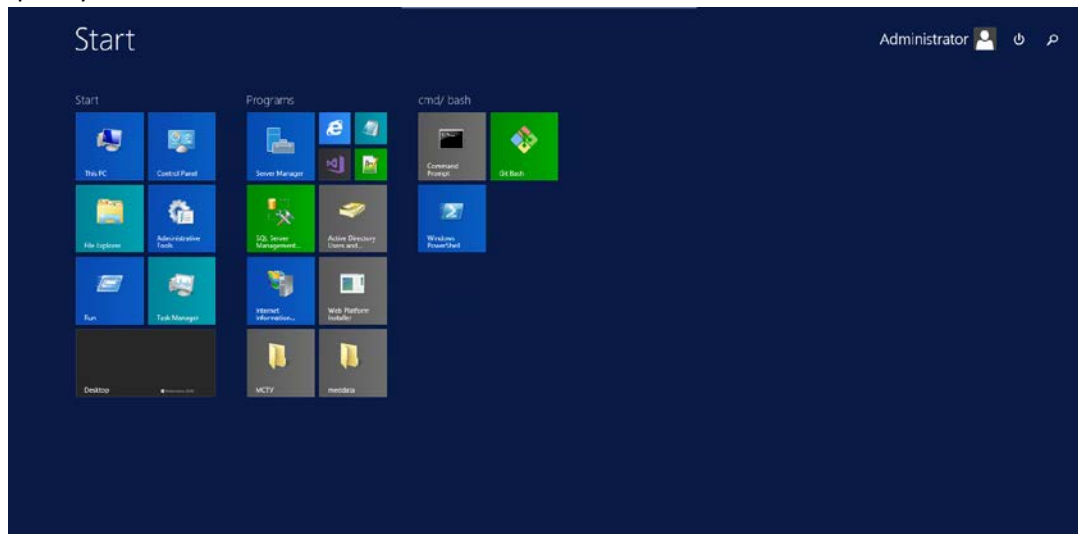# Setting Up Mata

From scratch in detail

*** Mata (a combination of Medicine and Data) was called MEDDATA during development and many places in this guide will therefore refer to it as Meddata. ***

Contents

1. Installing Windows

1. Get Windows Server 2012 Standard
2. Create a bootable media
3. Install Windows 2012 Server with GUI on a machine or virtual machine
4. Partition the disk
    a. Main partition for server C:\ (requires at least 45 GB + 40GB for future updates, database, defragmentation, …)
    b. Main partition for data M:\ (requires A LOT of GB to store all the data)
5. Run Windows Update (Control Panel > System and Security > Windows Update)
6. Possibly run Windrows Update multiple times as some updates depend on others
7. We suggest you set up your start menu to look like the following screenshot, in order to quickly find the relevant software:

(Add new software as you install it)

2. Installing SQL Server and SQL Server Management Studio (SSMS)

1. Download SQL Server 2012 Express Advanced (11.0.6020) and SQL Management Studio from microsoft.com
2. Uninstall all other versions of SQL Server before proceeding
3. Make sure you haven't set up the Domain yet if so, then demote the Server from being domain controller to normal server through Server Manager Remove Roles and Features.
4. Choose stand-alone installation
5. In the new window:
    a. Feature Selection: Take pre-selected features (all but LocalDB)
    b. Instance Configuration: Named instance: ~~MEDDATA~~ SQLExpress
    c. Database Engine Configuration: Add HDC and Mata Administrators in general to the DB admins
    d. Reporting Services Configuration: Choose Install only

3. Installing IIS and setting it up

1. In Server Manager click on Manage > Add Roles and Features
2. In the Add Roles and Features Wizard:

a. Before You Begin: click next
    b. Installation Type: choose Role-based or feature-based installation
    c. Server Selection: select the Mata server
    d. Server Roles: choose Web Server (IIS) and include management tools   **R**
    e. Features: leave as is
    f. Role Services: Select
        i. Windows Authentication,
        ii. IIS: ASP.NET,
        iii. IIS: .NET Extensibility,
        iv. IIS: .NET Extensibility 4.5,
        v. IIS: ODBC Logging;
    g. You may be interested in
        i. Logging tools,
        ii. Request Monitor and/or
        iii. Tracing
    h. Confirmation: Allow automatic restart if everything else is closed
3. Open IIS 8.0 Manager and you get prompted for Microsoft Web Platform Installer 5.0
4. Click on the link and download the program – use it to add any features required for IIS
5. Add PHP 7.1 and PHP 7.1 For IIS Express and dependencies

4. Installing Visual Studio

1. Download the installer for Visual Studio 2017 Community (or other) from Microsoft
2. Run the installer
    a. It may display an error message that it requires update KB2919355
        i. Click on the link provided OR
        ii. Ensure that you have installed all the updates from Windows Update
        iii. Then restart the installer
    b. Click Continue
3. Choose the following components
    o Universal Windows Platform development (create applications for the Universal Windows Platform with C#, VB, JavaScript, or optionally C++
    ✓ .NET desktop development (Build WPF, Windows Forms, and console applications using C#, Visual Basic and F#)
    o Desktop Development with C++ (Build classic Windows-based applications using the power of Visual C++ toolset, ATL, and optional features
    ✓ Anything related to .NET and SQL
    ✓ Git for Windows
    ✓ GitHub extension for Visual Studio
4. Click Install

5. Installing Notepad++

Not necessary but more powerful than Notepad and thus can help editing files for the rest of the set-up

1. Go to https://notepad-plus-plus.org/
2. Download the latest version
3. Install
4. Right click any file, to open with Notepad++

6. Creating a Domain

1. Rename server to user friendly name (e.g. '*MeddataServer*')
2. Open 'Server Manager'
3. Click on 'Add roles and features'
4. Inside the Add Roles and Feature Wizard:
    a. Choose Role-based or feature based installation
    b. Select the Mata server
    c. Server Roles: choose Active Directory Domain Services   **R**
    d. When installation completes, click on 'Promote this server to a domain controller'
5. Inside 'Active Directory Domain Services Configuration Wizard
    a. Deployment Configuration:
        i.   select 'Add a new forrest',
        ii. choose root domain name: *meddata.com OR meddata.soton.ac.uk*
    b. Domain Controller Options: choose Windows Server 2012 for both
    c. Click through other steps
6. After restart can confirm if everything worked
    a. go to Settings > Server Info
    b. Confirm that the domain reads meddata
    c. open command prompt on another machine on the same network
    d. ping the domain and the computer name individually

7. Users and User Groups

1. Go to Administrative tools > Active Directory Users and Computers
2. Expand meddata.com > Users
3. Right click on Users and select New > User use this to create the following users:
    a. *mdadmin (Mata Administrator)* – default account for admin user who administrates Mata
    b. *hdcsystem (HDC)* – user account used to run HDC programs and requires admin rights to database and filestore
    c. *website (MedData AppPool)* – user account used for meddata AppPool
    d. Sample users for HDC – this can well be valid names and people. You can always go back to this step to add more users, but remember to create at least two users now for testing purposes.
4. You may want to set the password of certain accounts (possibly the default '*Administrator*' account) to never expire, for that
    a. Right click on the user to change
    b. Select Properties
    c. Go to the Account tab
    d. Under Account Options check 'Password never expires'
5. Right click on Users and select New > Group, use this to create the following groups (each time set the Group scope to 'Global'):
    a. *MedData Administrators*
    b. *MedData Users*
6. Right click on a user to add the user to a group. Do this to group the following users:
    a. *MedData Administrator -> MedData Administrators*
    b. *HDC -> MedData Administrators*
    c. *MedData AppPool -> MedData Administrators*

      d.   Any user accounts created -> *MedData Users*

8. Permissions and Shared Drive

The final access permissions for a shared resource are determined by considering both the NTFS permissions and the sharing protocol permissions, and then applying the more restrictive permissions.

NTFS permissions and share permissions are independent in the sense that neither changes the other, and the most restrictive of the two will be applied to the shared resource.

1. In M:\data create a folder for each of your users, using their username as the folder name
2. In Explorer right click on M:\data folder and select the "Sharing" tab to enable sharing of this folder
3. Click on Advanced Sharing
   a. Confirm that you want to share this folder
   b. Enter a Share name (e.g. *Meddata*)
4. Click on Permissions
   a. Allow *Everyone* to Read
   b. Add *Meddata Administrators* and give them Full Control
   c. Add *Meddata Users* and give them Full Control
5. Confirm everything to close the windows
6. Run the following script as administrator (available as setpermissions.bat)

```
1    @echo off
2    echo "Sets definitions for the shared drive on a MedData server"
3    SET LOCDRIVE=M:
4    SET LOCFOLDER=M:\data
5    echo "Folder containing user folders is %LOCFOLDER% in %LOCDRIVE%"
6    cd %LOCDRIVE%
7    icacls %LOCDRIVE% /remove:g "CREATOR OWNER"
8    icacls %LOCDRIVE% /remove:d "CREATOR OWNER"
9    @echo on
10   REM Owner -> Full control (subfolders and files only)
11   icacls %LOCDRIVE% /grant:r "CREATOR OWNER":(OI)(CI)(IO)F
12   @echo off
13   icacls %LOCDRIVE% /remove:g "MedData Administrators"
14   icacls %LOCDRIVE% /remove:d "MedData Administrators"
15   @echo on
16   REM MedData Administrators -> Full control (this folder subfolders and
17   files)
18   icacls %LOCDRIVE% /grant:r "MedData Administrators":(OI)(CI)F
19   @echo off
20   icacls %LOCDRIVE% /remove:g "MedData Users"
21   icacls %LOCDRIVE% /remove:d "MedData Users"
22   @echo on
23   icacls %LOCDRIVE% /grant:r "MedData Users":(OI)(CI)(RX)
24   icacls %LOCDRIVE% /grant:r "MedData Users":(CI)(AD)
25   icacls %LOCDRIVE% /grant:r "MedData Users":(CI)(IO)(WD)
26
27   @echo off
28   cd % LOCFOLDER%
29   icacls %LOCFOLDER% /remove:g "MedData Administrators"
30   icacls %LOCFOLDER% /remove:d "MedData Administrators"
31   @echo on
```

```
32    REM MedData Administrators -> Full control (this folder and subfolders)
33    icacls %LOCFOLDER% /grant:r "MedData Administrators":(OI)(CI)F
34    @echo off
35    icacls %LOCFOLDER% /remove:g "MedData Users"
36    icacls %LOCFOLDER% /remove:d "MedData Users"
37    @echo on
38    REM MedData Users -> List folder contents (this folder and subfolders)
39    icacls %LOCFOLDER% /grant:r "MedData Users":(CI)(X,RD,RA,REA,RC)
40    @echo off
41    FOR /D %%s IN (*) DO call :setpermissions %%s
42
43    @echo off
44    set /p ending="Press Enter to close this window."
45
46
47    GOTO :EOF
48    :setpermissions
49        @echo %1
50          @echo off
51        icacls %LOCFOLDER%\%1 /remove:g %1
52        icacls %LOCFOLDER%\%1 /remove:d %1
53          @echo on
54          REM %1 -> Modify (this folder subfolders and files)
55          @echo off
56          REM also changes the folder icon if the permission setting is a
57    success
58          REM i.e. the foldername matches a user name
59          @echo on
60        icacls %LOCFOLDER%\%1 /grant:r %1:(OI)(CI)M && call :changeicon
61    %LOCFOLDER%\%1
62          @echo off
63        icacls %LOCFOLDER%\%1 /remove:g "Meddata Users"
64        icacls %LOCFOLDER%\%1 /remove:d "Meddata Users"
65        icacls %LOCFOLDER%\%1 /remove:g "Meddata Administrators"
66        icacls %LOCFOLDER%\%1 /remove:d "Meddata Administrators"
67        GOTO :EOF
68    :changeicon
69        echo [.ShellClassInfo] >>%1\desktop.txt
70        echo IconResource=C:\Windows\system32\SHELL32.dll,158 >>%1\desktop.txt
71        echo IconFile=%SystemRoot%\system32\SHELL32.dll >>%1\desktop.txt
72        echo IconIndex=158 >>%1\desktop.txt
73          @echo off
74        CHCP 1252 >NUL
75        ATTRIB -S -H %1\desktop.ini
76        CMD.EXE /D /A /C (SET/P=ÿþ)<NUL > %1\desktop.ini 2>NUL
77        CMD.EXE /D /U /C TYPE %1\desktop.txt >> %1\desktop.ini
78        DEL /F /Q %1\desktop.txt
79        ATTRIB +S +H %1\desktop.ini
80    :EOF
```

7. Note that the important parts have been highlighted, the changing of the icon is just a gimmic that allows users to find their own directory more quickly. Other parts are removing other security permissions you might have set when playing around with the permissions (like I do)

a.

b.

c.

8. Confirm that everything is set the way you want it: In Explorer right click on M: drive, click on Properties and select the "Security" tab and then "Advanced" to edit the permissions, do this for M: and M:\data as well as any folders inside M:\data

9. This may be a good point to restart the server to ensure all the changes are applied

9. Installing HDC

1. Obtain a Copy of HDC

Go to doi:10.5258/SOTON/377029 to download the original copy of HDC or use the one that came with this dataset.

2. Installing the Mata Database

1. Obtain the following SQL scripts (from HDCConfiguration > HDCDatabaseCreator) and load them (File > Open > File) into SQL Server Management Studio:
   - HDCMetadata_CreateDatabase.sql
   - HDCMetadata_CreateSchema.sql
   - HDCMetadata_PopulateData.sql
2. Execute the MaterialsMetadata_CreateDatabase.sql script, or create the database by hand

3. Execute the MaterialsMetadata_CreateSchema.sql script to configure the tables and their relationships. If a database name other than HDCMetadata was chosen, the script will need to be edited to handle this

4. Execute the HDCMetadata_PopulateData.sql script to add the default data required for proper operation, or edit the database manually (not recommended). If a database name other than HDCMetadata was chosen, the script will need to be edited to handle this.

    a. You need to edit the first user to `(0,'hdcsystem','HDC','unkown')` and

    b. the first group to `(0,'MedData Administrators',0)` as well as editing the

    c. UNCPath,

    d. LocalPath and

    e. WebPath to `\\meddata.com\`, `M:\` and `http://meddata.com` respectively. Make sure the database itself is called MEDDATADB (you can rename it later, but do so before continuing to 8.2)

    f. Confirm all the setting by checking

```
1  SELECT * FROM [dbo].[ExperimentParameters] WHERE ExperimentID=3
2
```

	ID	ExperimentID	Position	Name	Value	Unit	Type	IsCompulsory	RowVersion	SourceExperimentParameterID
1	11	3	NULL	TrackingFolderName	.meddata	NULL	NULL	NULL	0x0000000000017A7	NULL
2	12	3	NULL	TrackingFileName	metadata.xml	NULL	NULL	NULL	0x00000000000017A8	NULL
3	13	3	NULL	WebPath	https://meddataserver.clients.soton.ac.uk:8443/m...	NULL	NULL	NULL	0x00000000000017A9	NULL
4	14	3	NULL	UNCPath	\\meddataserver.clients.soton.ac.uk\meddata	NULL	NULL	NULL	0x00000000000017AA	NULL
5	15	3	NULL	LocalPath	M:\data	NULL	NULL	NULL	0x0000000000017AB	NULL
6	19	3	NULL	BasePathDepthInWatchFolder	1	NULL	NULL	NULL	0x00000000000017AC	NULL
7	20	3	NULL	LoggingVerbosity	3	NULL	NULL	NULL	0x00000000000017AD	NULL
8	30	3	NULL	DetailsPageRedirFileName	editmetadata.html	NULL	NULL	NULL	0x0000000000001799	0
9	36	3	NULL	FileNameToIgnore	thumbs.db	NULL	NULL	NULL	0x0000000000017AE	NULL
10	37	3	NULL	FolderNameToIgnore	.meddata	NULL	NULL	NULL	0x00000000000017AF	NULL
11	38	3	NULL	FileNameToIgnore	.DS_Store	NULL	NULL	NULL	0x00000000000017B0	NULL
12	39	3	NULL	FolderNameToIgnore	System Volume Information	NULL	NULL	NULL	0x00000000000017B1	NULL
13	40	3	NULL	FolderNameToIgnore	.previews	NULL	NULL	NULL	0x00000000000017B2	NULL

5. Grant read and write privileges to the database to the account that the File system monitor service and the SharePoint application pool runs under. In SSMS under the database locate Security > Users and right click on any user to create a New User...

3. Installing the File System Monitor by Building it Yourself

1. Download the updated HDC from GitHub (you will need all the services for a build)

2. Place them in "C:\Program Files\University of Southampton\Heterogeneous Data Centre"

3. Also make sure to create the folders ExperimentDataFilePlugins, ExperimentPlugins and MetadataSyncServicePlugins in there.

4. Finally create "config.xml" which should contain

```
1  <?xml version="1.0" encoding="utf-8"?>
2  <hdcconfiguration xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
3  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
4    <database databaseserver="MEDDATASERVER\SQLEXPRESS"
5  databasename="MEDDATADB" />
6    <filesystemmonitor configurationcontainerid="3" />
7    <sharepoint configurationcontainerid="2" />
8  </hdcconfiguration>
```

5. Open Visual Studio

6. Load HDCMetadataSyncService.sln

7. Try to build the solution – if there are any errors, make sure all the dependencies are installed (e.g. .NET 3.5 and .NET 4.0)

8. You can start the application to run the monitoring service from Visual Studio. Make sure that the service has connection to the database and test it works properly by adding a few datasets.

4. Installing the File System Monitor Without the Configuration Program

1. Find the HDCMetadataSyncService.exe program on the computer the file system monitor is going to be used.
2. Execute the following from a command prompt in Windows running with Administrator privileges:

```
1  CMD1> cd C:\Windows\Microsoft.NET\Framework\v4.0.30319
2  CMD2> InstallUtil.exe "C:\Program Files\University of
3         Southampton\Heterogeneous Data
4         Centre\HDCMetadataSyncService\HDCMetadataSyncService.exe"
```

Command 1 sets the working directory to the .NET Framework's folder and command 2 executes the install of the HDCMetadataSyncService.exe service found in the previous step. You will be prompted for the user name and password of the service account, which should have read and write permissions to the HDC share and to the HDCMetadata database.

10. Setting Up the Web-Frontend

1. Either download the website front-end from the dataset repository where you found this manual, or open Git Bash and go to C:\inetpub\wwwroot to clone Mata frontend there

```
1  cd C:
2  cd inetpub
3  git clone https://github.com/LWollatz/meddata.git
```
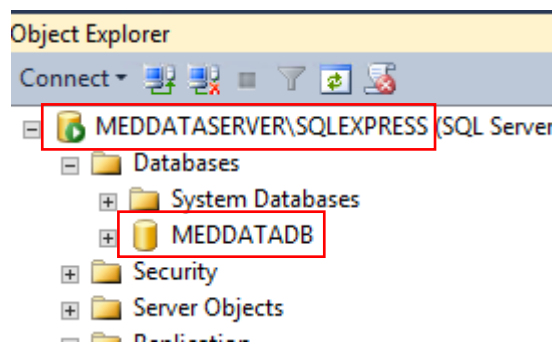
2. in IIS Manager expand MEDDATASERVER and right click Sites to Add Website
3. Fill in the details on the new Window:
    a. Site name: meddata
    b. Physical path: C:\inetpub\meddata (Pass-through authentication)
    c. Binding: leave as
        i. http, All Unassigned, Port 80, also add
        ii. https, All Unassigned, Port 443
    d. Host name: www.meddata.com or whatever the name of the server.
4. Right Click meddata website and select "Add Virtual Directory…"
5. In Add Virtual Directory:
    a. Alias: data
    b. Physical Path: M:\data
    c. Pass-through authentication
6. In MEDDATASERVER open Configuration Editor
    a. Find the section system.webServer/handlers
    b. In the Actions pane select Unlock Section
7. In meddata open PHP Manager
    a. If there are any complains, click "view recommendations", tick all and confirm
    b. If PHP is not enabled, click Register new PHP version

            i.   Select c:\Program Files\PHP\v7.1\php-cgi.exe

8. In meddata open Default Document
   a. Move index.php to the top
9. Under MEDDATASERVER > Application Pools
   a. Select the meddata application pool
   b. In the Actions pane select Advanced Settings…
   c. Under Process Model find the entry Identity
   d. Set it to Custom Account
      i. User name: website
10. Make sure to download Microsofts patch for sqlsrv and PHP 7
    a. Find out if your PHP installation is TS or NTS
       i. Open cmd
       ii. Execute `php -i|findstr "Thread"`
    b. Go to https://pecl.php.net/package/sqlsrv/5.0.0/windows
       i. choose the latest sqlsrv to match your version of PHP
       ii. choose the Non Thread Safe or Thread Safe version matching your PHP and OS
    c. Go to https://pecl.php.net/package/pdo_sqlsrv/5.1.0/windows
       i. choose the matching version of pdo_sqlsrv
    d. Make sure that the driver is in your PHP extension directory
       i. Go to C:\Program Files\PHP\v7.1\ext (similar path for other versions of PHP)
       ii. Copy both php_sqlsrv.dll and php_pdo_sqlsrv.dll there
    e. Enable the drivers within your PHP installation's php.ini
       i. Go to C:\Program Files\PHP\v7.1 (similar path for other versions of PHP)
       ii. Find php.ini
       iii. Under Dynamic Extensions add

```
1   extension=php_sqlsrv.dll
2   extension=php_pdo_sqlsrv.dll
```

11. Install the ODBC Driver required by the SQL Server DLL
    a. Go To http://go.microsoft.com/fwlink/?LinkId=163712
    b. Find the right version of ODBC Driver and follow that link (we use Microsoft ODBC Driver 13.1 for SQL Server)
    c. Run the downloaded microsoft installer file
    d. In the installer select Client Components to be installed
12. Edit the Authentication for the website in IIS
    a. In the Features View right click "Authentication" under "IIS" and select "Open Feature"
    b. For Windows Authentication set "Enabled" from the Action Pane
    c. Disable all other Authentication options
13. Edit _LayoutDatabase.php to suit your server and database name:
    a. $serverName = "serverName\instanceName";
    b. $connectionInfo = array("Database"=>"databaseName");

c. Confirm these with SQL Manager:

14. Restart the Server in IIS
15. Try accessing the website from a remote machine
16. If you get stuck with error messages, enable detailed errors by replacing the httpErrors section in web.config with <httpErrors errorMode="Detailed" />
17. Also can place ini_set("display_errors", "on"); on top of any php page to catch php errors
18. Tweak the database
    a. Need to add Administrator as user
    b. Need to add user groups

11. Setting Up the Tiler for MCTV

1. Download and install Erlang OTP 19.3 or later from www.erlang.org
    a. Just install the core Erlang (the Microsoft DLL's should already be present)
2. Download and install Rabbit MQ 3.6.9 or later from www.rabbitmq.com/
3. Download and install Python 2.7 from www.python.org (*note: Python 2.7 was required for Pillow. But since early 2017 Pillow supports Python 3 and therefore moving the code to Python 3 should be possible*)
    a. Install for all users
    b. Install under C:\Python27
    c. Select core features,
        i. having python.exe added to path can make life easier later if this will be the only version of Python running.
        ii. pip can be useful for installing packages
4. Download the MCTV tiler from GitHub
    a. Open Git Bash
    b. Go to C:\Program Files\University of Southampton
    c. Git clone https://github.com/LWollatz/MCTV-tiler.git
    d.
5. Download and install
    a. Celery Version 3.1.25 (newer versions don't support Windows but check if they do again since later version will support more options)
        i. Execute `python –m pip install Celery==3.1.25`
    b. Numpy
        i. Execute `python –m pip install numpy`
    c. PILlow
        i. Pillow and PIL cannot co-exist in the same environment. Before installing Pillow, please uninstall PIL

ii. Execute `python -m pip install Pillow`

6. Edit configuration
    a. Edit tilemakerwkr.sh and change the execution directory and celery directory as apropriate
    b. Open a command prompt and execute the two lines to test if everything works – this should also throw any errors in case of python packages not being installed…
7. Download the HDC Tiler Plug-In and place it into the plugin directory

12. Post Installation Manual

1. Starting the services manually
    1. Execute the tilemakerwkr.sh file under "C:\Program Files\University of Southampton\MCTV" to start the messaging queue
    2. Open the HDCMetadataSyncService sln file in Visual Studio and run it to start the HDC file-watcher
    3. Open IIS to make sure the server is started

2. Stopping all services after manual start
    1. Use Enter to stop HDC file watcher
    2. Use Ctrl+C to stop Celery queue

3. Adding a New User
    1. Open Active Directory Users and Computers
    2. Add a new User
    3. Add the new user to the MedData Users group
    4. Create a folder under M:/data with the users username
    5. Execute setdefpermissions.bat

13. Frequently Encountered Errors

1. The SQL database has no valid owner:

3
```
SELECT SUSER_SNAME(owner_sid) as owner_name, * FROM sys.database
```
Make sure to set them as sa or su or whatever it was

2. I can't connect to the server
Can you ping the IP?

If you have troubles with the DNS, remember `ipconfig /flushdns`

3. I am getting an Error when trying to open the webpage
If you get stuck with error messages, enable detailed errors by replacing the `httpErrors` section in web.config with `<httpErrors errorMode="Detailed" />`

You can place `ini_set("display_errors", "on");` on top of any php page to catch php errors

4. I am having troubles with PHP
You can place `ini_set("display_errors", "on");` on top of any php page to catch php errors.