Pharmadex Maintenance Guide

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SIAPS
Systems for Improved Access to Pharmaceuticals and Services

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About SIAPS

The purpose of the System for Improved Pharmaceutical Services Access Program (SIAPS) is to ensure the availability of quality pharmaceuticals and effective pharmaceutical services to achieve desired health outcomes. To achieve this goal, SIAPS outcome areas include improving governance, building capacity for pharmaceutical management and services, addressing information needed for decision-making in the pharmaceutical sector, strengthening funding strategies and mechanisms to improve access to medicines, and increase the quality of pharmaceutical services.

Recommended Quote

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This manual would not have been completed without the active contributions of these registration sector staff:

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BACKGROUND

Pharmadex is a web-based integrated information solution that facilitates the management, documentation, dissemination, and sharing of regulatory information within national regulatory authorities (NRAs) and their major stakeholders. The system will capture and track whether the dossier requirements for medicine registration submitted by pharmaceutical manufacturers are based on Common Technical Document standards.

OBJECTIVE

System Administrator is responsible for the operational state of the Pharmadex System. This guide covers the following topics:

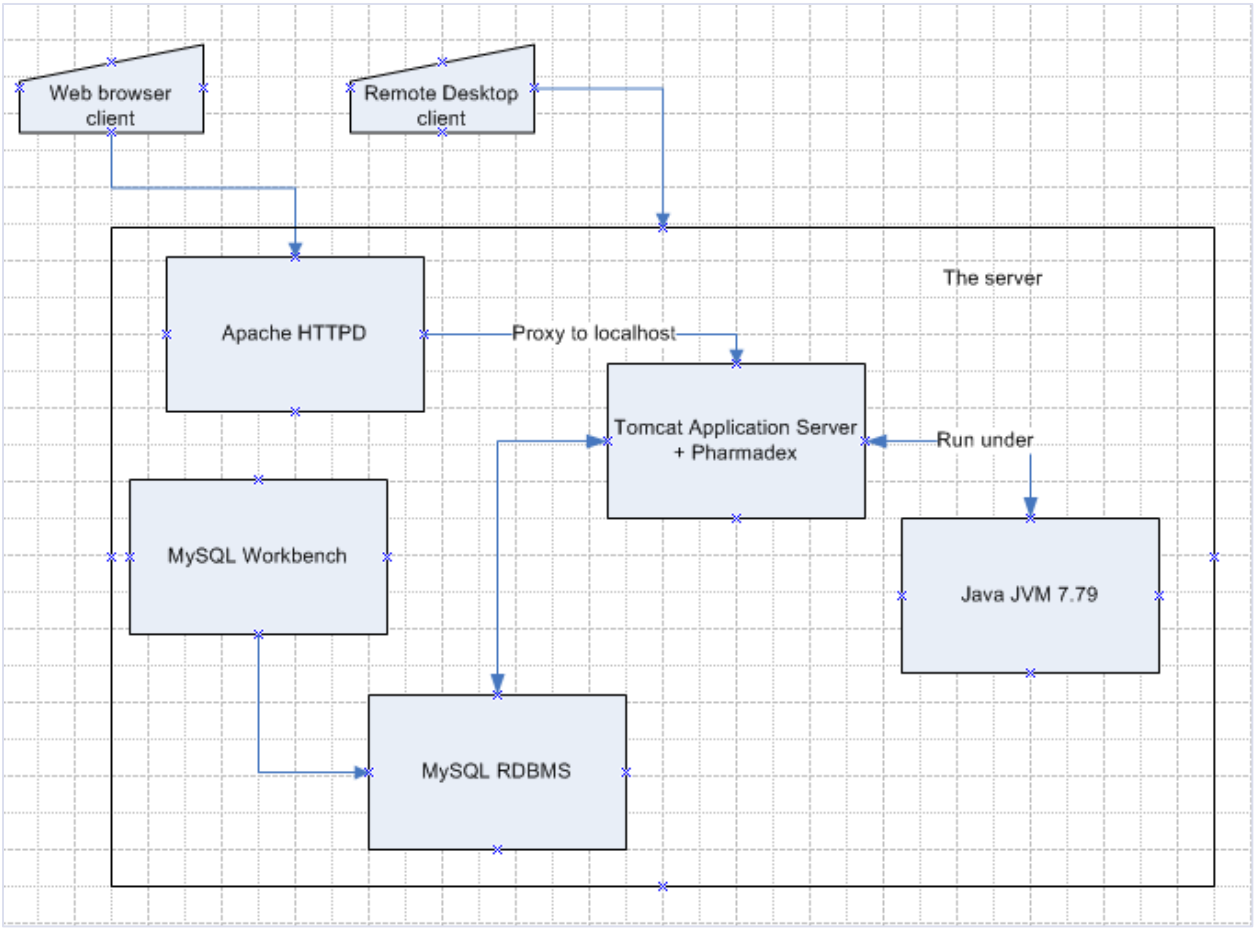
1. Skill requirements for System Administrator
2. Pharmadex System description
3. System Administrator's areas of responsibility:
    - Maintenance
    - Installation of updates
    - Data backup
4. Troubleshooting guides, specific software guides and how to get help

SKILL REQUIRED

1. General skill
    - Maintenance, configuring and securing HTTP, routing HTTP(HTTPS) Internet connections to a local network resource (server)
    - Maintenance, configuring and securing HTTP, routing HTTP(HTTPS) Intranet connection to a local network resource (server) on a Local Area Network
    - Perform typical maintenance tasks on Windows Server 2012, such as:
        - Start/Restart server
        - Start/Stop system services
        - Install new software
        - Add and monitor scheduled task using the system scheduler
2. Pharmadex system specific skill:
    - Maintenance MySQL server
    - Use MySQL Workbench
    - Apache HTTPD server:
        - Configure virtual hosts
        - Read and understand logs
    - Apache Tomcat server:
        - Deploy/un-deploy applications
        - Read and understand logs

SYSTEM DIAGRAM

Common Pharmadex System diagram is below.



The server is running under OS Windows Server 2012 or above**.**

Apache HTTPD is a web gateway for Pharmadex. This software manages web connections for the Pharmadex application. All connection requests for Pharmadex will be passed through (proxy) to the Pharmadex application. Direct connections from the outside to the Pharmadex Application as well as the database are disabled. Only version 2.2.11 of Apache HTTPD should be used.

The Tomcat Application Server is a set of Java libraries (codes and data) that help run Web Java Applications correctly. Only versions 7.0.68 and 7.069 of the Tomcat Application Server should be used.

Pharmadex is a web-based application created using Java, which works under the control of the Tomcat Application Server 7. All codes for this application are in a file named <country_name>.war (for instance mozambique.war). Use the latest version of this file.

Both Pharmadex and Tomcat run under the **Java Runtime Environment**. Use version 7.79 of Java. There are two Java installations—the Java SE Virtual Machine (JVM) and the Java SE Java Development Kit (JDK). JDK contains JVM and additional software that helps manage the Java application. Use only JDK version 7.79.

MySQL is a powerful database management system that manages all Pharmadex data. Use version 5.7 of the Community Edition. It is possible to use the newest version, but testing should be conducted before doing so.

MySQL Workbench is a tool to manage the MySQL database, including updates and backup restores. This tool should be on both servers and not just the database server. Use only the latest version of MySQL workbench Community Edition. Annex C has some useful examples of how to use this tool.

A defined web address allows the user to use a web browser to access Pharmadex[1]. The recommended web browser is the latest version of **Google Chrome**.

In addition, the system administrator can access Pharmadex servers using Windows **Remote Desktop Connection**. It is a good idea to use non-standard TCP/IP port to ensure basic security.

For some countries, Pharmadex System has been implemented on two servers – one server for the Application, the other server for the Database. Annex A details such an implementation that is currently used in Mozambique and Ethiopia.

[1] Usually there are two addresses – Internet and Intranet

TASKS

Weekly maintenance

Weekly maintenance will ensure that the whole system is functioning properly. In addition, the Apache and Apache Tomcat servers should be restarted every week. A proper system should:

1. Load a page in no more than three seconds
2. Run a daily backup
3. Have at least 30% of RAM free
4. Have at least 70GB free disk space on database server's disk

To perform weekly maintenance, execute following steps:

1. Check the page load time from the Local Area Network – should be no more than three seconds
   - Run Pharmadex from any computer in the Local Area Network
   - Login as admin
   - Execute Registration-Application Processing-Process Product Application (to ensure all processes work fine)
2. Ensure server's health and backup status
   - Open Remote Desktop Connection to the server
   - Check free RAM using by Task Manager. At least 30% of the RAM should be free.
   - Check free disk space. There should be at least 70 GB of free disk space on the server.
   - Open directory specified for backup (for instance, c:\backup) and verify that it contains that day's or the previous day's backup. Backup availability will depend- on the backup schedule and time the system is accessed.
   - Restart Apache HTTPD and Apache Tomcat from the Services window in Admin tools:
     - Stop Apache HTTPD service
     - Stop Apache Tomcat service
     - Open the logs folder for Apache HTTPD Server. Examine error.log. Remove access.log file. Usually, this file is not useful.
     - Open the logs folder for Apache Tomcat Server. Examine the latest catalina.*.log. If some unusual messages will be found, ask tech support or try to determine cause of these messages
     - Start Apache Tomcat service
     - Wait about 3 min

- Start Apache HTTPD service
- Check Pharmadex by executing step 1

In case of any difficulties, refer to the Annex B (Troubleshooting).

Updates

All Pharmadex software updates must be installed. Updates may include:

1. Database scripts (files with the extension SQL)
2. Application (file “country_name.war”)
3. As described in release Notes (MS Word files labeled ReleaseYYYYMMDD.docx)
4. Additional files accompanying Release Notes

Install the update/s by following the steps listed below:

1. Open directory for backup (for instance, c:\backup) and verify that it contains that day’s or the previous day’s backup (depends on the backup schedule and system access timing). It is forbidden to install any update if the latest backup does not exist. Ensure that the backup exists by starting backup manually as described in Annex C
2. Stop Apache HTTPD and Apache Tomcat services
3. Prepare the update
   - Create on the application server desktop folder with name same as the update date (YYYYMMDD), for example 20160920
   - Copy all files from new release to the folder created in the previous step
   - Read Release Notes. There may be important additional information regarding the update installation.
4. Install the update
   - Updating the database, if the update contains SQL scripts
     - Run all SQL script using MySQL Workbench (See example in Annex C). The sequence of running the scripts can be found in the Release Notes. If the Release Notes do not contain this information, no specific sequence is required.
     - If any of database script fails, please restore the database from backup, stop installing the update and contact Pharmadex Support.
   - Updating the application, if the update contains country_name.war
     - Open a folder webapps for Apache Tomcat

- Copy the existing file country_name.war from this folder to a safe location. This file will be needed only in case of total failure of the update. It is not reasonable to keep all copies of old country_name.war. The latest copy will be enough.
- From webapps folder remove the file country_name.war and folder country_name
- Copy the new file country_name.war from the update to the folder webapps

5. Start Apache Tomcat service
6. Wait 3 min after starting Tomcat, folder *country_name* must be created in webapps folder by Apache Tomcat service
7. When the *country_name* folder is created, Start Apache HTTPD service
8. Check Pharmadex from any computer in the Local Area Network
   - Login as admin
   - Execute Registration-Application Processing-Process Product Application
   - If required verify that any changes made are functioning properly
9. Inform users about changes by sending out comprehensive release notes

Data backup

Backup policy for Pharmadex database must establish at least:

1. Daily backup for whole database
2. Keep backup copies at least a week old

Daily backup should be independent of any other backups, such as incremental disk backups etc.

To perform daily backup use the **mysqldump** utility from MySQL server installation. Please, refer to MySQL documentation.

It is recommended to create Windows batch file to backup the Database as shown in the example below and run this file every night using standard Windows Scheduler.

Example of backup.cmd file

```
@echo off
@For /F "tokens=1,2,3 delims=. " %%A in ('Date /t') do @(
Set Day=%%A
Set Month=%%B
Set Year=%%C
)
@echo DAY = %Day%
```

```
@echo Month = %Month%
@echo Year = %Year%
Set fileName=C:\backup\%Year%%Month%%Day%pdx_mz.sql
@echo Start backup to the file %fileName%
"C:\Program Files\MySQL\MySQL Server 5.5\bin\mysqldump" --add-drop-database –upharm
 –psecret_password --databases pdx_mz > "%fileName%"
```

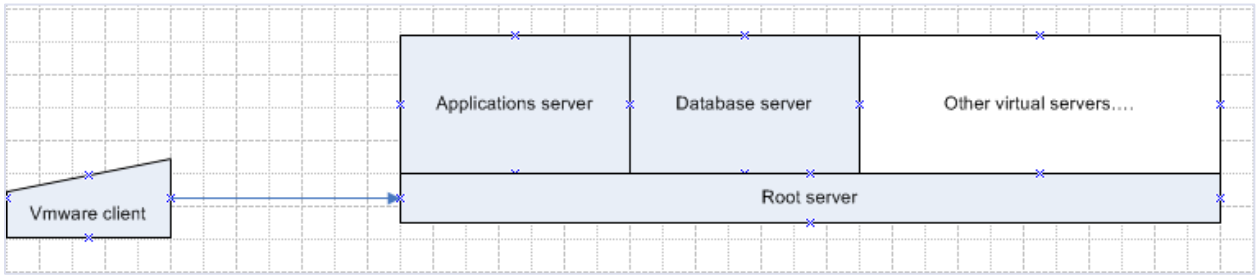
ANNEX A. COUNTRY SPECIFIC INSTALLATIONS

Two (2) Server Deployment (Using VMWare)

For Mozambique and Ethiopia, Pharmadex System is deployed on two servers for each deployment:

- Application Server – for Apache HTTPD and Apache Tomcat
- Database Server – dedicated server for MySQL

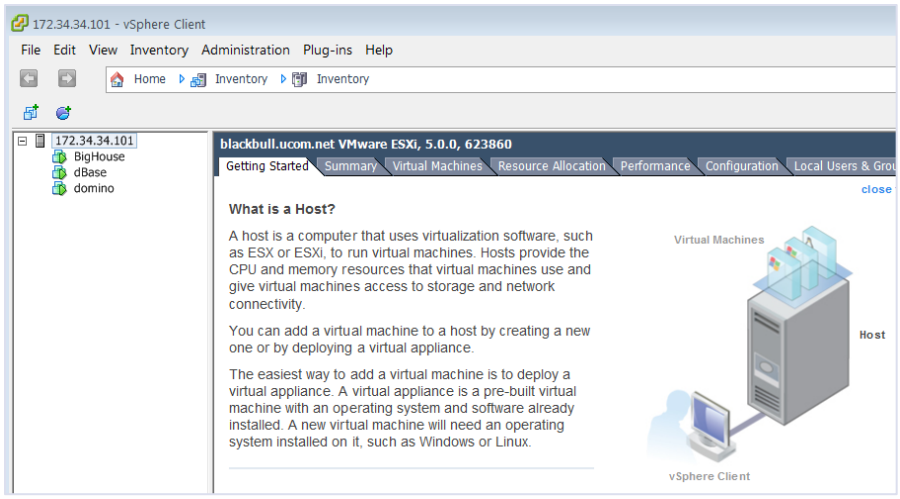
Both servers are deployed on one physical box using Vsphere Hypervisor[2]. It is a typical deployment that is provided by most System Integrators. Therefore, System Administrator has to use VMWare client[3] to manage the servers. The typical deployment schema is below



To use VMWare client, to the following is required:

1. Install the VMware client on the computer connected to the network where Pharmadex will be deployed/used.
2. Run the VMware client on the Root server and log in as Vsphere root user.
3. Go to the inventory page (as shown below):

[2] Details are at http://www.vmware.com/products/vsphere-hypervisor.html
[3] Ask System Integrator or IT infrastructure support how to install VMWare client



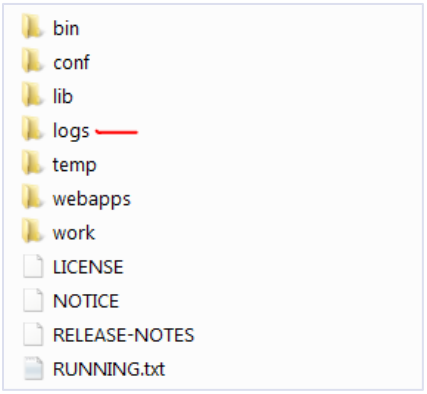
This deployment schema allows efficient use of available hardware. It is highly recommended for systems that will come under significant loads – 50 simultaneous users and above. A dedicated database server is desirable, but not mandatory.

ANNEX B. TROUBLESHOOTING GUIDE

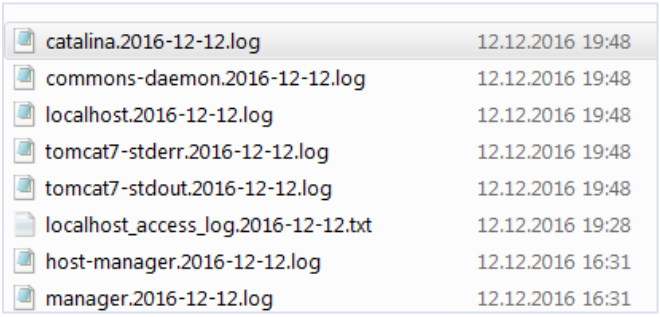
Software specific procedures

How to check logs

Significant information can be found in Apache Tomcat logs. These logs are in folder “logs” under Apache Tomcat root folder. For instance:



For any specific date (for example Dec 12 2016) the following logs can be found



It is recommended to check the log files in the following sequence:

1. catalina
2. tomcat7-stderr
3. tomcat7-stdout

Other log files are not important.

Currently there is no dedicated log file for Pharmadex application. This file will be useful when there are a lot of other applications on the Apache Tomcat server. In this situation, please contact Pharmadex Support for details.

How to restart Pharmadex System

The most reliable way to restart Pharmadex is to restart the server's operating system. However, it is not always desirable. It is possible to restart services only in the following sequence:

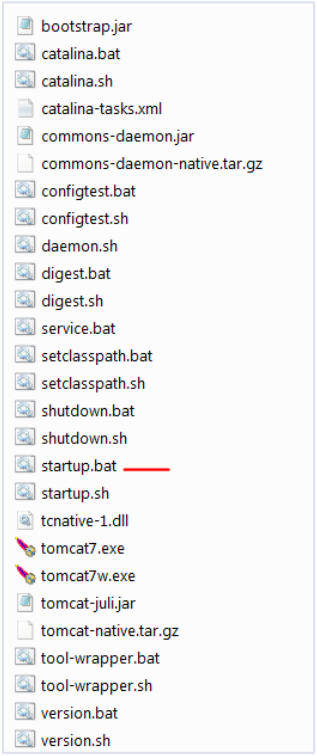
1. Stop Apache HTTPD
2. Stop Apache Tomcat
3. Stop MySQL
4. Start MySQL
5. Start Apache Tomcat
6. Wait about 3 min
7. Start Apache HTTPD

How to start Apache Tomcat manually

If Apache Tomcat fails to start as service, the best way to determine the cause of it not starting as a service is to start Apache Tomcat manually.

To start Apache Tomcat manually:

Open folder "bin" under Apache Tomcat root folder (for example, if Apache Tomcat is installed in D:\servers\apache-tomcat-7.0.68, the "bin" folder will be D:\servers\apache-tomcat-7.0.68\bin)



Run file startup.bat. A DOS window will be displayed. In this window, the start sequence can be easily tracked:

Press Ctrl-c to exit this window, when it is no longer needed.

How to start Apache HTTPD manually

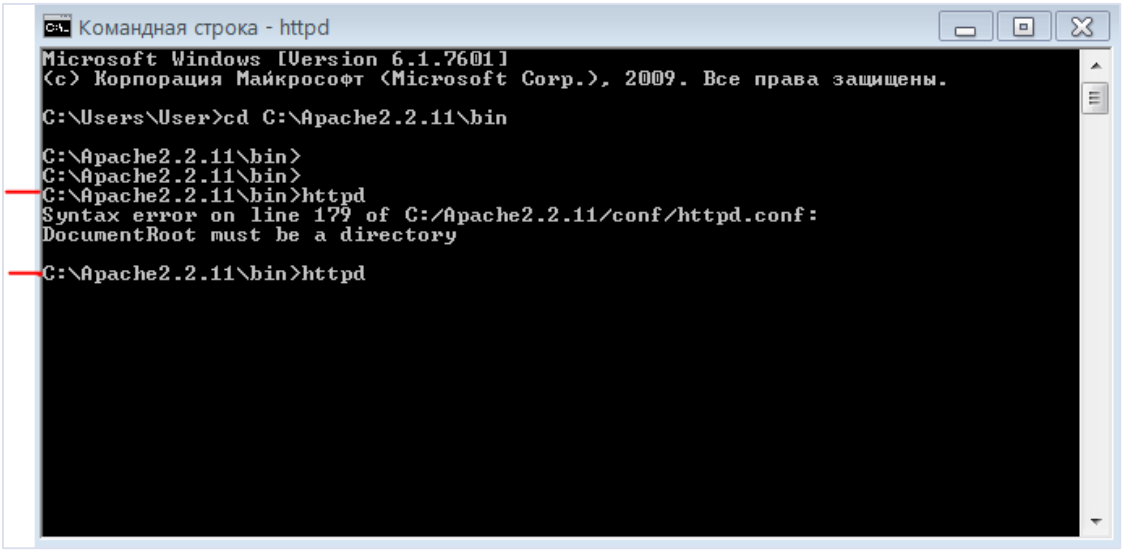
If Apache HTTPD fails to start as service, the best way to determine the cause of it not starting as a service is to start Apache HTTPD manually.

To start Apache HTTPD manually:

Run DOS window

Open folder “bin” under Apache HTTPD root folder (for example, if Apache HTTPD is installed in C:\Apache2.2.11\, the “bin” folder will be C:\Apache2.2.11\ \bin)

Run httpd from command line. The example below displays two starts of httpd – with error and successful

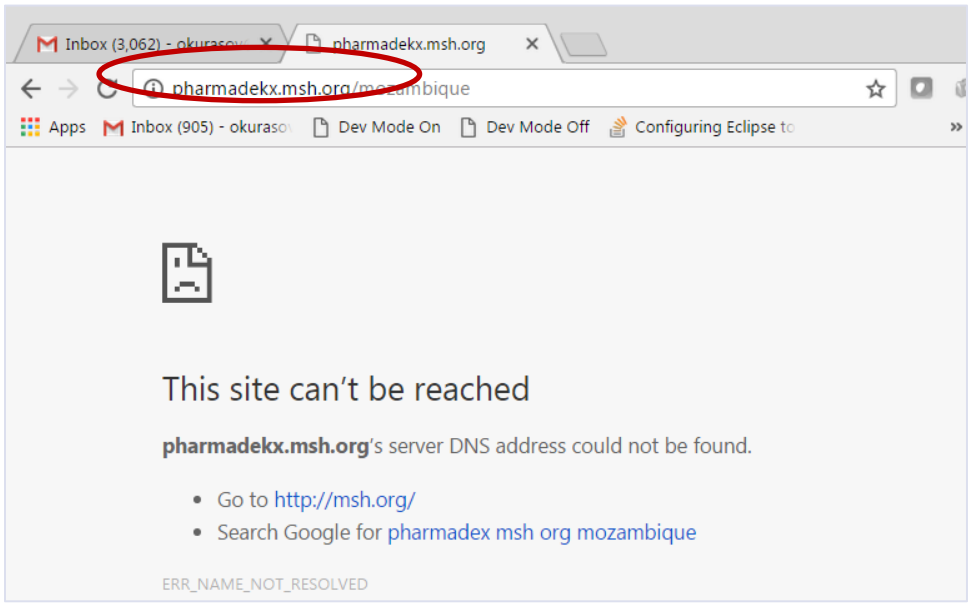


Close DOS window to exit this window, when it is no longer needed.

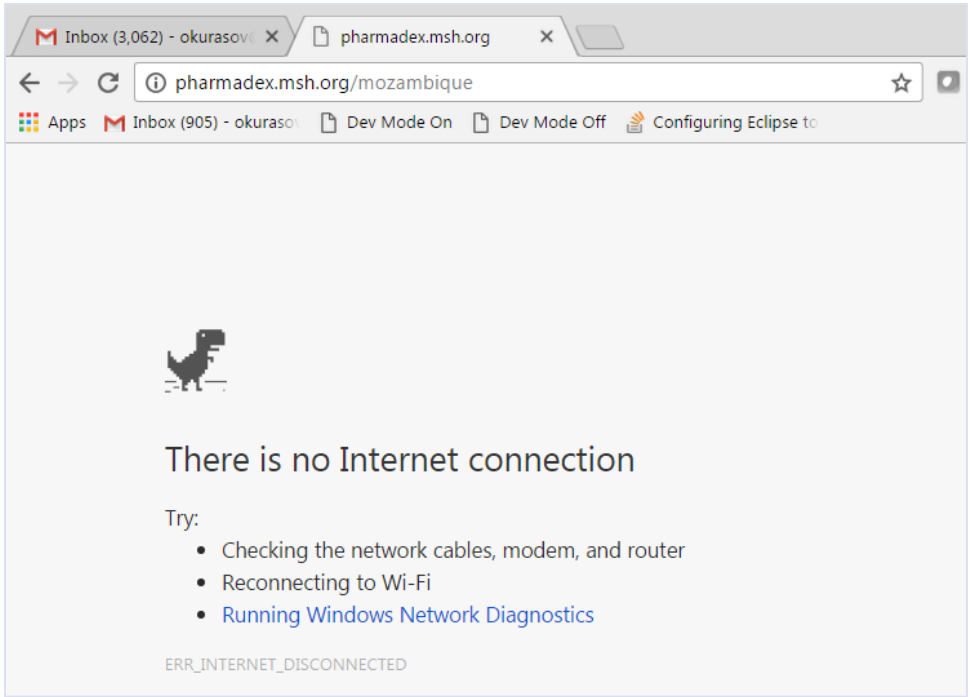
Pharmadex is inaccessible on a workstation

To select an appropriate corrective action, please refer to the examples and the table with recommended corrective actions below.

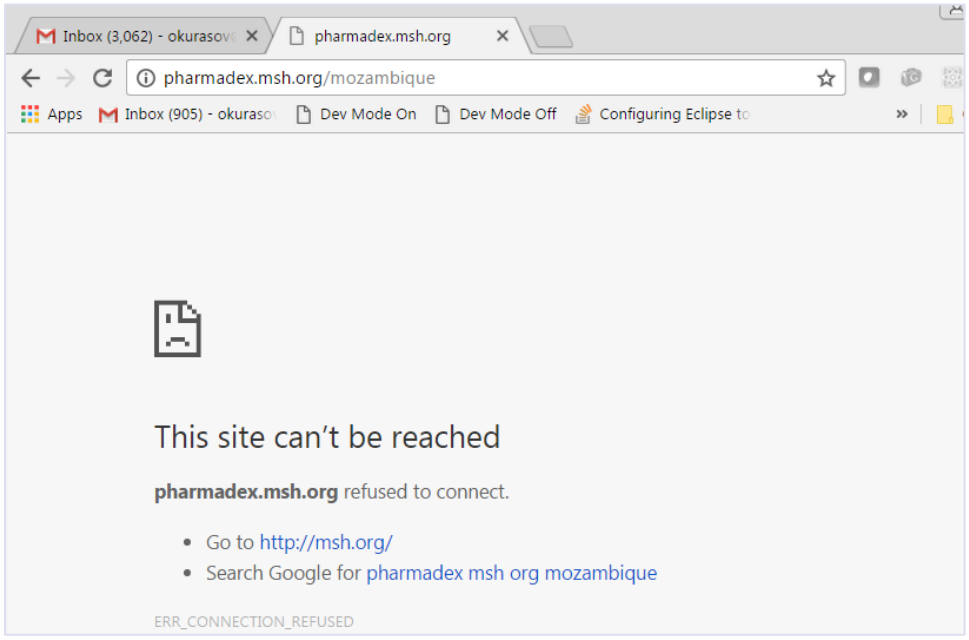
Example 1 Wrong address



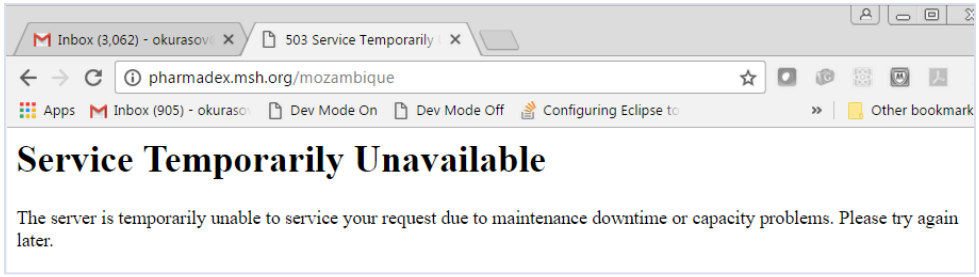
Example 2 Network connection problem



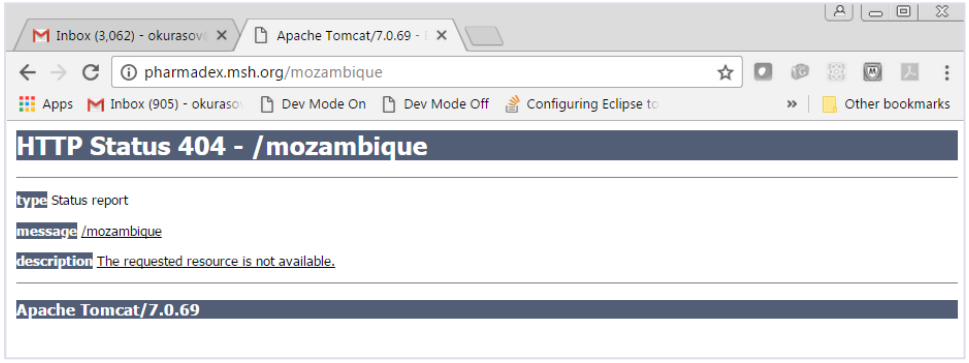
Example 3 Apache HTTPD server is down



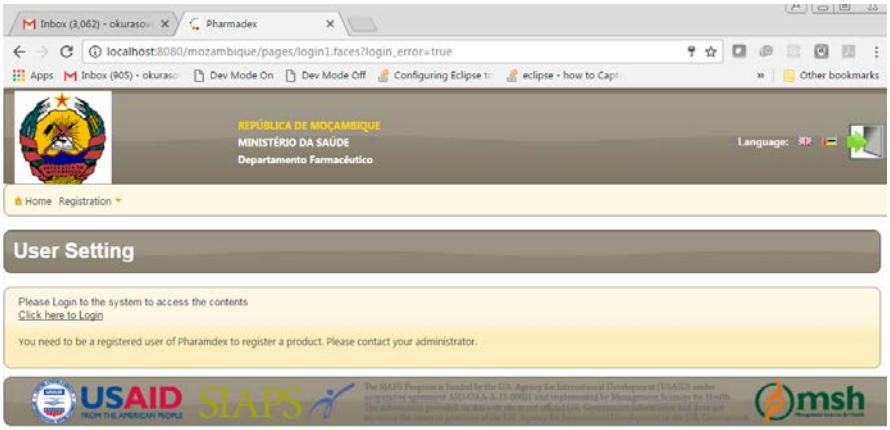
Example 4 Apache Tomcat Server is down



Example 5 The Application is down or not started



Example 6 User cannot login



Recommended corrective actions

Example #	Possible causes	Actions
1	User typed the wrong address	Check address and type right one
	User typed the correct address first time but without http:// (https://) prefix	Add the prefix to address. It is a security feature for most modern browsers. It will not be necessary to type this prefix after the first successful connection.
	User typed the right address, but the DNS doesn't resolve it	Check the Windows Network domain controller and/or other DNS settings. Check whether user connected to external VPN, instead of Local Network Connection
2	User's workstation does not connect to the Local Network or the Local Network is down	Check Network connection
3	Apache HTTPD service is not working	Try to restart Apache HTTPD service on the server
	The server is down	Restart the server's operating system
4	Apache Tomcat service is down	Restart Apache Tomcat service on the application server. Check Apache Tomcat Log for the real cause.
		Contact Pharmadex support with more details
5	Pharmadex application did not start after new update	Check Apache Tomcat logs for line/s such as "SEVERE: The war name [country_name .war] is invalid. The archive will be ignored". If found, please reload new update from Internet. If this does not help, contact Pharmadex Support
	Pharmadex application was working, but unexpectedly stopped	Check Apache Tomcat Logs for cause of the problem. If this cannot be resolved independently, contact Pharmadex Support. Anyway, try to restart Apache Tomcat service
6	User forgot login/password	Check whether admin user can login. If yes, reset password for this user. If admin user cannot login, see below.
	MySQL service is down or connection to MySQL is down	Check MySQL service and network connection to MySQL server in case when MySQL server is on other computer.

Weekly maintenance troubleshooting

Possible issues while weekly maintenance procedure and corresponding corrective actions listed in table below.

Maintenance step	Possible issues	Corrective actions
Check page load time	Page load time is too slow – in excess of 3-5 sec	Check page load time from other workstation. If this time is slow, follow the procedure below, otherwise reload the first workstation. Ping the server from the workstation. Reply time should be within 1 to 100ms, with an average of about 30ms. If reply time specified above is exceeded – check network connection If page load time is still long, restart the Pharmadex System as described earlier. If it is does not help, check disk space and memory. If nothing helps, or slowness occurs every day, please contact Pharmadex Support.
Check daily backup	Backup folder (for example c:\backup) does not contain backup for one or several days before	The most common cause of this is automated restart of the server because of Windows update. The MS Windows Scheduler that controls backup can perform backup only if active session of system administrator user is running. To run this session it is enough to log in using the Remote Desktop Connection and then close the Remote Desktop connection without logout. The session will keep running. Therefore, it will be useful to perform an additional check. First, check free disk space on backup disk on the server. If it there is not enough disk space, please remove old backup files. Leave only files for the last week. Run backup.cmd from the backup folder on the server. It will take a while. After backup.cmd finishes working, new backup file will appear in the backup folder If new backup file does not appear, please contact Pharmadex Support.
Check disk and memory	The server does not have enough free memory	Restart the server's operating system
	The server does not have enough disk space	Remove all backup files more than a week old.

Software update troubleshooting

Possible issues while installing updates and corresponding corrective actions are listed in table below.

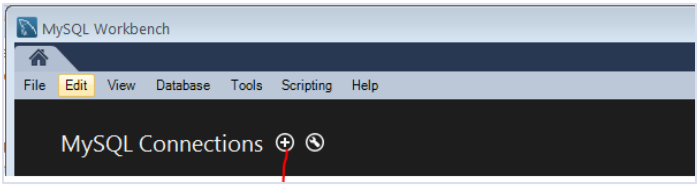
Installation step	Possible issues	Corrective actions
Stop Apache HTTPD service	Apache HTTPD service cannot be stopped	Restart the server's operating system. After the restart, stop Apache HTTPD.
Stop Apache Tomcat Service	Apache Tomcat service cannot be stopped	Restart the server's operating system. After the restart, stop Apache HTTPD service, stop Apache Tomcat service.
Execute database scripts	Execution failed	Contact Pharmadex Support
Remove file country_name.war and folder country_name from Apache Tomcat webapps folder	Unable to remove	Stop Apache Tomcat service and try again
Start Apache Tomcat service	Unable to start	Start Apache Tomcat manually to diagnose errors. Check logs and try initial troubleshooting. If there is no progress, contact Pharmadex Support
Start Apache HTTPD service	Unable to start	Start Apache HTTPD manually to diagnose errors. Check logs and try initial troubleshooting. If there is no progress, contact Pharmadex Support

ANNEX C. USING MYSQL WORKBENCH

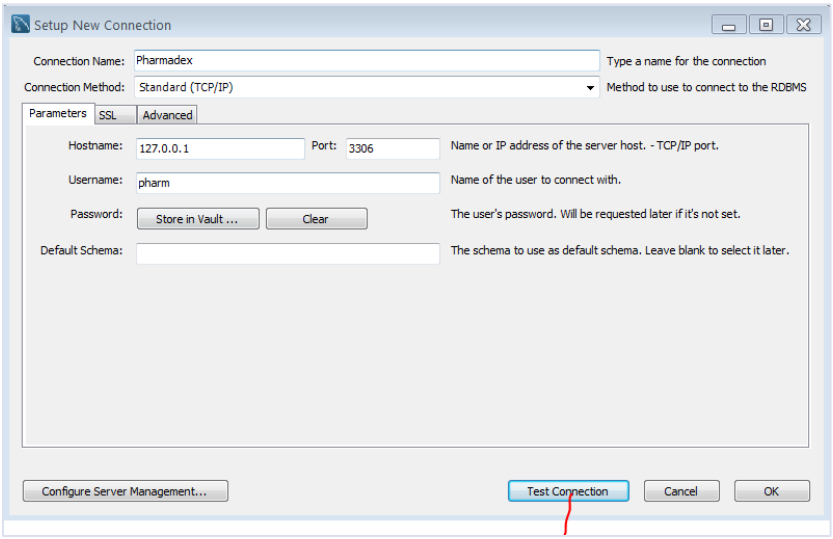
How to make connection to Pharmadex Database

Run MySQL workbench

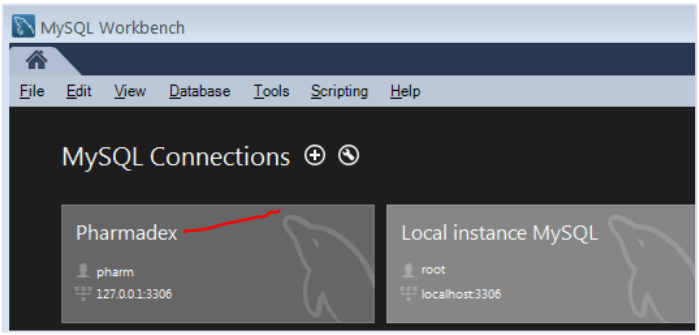
Click Add Connection



Fill form like below and click Test Connection



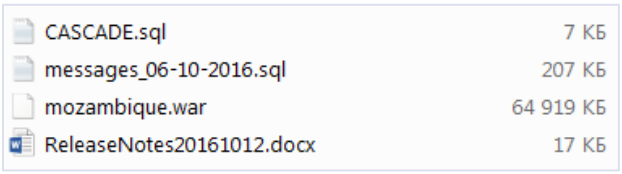
If connection is successful, save it



How to install a database update

Suppose the update listed below is present

First, ensure that Backup is available, if not take a backup and store it safely. See details above.



Quote from Release Notes:

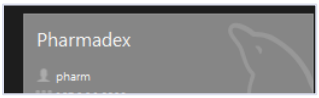
This version contains two database scripts:

1. CASCADE.sql – intends to prepare database for future deletion of wrong products and applications
2. messages_06-10-2016.sql – corrections of labels user screens/forms

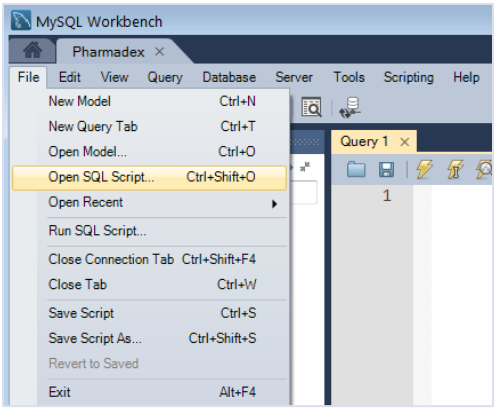
First run CASCADE.SQL, then messages_06-10-2016.sql

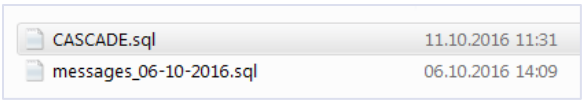
Run MySQL workbench

Connect to the database

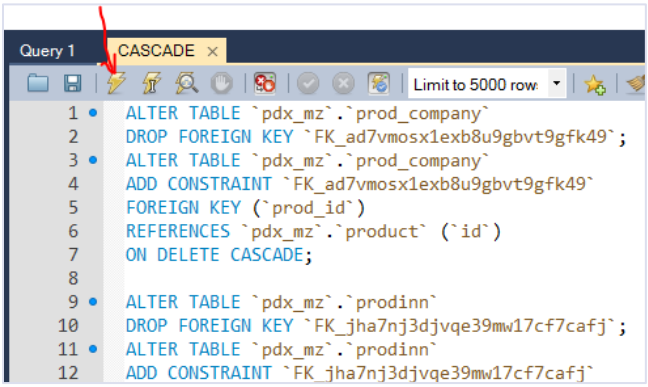


Open CASCADE.sql



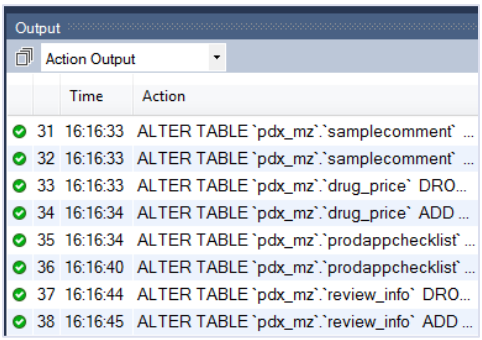


Run it!

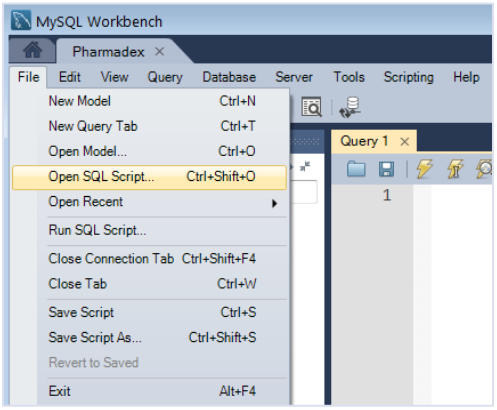


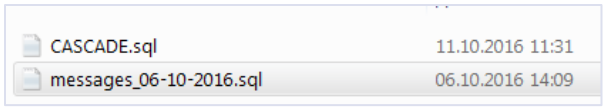
It will take a while, wait for it to finish!

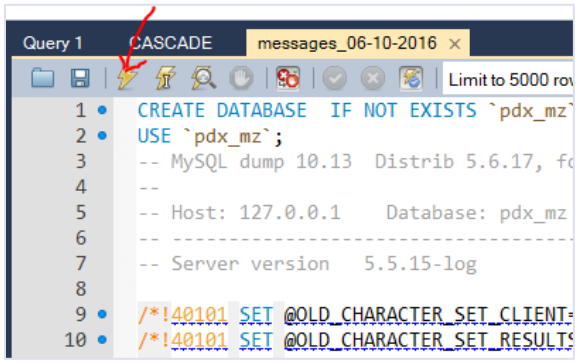
Check Action output. All records must be green. Otherwise, stop installation and restore the database from backup

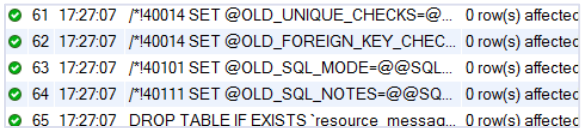


Repeat these operations for script messages_06-10-2016.sql









How to restore a database

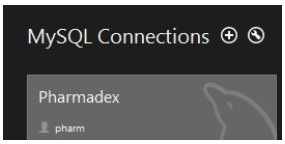
Restore is a very rare operation that is required only in case of database disaster or wrong database update or deployment of new Database server. The most convenient tool to restore data is MySQL Workbench.

For restoring the database, you will need the latest backup.

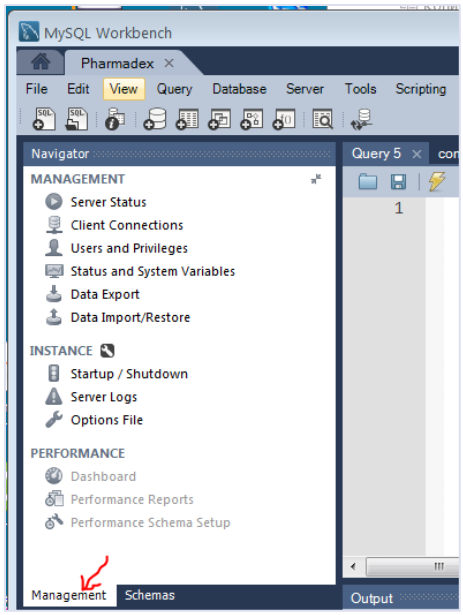
For instance, the latest backup is file 20161019pdx_mz.sql

Run MySQL workbench

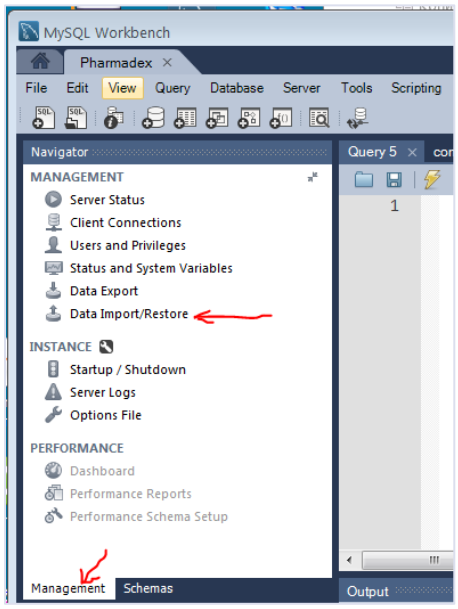
Connect to Pharmadex database



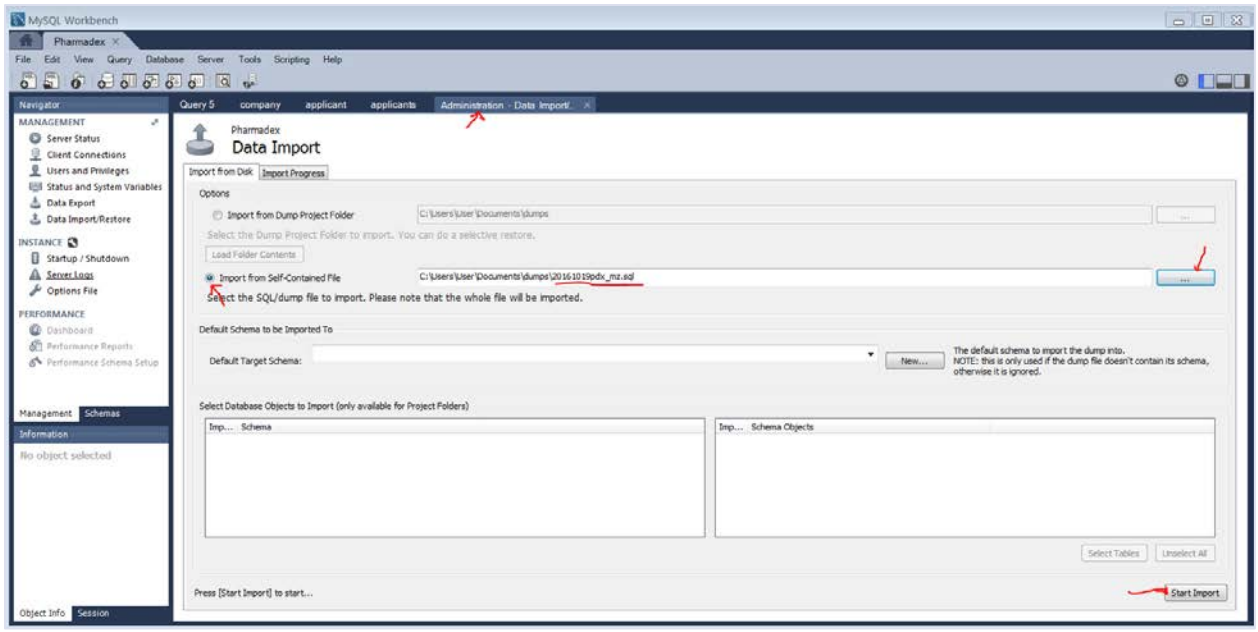
Open Management Navigator Tab



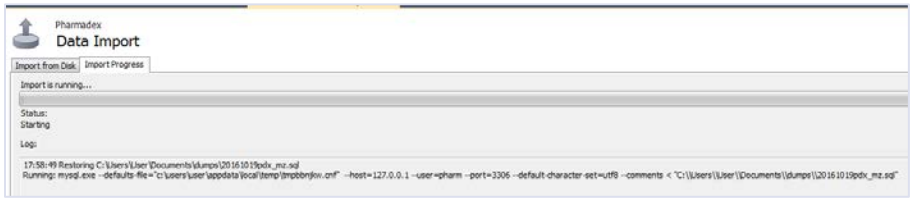
Select Data Import/Restore



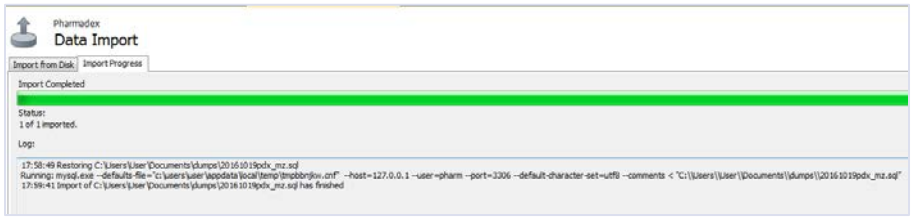
First select Import from Self-Contained File, then select the backup file, and click Start Import



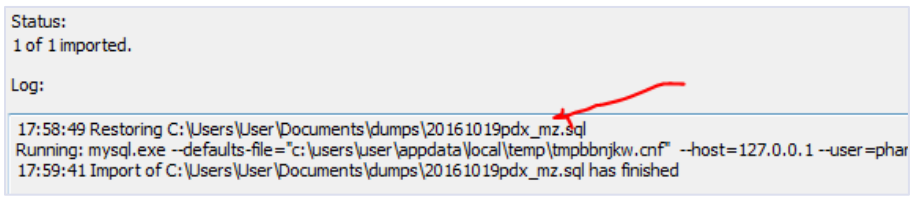
Import or restore will start.



Whole process will take a time, wait until finish



Pay attention to the import log. Sometimes it may contain error messages. In this case, import will be incomplete. Please determine cause of it. Example of correct log is below

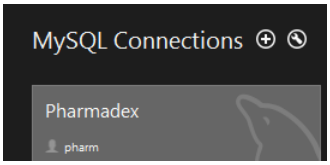


How to run backup manually

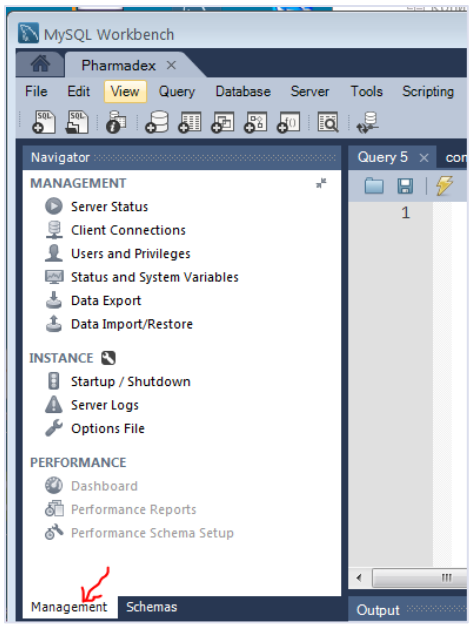
Sometimes it is necessary to make backup manually. To do this:

Run MySQL workbench

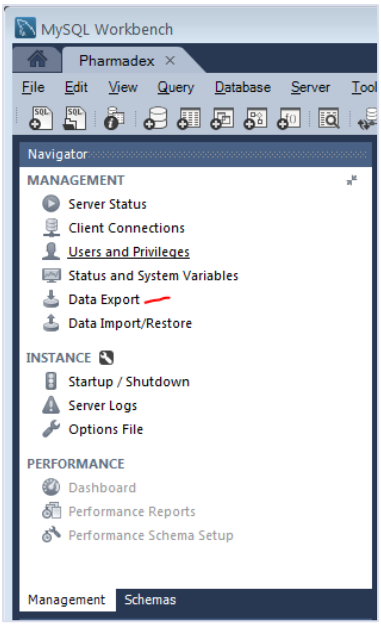
Connect to Pharmadex database



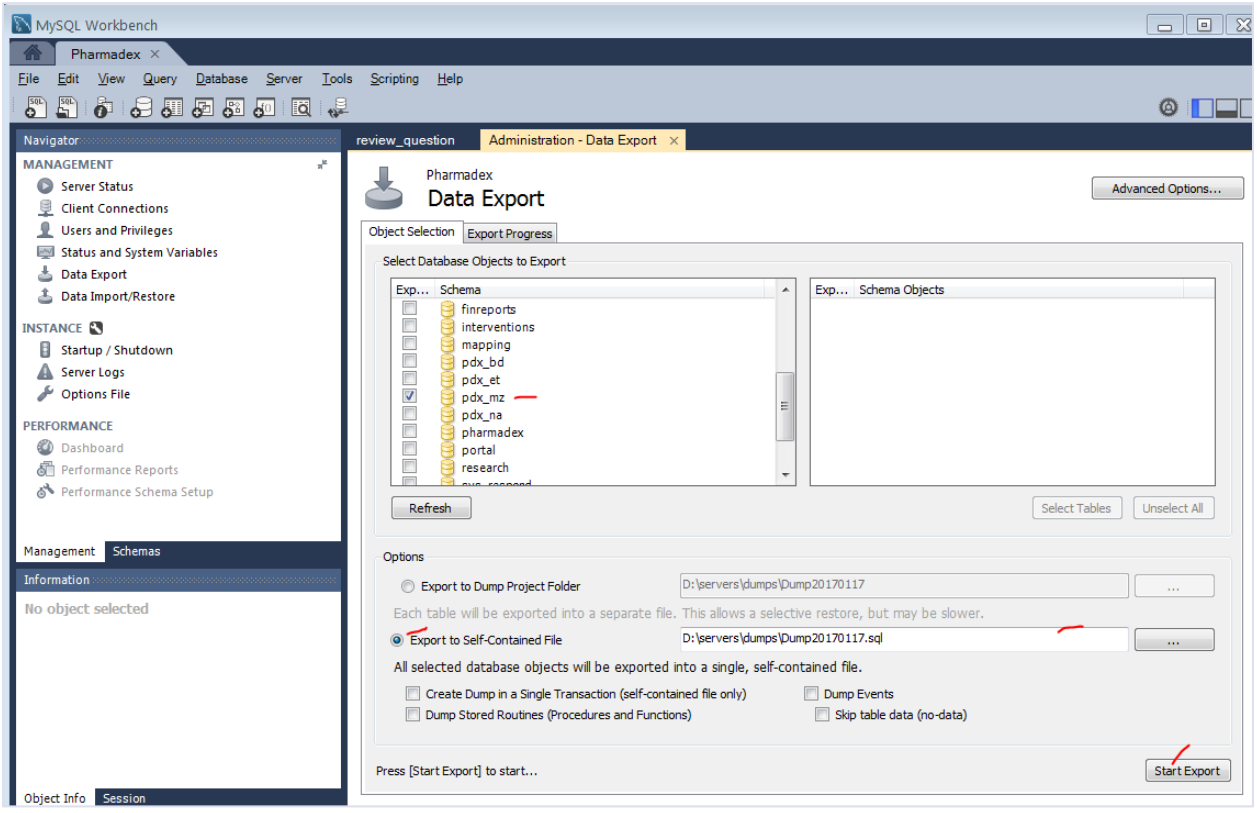
Open Management Navigator Tab



Select Data Export

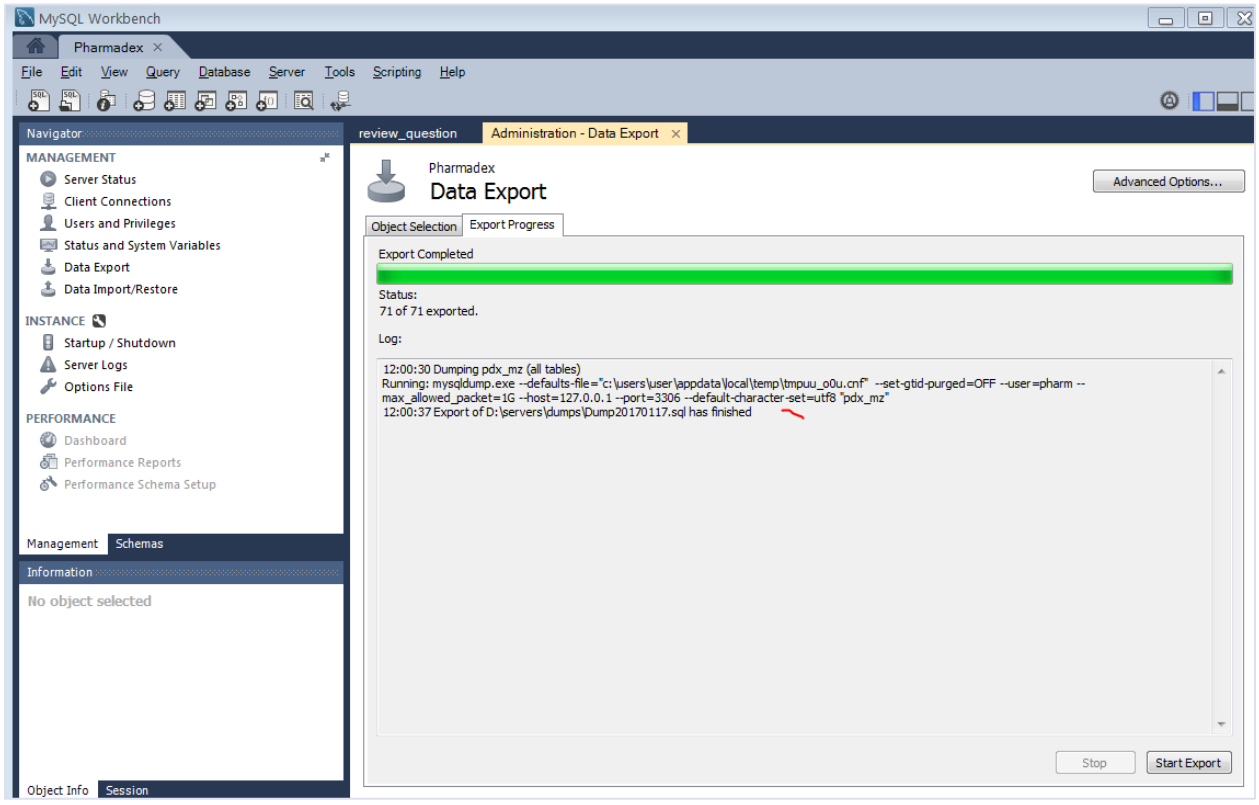


Select the database; select Export to Self-Contained File, correct the file name as needed, click Start Export



Backup may take a while. Wait for the “Export Completed” message. Pay attention that the “green” bar under “Export Completed” does not necessarily mean success of“Export Completed Successfully”. The green bar will be displayed for both successful and unsuccessful operations

Please check log to ensure success.



ANNEX D HOW TO GET HELP

1. Google search. The most useful (and trusted) source are articles on “stackoverflow.com”
2. Official support sites:
    - https://httpd.apache.org/
    - http://tomcat.apache.org/
    - http://dev.mysql.com/doc/
3. Service Level Agreement with Pharmadex Support Team