AWLRS Infrastructure Guide v1.3

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Disclaimer

This guide provides instructions for building a basic "out of the box" environment to which the AWLRS application can be deployed. **It is intended only as a guide**; each individual customer site may have their own rules regarding the configuration of components such as IIS in which case the instructions given here may need to be adapted accordingly.

You must **ensure** that you have **adequate licensing** for all 3rd party software required such as **Windows Server** and **Oracle.** If you are unsure, please contact your Bentley Account Manager.

1 Database Server

The AWLRS application is dependent upon a fully patched exor core 4900 installation therefore it is assumed that an appropriate database server with an instance of exor core 4900 installed already exists before any attempt to deploy AWLRS is made.

2 Application Server

2.1 Base Server

The application server build should start with clean installation of Windows Server 2019.

The following additional assumptions are made:

- The server is fully patched via Windows Update.
- A single static IP address is used.
- Minimum specification for the application server is as follows:
  - 2 CPU Cores
  - 8 GB RAM
  - 1 logical disk (C:) with 50GB of space allocated

2.2 Staging Folder

The following software components will need to be downloaded to a staging folder on the application server, for example C:\Stage, from this point on this folder will be referred to as <stage>.

2.2.1 Oracle Client Software

Download the following Oracle client:

- Oracle 19c Client (19.3) for Microsoft Windows x64 (64-bit)
    - Important: At Oracle 19c, there is a choice of downloads. Install windows.x64_19300_client.zip

Download the appropriate patch set, in line with your corporate security and patching standards. AWLRS 1.3 was developed and validated against this patch set for the Oracle Client.

- OPatch p6880880_190000_MSWIN-x86-64 (Oracle recommends that you use the latest released OPatch version for 12.2, which is available for download from My Oracle Support patch 6880880)
- Microsoft Windows 64-bit Bundle Patch April 2021, Microsoft Windows x86-64 BP 19.11.0.0.210420 Patch 32409154, p32409154_190000_MSWIN-x86-64
- JDK8u291Patch 32490416

NB. Please note that a "My Oracle Support" account may be required to download this component.

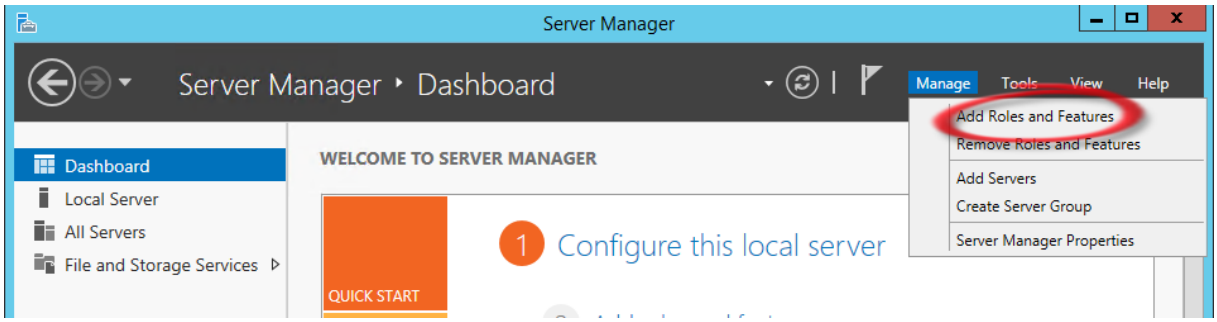
2.2.2 MapServer

Up to and including AWLRS build 1.3.18.1 the Bentley build of MapServer 7.0.7.33 can be used.

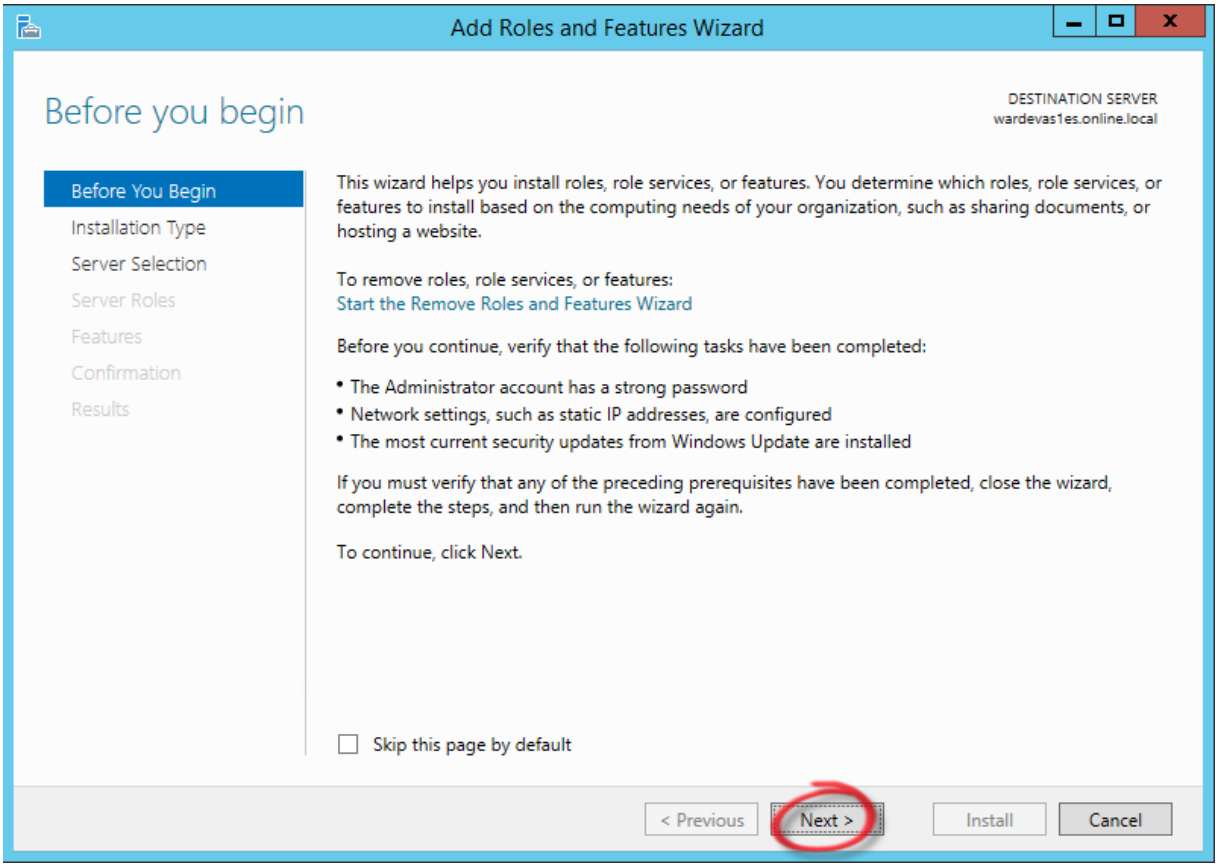
From AWLRS build 1.3.19.1 onwards the Bentley build of Mapserver included in the AWLRS release zip (assetwise_mapserver_7.6.4.0.zip) MUST be used.

2.2.3 Install IIS

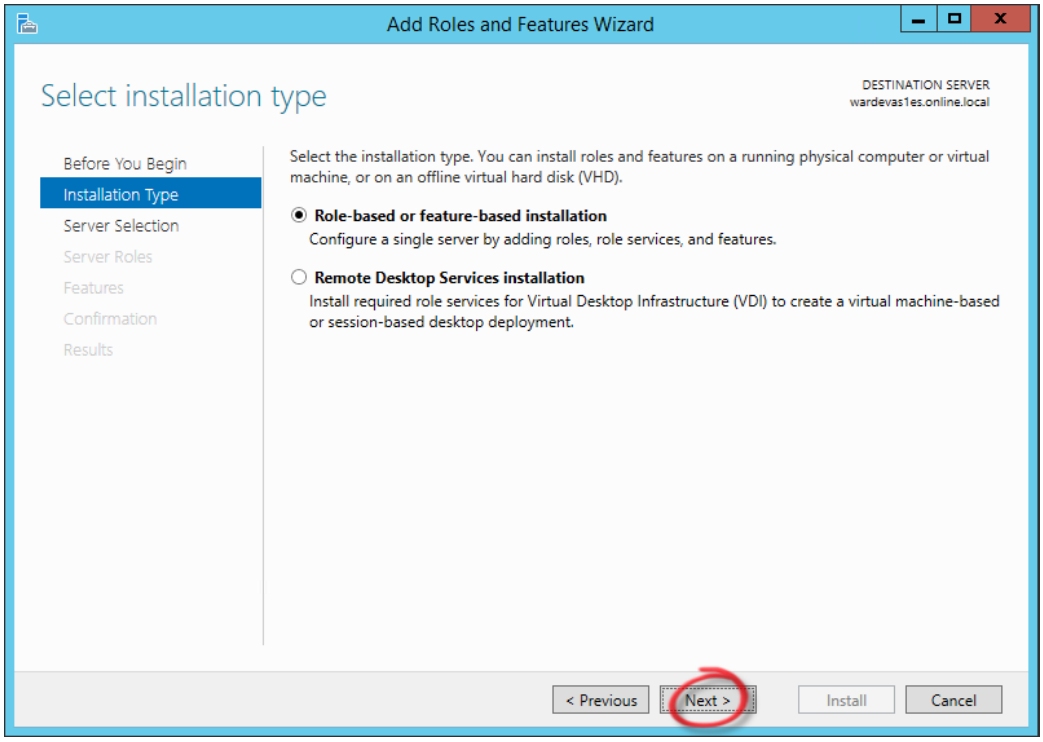
Open Server Manager and select “Add roles and features” from the “Manage” menu:



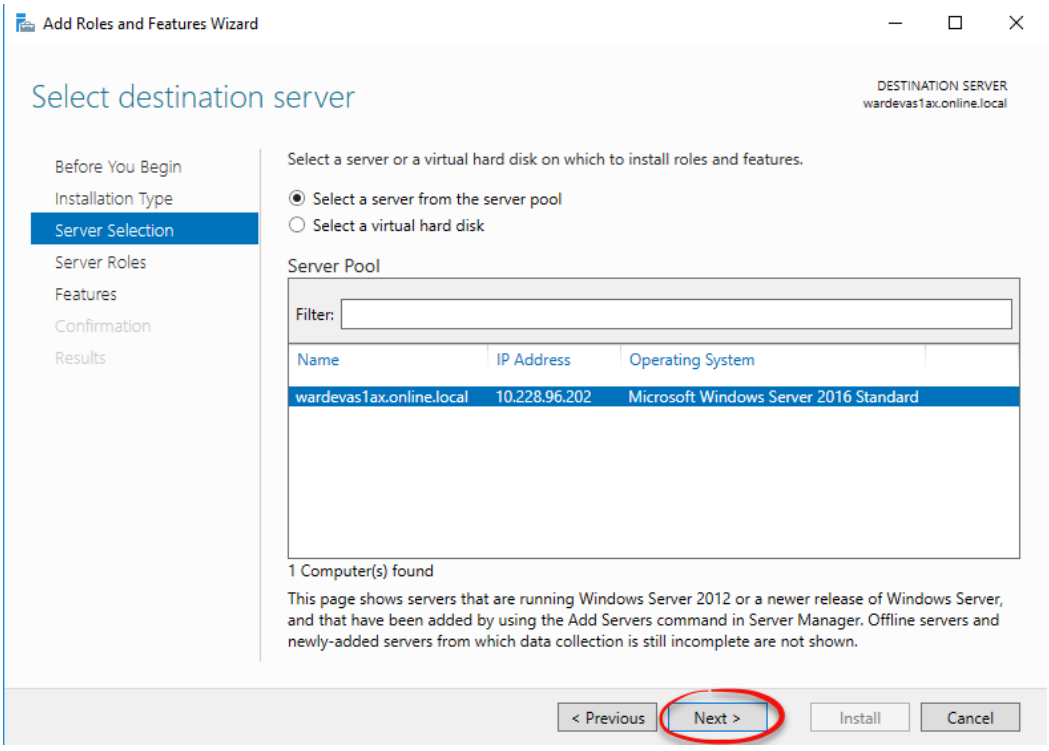
If the “Before You Begin” page is shown click on “Next”:



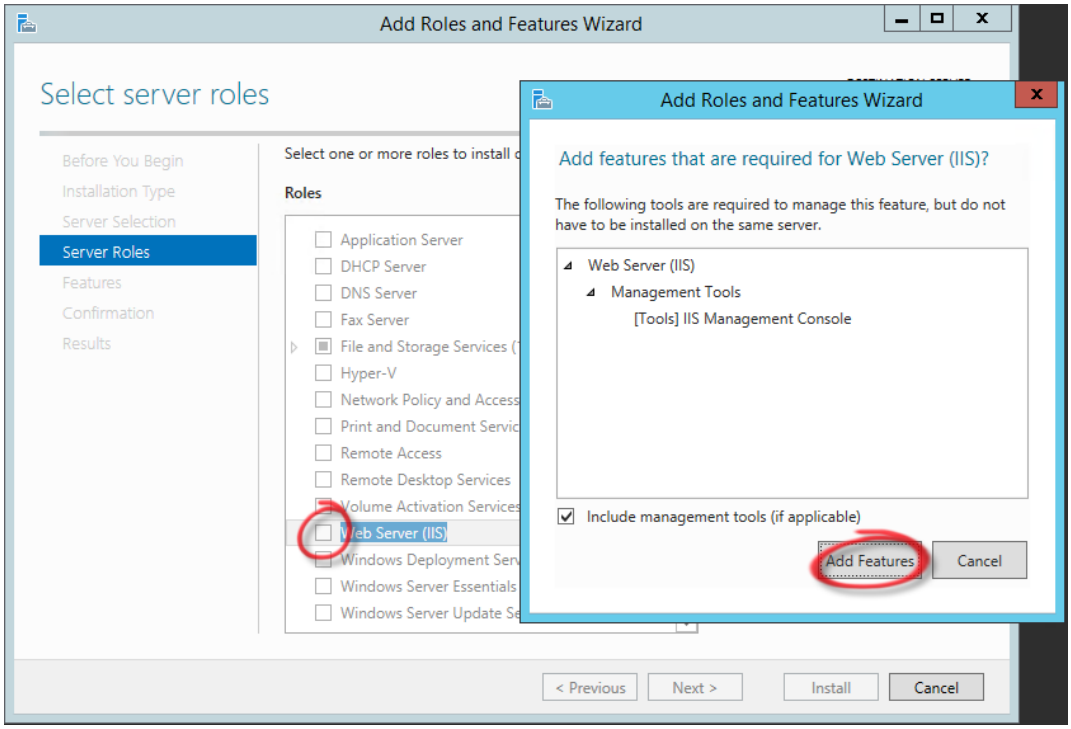
Make sure that “Role-based or feature-based installation” is selected and click on “Next”:



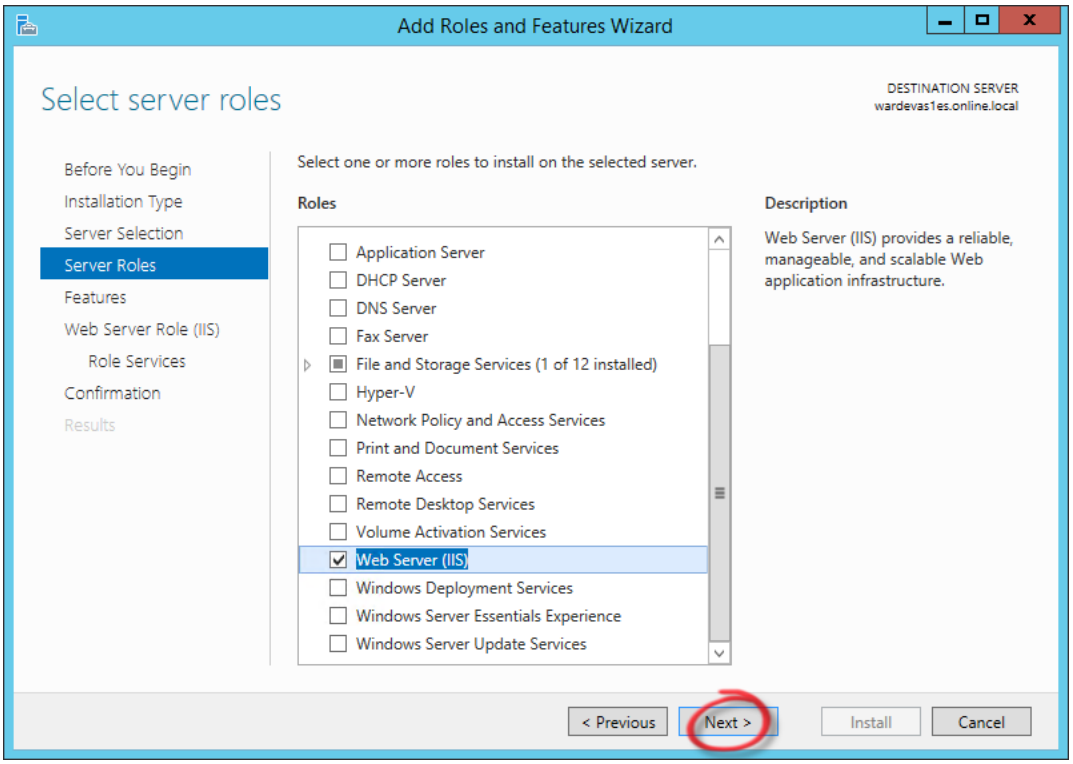
Accept the default “Select a server from the server pool” and the server being configured from the server pool and click on “Next”:



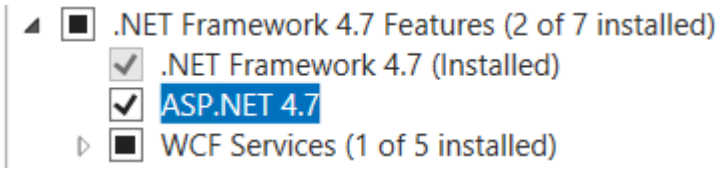
Scroll down the list of Server Roles and select “Web Server (IIS)”, click on “Add Features” in the window that pops up to confirm the addition of the IIS Management Console:



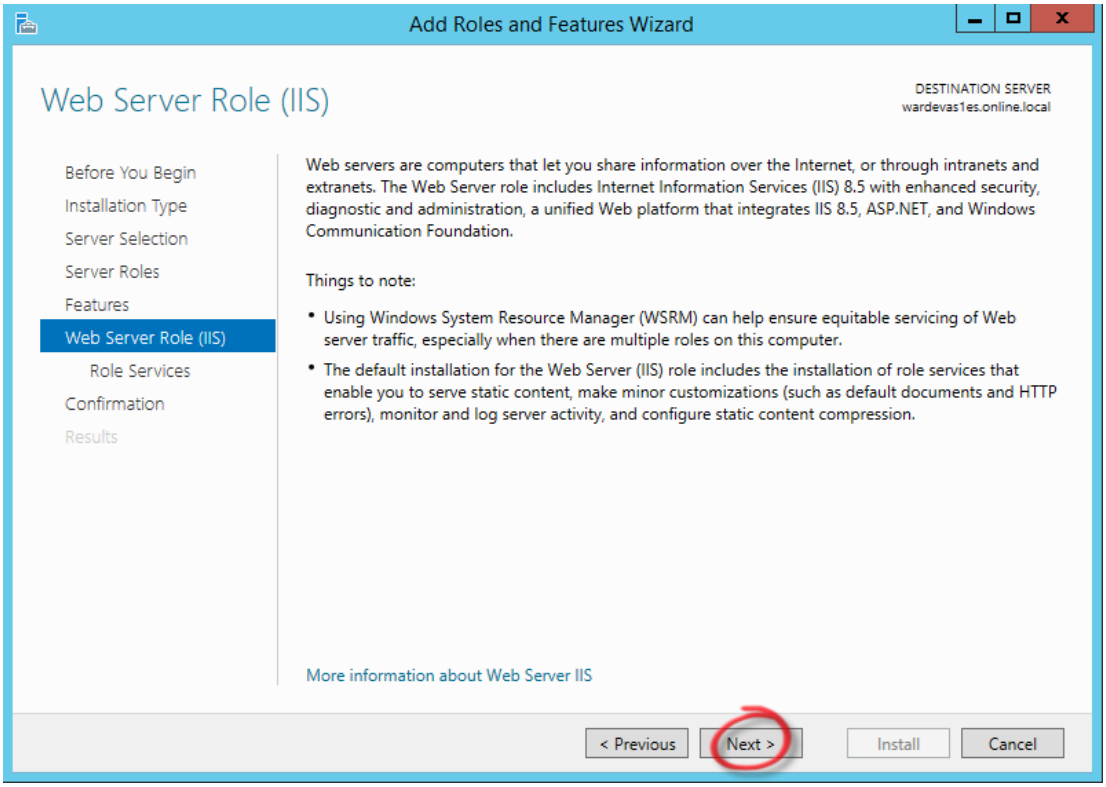
Click on “Next”:



Select “ASP.NET 4.7” from the list of Features and click on “Next”:



Click on “Next” to continue to “Role Services”:



Ensure that the following Role Services are selected in addition to the defaults (Click on “Add Features” if any popups are displayed as you select the Role Services from the list) then click on “Next”:

- HTTP Redirection
- Logging Tools
- Request Monitor
- Dynamic Content Compression
- Basic Authentication
- Client Certificate Mapping Authentication
- Digest Authentication
- IIS Client Certificate Mapping Authentication
- IP and Domain Restrictions
- URL Authorization
- Windows Authentication
- .Net Extensibility 4.7
- ASP
- ASP.NET 4.7
- CGI
- ISAPI Extensions
- ISAPI Filters
- Server Side Includes
- IIS Management Scripts and Tools

Check the list of Roles and Features to be installed then click on “Install”:

The installation will start, it may take a few minutes to complete:

Once the installation is complete click on “Close”

2.3 Install .NET 4.7.2

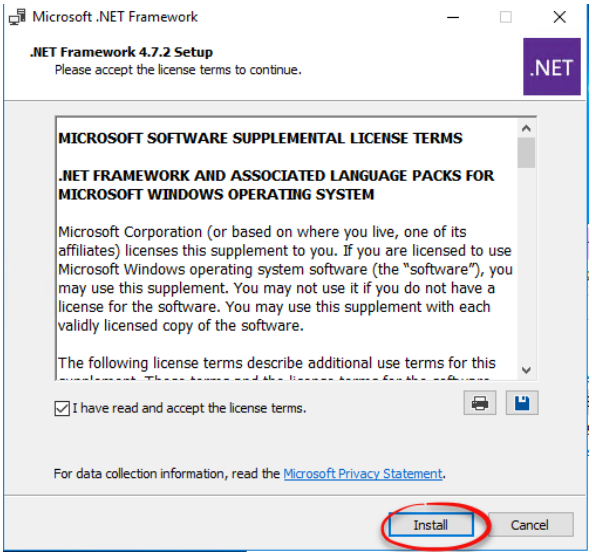
NOTE: This should already be present by default on the operating system. Please disregard this section if it is already installed.

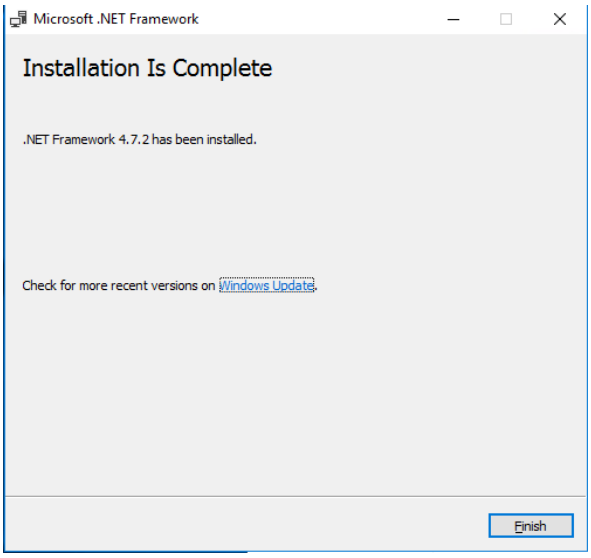
Using a browser on the **application server**, navigate to the following URL:

https://dotnet.microsoft.com/download/dotnet-framework/net472

Download the runtime version, once downloaded, depending on your browser, you may see a pop-up prompt asking for permission to run the file, if not the browse to the download location and double click on the file to execute it.

Select “Install”





Once complete restart the app server.

2.4 Install .NET Core

Download and install the .NET core hosting bundle from the Microsoft website.

https://dotnet.microsoft.com/download/dotnet-core/thank-you/runtime-aspnetcore-3.1.5-windows-hosting-bundle-installer

See recommended downloads for the latest version of .NET.

Build apps - SDK

This release contains multiple SDKs. If you're using Visual Studio, look for the SDK that supports the version you're using. If you're not using Visual Studio, install the first SDK listed.

SDK 3.1.301

Visual Studio support
Visual Studio 2019 (v16.6)

Included in
Visual Studio 16.6.2

Included runtimes
.NET Core Runtime 3.1.5
ASP.NET Core Runtime 3.1.5
Desktop Runtime 3.1.5

Run apps - Runtime

ASP.NET Core Runtime 3.1.5

The ASP.NET Core Runtime enables you to run existing web/server applications. **On Windows, we recommended installing the Hosting Bundle, which includes the .NET Core Runtime and IIS support.**

IIS runtime support (ASP.NET Core Module v2)
13.1.20142.5

OS	Installers	Binaries
Linux	Package manager instructions	ARM32 | ARM64 | ARM64 Alpine | x64 Alpine | x64
macOS		x64
Windows	x64 | x86 | Hosting Bundle	ARM32 | x64 | x86

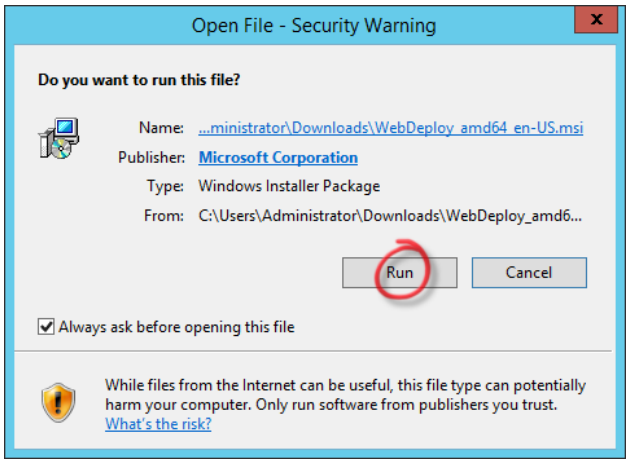
2.5 Install Web Deploy

Using a browser on the **application server**, navigate to the following URL:

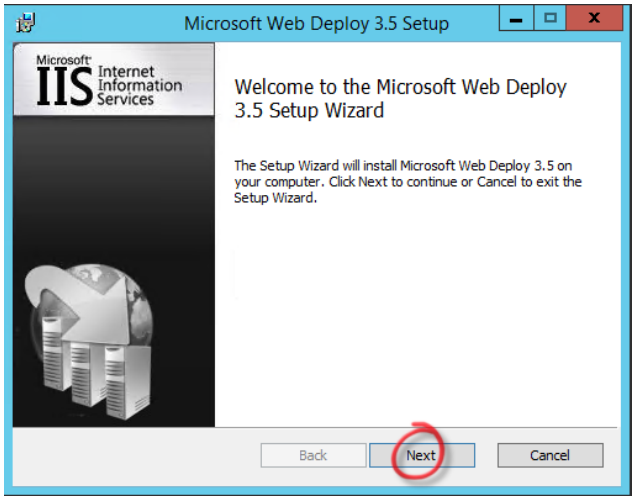
https://www.microsoft.com/en-gb/download/confirmation.aspx?id=39277

This will initiate the download of the file “WebDeploy_amd64_en-US.msi”
Once downloaded, depending on your browser, you may see a pop-up prompt asking for permission to run the file, if not the browse to the download location and double click on the file to execute it.

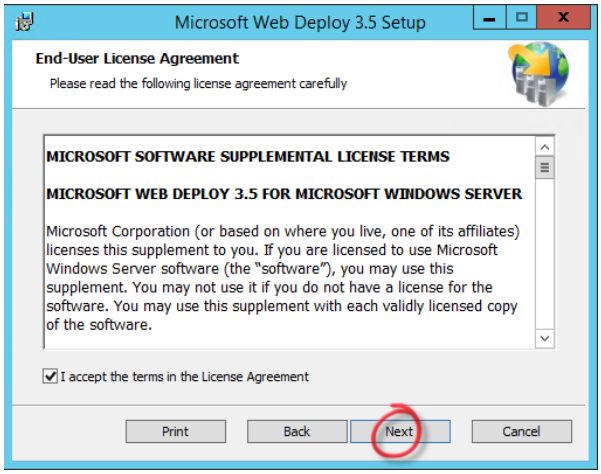
Select “Run” when prompted:



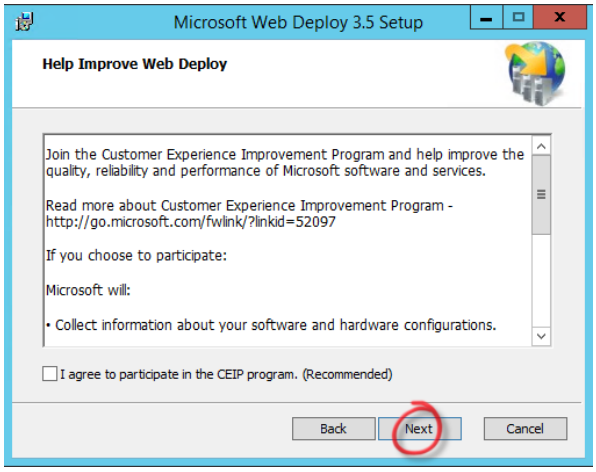
When the Setup window is displayed click on “Next”:



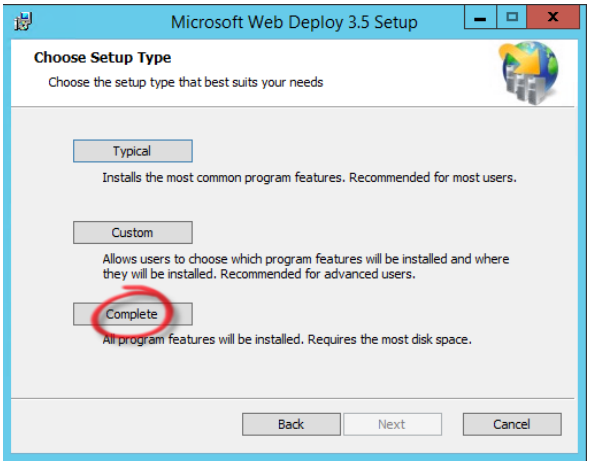
Tick the box to accept the terms of the license agreement and click on “Next”:



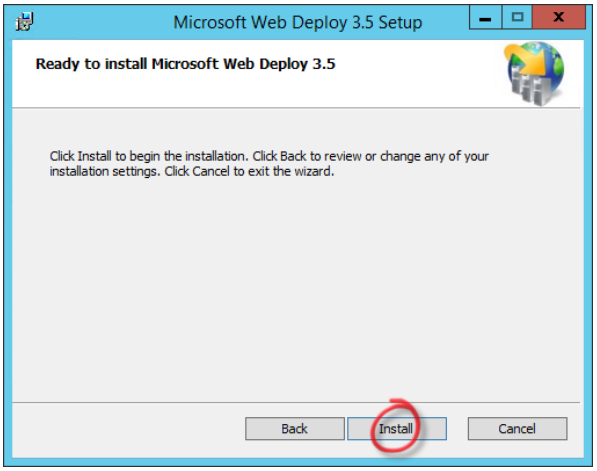
Tick the box if you wish to participate in the CEIP program and click on "Next":



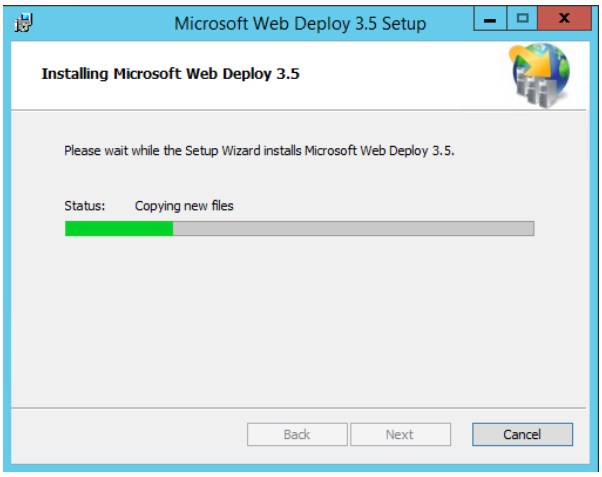
Click on "Complete" to perform a full install:



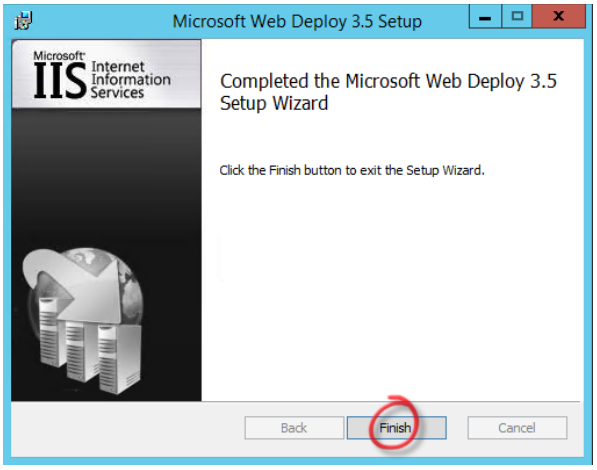
Click on “Install”:



The installation will begin:



Click on “Finish” to complete the installation:

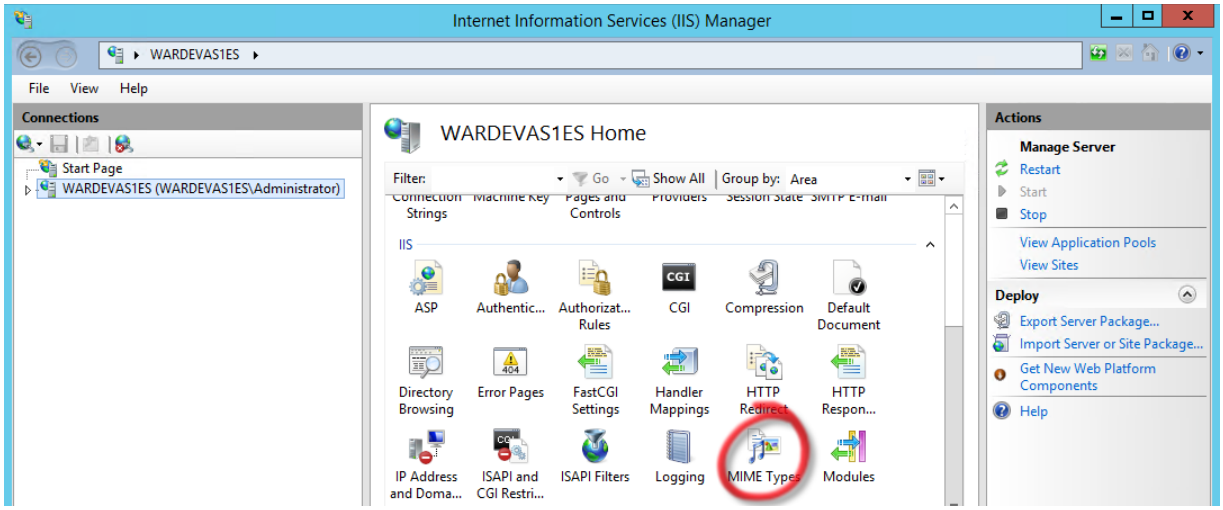


The Web Deploy installation is now complete.

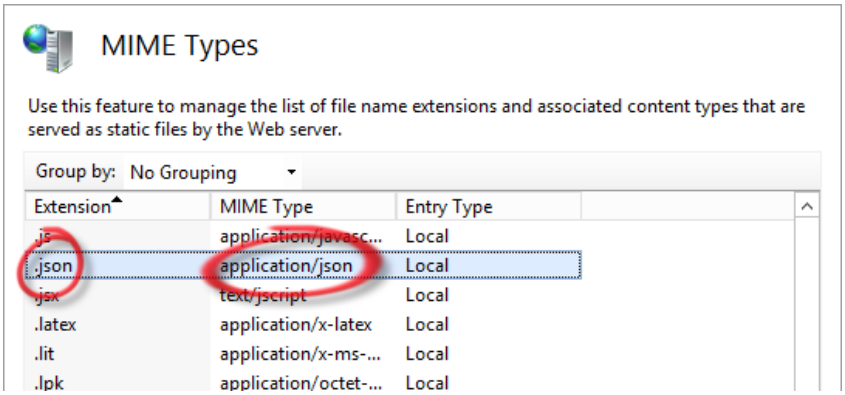
2.6 Configure MIME Type

The AWLRS Web Api returns some content to the AWLRS Application as json files so a MIME Type for the ".json" extension is required.

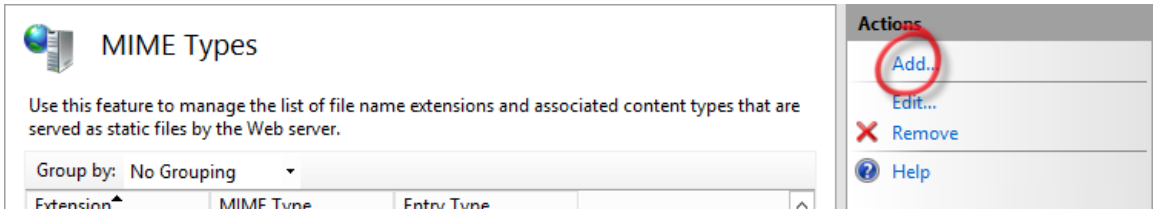
On the **application server** run the Internet Information Services (IIS) Manager application, select the server in the left-hand side and double click the "MIME Types" icon in the central panel:



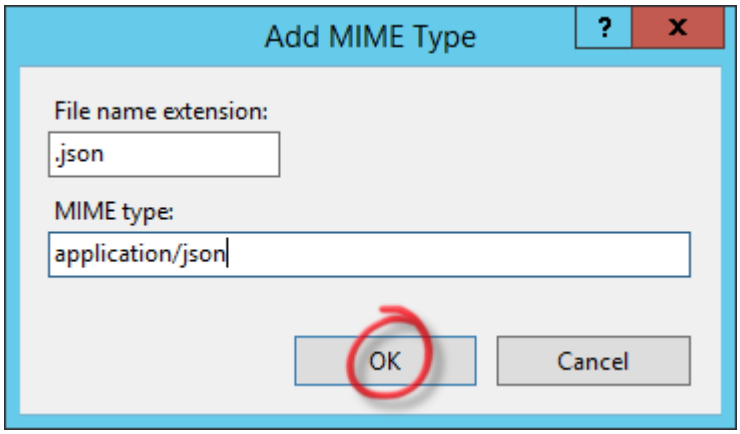
Check that the list of MIME Types has an entry for the extension ".json" as shown below:



If there is no entry then click "Add" in the "Actions" panel on the right-hand side:



Enter the following values and click on "OK":
File name extension: .json
MIME type: application/json

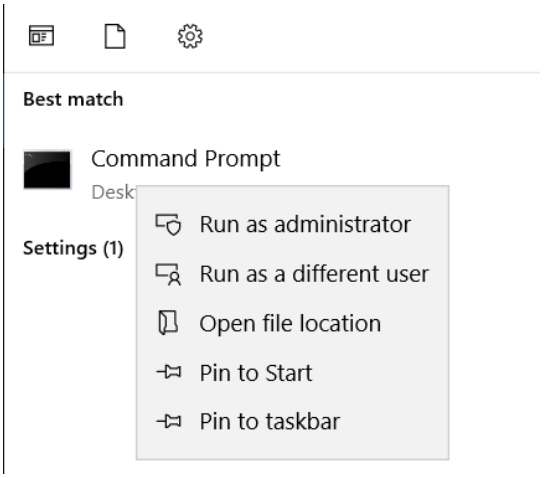


Exit IIS Manager.

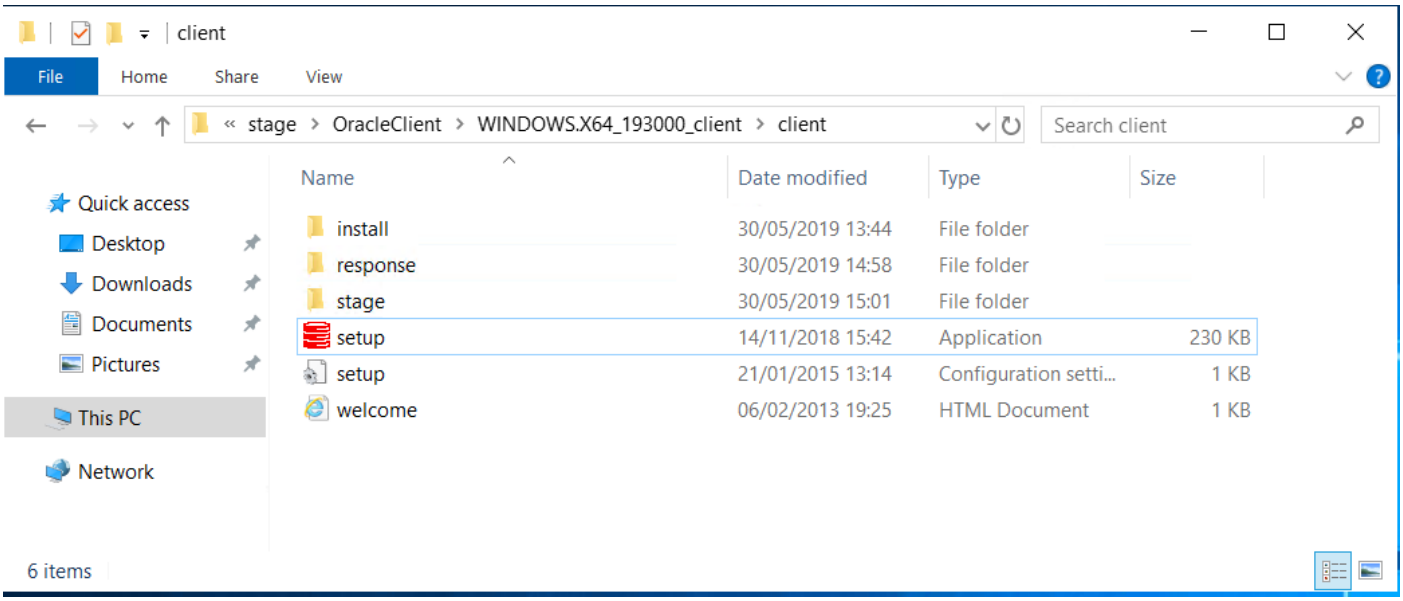
2.7 Install the Oracle Client

On the **application server** go to the <stage> folder created in section 2.2 and unzip the downloaded Oracle 19c Client for Windows x64 to a folder called OracleClient. Oracle recommend to unzip with 7-zip, rather than the native windows unzip.

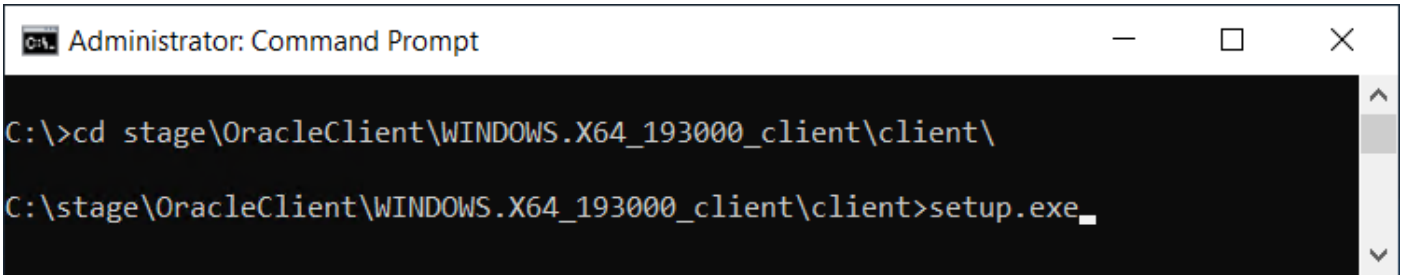
Before installing all the Oracle software in this guide, you should be logged in as a local user, and must always open a command prompt with administrator permissions.



You should now have a folder structure that looks something like this:

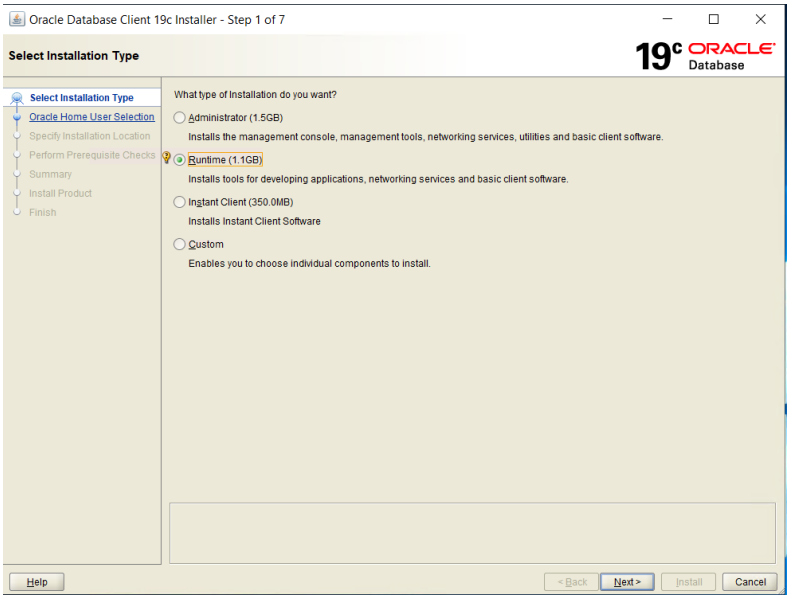


In the command window, navigate to the Oracle client setup directory, and run setup.exe

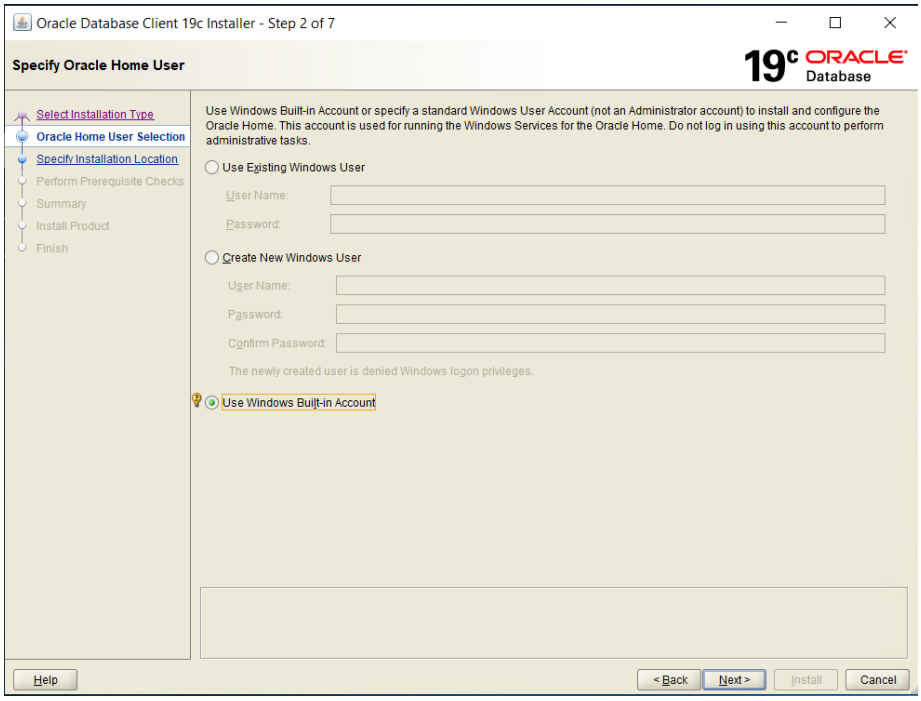


Run <stage>\OracleClient\client\setup.exe as administrator, a command prompt will be briefly displayed followed by the Oracle Client Installer.

(Below) Select “Runtime” from the list of installation types and click on “Next”:

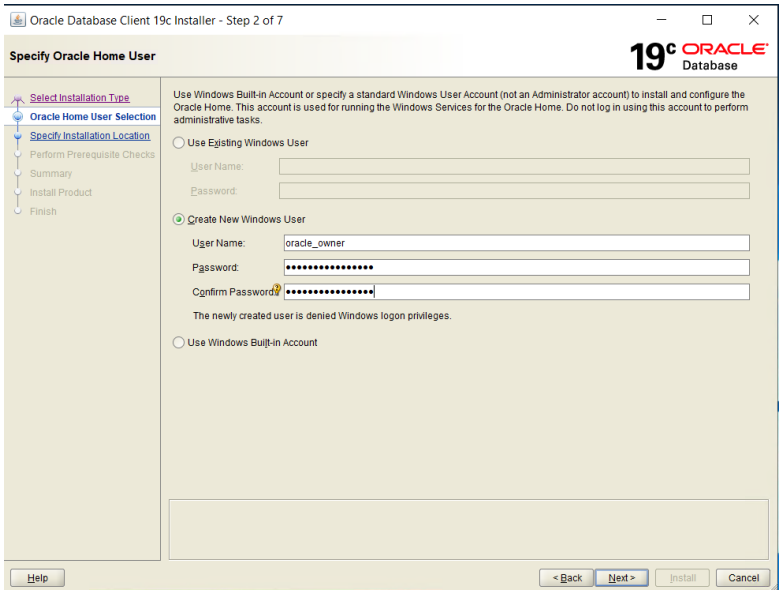


In the next section you have different options. The Oracle recommended approach is to install as a new windows user. Your corporate security and build requirements may be different.

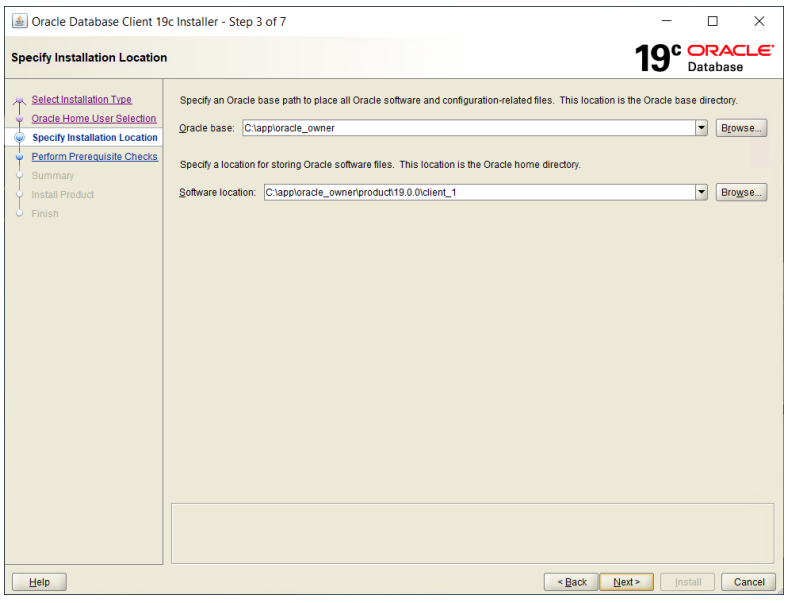


- For Bentley internal or development purposes you can stick to the default of "Use Windows Built-in Account".
- If you are unable to create a Windows user, the most likely reason is setup.exe is not being with Administrator Privileges – it would be best to start the install again.

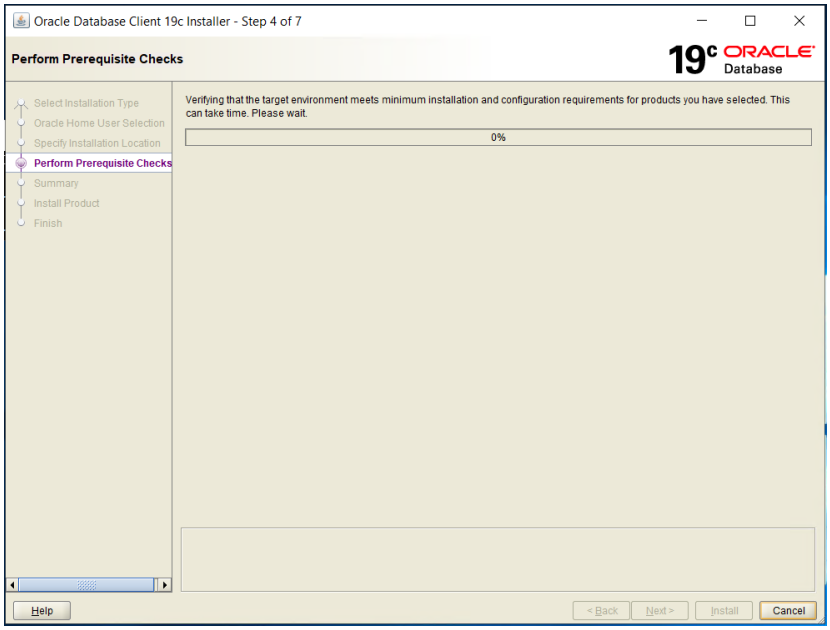
In this example below, the windows user will be called "oracle_owner"
Regardless of whether you chose a built-in account, or to Create a New Windows user, Click Next .



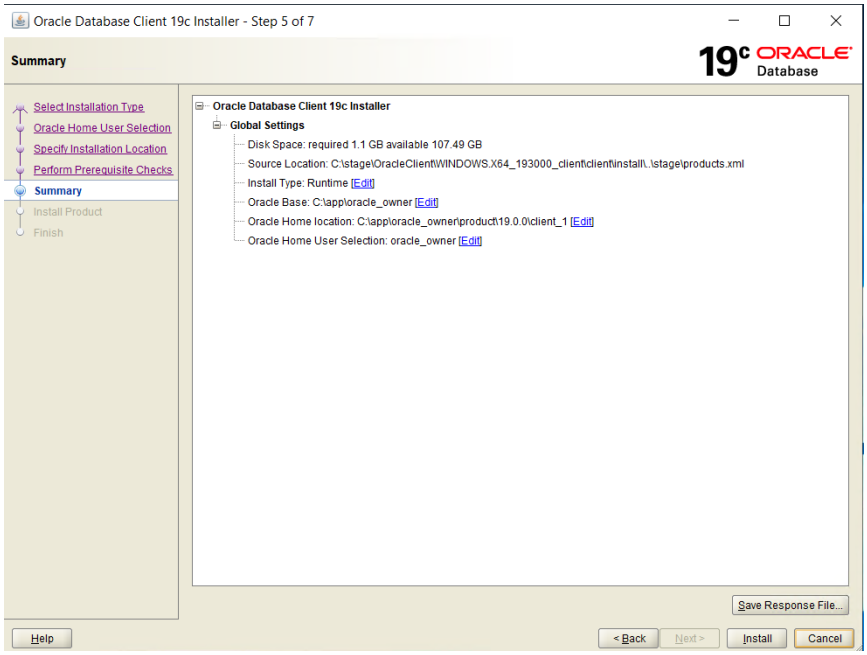
(Below) Optionally amend the locations of the install and click next:

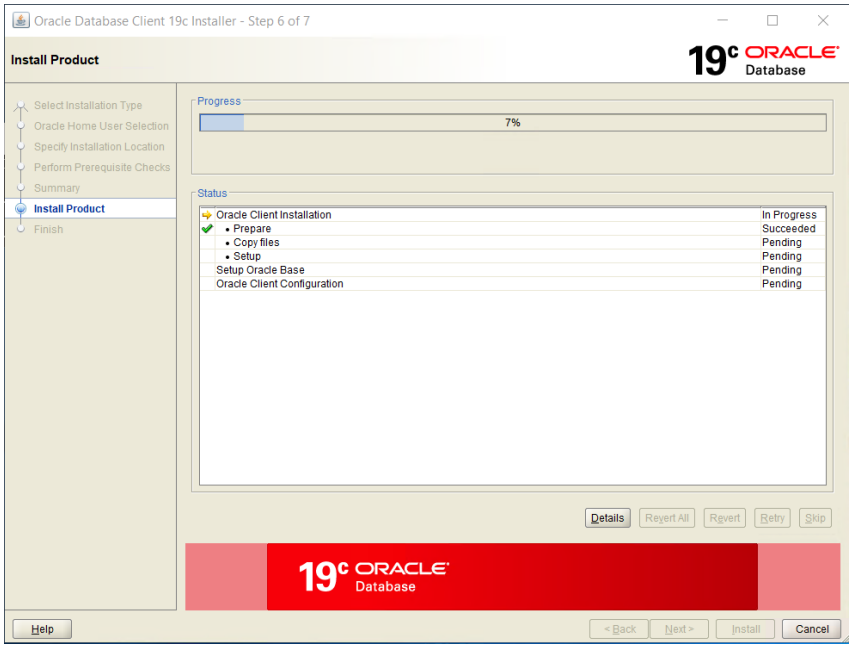


Click Next, Install will verify Pre-requisite checks

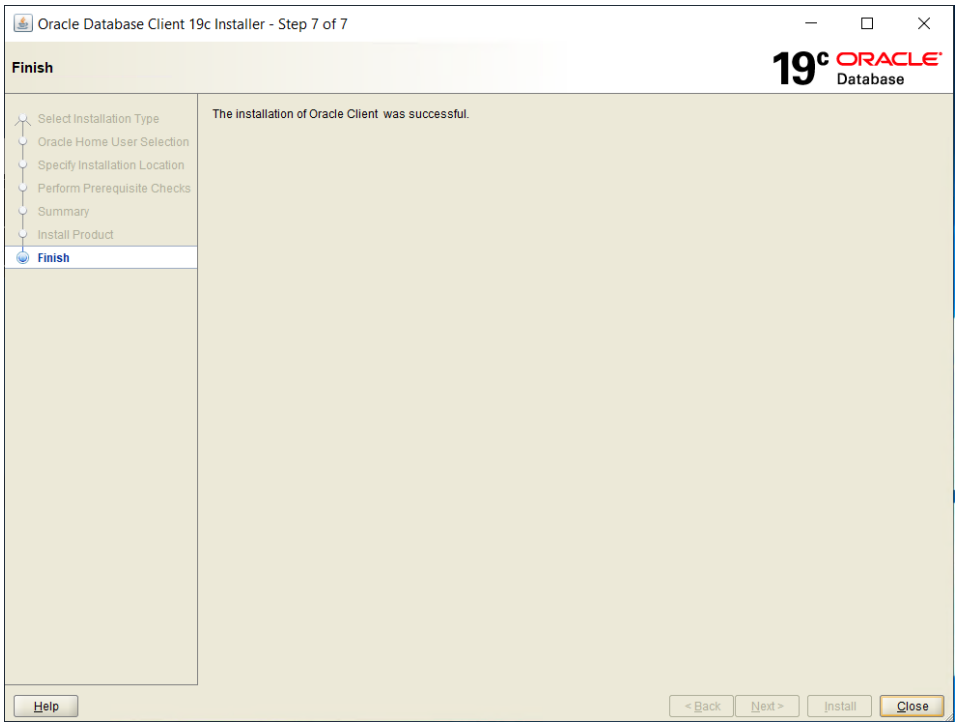


Click install when it has completed pre-requisite checks ok





(Above, installation will continue).



At this point the Oracle 19c client is installed, patching is now required.

2.8 Patch Oracle Client

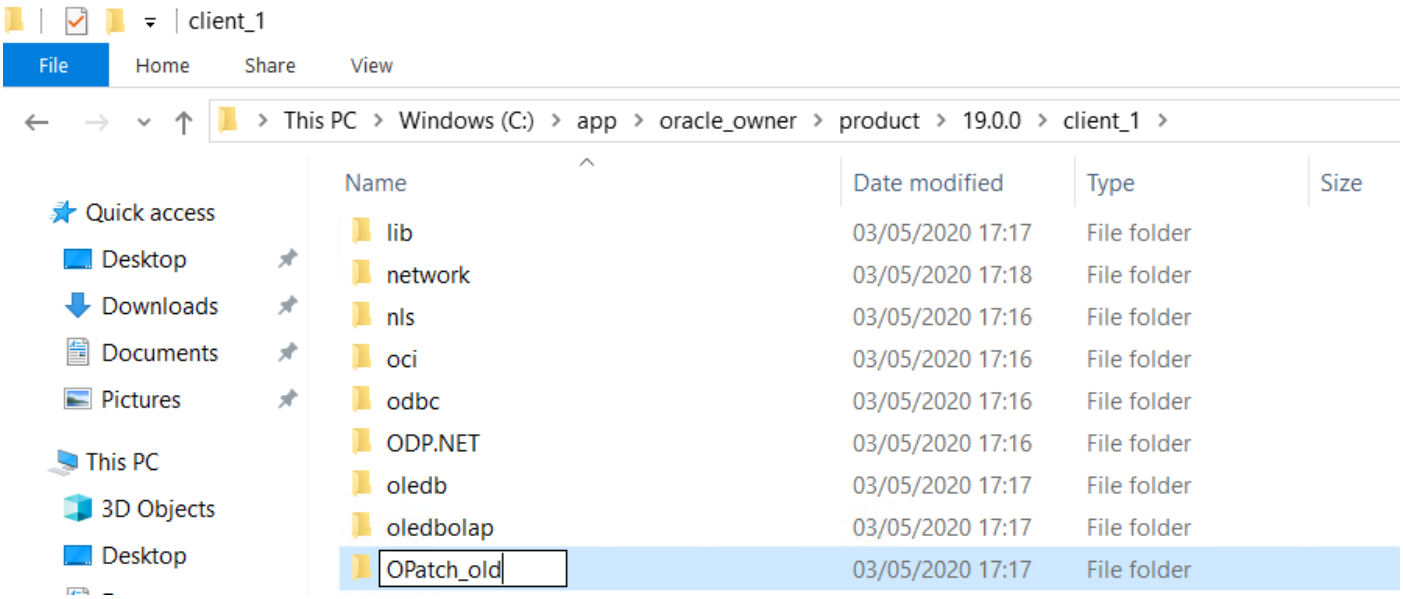
This section contains two tasks

- Extract the latest copy of Opatch, and put it in the Client Oracle_Home
  (Opatch is Oracle's Patching Utility.)
- Install the patchset

2.8.1 Update OPatch

Navigate to the Oracle client install directory and rename the existing Opatch directory as Opatch_old
(Which in this example is C:\app\oracle_owner\product\19.0.0\client_1\OPatch)
e.g.

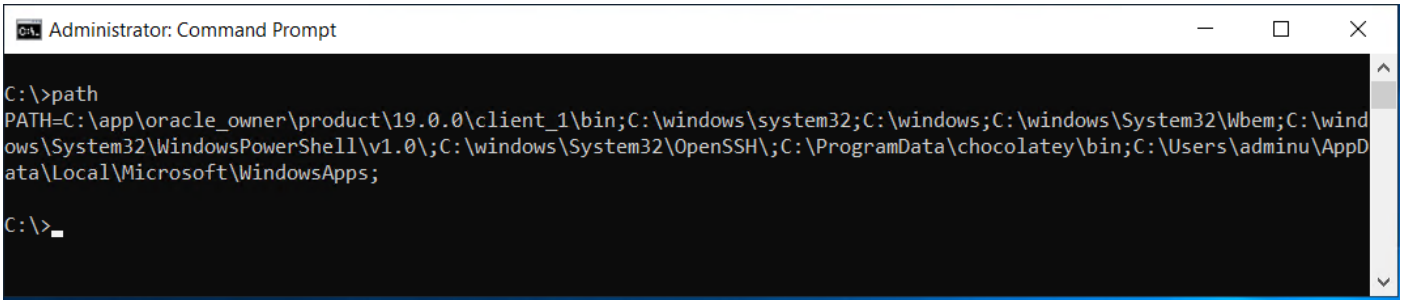
Extract opatch download into a Staging area and copy the Opatch folder from it, and then paste it into your client installation



2.8.2 Install the Windows patch set

This is not intended to replace the README.html contained in this Oracle patch, which are maintained and published by Oracle. You are recommended to carefully read the README before patching.

Open a **new** command prompt as administrator, this is to make sure your PATH has been updated with the new ORACLE_HOME for the client and run the PATH command. You should now see an Oracle client on the front of the path. If you don't see an oracle client on it, you need to close the window, and open a new one.



Set the following variables – please note the following example is for a client installed in C:\app\oracle_owner\product\19.0.0\client_1

SET ORACLE_HOME=C:\app\oracle_owner\product\19.0.0\client_1
PATH=%ORACLE_HOME%\OPatch;%PATH%
PATH=%ORACLE_HOME%\perl\bin;%PATH%
Set PERL5LIB= <Press Enter>
This last command is to remove PERL5LIB from the path.

This adds opatch and perl into the path, we can verify that's ok as follows using these two commands

Perl -v

Opatch lsinventory

```
C:\stage\p32409154_190000_MSWIN-x86-64\32409154>SET ORACLE_HOME=C:\app\oracle_owner\product\19.0.0\client_1

C:\stage\p32409154_190000_MSWIN-x86-64\32409154>PATH=%ORACLE_HOME%\OPatch;%PATH%

C:\stage\p32409154_190000_MSWIN-x86-64\32409154>PATH=%ORACLE_HOME%\perl\bin;%PATH%

C:\stage\p32409154_190000_MSWIN-x86-64\32409154>Set PERL5LIB=

C:\stage\p32409154_190000_MSWIN-x86-64\32409154>perl -v

This is perl 5, version 28, subversion 1 (v5.28.1) built for MSWin32-x64-multi-thread
(with 1 registered patch, see perl -V for more detail)

Copyright 1987-2018, Larry Wall

Perl may be copied only under the terms of either the Artistic License or the
GNU General Public License, which may be found in the Perl 5 source kit.

Complete documentation for Perl, including FAQ lists, should be found on
this system using "man perl" or "perldoc perl".  If you have access to the
Internet, point your browser at http://www.perl.org/, the Perl Home Page.
```

This should show some output from Perl.

```
C:\stage\p32409154_190000_MSWIN-x86-64\32409154>opatch lsinventory
Oracle Interim Patch Installer version 12.2.0.1.24
Copyright (c) 2021, Oracle Corporation.  All rights reserved.


Oracle Home       : C:\app\oracle_owner\product\19.0.0\client_1
Central Inventory : C:\Program Files\Oracle\Inventory
   from           :
OPatch version    : 12.2.0.1.24
OUI version       : 12.2.0.7.0
Log file location : C:\app\oracle_owner\product\19.0.0\client_1\cfgtoollogs\opatch\opatch2021-06-03_11-24-31AM_1.log

Lsinventory Output file location : C:\app\oracle_owner\product\19.0.0\client_1\cfgtoollogs\opatch\lsinv\lsinventory2021-06-
03_11-24-31AM.txt
--------------------------------------------------------------------------------
Local Machine Information::
Hostname: dtlexdapp06.bentley.com
ARU platform id: 233
ARU platform description:: Microsoft Windows (64-bit AMD)


Installed Top-level Products (1):

Oracle Client 19c                                                    19.0.0.0.0
There are 1 products installed in this Oracle Home.


There are no Interim patches installed in this Oracle Home.


--------------------------------------------------------------------------------

OPatch succeeded.

C:\stage\p32409154_190000_MSWIN-x86-64\32409154>
```

The last line should say “OPatch Succeeded”

Stop the service for the Distributed Transaction Coordinator service (which is not an Oracle service) if it is running. It may not be running, so ignore the error (as below) if it isn’t running.

net stop msdtc

```
C:\WINDOWS\system32>net stop msdtc
The Distributed Transaction Coordinator service is not started.

More help is available by typing NET HELPMSG 3521.


C:\WINDOWS\system32>
```

Here is an example of it running

```
E:\app\client\oracle\product\12.2.0\client_1\odp.net\bin\4>net stop msdtc
The Distributed Transaction Coordinator service is stopping.
The Distributed Transaction Coordinator service was stopped successfully.

E:\app\client\oracle\product\12.2.0\client_1\odp.net\bin\4>
```

Navigate to the staging area, and unzip the patch **p32409154_190000_MSWIN-x86-64**,

Using the command prompt we have open navigate into the folder and type opatch apply answering **Y** to the questions.

```
Do you want to proceed? [y|n]
y
User Responded with: Y
All checks passed.

Please shutdown Oracle instances running out of this ORACLE_HOME on the local system.
(Oracle Home = 'C:\app\oracle_owner\product\19.0.0\client_1')


Is the local system ready for patching? [y|n]
y
User Responded with: Y
Backing up files...
```

Below is a snapshot of the output produced

```
Patching component oracle.ldap.owm, 19.0.0.0.0...

Patching component oracle.rdbms.rsf, 19.0.0.0.0...

Patching component oracle.network.rsf, 19.0.0.0.0...

Patching component oracle.has.rsf, 19.0.0.0.0...

Patching component oracle.odbc.ic, 19.0.0.0.0...

Patching component oracle.sqlplus, 19.0.0.0.0...

Patching component oracle.has.common.cvu, 19.0.0.0.0...
Patch 32409154 successfully applied.
Log file location: C:\app\oracle_owner\product\19.0.0\client_1\cfgtoollogs\opatch\opatch2021-06-03_11-34-53AM_1.log

OPatch succeeded.

C:\stage\p32409154_190000_MSWIN-x86-64\32409154>
```

2.8.2.1 Install Client JDK patch

Navigate to the patch folder

```
C:\stage\p32490416_190000_MSWIN-x86-64>cd 32490416

C:\stage\p32490416_190000_MSWIN-x86-64\32490416>opatch apply
```

```
Do you want to proceed? [y|n]
y
User Responded with: Y
All checks passed.

Please shutdown Oracle instances running out of this ORACLE_HOME on the local system.
(Oracle Home = 'C:\app\oracle_owner\product\19.0.0\client_1')


Is the local system ready for patching? [y|n]
y
User Responded with: Y
Backing up files...
Applying interim patch '32490416' to OH 'C:\app\oracle_owner\product\19.0.0\client_1'

Patching component oracle.jdk, 1.8.0.201.0...
Patch 32490416 successfully applied.
Log file location: C:\app\oracle_owner\product\19.0.0\client_1\cfgtoollogs\opatch\opatch2021-06-03_11-46-23AM_1.log

OPatch succeeded.

C:\stage\p32490416_190000_MSWIN-x86-64\32490416>
```

Command should finish with “Opatch Succeeded”, If you stopped the MTSDC, restart it.

net start msdtc

```
C:\stage\29394003>net start msdtc
The Distributed Transaction Coordinator service is starting.
The Distributed Transaction Coordinator service was started successfully.


C:\stage\29394003>
```

To ensure this was successfully run then type

Opatch lspatches

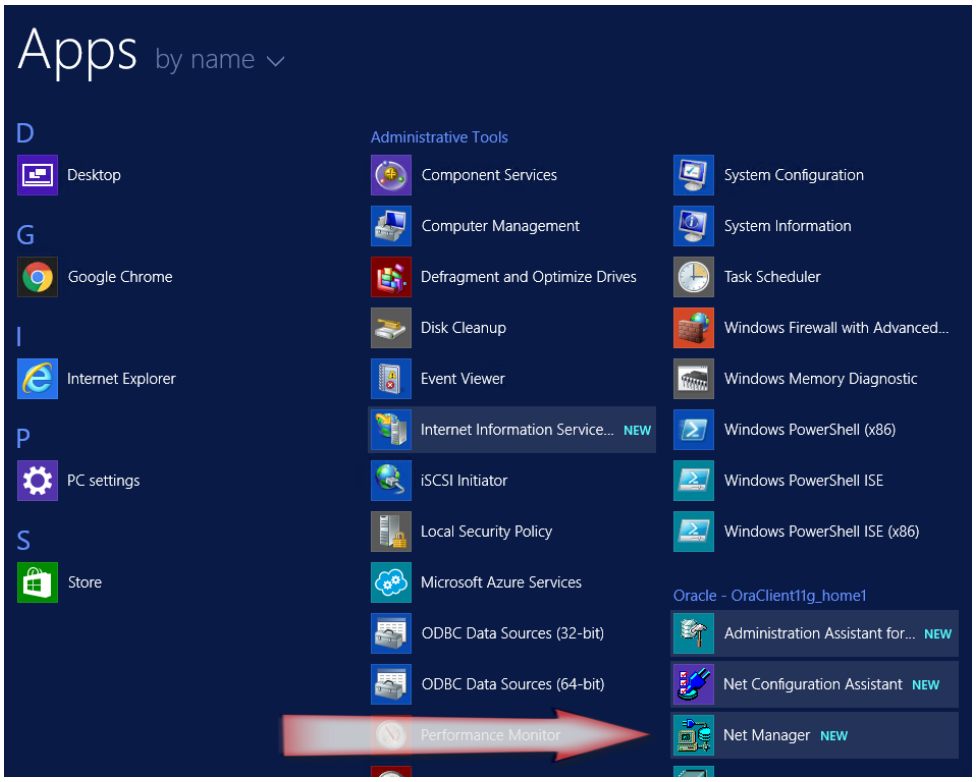
This should show the patch – see below “Patch Description” line.

```
C:\stage\p32490416_190000_MSWIN-x86-64\32490416>opatch lspatches
32490416;JDK BUNDLE PATCH 19.0.0.0.210420
32409154;Windows Database Bundle Patch : 19.11.0.0.210420 (32409154)
```

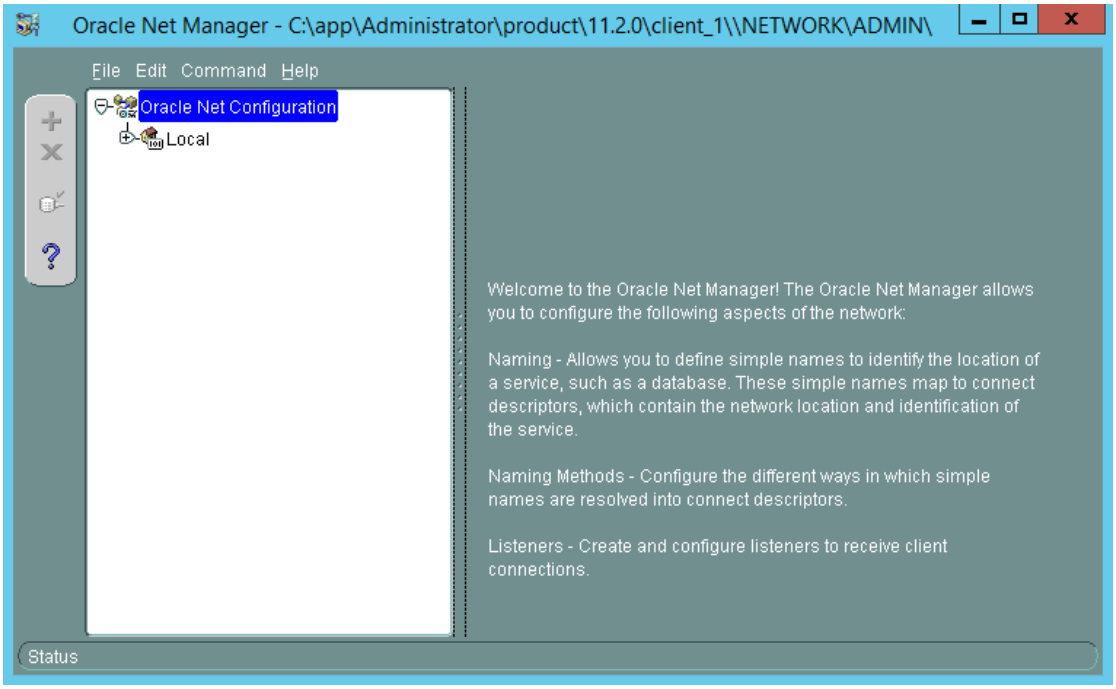
You can now delete the files you copied in your staging area.

2.9 Configure the database connection

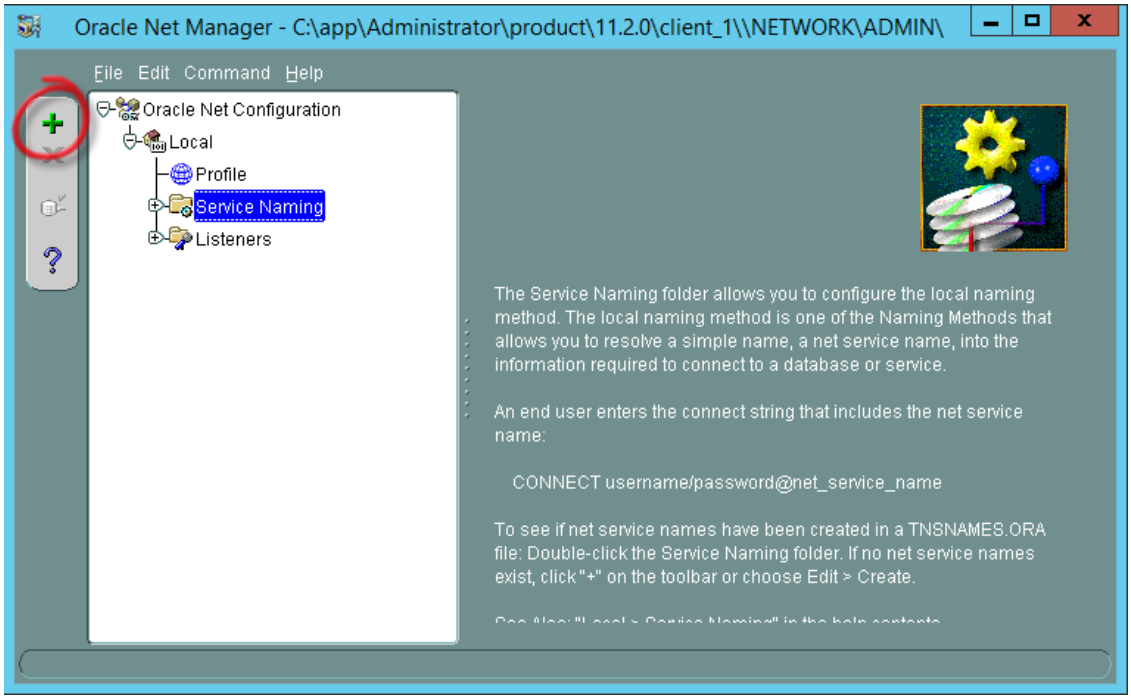
To configure a database connection run the Oracle Net Manager application:



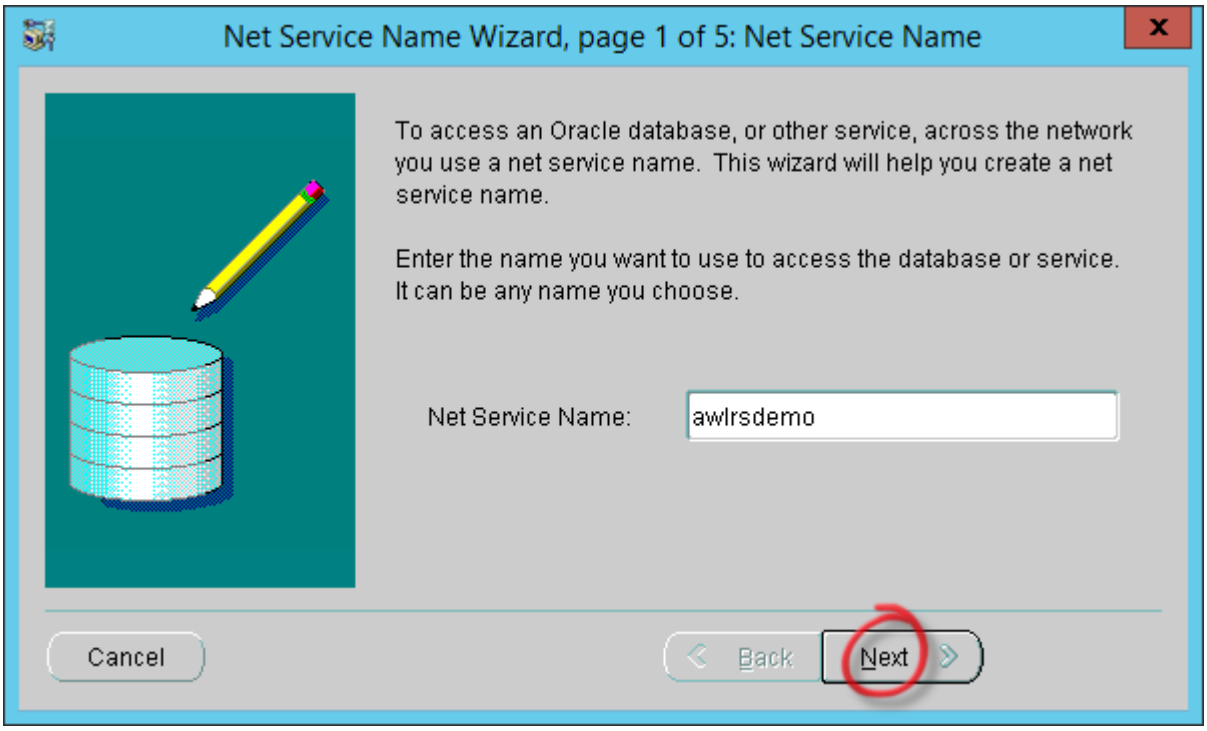
The application will run on the desktop:



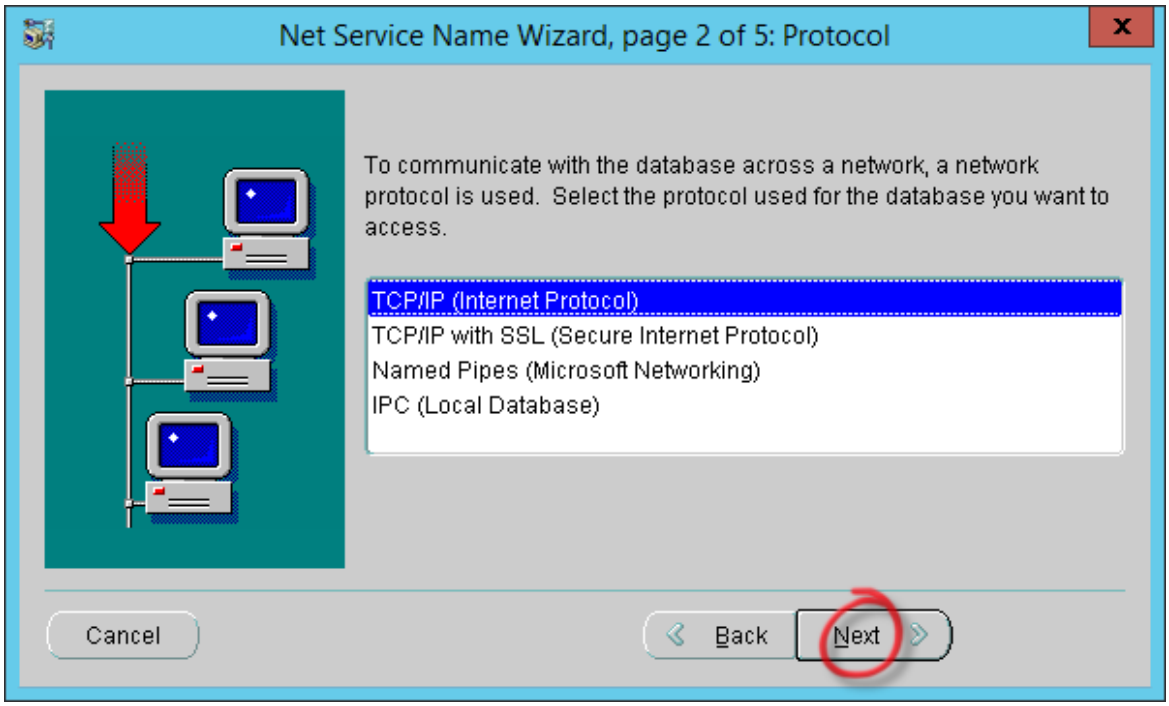
Under “Oracle Net Configuration”, expand “Local”, select “Service Naming” then click on the plus [+] icon.



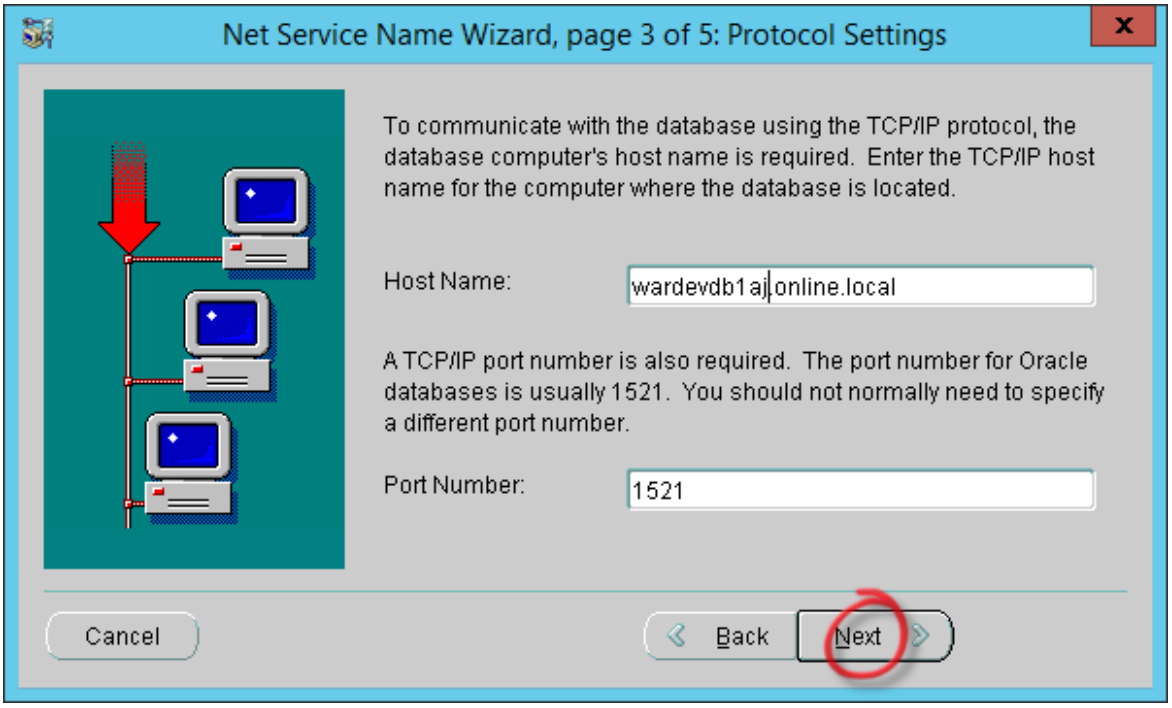
The Net Service Name Wizard will be displayed, enter the name of the database in which AWLRS will be installed and click on “Next”:



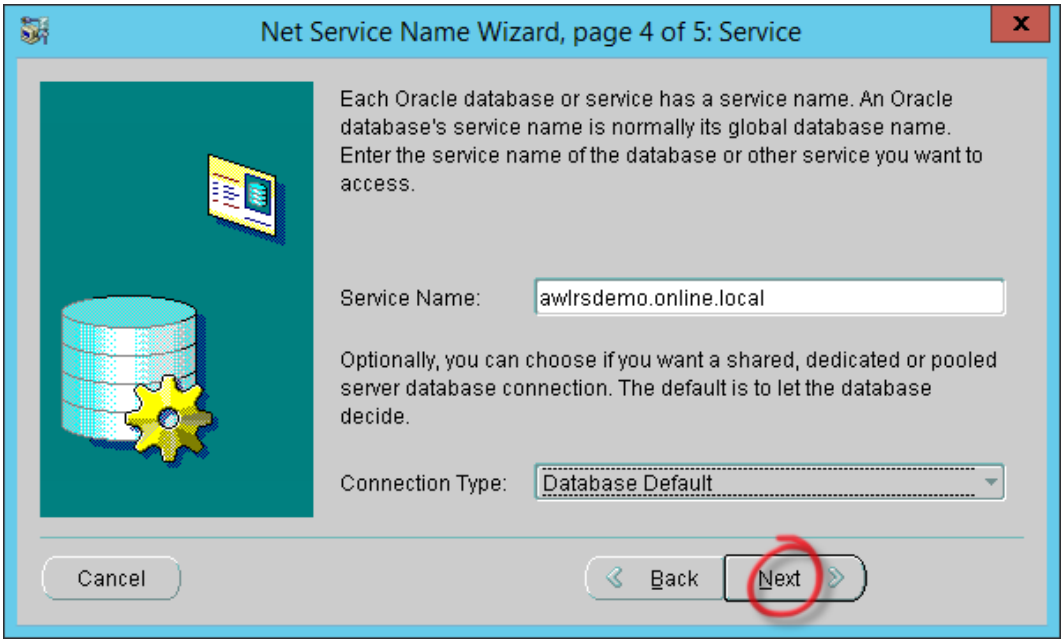
Ensure that “TCP/IP (Internet Protocol)” is selected and click on “Next”:



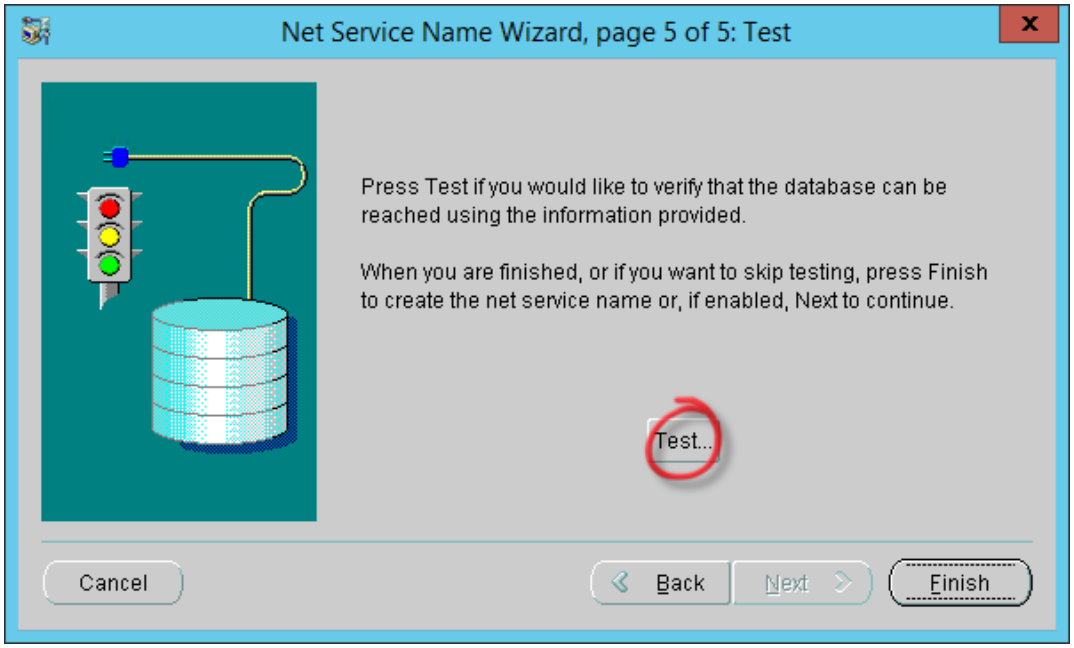
Enter the Host Name (either the fully qualified name of the database server or its IP Address) and the port number and click on “Next”:



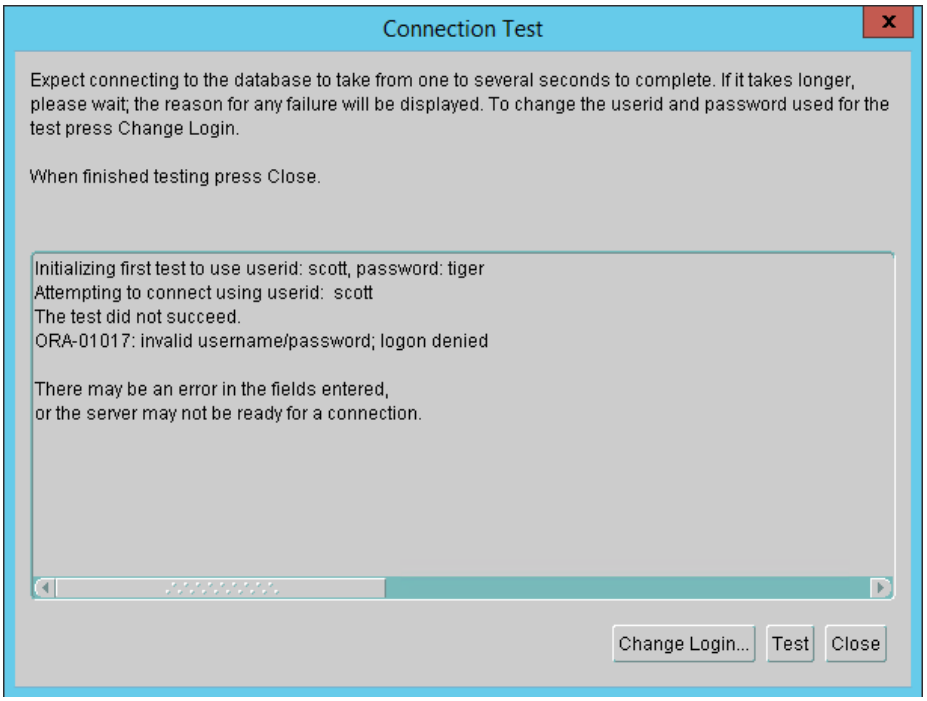
Enter the full database name, including the domain, ensure the Connection Type is “Database Default” and click on “Next”:



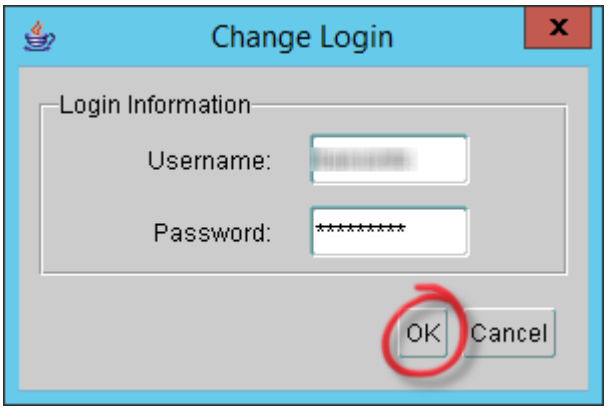
To test the connection details, click on “Test”:



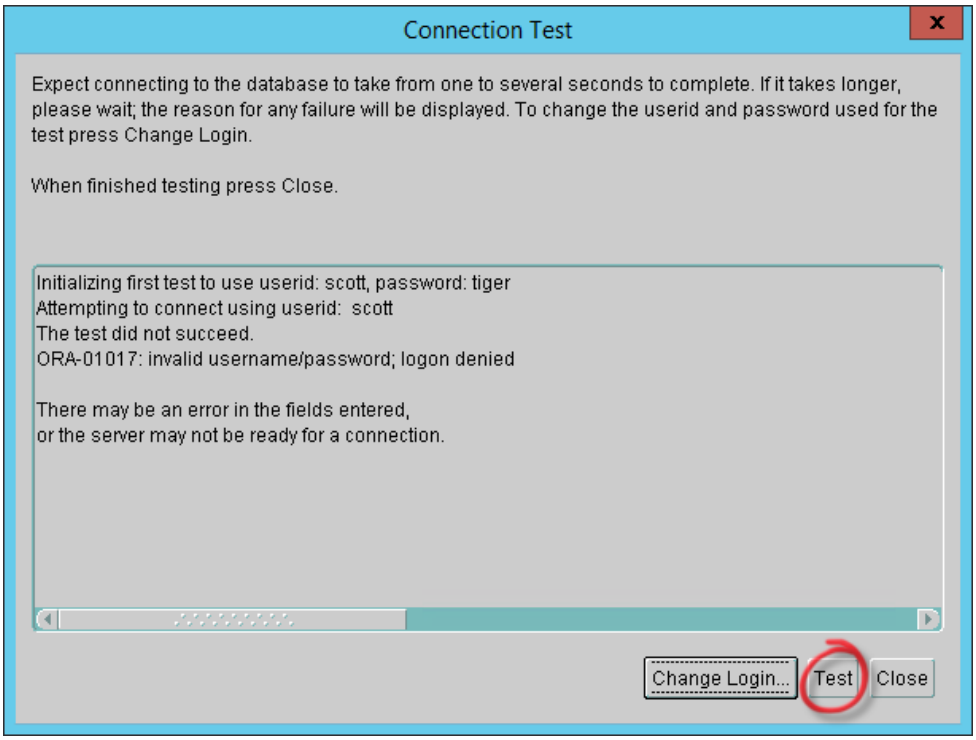
The test will probably fail (with either 0RA-01017: Invalid usernames/password, logon denied or ORA-28043: invalid bind credentials for DB-OID connection) as the default “scott/tiger” user will not exist in the database. Click on “Change Login”:

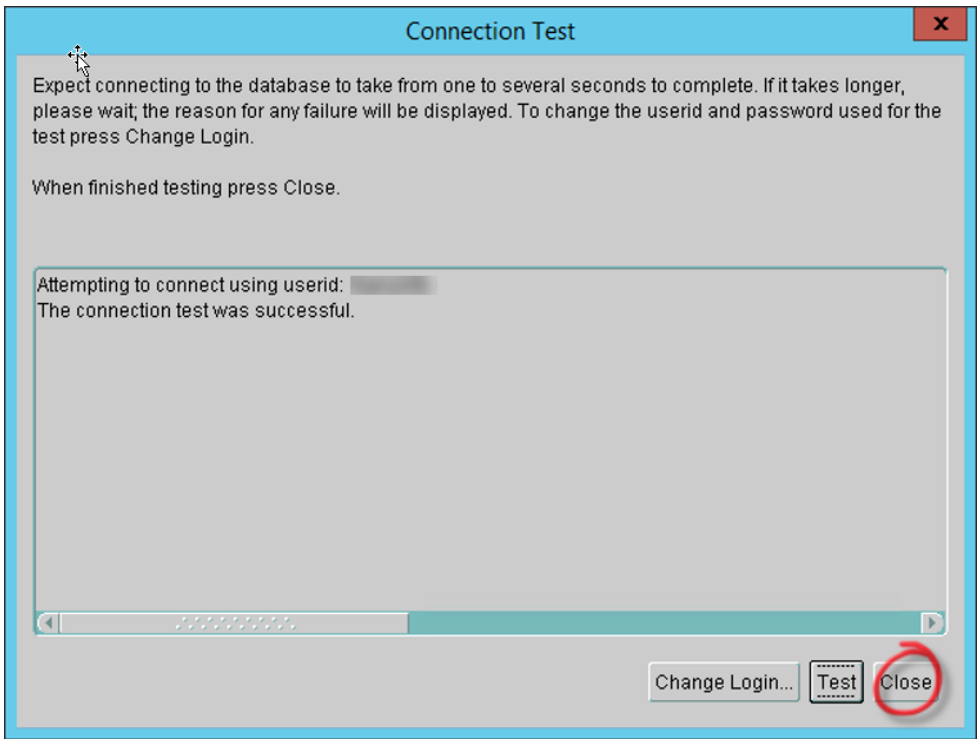


Enter the username and password for a user that does exists on the database, for example the exor Highways Owner, and click on “OK”:

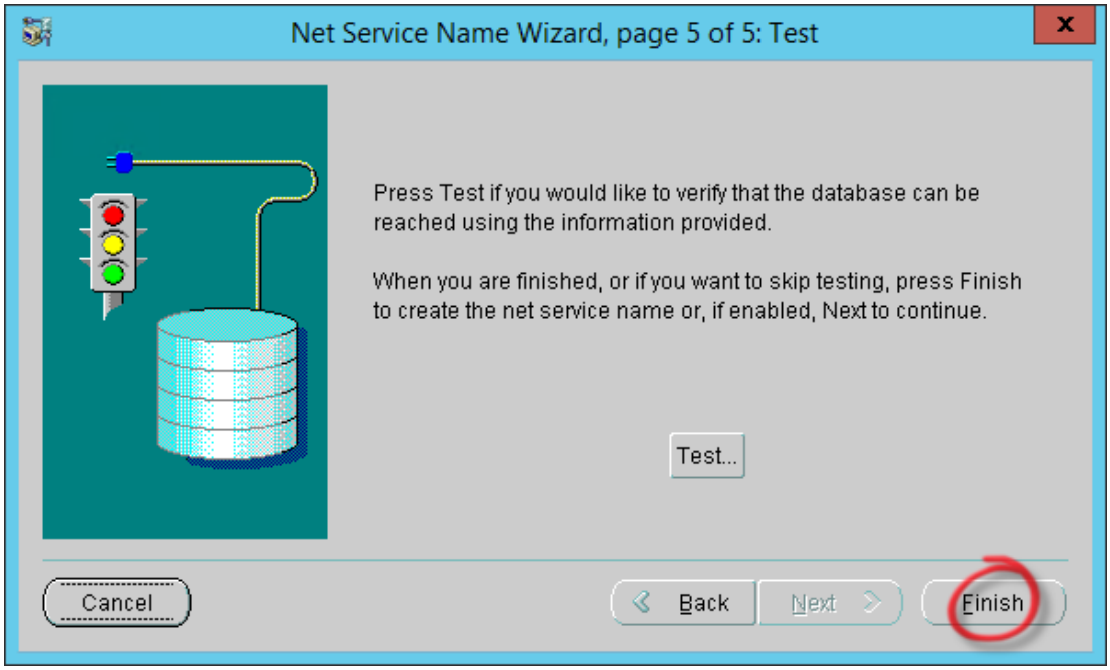


Click on “Test” again, this time the connection test should be successful, click on “Close” to continue:

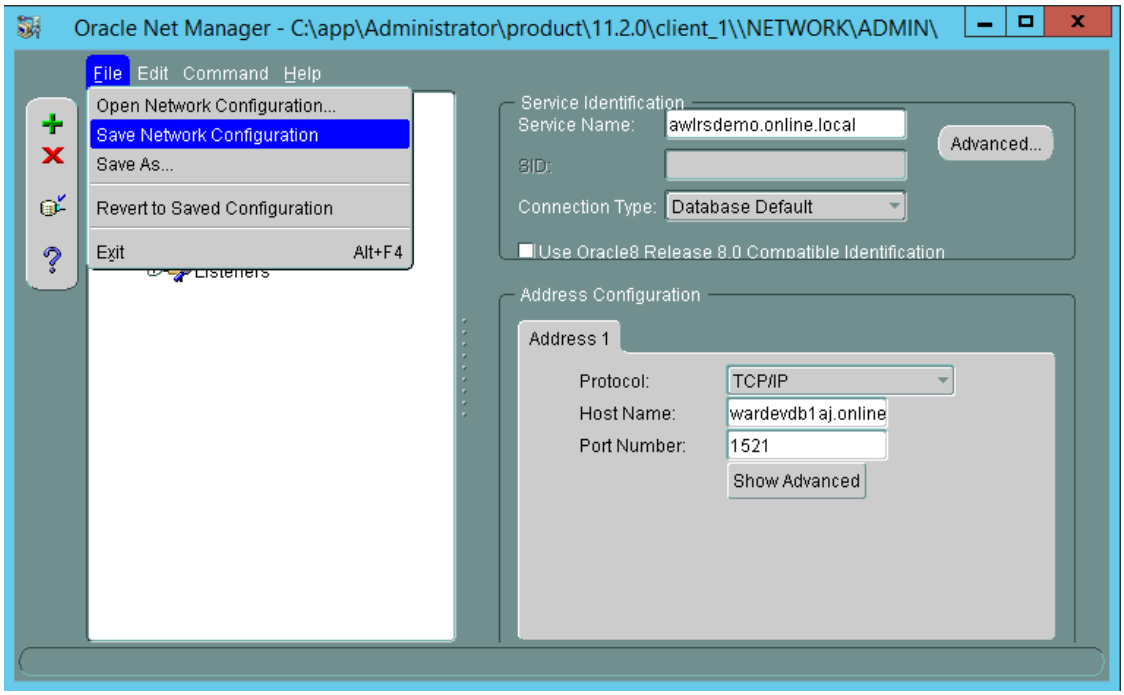




Click on “Finish”:



Review the information displayed for the connection that has just been added then click on File → Save Network Configuration to save the changes. Close the Oracle Net Manager application.



2.9.1 Change the SQLNET.ora file

Go to your ORACLE_HOME\network\admin directory, e.g.
C:\app\oracle_owner\product\19.0.0\client_1\network\admin

Change: SQLNET.AUTHENTICATION_SERVICES=(NTS)
To: SQLNET.AUTHENTICATION_SERVICES=(NONE)

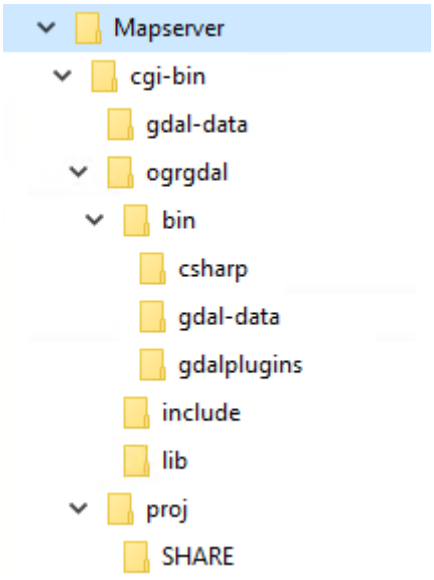
If this is not set as stated above, you may well experience ORA-12638: Credential retrieval failed errors.

2.10 Install MapServer

2.10.1 Build the MapServer directory

On the **application server** go to the <stage> folder created in section 2.2 and unzip the downloaded MapServer zip file to a folder on the application server, for example C:\mapserver. This folder will be referred to as the <mapserver> folder from here on.

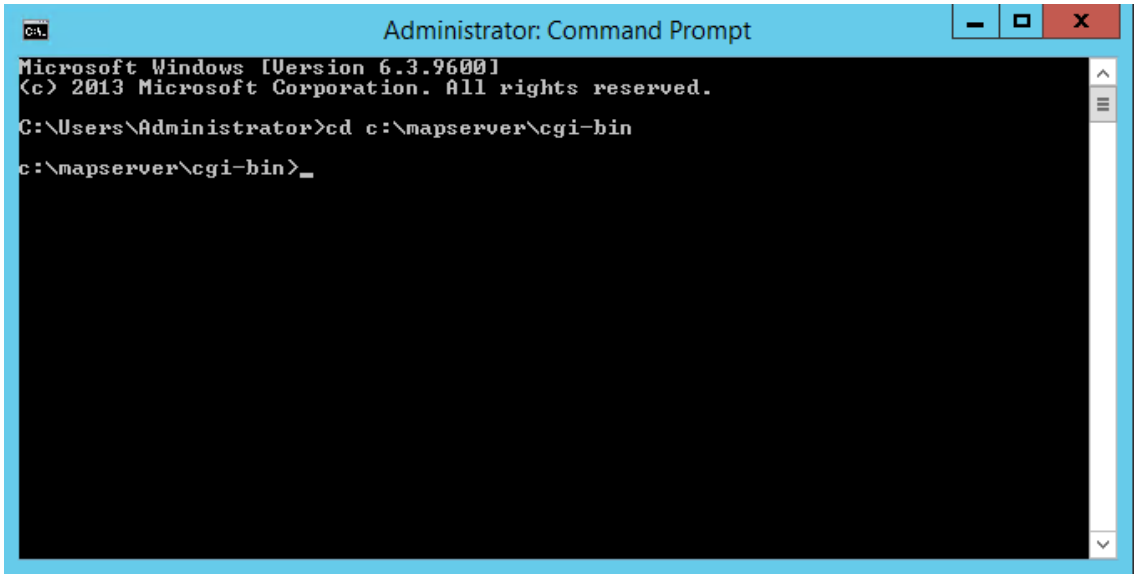
You should now have a folder structure as shown below:



2.10.2 Encyption Key

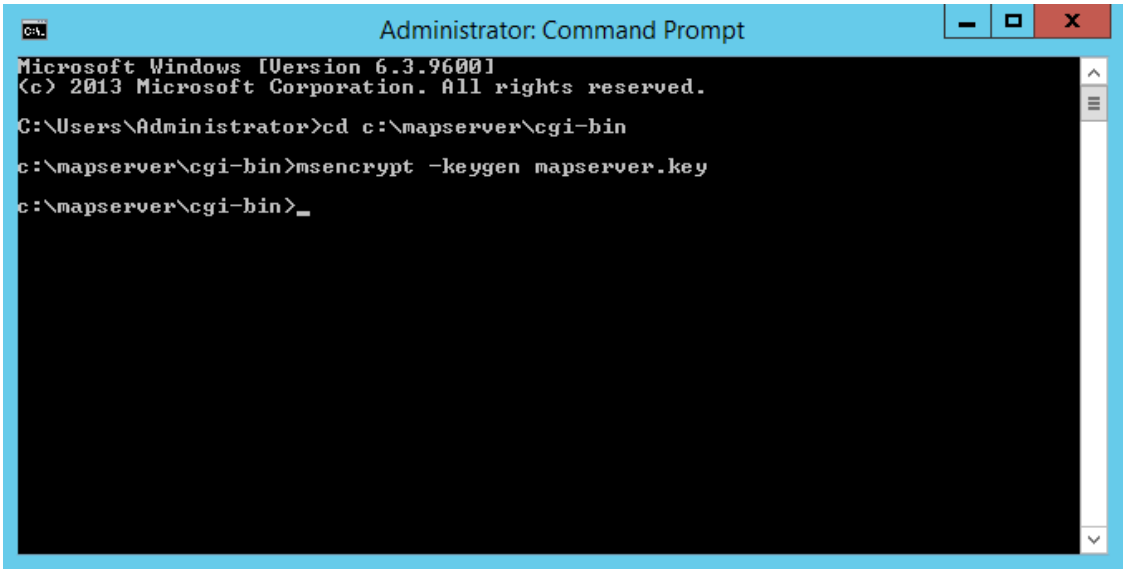
Start a new command prompt using the “Run as Administrator” option, and navigate to the <mapserver>\cgi-bin folder:

```
cd C:\mapserver\cgi-bin
```



Enter the following command to generate an encryption key:

msencrypt -keygen mapserver.key

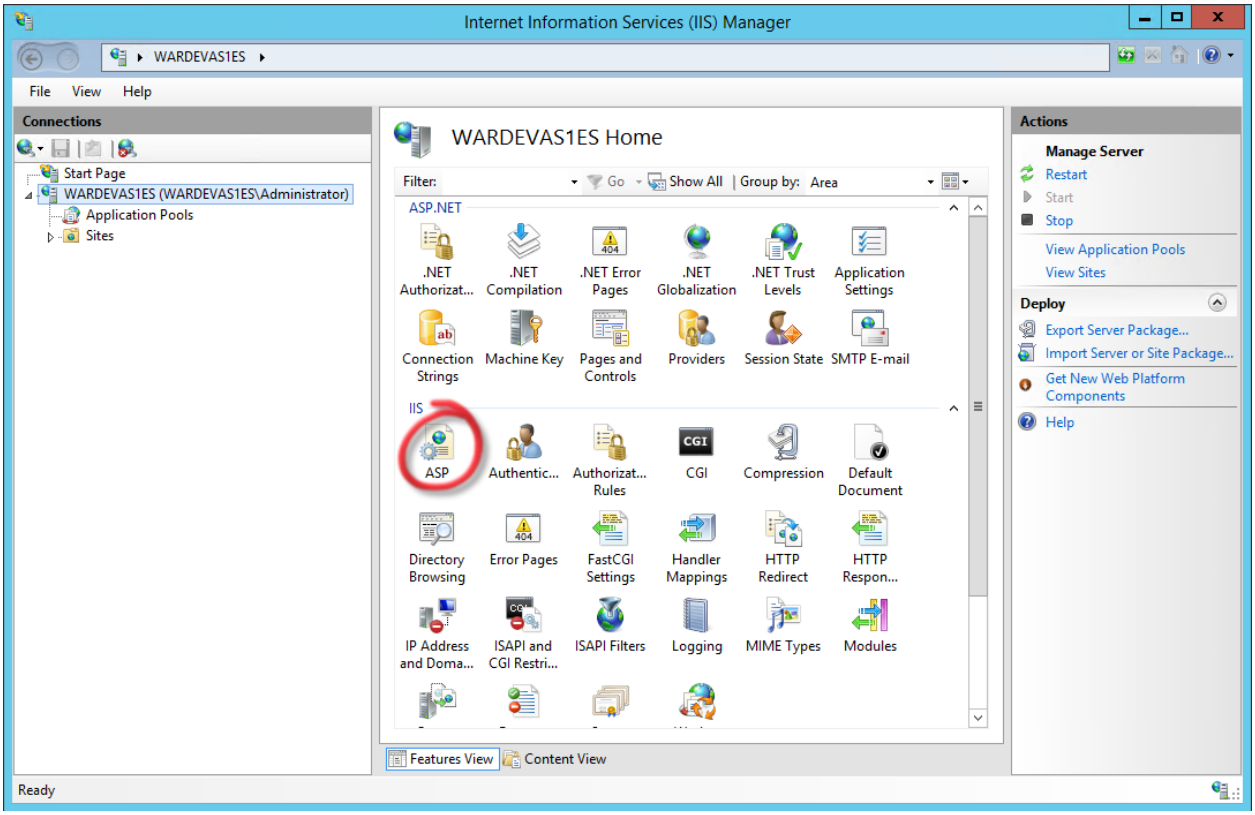


There should now be a file called mapserver.key in the <mapserver>\cgi-bin folder. Type exit to close the command prompt.

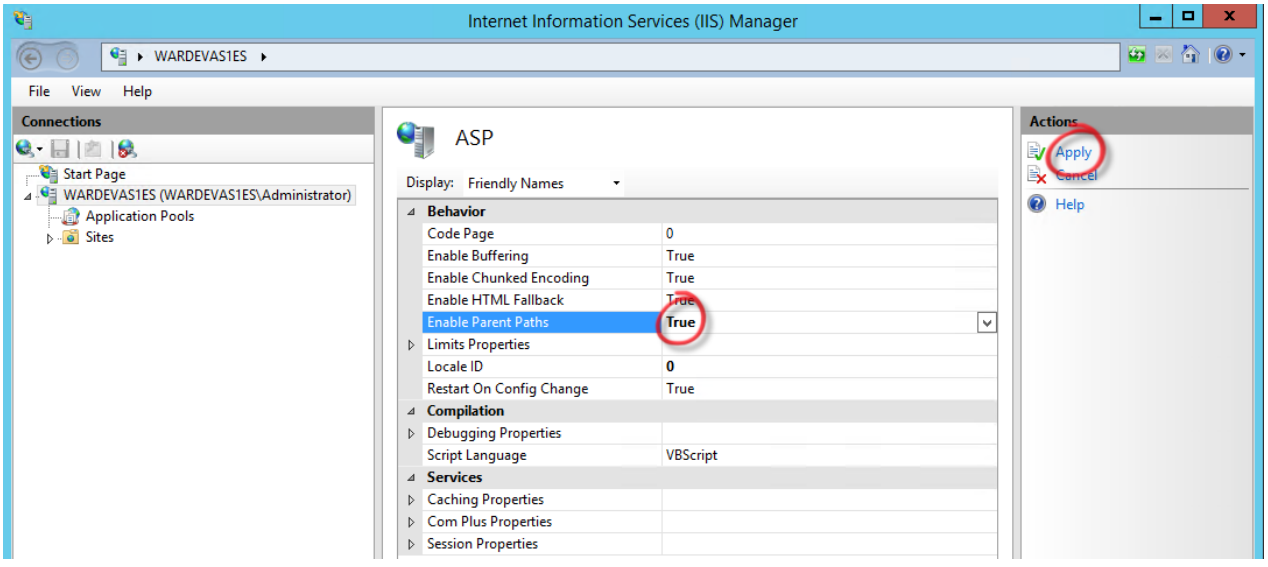
2.10.3 Configure Mapserver in IIS

On the **application server** run the Internet Information Services (IIS) Manager application.

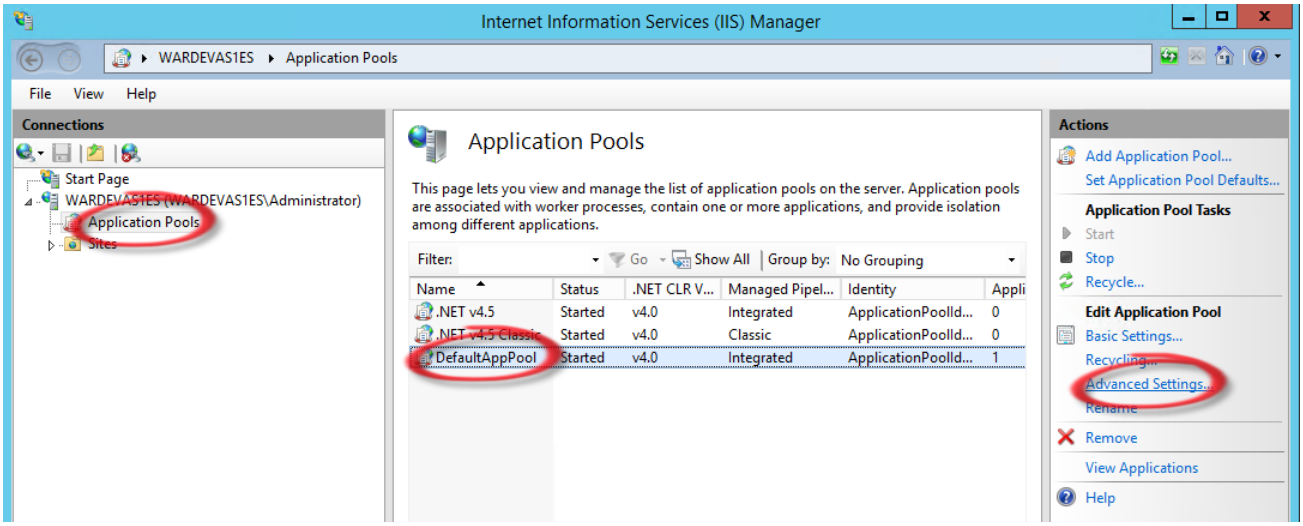
Click on the server branch (WARDEVAS1ES in the example below) in the left-hand panel then double click on the ASP icon in the central panel:



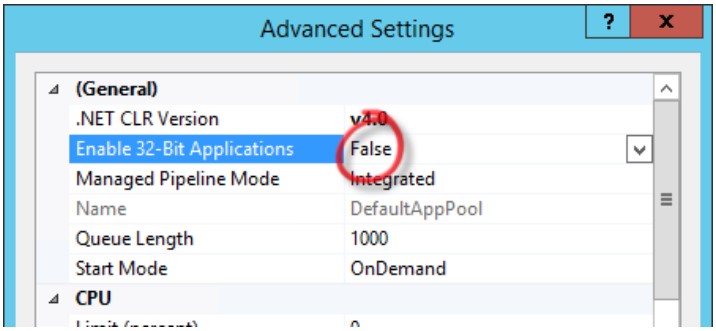
Ensure that “Enable Parent Paths” is set to “True”, if you changed the value click on “Apply” on the right-hand side to save the change:



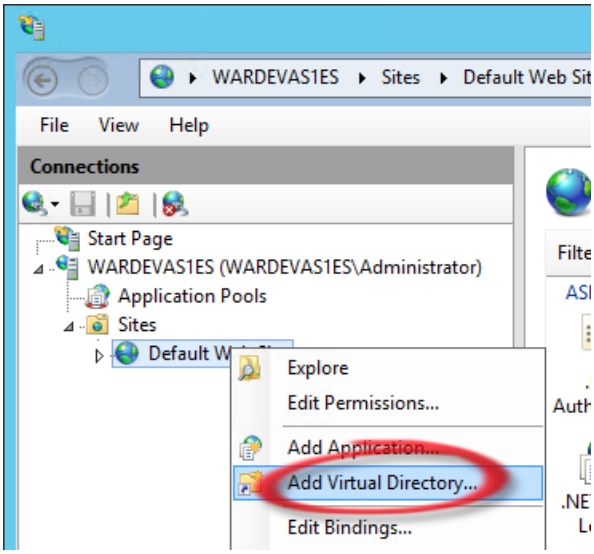
Click on “Application Pools” in the left-hand panel, select “DefaultAppPool” in the central panel then click on “Advanced Settings” in the right-hand panel:



Ensure that “Enable 32-Bit Applications” is set to “False”:



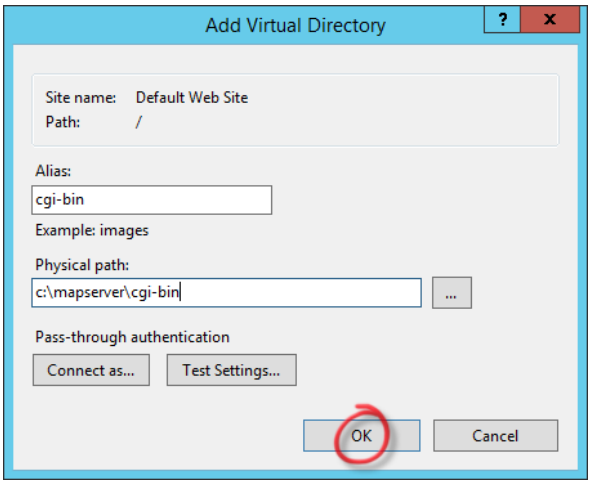
Expand the “Sites” branch in the left-hand panel, right click on “Default Web Site” then select “Add Virtual Directory…” from the context menu:



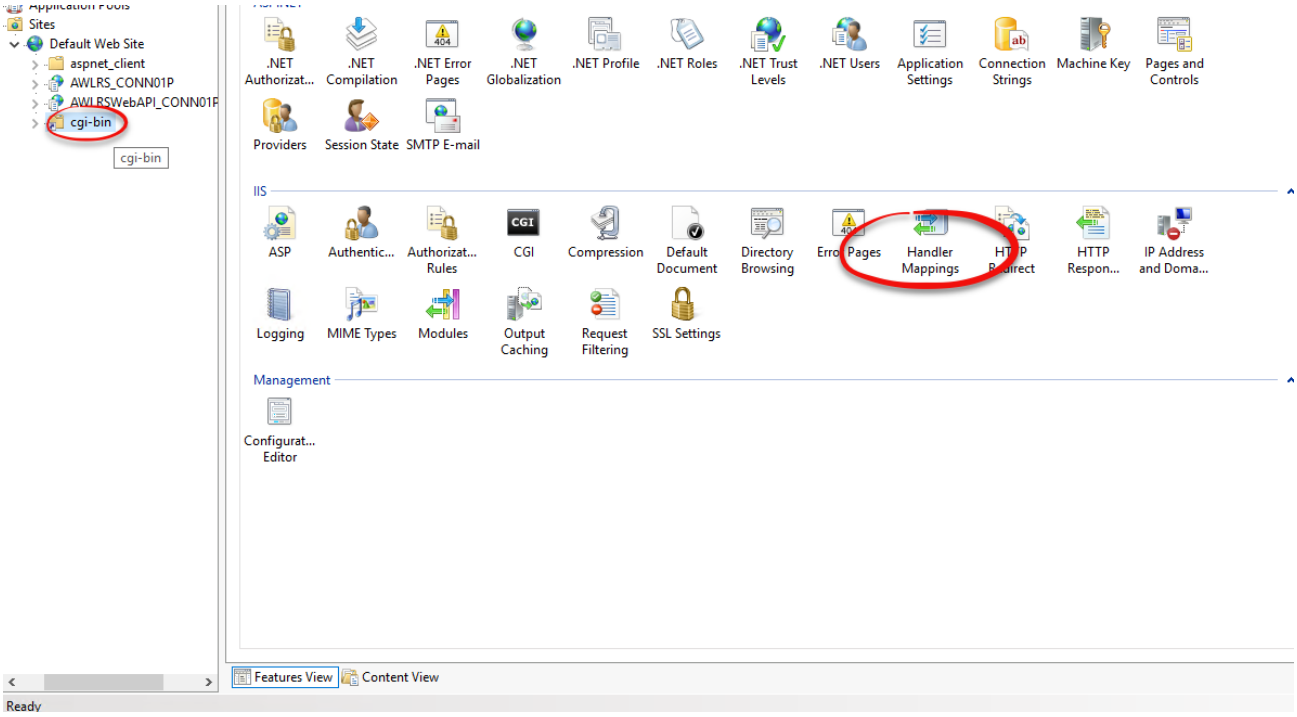
Enter the following values and click “OK”:

Alias: cgi-bin

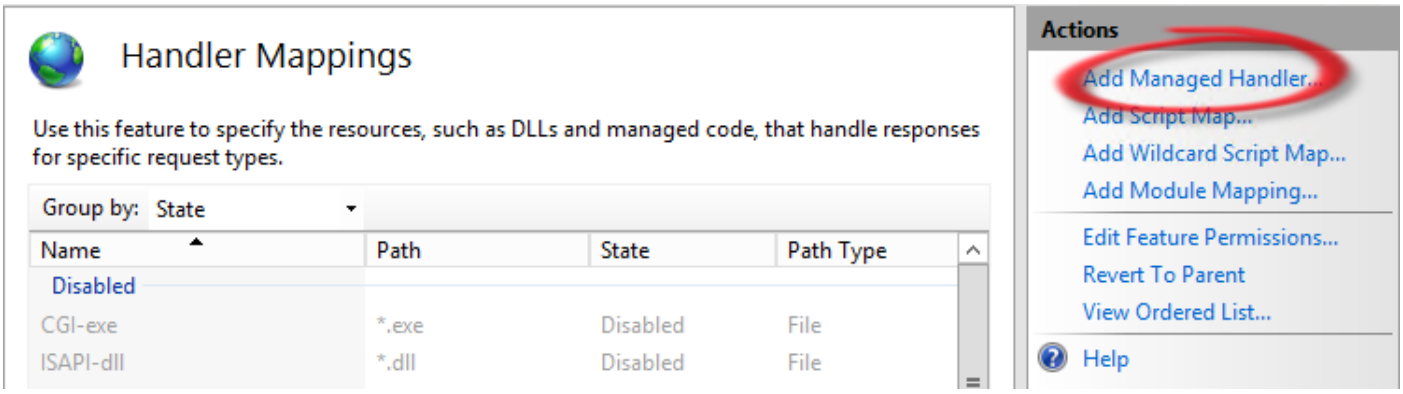
Physical path: <mapserver>\cgi-bin



Select “cgi-bin” in the left-hand panel then double click on the “Handler Mappings” icon in the central panel:



Click on “Add Managed Handler…” in the right-hand panel:

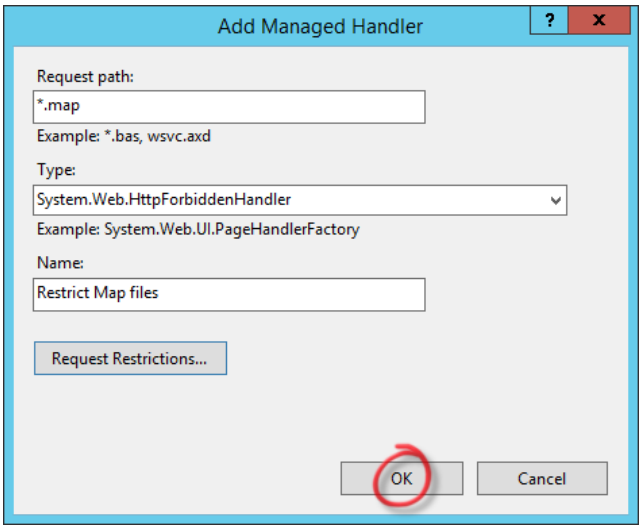


Enter the following values and click on “OK”:

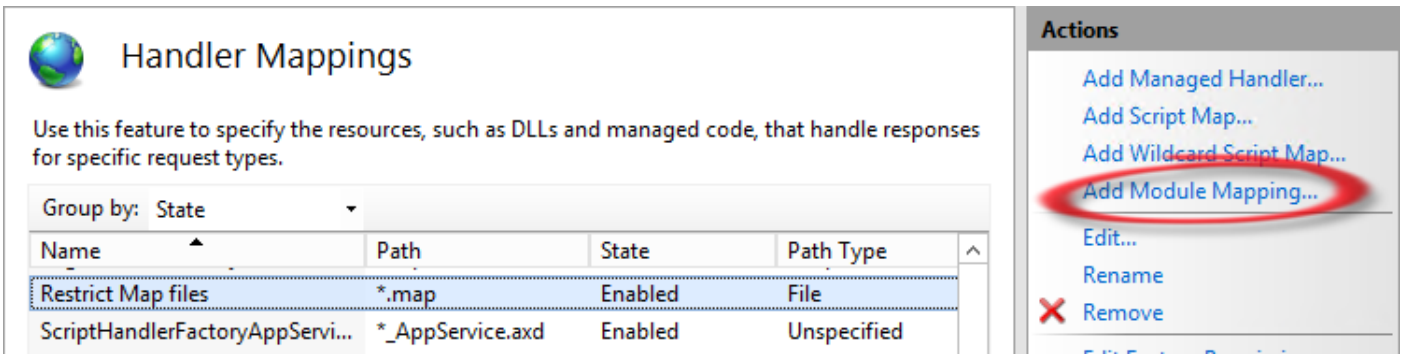
Request path: *.map

Type: System.Web.HttpForbiddenHandler

Name: Restrict Map files



Select “Restrict Map Files” and click on “Add Module Mapping…” in the right-hand panel:



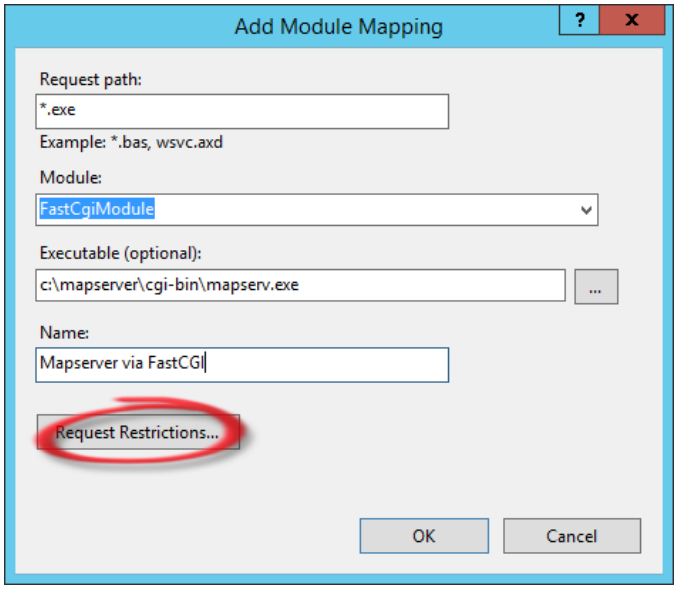
Enter the following values then click on “Request Restrictions…”:

Request path: *.exe

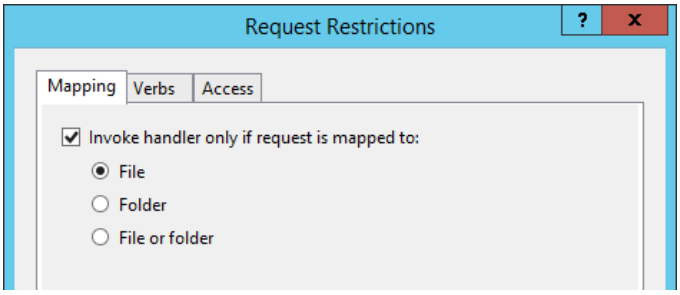
Module: FastCgiModule

Executable: <mapserver>\cgi-bin\mapserv.exe

Name: Mapserver via FastCGI

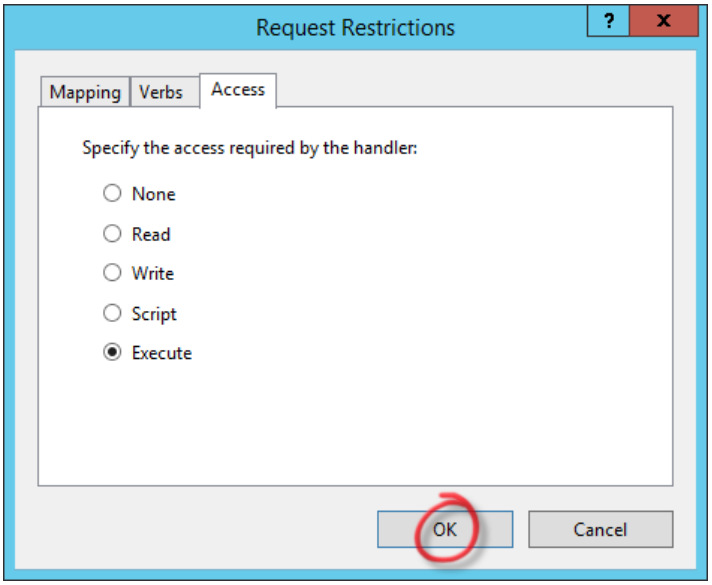


In the “Mapping” tab make sure that “Invoke handler only if request is mapped to:” is ticked and that “File” is selected.

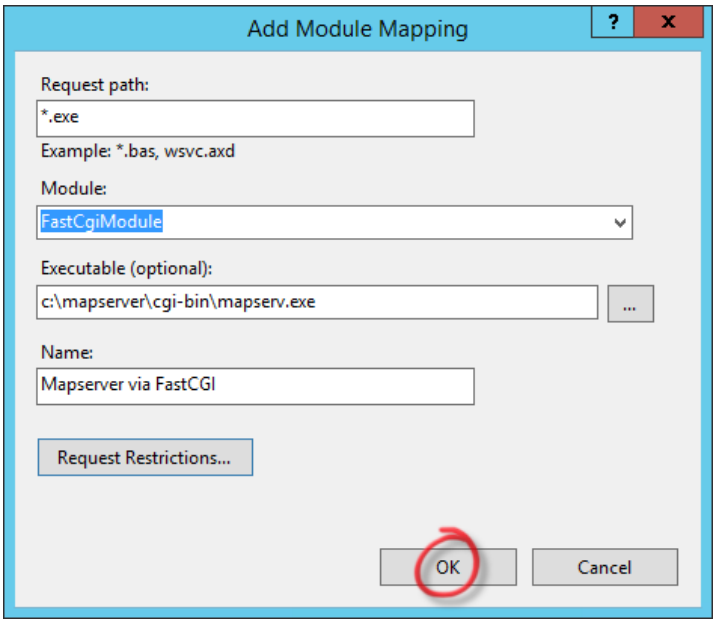


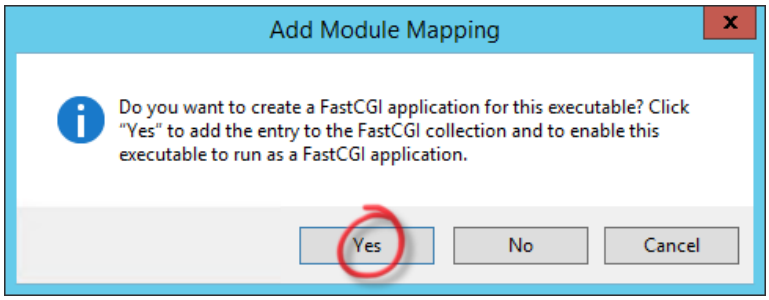
In the “Verbs” tab select “One of the following verbs:” and enter “GET,HEAD,POST”

In the “Access” tab select “Execute” and click on “OK”

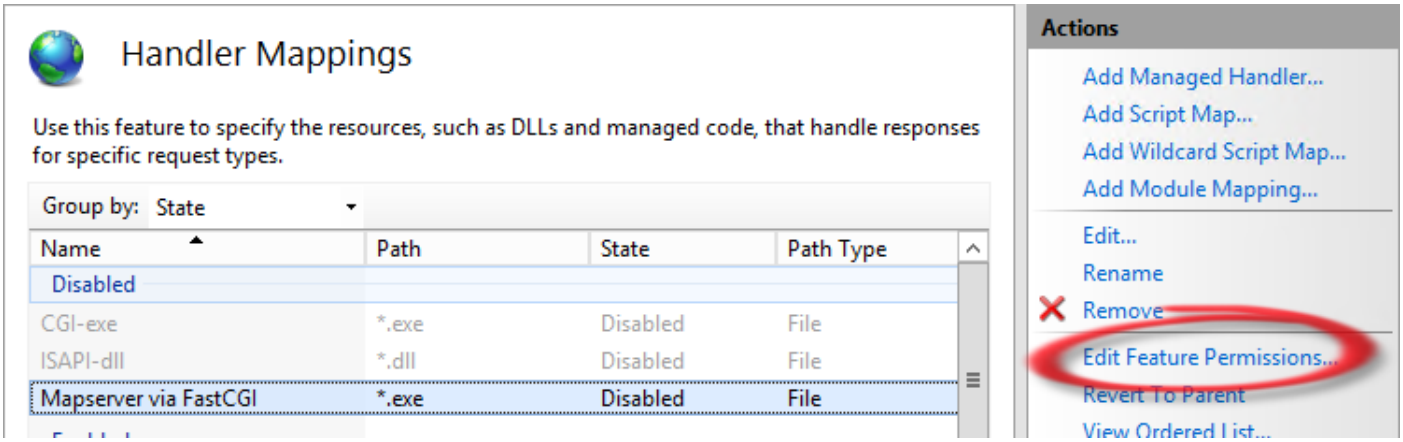


Click on “OK” then “Yes” when Prompted:

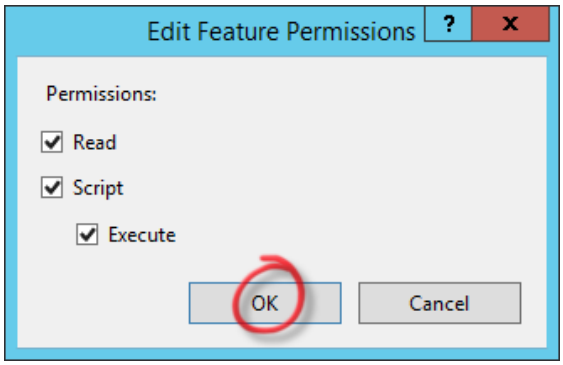




Select the “Mapserver via FastCGI” handler mapping and click on “Edit Feature Permissions…” in the right-hand panel.



Ensure that “Read”, “Script” and “Execute” are all ticked then click on “OK”



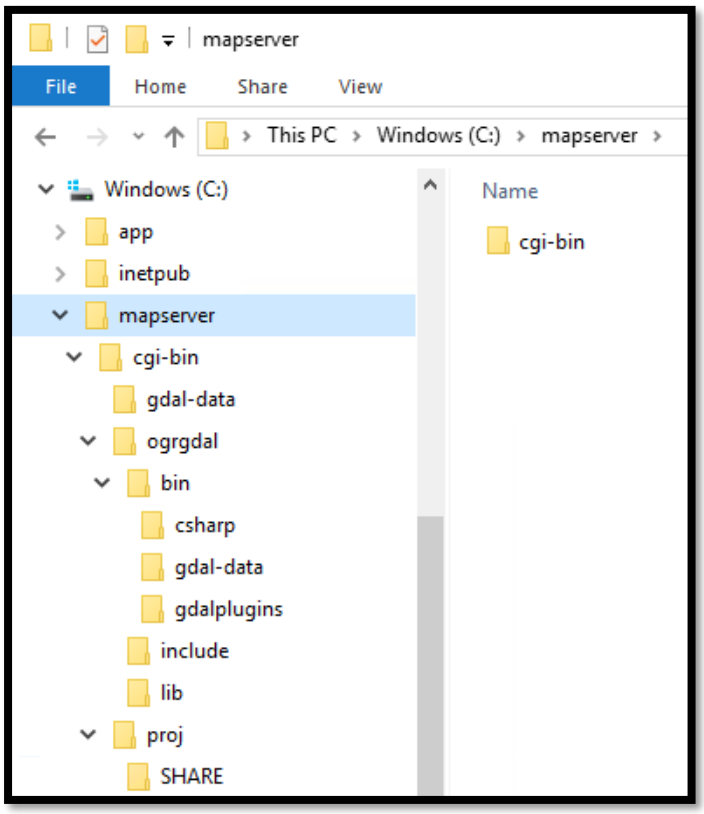
The Mapserver IIS configuration is complete, close IIS Manager.

2.11 Upgrade MapServer

As previously stated from AWLRS build 1.3.19.1 onwards the use of the Bentley build of Mapserver is mandated, if a different version of Mapserver has previously been deployed to the server for an older build of AWLRS then Mapserver must be updated to the version shipped in the AWLRS release zip (assetwise_mapserver_7.6.4.0.zip).

To upgrade an existing Mapsever deployment please log into the IIS server and follow these steps:

1. Stop IIS (At the command prompt type “iisreset /stop”)
2. Rename the existing mapserver folder to mapserver_old (e.g. c:\mapserver becomes c:\mapserver_old)
3. Unzip the shipped mapserver zip file (assetwise_mapserver_7.6.4.0.zip) to the path of the old mapserver folder (e.g. c:\mapserver) this should give you the folder structure below:



4. Copy the following files from mapserver_old\cgi-bin to mapserver\cgi-bin
   - web.config
   - mapserver.key
   - fonts.list
5. Start IIS (At the command prompt type “iisreset /start”)