization's network infrastructure. It is the responsibility of the organization to provide sufficient checkpoints before granted users access in the first place (enforce complex passwords, rotate passwords every so often, VPN, physical access to site premises, encryption etc).

In order to prevent accidental typos when entering a password, each time a password is entered for the first time (or modified later on), it must be entered twice. If the entered passwords don't match, an error is shown:

Password

Confirm password The password and confirmation password do not match.

6.2 Activity log

By clicking on the user's login in the overview table, you can see the most recent (valid or invalid) login attempts, as well as the most recently consulted slides:

User 'admin' Log

Home > Users > Log

| System Access Log | | | | | | |
|--------------------------|------------------------|---------------|---------------|---------|------------------------------|--|
| Session ID | Last Accessed | Host Address | Host Name | Success | Failure Reason | |
| dNV65SaOTgob_JTNZg1lhw2 | 9/29/2017, 10:36:00 AM | 90.152.74.210 | 90.152.74.210 | true | | |
| | 9/29/2017, 10:33:38 AM | 90.152.74.210 | 90.152.74.210 | false | Invalid username or password | |
| 8IEi5FPy3Qwz-bTc-WlQgmg2 | 9/29/2017, 6:00:34 AM | 85.25.210.144 | 85.25.210.144 | true | | |
| 8E_LsSe0Zbbh789MrKmSFA2 | 9/28/2017, 6:00:26 PM | 85.25.210.144 | 85.25.210.144 | true | | |
| oPFFzzwHCampWrPI3xELQA2 | 9/28/2017, 6:00:38 AM | 85.25.210.144 | 85.25.210.144 | true | | |
| EXer3T_3P2Lw5Cp9EsPHeg2 | 9/27/2017, 6:00:18 PM | 85.25.210.144 | 85.25.210.144 | true | | |
| 4YIKUwXEQ5qlc5Jkz3IDMg2 | 9/27/2017, 6:00:37 AM | 85.25.210.144 | 85.25.210.144 | true | | |
| 5rULTU95QTJHnHv9jLImQA2 | 9/26/2017, 6:00:24 PM | 85.25.210.144 | 85.25.210.144 | true | | |
| 5rULTU95QTJHnHv9jLImQA2 | 9/26/2017, 4:19:19 PM | 87.203.117.2 | 87.203.117.2 | true | | |
| 3ZUvsvp4NcIEVRGuLj3rQ2 | 9/26/2017, 6:00:35 AM | 85.25.210.144 | 85.25.210.144 | true | | |

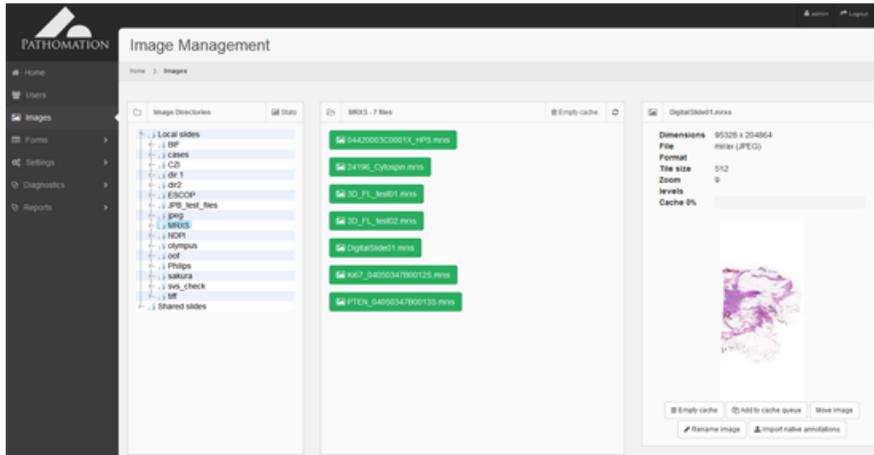
Showing 1 to 10 of 15,356 entries

Previous 1 2 3 4 5 ... 1536 Next

| Image Access Log | |
|-----------------------|---|
| Last Accessed | Image Path |
| 9/26/2017, 4:21:17 PM | _in_aperio/2017-09-08/Lpx 016 Slr.svs |
| 9/21/2017, 1:36:17 PM | ICONVoor 1.svs |
| 9/18/2017, 4:44:37 PM | ICON/55 3.svs |
| 9/18/2017, 4:26:45 PM | ICONVoor 1.svs |
| 9/18/2017, 4:17:48 PM | ICON/tube 2 1.svs |
| 9/6/2017, 9:03:53 PM | pathologie/1.3. Hemochromatose van de lever met levercirrose (HES).mixs |
| 9/6/2017, 9:03:36 PM | ICON/tube 2 1.svs |
| 9/6/2017, 8:59:32 PM | ICONVoor 2.svs |
| 9/6/2017, 8:16:28 PM | ICONVoor 1.svs |

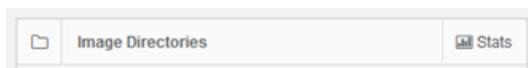
7 Image management

The image manager is accessible from the "Images" option on the left menu. This section allows the user to browse through the available virtual slides, manage the cache files, view, move and rename each image and import native annotations for the supported digital slide formats.



Using the tree view the user can navigate through the available directories. You only see the subdirectories that are "true" subdirectories. PMA.core is smart enough to filter out standard subdirectories that belong e.g. to Olympus VSI or 3DHitech MRXS slides, or reserved directories only used by the operating system (like .snapshots on Apple-originating samba-share).

Clicking on a directory will display its contents in the middle section. The "stats" button will calculate cache statistics for all the cache files in the system.

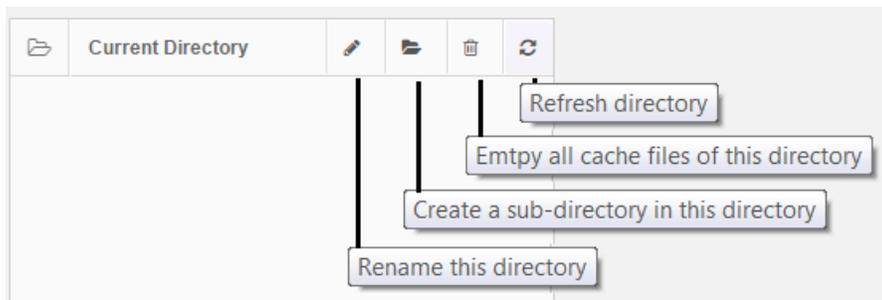


Sample cache report:

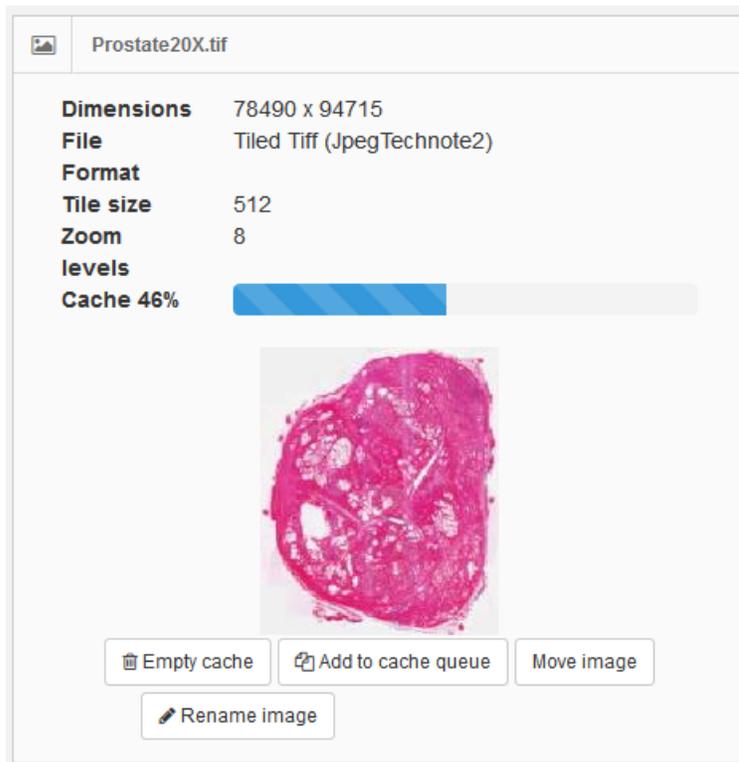
| Cache statistics | |
|------------------------|--------|
| Number of cache files | 4 |
| Average tiles per file | 45 |
| Average cache size | 3.1 MB |

Close

The contents of the selected directory are displayed in the middle panel. Each type of slide is presented in a different color. Several operations are available at the level of a directory. Note that the "Empty Cache" button erases all the cache files for the selected directory and may take a while to run.



When an image is selected, its information as well as a thumbnail are presented in the image panel.



Clicking on the image opens a full screen viewer. There are several buttons available in the image panel interface:

- **Empty cache:** Erases the cache of the slide
- **Add to cache queue:** Adds the image to background cache service's queue, which will schedule the population of the cache file. The cache queue can be monitored through the [Cache builder settings](#).
- **Move image:** Moves the image to another directory
- **Rename image:** Renames the image

7.1 Manipulating slides

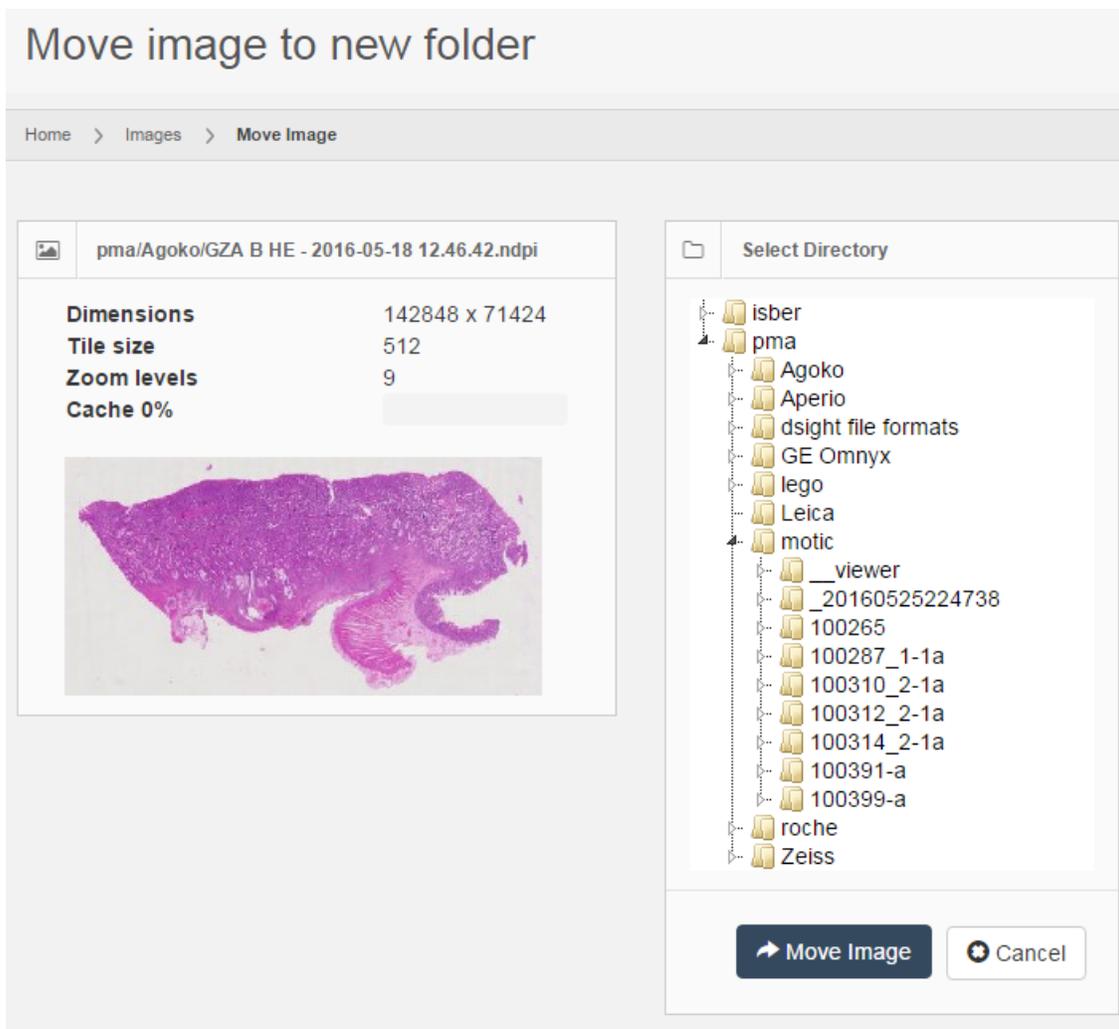
Whole Slide Images comes in a variety of (physical) shapes and sizes. Some file formats (like Zeiss ZVI or Nikon ND2) can represent no more than a (multi-fluorescent channel) snapshot. Other formats can be very complex and consist of multiple files and directories.

At the end of the day, end-users just want to be able to manipulate whole slide images. As an end-user you do not want to worry about what all files constitute your WSIs, especially not if you have a heterogeneous working environment with slide originating from different scanners.

In order to make the process of manipulating WSIs a seamless experience, PMA.core offers slide move and copy operations as part of its user interface.



All you need to do is indicate what slide you want to transfer, and where you want to have it transferred to. PMA.core behind the scenes takes care and makes sure of transferring the whole slide of you, whether it consists of just one file or multiple files.

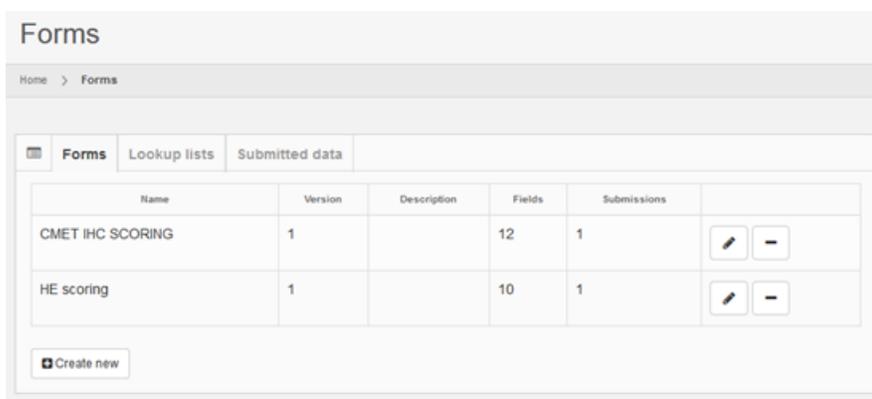


8 Form management

In the forms management section, data input forms can be designed that are subsequently assigned to virtual slides. These forms can then be filled in by the system's users while viewing slides. The data that users submit for each form are also available within this section.

8.1 Forms

In the forms tab, the list of available forms is displayed. It is possible to create new forms or edit the existing ones.

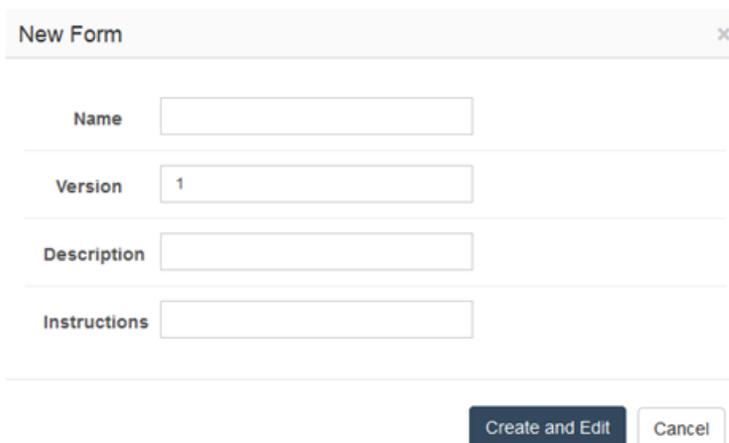


The screenshot shows a web interface titled 'Forms'. Below the title is a breadcrumb 'Home > Forms'. There are three tabs: 'Forms', 'Lookup lists', and 'Submitted data'. The 'Forms' tab is active, displaying a table with the following data:

| Name | Version | Description | Fields | Submissions | |
|------------------|---------|-------------|--------|-------------|--|
| CMET IHC SCORING | 1 | | 12 | 1 | |
| HE scoring | 1 | | 10 | 1 | |

Below the table is a 'Create new' button.

Adding a new form displays a pop up dialog that accepts the basic information of a form. Once this data is provided, the form designer is displayed.



The 'New Form' dialog box contains the following input fields:

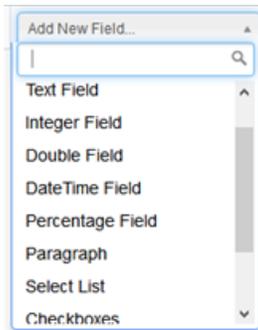
- Name**:
- Version**:
- Description**:
- Instructions**:

At the bottom of the dialog are two buttons: 'Create and Edit' and 'Cancel'.

| Field | Description |
|---------|-----------------------------|
| Name | The form's title |
| Version | Numeric version of the form |

| Description | Description text |
|--------------|--|
| Instructions | Optional instructional text to be displayed to the users that will fill the form |

The form designer enables the management of a form's available fields. A new field can be added by selecting the desired field type from the "Add New Field" dropdown box:



| Field Type | Description |
|-------------|---|
| Text | Displays a text box that accepts a free text value |
| Integer | Displays a text box that accepts an integer value |
| Double | Displays a text box that accepts a decimal value |
| DateTime | Displays a text box that accepts a date & time values |
| Percentage | Displays a text box that accepts values between 0 and 100 |
| Paragraph | Displays a paragraph of text which accepts no input |
| Select List | Displays a list box that contains values from a predefined list |

| | |
|------------|--|
| Checkboxes | Displays multiple checkboxes with values from a predefined list |
| Radio | Displays multiple radio buttons with values from a predefined list |
| Label | Displays a text label which accepts no input |

Once a field type is selected, a panel is displayed at the end of the field list containing the properties of the field. Depending on the field type, different information have to be provided in order for the field to be defined.

| Field Properties | Description | Field Types |
|------------------|---|--|
| Label | The text label that will appear next to the field | All |
| Tooltip | The text hint that will appear when the mouse is over the field | All |
| Lower Bound | The minimum allowed value | Integer, Double, Percentage, DateTime |
| Upper Bound | The maximum allowed value | Integer, Double, Percentage, DateTime |
| Required | Boolean value that indicates whether or not this field is required | Text, Integer, Double, Percentage, DateTime, Select, Checkboxes, Radio |
| Allow Below | Boolean value that indicates whether or not it is allowed to enter values below the lower bound | Integer, Double, Percentage, DateTime |
| List | Lookup list of values | Select, Checkboxes, Radio |
| Allow Other | Boolean value that indicates whether or not it is allowed to | Select, Checkboxes, Radio |

enter values that are not
contained in the list of values

The order by which the fields appear in the form can be arranged by dragging each field's panel to the desired location:

The screenshot shows a form editor interface. At the top, there is a dropdown menu labeled 'Paragraph'. Below it, there are two panels. The left panel is titled 'Label' and contains a 'Label' field with the text 'Control evaluation', a 'Tooltip' field, and a 'Remove' button. The right panel is titled 'RadioButton' and contains a 'Required' checkbox, a 'Label' field with the text '4 in 1 control', a 'Tooltip' field, an 'Allow Other' checkbox, a 'List' dropdown menu with the text 'acceptable Y/N', and a 'Remove' button.

8.2 Look-up lists

In the Lookup lists tab, lists of values are defined that can be assigned to form fields in order to reduce the acceptable values to specific ones.

Forms

Home > Forms

Forms Lookup lists Submitted data

| Name | List Version | Items | |
|-------------------------|--------------|-------|--|
| Clinical Dx | 0 | 1 | |
| Score | 0 | 4 | |
| Staining artifacts | 0 | 5 | |
| Staining failures | 0 | 4 | |
| Type of tissue received | 0 | 5 | |
| Y/N | 0 | 2 | |
| acceptable Y/N | 0 | 2 | |

Create new

A lookup list consists of the following fields:

| Field | Description |
|--------------|-----------------------------|
| Name | The name of the list |
| List Version | Numeric version of the list |

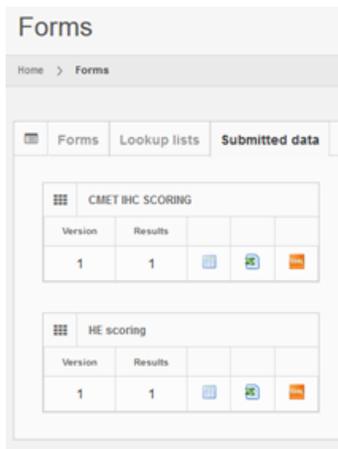
The screenshot shows the 'Edit List' interface. It includes a breadcrumb trail 'Home > Forms > Edit List'. The main form area has a title 'Edit List' and two input fields: 'Name' (containing 'Y/N') and 'List Version' (containing '0'). Below the inputs are 'Save' and 'Back to List' buttons. A bottom panel titled 'Items' contains an 'Add List Item' button and two rows of 'Value' fields (one with 'YES', one with 'NO') and 'Remove' buttons.

The possible values of the list can be added from the panel on the bottom of the list editor.

8.3 Submitted data

The data submitted by each user for each form can be obtained in the "Submitted data" tab in the formats:

- HTML
- CSV
- XML



8.4 Access control

Forms can be specified to apply to only specific root-directories. Click on the "Form accessibility" button in the forms meta-data view:

| Name | Version | Description | Fields | Submissions | |
|----------------------------------|---------|--|--------|-------------|--|
| BM trephine biopsy quality score | 1 | | 5 | 53 | |
| Foulis_case | 1 | | 7 | 196 | |
| Foulis_private | 1 | Further Case Information | 1 | 58 | |
| Foulis_slide | 1 | | 3 | 373 | |
| Gepts_case | 1 | select case-level data from 1965 Willy Gepts paper | 5 | 22 | |
| Gepts_slide | 1 | Slide level data | 1 | 138 | |
| Gepts_specimen | 1 | specimen level data | 1 | 18 | |

You now see a roster that displays all the available root-directories along the X-axis, along with all available forms on the Y-access.

Form availability overview

Home > Forms > Form availability overview

| Form availability overview | | | | | | | | | | | | Save |
|----------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| Form / Directory | ICON | MOC | Workgroup | _in_aperio | _in_fluo_bd | _in_fluo_nikon | _in_fluo_zeiss | anapath_cases | dbb | fielt study | foulis | gepts |
| Gepts_case | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Gepts_specimen | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Gepts_slide | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Foulis_case | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Foulis_slide | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Foulis_private | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| BM trephine biopsy quality score | <input type="checkbox"/> | <input type="checkbox"/> |

Check the form/root combinations that you want to make exclusive, and press the save button in the top-right corner to apply the changes.

When no restrictions are set, the form is available for all root-directories (as is the case with the "BM trephine" form in the screenshot).

9 System status & diagnostics

Several status & diagnostic tool are available under the "Status" option on the left menu.

9.1 Installation check

The installation check section performs various test to ensure the correct installation of the system as well as to verify the presence of all the required libraries.

Installation Checks

Home > Installation Checks

| i | Settings | |
|-------------------------------|--|--|
| Operating System | Microsoft Windows NT 6.1.7601 Service Pack 1 (64-bit) | |
| IIS version | Microsoft-IIS/10.0 | |
| Application init time | 8593.4915 ms | |
| Allow nested root directories | true | |
| Session Timeout | 200 minutes | |
| Webforms Timeout | 03:20:00 minutes | |
| Current user | Yes-HPI\Yes | |
| DB connection string | Data Source=[DataDirectory]Data\Global.s3db;Version=3; | |
| Application path | C:\pathomation\PMA.core 1.x\HistoScopeServerWeb Mapped as /histoscope | |
| Cache path | ~/App_Data/Cache | |
| Mapped cache path | C:\pathomation\PMA.core 1.x\HistoScopeServerWeb\AppData\Cache | |
| Log path | ~/App_Data/Log | |
| Mapped log path | C:\pathomation\PMA.core 1.x\HistoScopeServerWeb\AppData\Log | |
| Recognized extensions | *.tif*, *.vsi*, *.bif, *.ndpi, *.mrxs, *.svs, *.scn, *.zvi, *.jpg, *.jpeg, *.czi, DICOMDIR, *.nd2, *.svslide | |

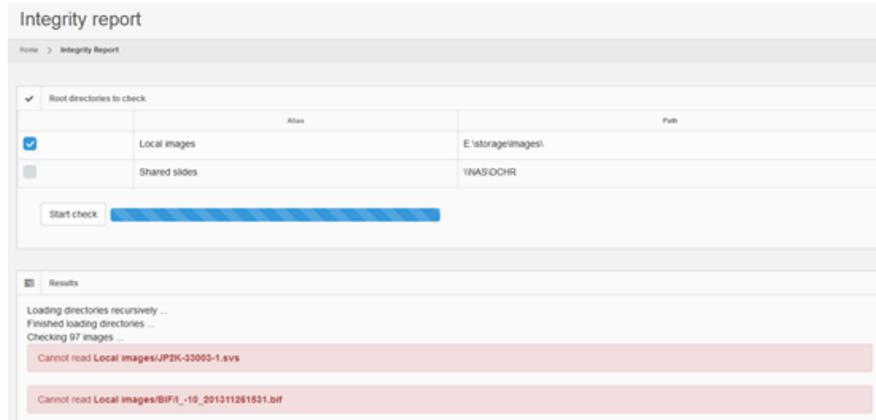
| ✓ | Checks | |
|--|--|--|
| Database connection | PASSED | |
| Database schema | PASSED | |
| Database write | PASSED | |
| DB test insert | PASSED | |
| DB delete | PASSED | |
| Cache directory create file | PASSED | |
| Cache directory delete file | PASSED | |
| Cache directory create sub - directory | PASSED | |
| Cache directory delete sub - directory | PASSED | |
| Log directory create file | PASSED | |
| Log directory delete file | PASSED | |
| TraceHandler available | PASSED | |
| OpenSlide Library | PASSED Version 3.4.1 | |

Several these parameters are only available from PMA.core 1.1 and onwards, including: Operating System, IIS version, Application init time, [Allow nested root directories](#), Application path, and Recognized file extensions.

The Webforms Timeout value indicates the amount of time after which an idle user gets logged out of the administration UI of PMA.core.

9.2 Integrity Report

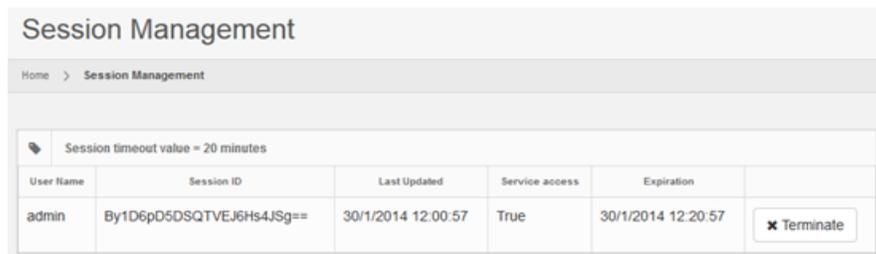
The integrity report section will perform a recursive scan on the selected root directories and report virtual slides that cannot be parsed by the system.



You can select one or more root-directories to be scanned at the time.

9.3 Active Sessions

In the session management section the currently active users are displayed. The system gives the ability to terminate a user's session.



The lifespan of a session is governed by the ASP.Net session time out value. This value is displayed in the [installation check page](#). When a session is idle for more time than what is defined as the session time out value, it becomes automatically invalid and the corresponding user will need to log in again.

You may delete an active session (e.g. when it's been idle for a large period of time; perhaps the end-user forgot to log out properly), but you cannot delete your own session.

9.4 Logs

The log file section provides access to the raw log files produced by the server.

| Top 20 most recent files | |
|--------------------------|--|
| | tile_server_log-2014-01-30.log |
| | tile_server_log-2014-01-29.log |
| | tile_server_log-2014-01-28.log |
| | tile_server_log-2014-01-25.log |
| | tile_server_log-2014-01-24.log |
| | tile_server_log-2014-01-18.log |

The log file section provides access to the raw log files produced by the server.

10 Advanced topics

10.1 Interfacing the server from 3rd party software

PMA.core is a very flexible product. In such, it can be interfaced with from a number of other environments. That type of operations is outside the scope of this document however. This type of functionality is described in a separate document titled "programming guidelines".

10.2 Cache service

The cache service is an optional component of the PMA.core platform. It is a Windows service that runs in the background and it's purpose is to generate and store tiles from digital slides. This is a process that is typically scheduled a priori. In other words, a digital slide is added to the cache service's queue, the service builds a cache for it and then PMA.core can use the pre-built cache in order to serve requests for the particular image, to improve performance.

10.2.1 When to use the cache service

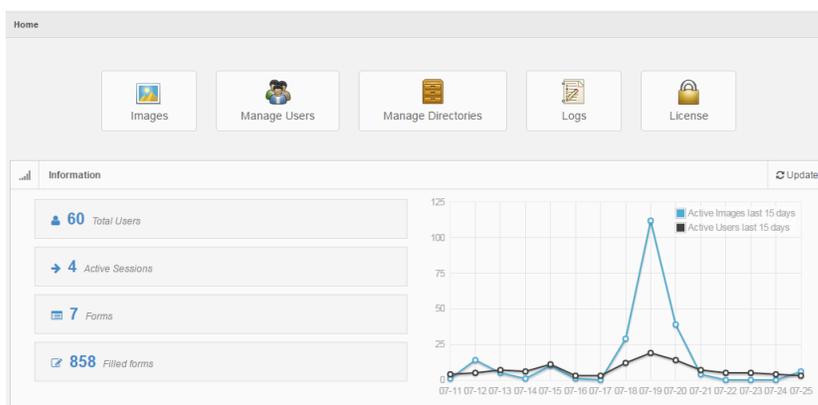
Creating a cache from a digital slide is a lengthy process. You should only add a digital slide to the cache service's queue when you expect this slide to be viewed a lot of times by many users. This reduces the effort required by the server to read the original image, since it can serve pre-generated images instead. You should avoid adding images to the queue that are not expected to be viewed many times, in order to save storage space.

10.2.2 How to add an image to the queue

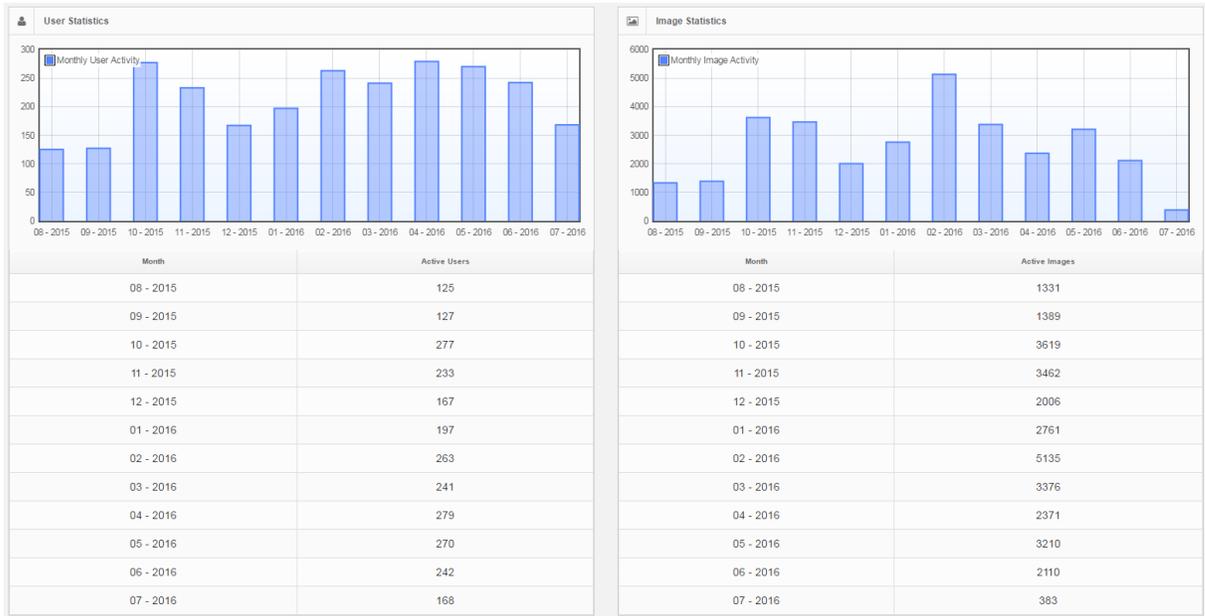
This task is explained in the "[Cache Settings](#)" section of the server setup process.

10.3 Monitoring system use

On the main page, you can see a chart that indicates recent system use:



Clicking on the chart brings up a historical (since system inception) chart of both consulted slides and user sessions (on a monthly basis):



You can limit the chart to show the historical load and access to just one particular [root-directory](#):



10.4 Adding a copyright notice to snapshots

The following operations should only be performed by experienced users. If you don't know where or how to find a file called "App_Data\Data\PMACore.config", you should stop reading and contact somebody more knowledgeable in this area.

Assuming that you know what you're doing; you can add a copyright text to draw on top of snapshots.

```

<!-- Copyright text to draw on region calls.
      Remove or set to empty string to prevent the text from being drawn -->
<add key="regionCopyrightText" value="© 2016 Pathomation" />

```

You can determine the position of the copyright notice as well:

```

<!-- Position to draw copyright text on region calls:
      0=top left, 1=top right, 2=bottom left, 3=bottom right -->
<add key="regionCopyrightTextPosition" value="3" />

```

Your resulting snapshots will now have a right-aligned copyright notice added to the bottom:



You can remove or set the value to an empty string to prevent the text from being drawn.

10.5 Impact of tile quality on data traffic

Using [Image Settings](#), one can control the quality of individual tiles. Each tile is a JPEG-image, and the setting controls the compression-rate used to generate these JPEGs.

We did a survey of the impact of various quality settings, and came up with the following measurements. As could be predicted, reducing the tile quality significantly reduces the amount of bytes transferred:

| Quality | Image | % requested | Bytes downloaded |
|---------|-------------------------------|-------------|------------------|
| 100 | pma/_CACHE_TEST/CMU-2_100.svs | 100 | 1101.15 mb |
| 90 | pma/_CACHE_TEST/CMU-2_90.svs | 100 | 426.89 mb |
| 80 | pma/_CACHE_TEST/CMU-2_80.svs | 100 | 326.94 mb |
| 70 | pma/_CACHE_TEST/CMU-2_70.svs | 100 | 278.12 mb |
| 60 | pma/_CACHE_TEST/CMU-2_60.svs | 100 | 250.46 mb |
| 50 | pma/_CACHE_TEST/CMU-2_50.svs | 100 | 225.63 mb |
| 40 | pma/_CACHE_TEST/CMU-2_40.svs | 100 | 202.37 mb |
| 30 | pma/_CACHE_TEST/CMU-2_30.svs | 100 | 181.84 mb |
| 20 | pma/_CACHE_TEST/CMU-2_20.svs | 100 | 154.78 mb |
| 10 | pma/_CACHE_TEST/CMU-2_10.svs | 100 | 106.15 mb |

Does tile quality impact the time it takes to serve a tile? We don't notice any meaningful difference (except for the obvious measurements directly related to physical tile file size).

Below you can see all measurements combined in a single chart:

