Thick Client Pentest Lab Setup: DVTA

January 1, 2021 By Raj Chandel

Thick client applications are not new and have been around for many years and can be still easily found within a variety of organizations. Thick clients are majorly used across organizations for their internal operations and Just because of the adoption of Hybrid infrastructure architecture, thick-client applications become a better target for attackers.

However, if given to perform a pentest on thick clients, it is not as simple as a web application, but also Thick client testing can be exciting for pentesters because the attack surface of these applications is significant. Thick client application pentesting involves both server-side and local processing.

Simple automated assessment scanning isn't enough for Thick client application pentesting it requires a lot of patience and a methodical approach also moreover the process often requires specialized tools and custom testing setup.

Architecture

Basically, there are two types of Architecture available

- Two-Tier Architecture
- Three-Tier Architecture

Two-Tier Architecture

In two-tier architecture, client and database interact with each other and it implements a client-to-server communication.

In easy language the application is installed on the client computer and, in the manner to work, will need to communicate with a database server. For example, imagine a Banking application that was installed on the client computer and, in order to retrieve the 'costumer' information, it directly communicates with the Bank database server.

Three-Tier Architecture

This is an alternate and well structured Three-tier architecture. In Three-tier architecture the client communicates with an application server. Here the client-server has three components defined in which it turns talks to the database in a way similar to the regular web application. The most common communication is HTTP/HTTPS.

Three-tier architecture has a security advantage because it prevents the end-user from communicating directly with the database server.

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- Installation and configuration of SQL Server Express 2008
- Installation and configuration of SQL Server Management Studio
- Download and install FileZilla Server

Prerequisites

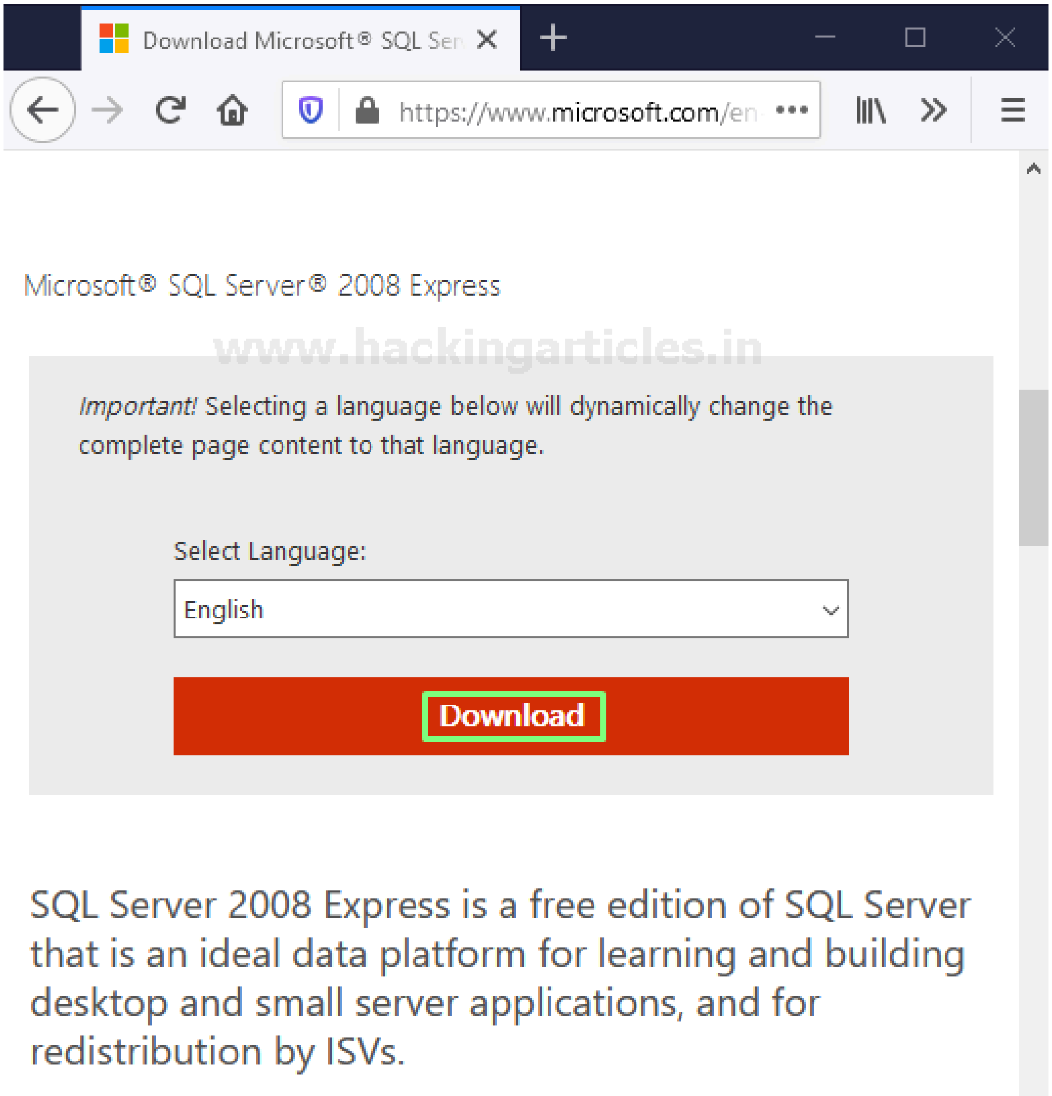
- VMWare workstation or Virtual box
- Windows 10 as a Database (SQL Server)
- Windows 10 as a Client (DVTA)
- SQL Server Express 2008
- SQL Server Management Studio
- FileZilla FTP server
- Damn Vulnerable Thick Client Application (DVTA) Modified version

Installation and configuration of SQL Server Express 2008

Let's open up our Virtual machine and create a fresh Windows 10 VM and then the first thing we are going to download is SQL Server Express 2008

You can download SQL Server directly from here: –

https://www.microsoft.com/en-us/download/details.aspx?id=1695



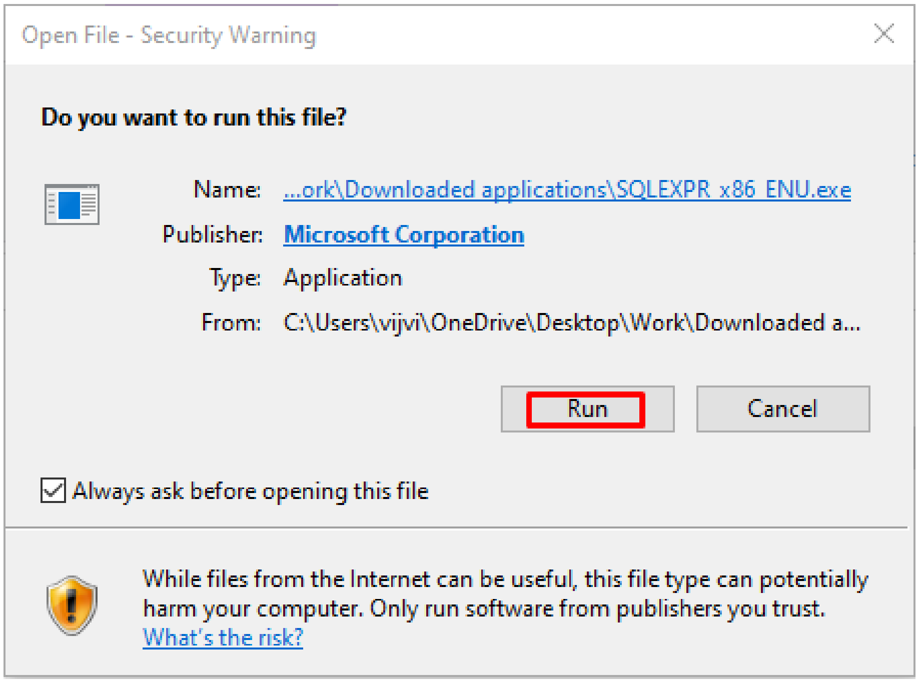
Microsoft® SQL Server® 2008 Express

Important! Selecting a language below will dynamically change the complete page content to that language.

Select Language: English

SQL Server 2008 Express is a free edition of SQL Server that is an ideal data platform for learning and building desktop and small server applications, and for redistribution by ISVs.

Alright, now we have downloaded the SQL Server Express 2008. Let's open it up and run it.



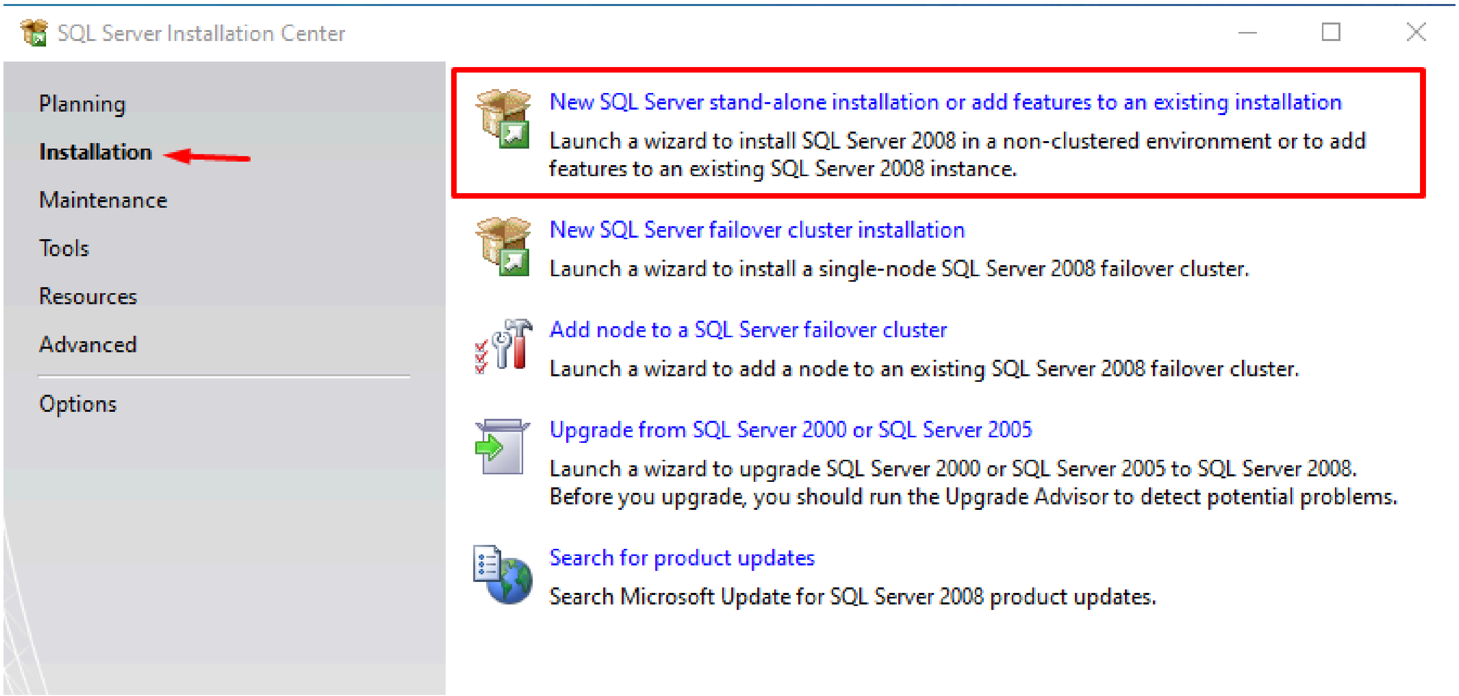
Do you want to run this file?

Name: ...ork\Downloaded applications\SQLEXPR_x86_ENU.exe
Publisher: Microsoft Corporation
Type: Application
From: C:\Users\vijvi\OneDrive\Desktop\Work\Downloaded a...

☑ Always ask before opening this file

While files from the Internet can be useful, this file type can potentially harm your computer. Only run software from publishers you trust. What's the risk?

After running it will pop up a SQL Server installation Prompt select New SQL Server stand-alone installation and it will perform some checks to check everything fine for the installation when it completes the check process hit the ok button and move forward as shown below.



New SQL Server stand-alone installation or add features to an existing installation
Launch a wizard to install SQL Server 2008 in a non-clustered environment or to add features to an existing SQL Server 2008 instance.

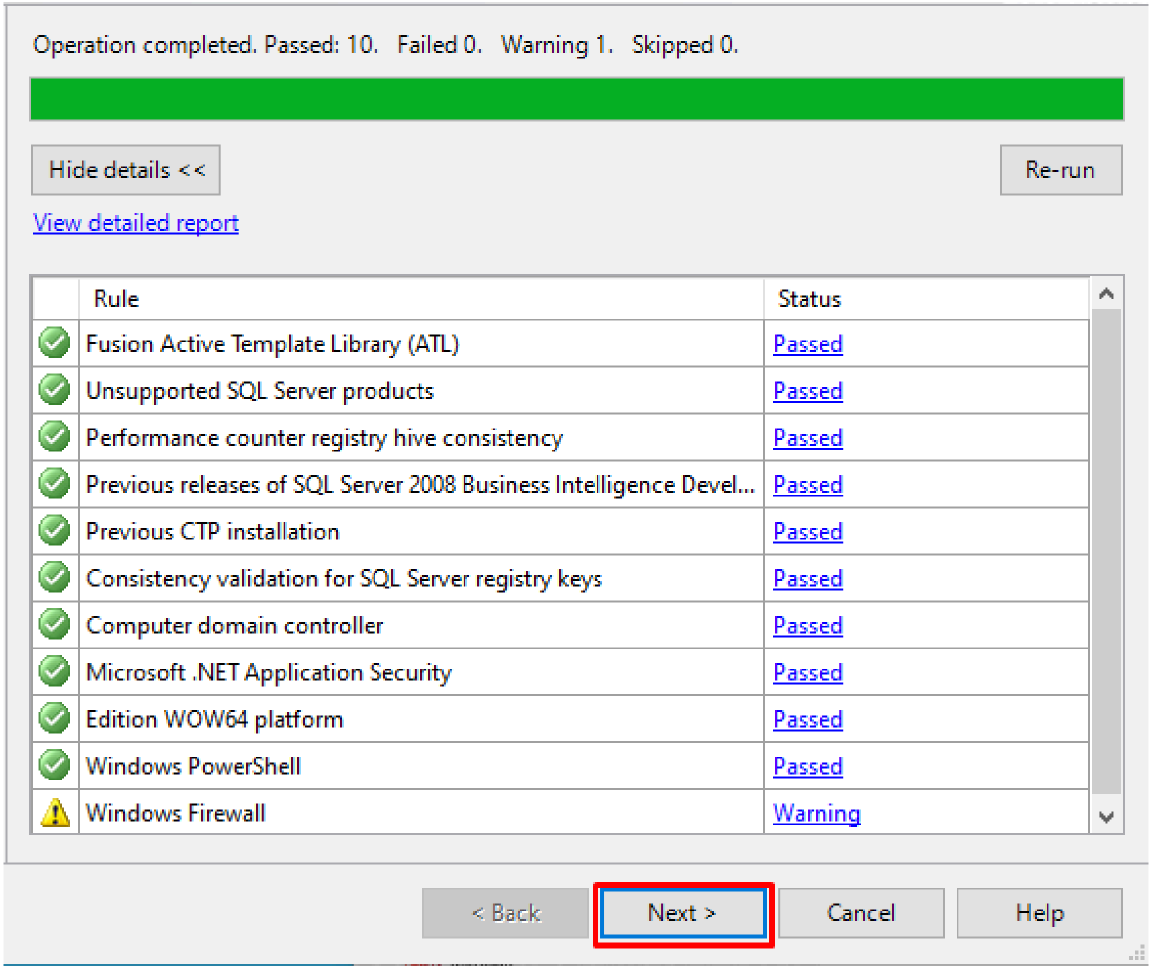
New SQL Server failover cluster installation
Launch a wizard to install a single-node SQL Server 2008 failover cluster.

Add node to a SQL Server failover cluster
Launch a wizard to add a node to an existing SQL Server 2008 failover cluster.

Upgrade from SQL Server 2000 or SQL Server 2005
Launch a wizard to upgrade SQL Server 2000 or SQL Server 2005 to SQL Server 2008. Before you upgrade, you should run the Upgrade Advisor to detect potential problems.

Search for product updates
Search Microsoft Update for SQL Server 2008 product updates.

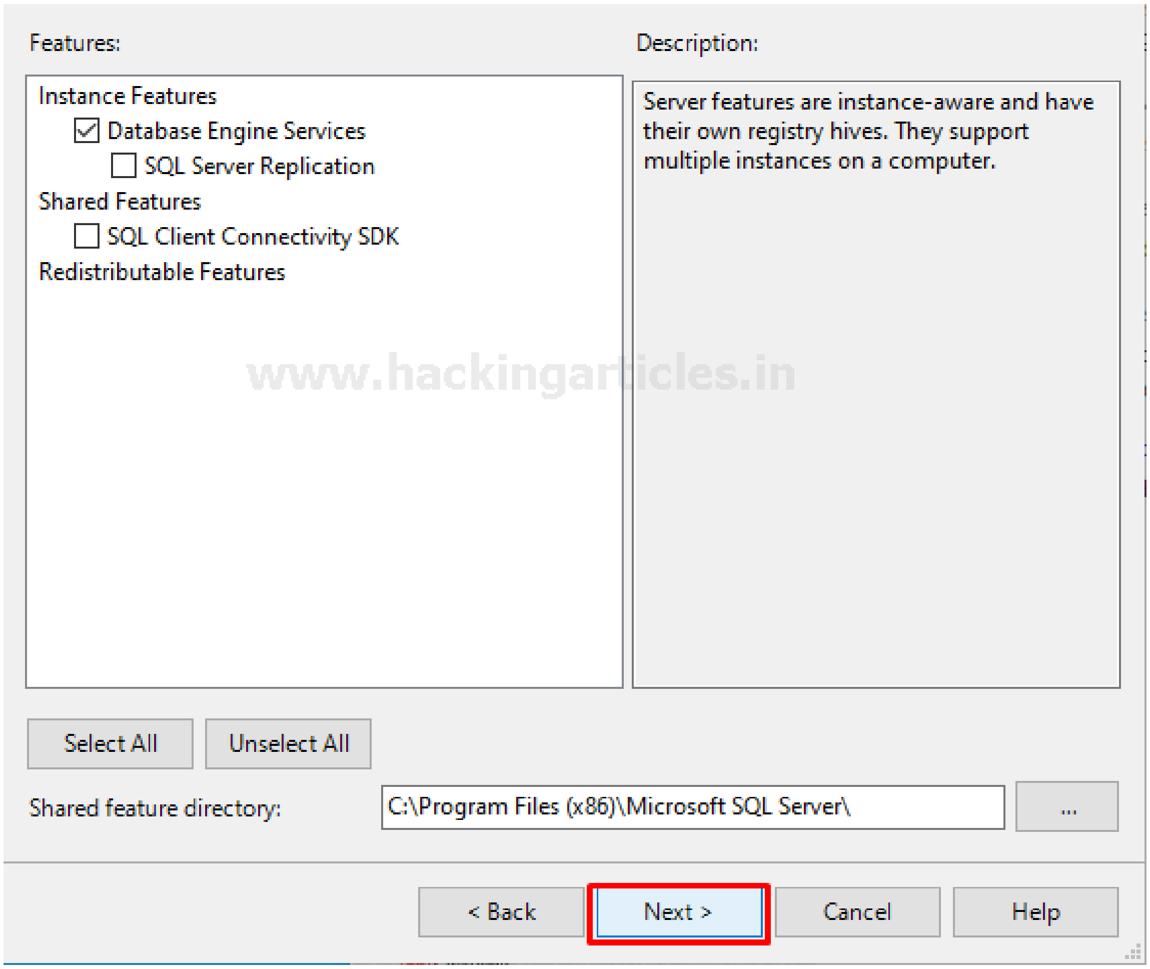
Accept the License terms and conditions and move to next and install setup support files.



Operation completed. Passed: 10. Failed 0. Warning 1. Skipped 0.

	Rule	Status
✓	Fusion Active Template Library (ATL)	Passed
✓	Unsupported SQL Server products	Passed
✓	Performance counter registry hive consistency	Passed
✓	Previous releases of SQL Server 2008 Business Intelligence Devel...	Passed
✓	Previous CTP installation	Passed
✓	Consistency validation for SQL Server registry keys	Passed
✓	Computer domain controller	Passed
✓	Microsoft .NET Application Security	Passed
✓	Edition WOW64 platform	Passed
✓	Windows PowerShell	Passed
⚠	Windows Firewall	Warning

Alright, if you are seeing this prompt that means everything is ok here move to the next and choose Database service Engine then hit next



Features:

Instance Features

- ☑ Database Engine Services
  - □ SQL Server Replication

Shared Features

- □ SQL Client Connectivity SDK

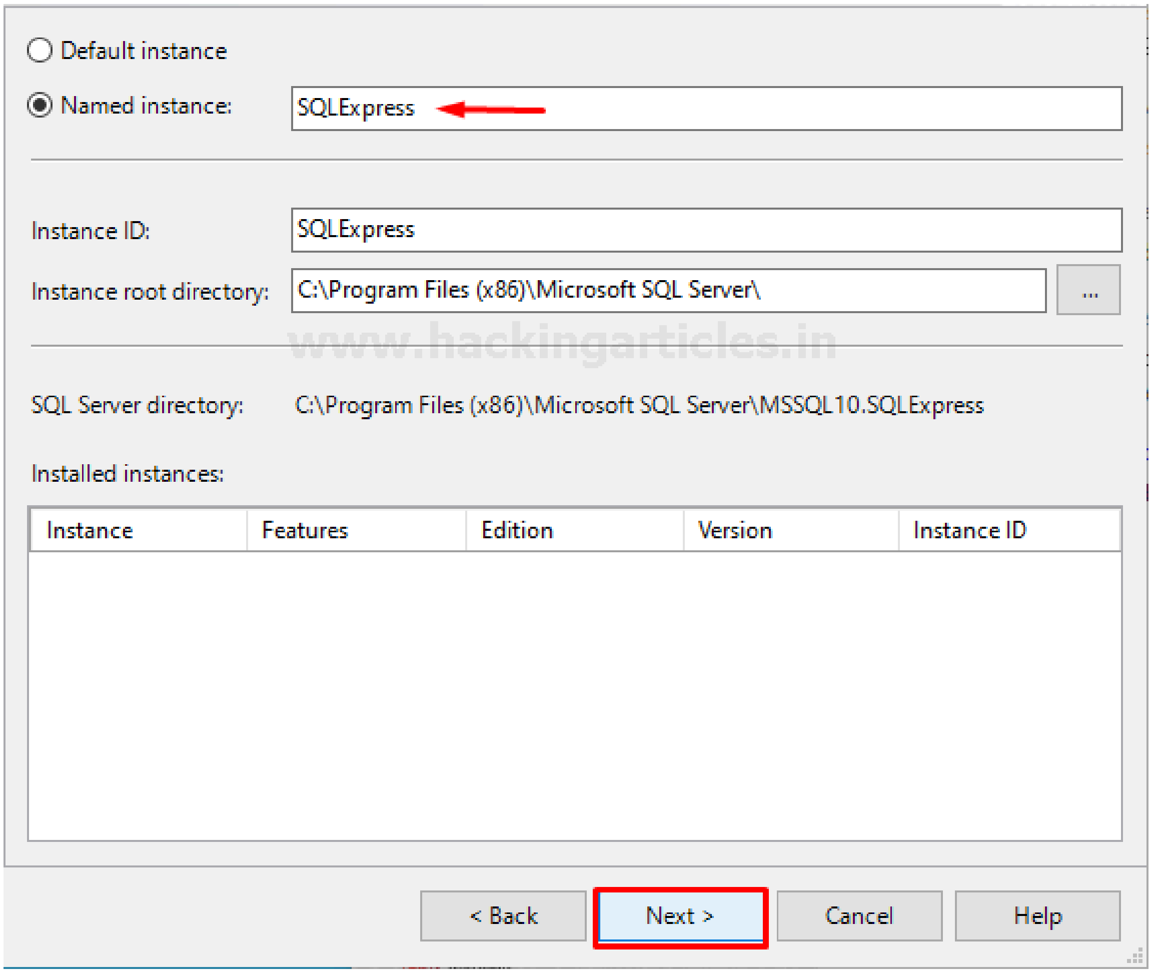
Redistributable Features

Description:

Server features are instance-aware and have their own registry hives. They support multiple instances on a computer.

Shared feature directory: C:\Program Files (x86)\Microsoft SQL Server\

Now we’re going to create an instance named “SQL Express” as shown below



○ Default instance

● Named instance: SQLExpress

Instance ID: SQLExpress

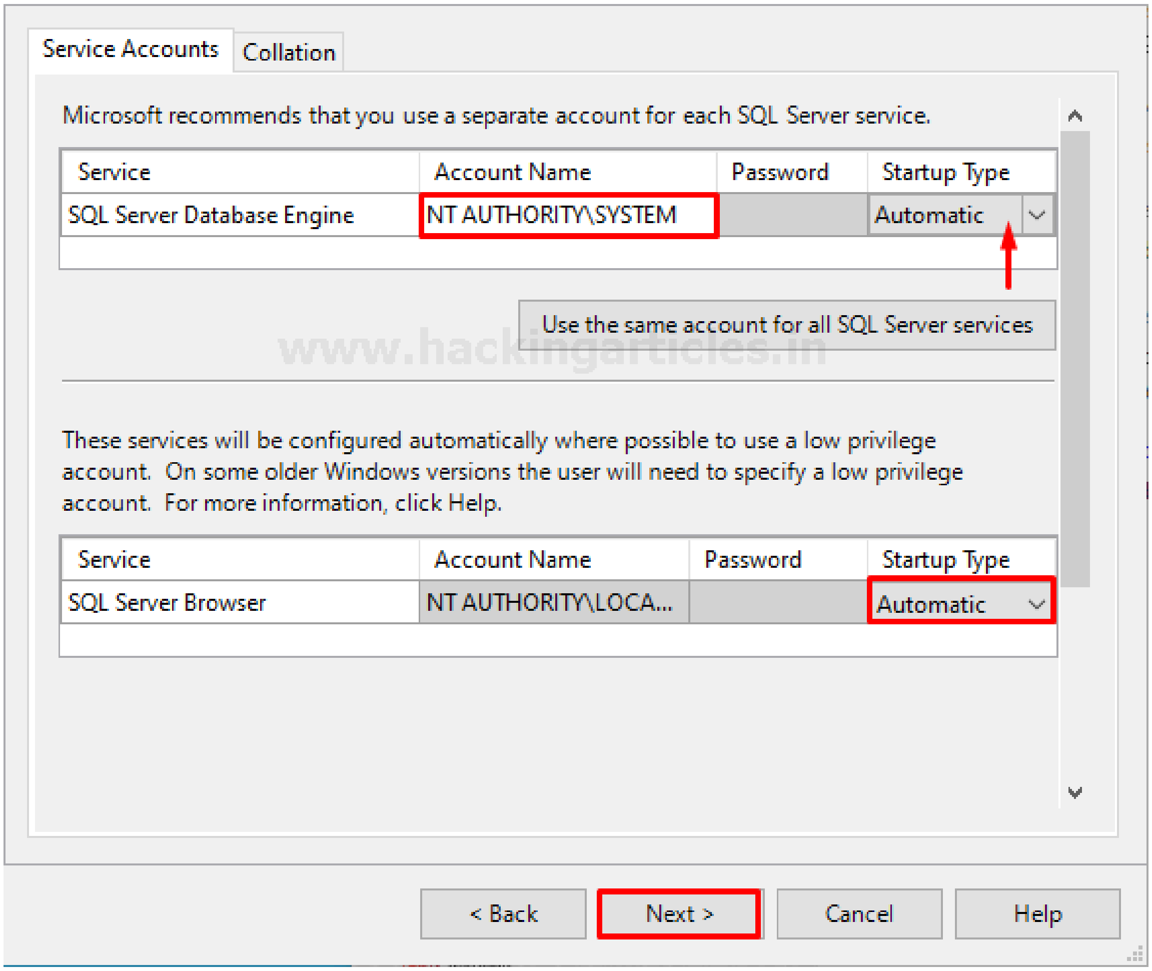
Instance root directory: C:\Program Files (x86)\Microsoft SQL Server\

SQL Server directory: C:\Program Files (x86)\Microsoft SQL Server\MSSQL10.SQLExpress

Installed instances:

Instance	Features	Edition	Version	Instance ID

By selecting Named instance hit next and next until you reach to **server configuration** as shown below



Microsoft recommends that you use a separate account for each SQL Server service.

Service	Account Name	Password	Startup Type
SQL Server Database Engine	NT AUTHORITY\SYSTEM		Automatic

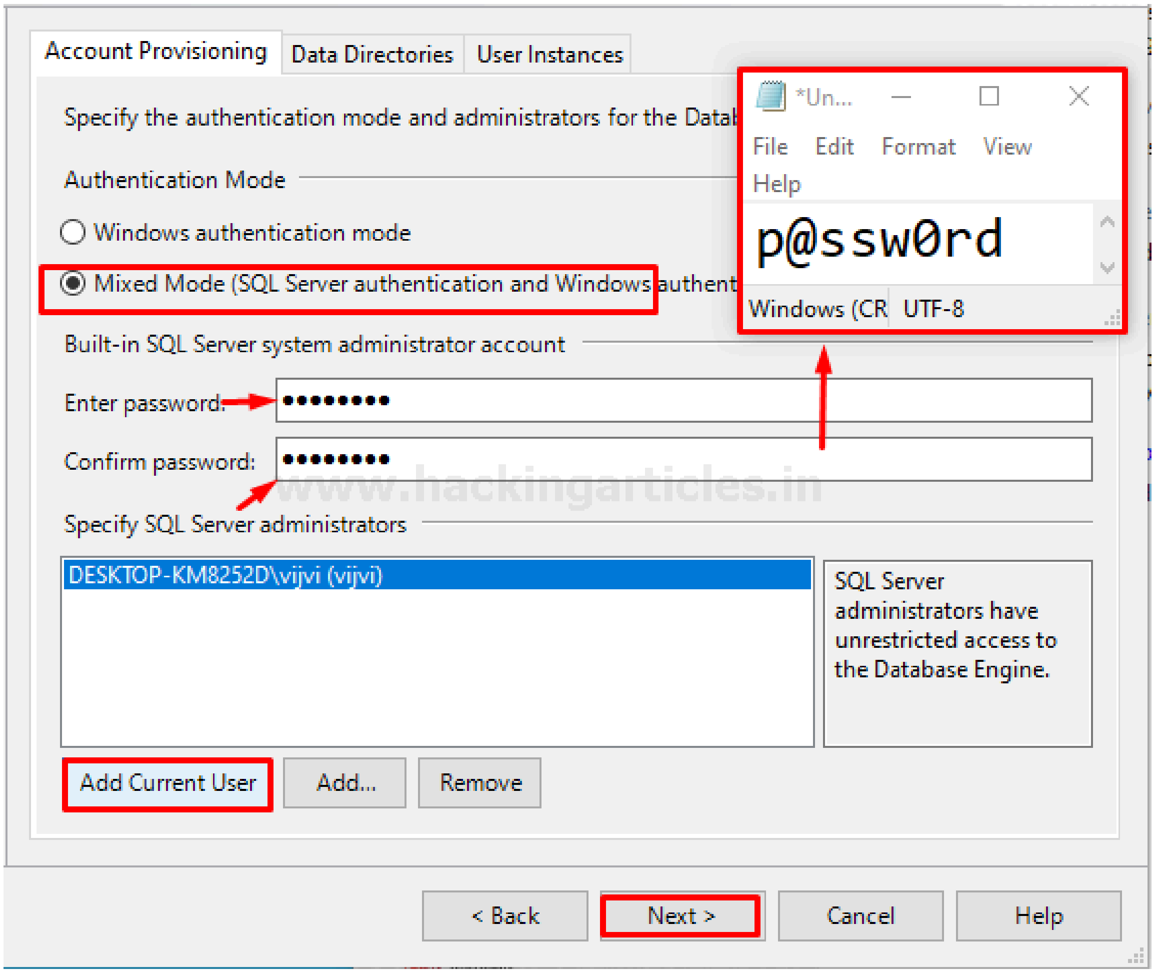
These services will be configured automatically where possible to use a low privilege account. On some older Windows versions the user will need to specify a low privilege account. For more information, click Help.

Service	Account Name	Password	Startup Type
SQL Server Browser	NT AUTHORITY\LOCA...		Automatic

Here, we’re going to use NT Authority\System and make the startup Type Automatic and hit next.

On the next Prompt Authentication, mode is selected to Windows authentication mode select it to **“Mixed Mode”** so we will have both SQL Server authentication as well as Windows authentication.

Let’s enter the **Password** so in this case, we’re going to use this **“p@ssw0rd”** as the password because this is what is used by DVTA application and **Add current user** who is going to be SQL server administrator then hit next as shown below



Specify the authentication mode and administrators for the Datal

Authentication Mode

○ Windows authentication mode

● Mixed Mode (SQL Server authentication and Windows authent

Built-in SQL Server system administrator account

Enter password: •••••••••

Confirm password: •••••••••

p@ssw0rd

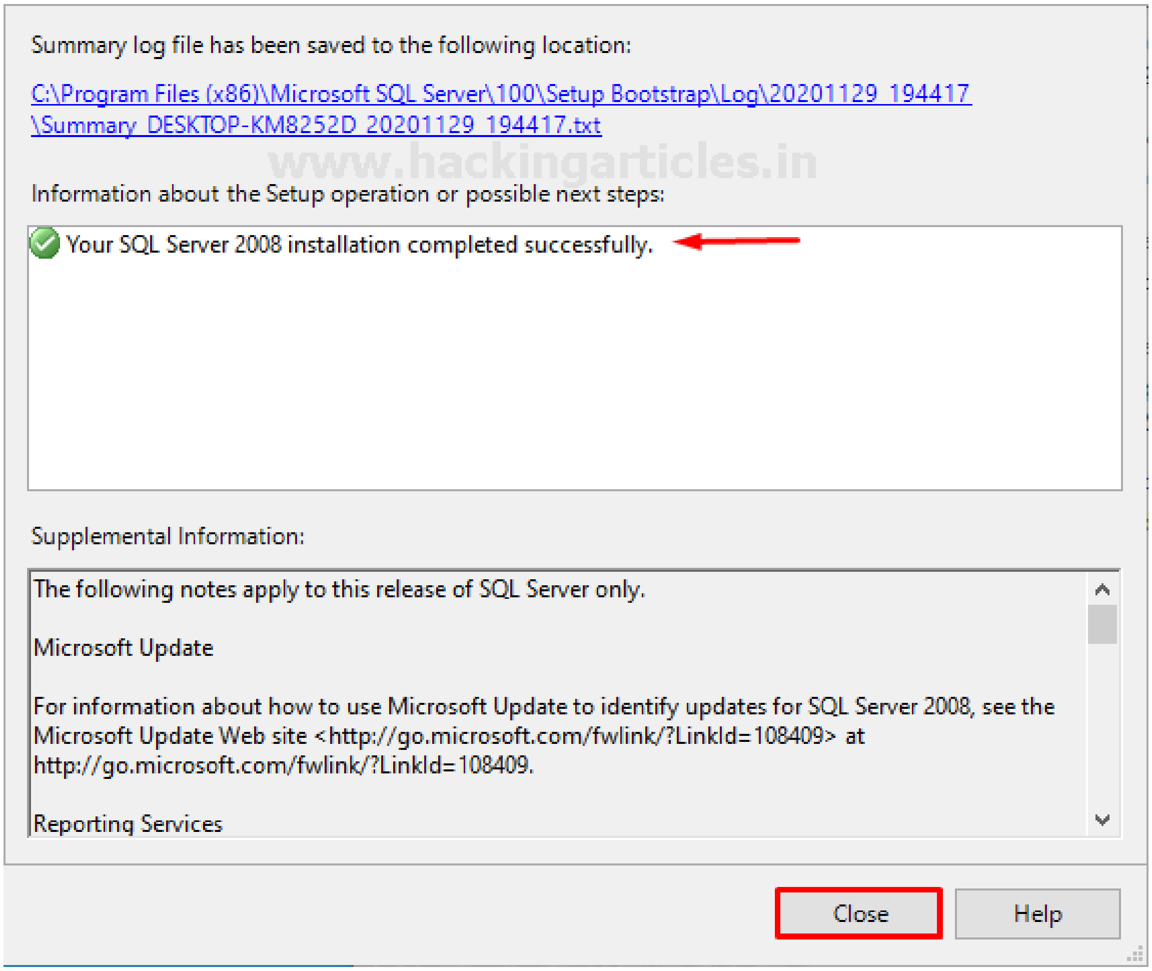
Specify SQL Server administrators

DESKTOP-KM8252D\vijvi (vijvi)

SQL Server administrators have unrestricted access to the Database Engine.

Hit next and next button until it reaches to Ready to install page further then install the server by hitting the install button. Yeah, it will take some to install so by leaving it on the installation process go get served you with some snacks… I know these processes are quite boring but to get hands-on and learn attack vectors or techniques we need to set up the lab first.

When the installation completes it will show you a prompt like shown below



Summary log file has been saved to the following location:

C:\Program Files (x86)\Microsoft SQL Server\100\Setup Bootstrap\Log\20201129_194417\Summary_DESKTOP-KM8252D_20201129_194417.txt

Information about the Setup operation or possible next steps:

✓ Your SQL Server 2008 installation completed successfully.

Supplemental Information:

The following notes apply to this release of SQL Server only.

Microsoft Update

For information about how to use Microsoft Update to identify updates for SQL Server 2008, see the Microsoft Update Web site <http://go.microsoft.com/fwlink/?LinkId=108409> at http://go.microsoft.com/fwlink/?LinkId=108409.

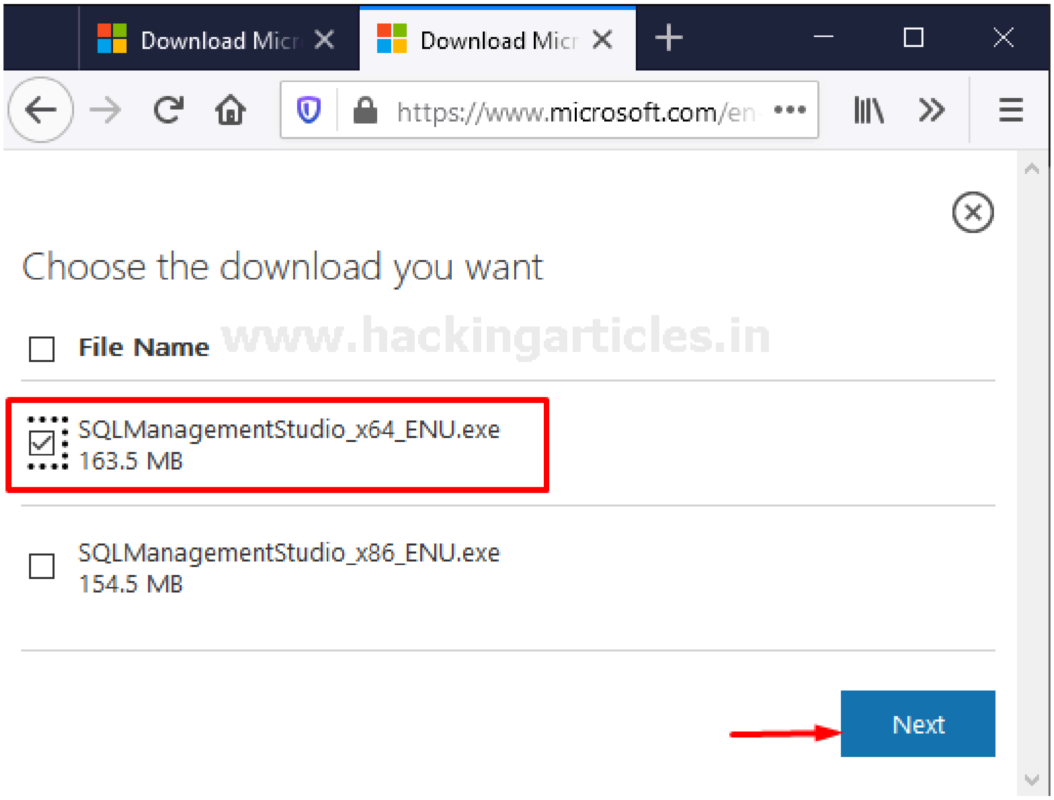
Reporting Services

As you can see, we have successfully installed SQL server 2008.

Installation and configuration of SQL Server Management Studio

You can download SQL Server Management Studio directly by following this link

https://www.microsoft.com/en-us/download/details.aspx?id=22985



Choose the download you want

□ File Name

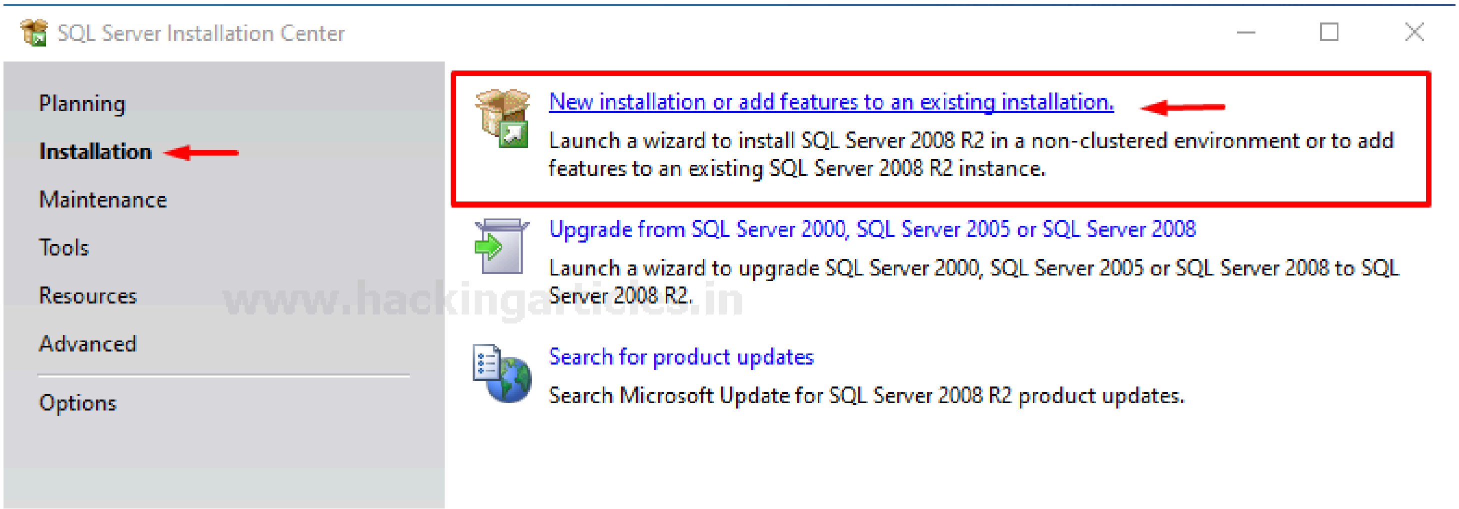
☑ SQLManagementStudio_x64_ENU.exe
163.5 MB

□ SQLManagementStudio_x86_ENU.exe
154.5 MB

Select the suitable package as per your environment and download the management studio.

Alright, when the download is complete open up the installation file and run the setup.

Once again we will see a prompt window like the previous SQL Server 2008 setup select the new installation

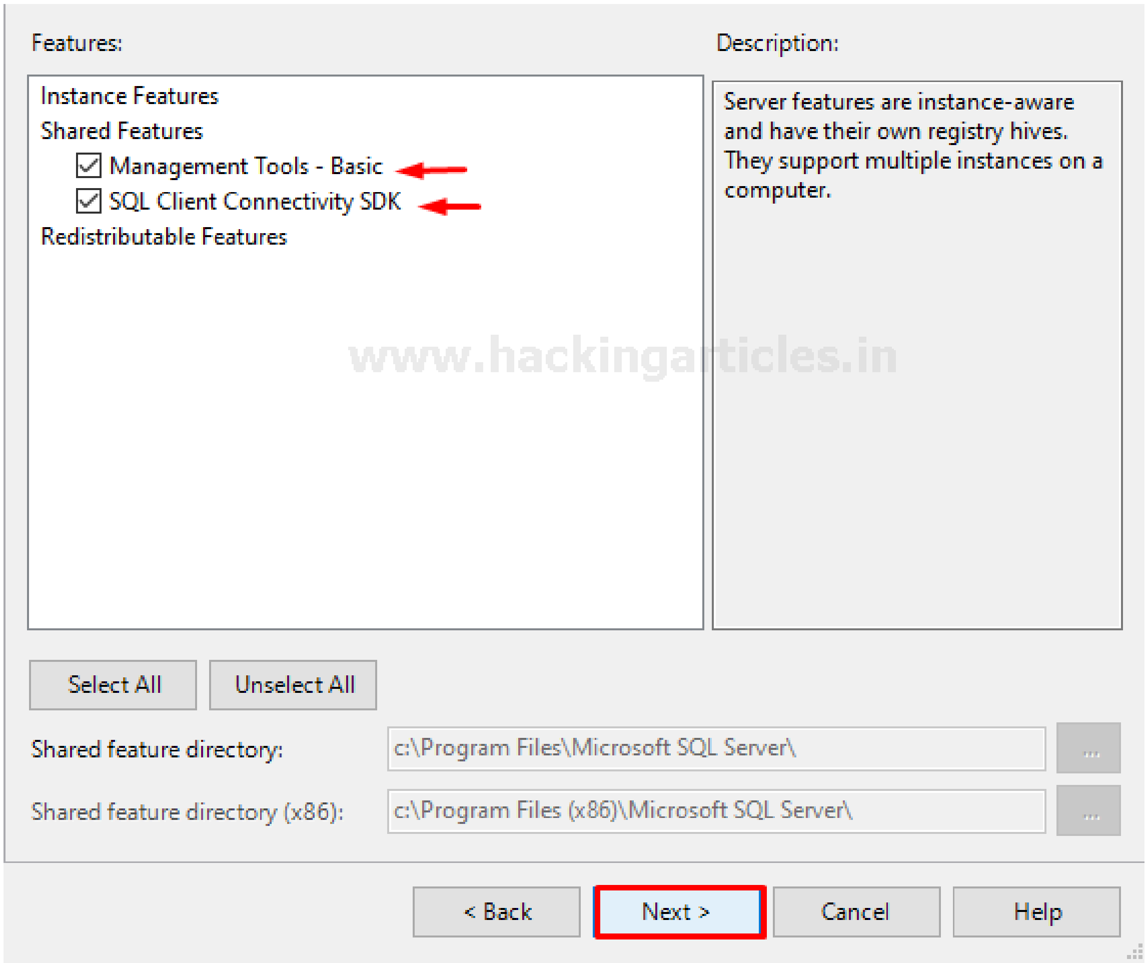


New installation or add features to an existing installation.
Launch a wizard to install SQL Server 2008 R2 in a non-clustered environment or to add features to an existing SQL Server 2008 R2 instance.

Upgrade from SQL Server 2000, SQL Server 2005 or SQL Server 2008
Launch a wizard to upgrade SQL Server 2000, SQL Server 2005 or SQL Server 2008 to SQL Server 2008 R2.

Search for product updates
Search Microsoft Update for SQL Server 2008 R2 product updates.

Accept the License Terms and on the features, page select All Features and move to next step



Features:

Instance Features

Shared Features

☑ Management Tools - Basic

☑ SQL Client Connectivity SDK

Redistributable Features

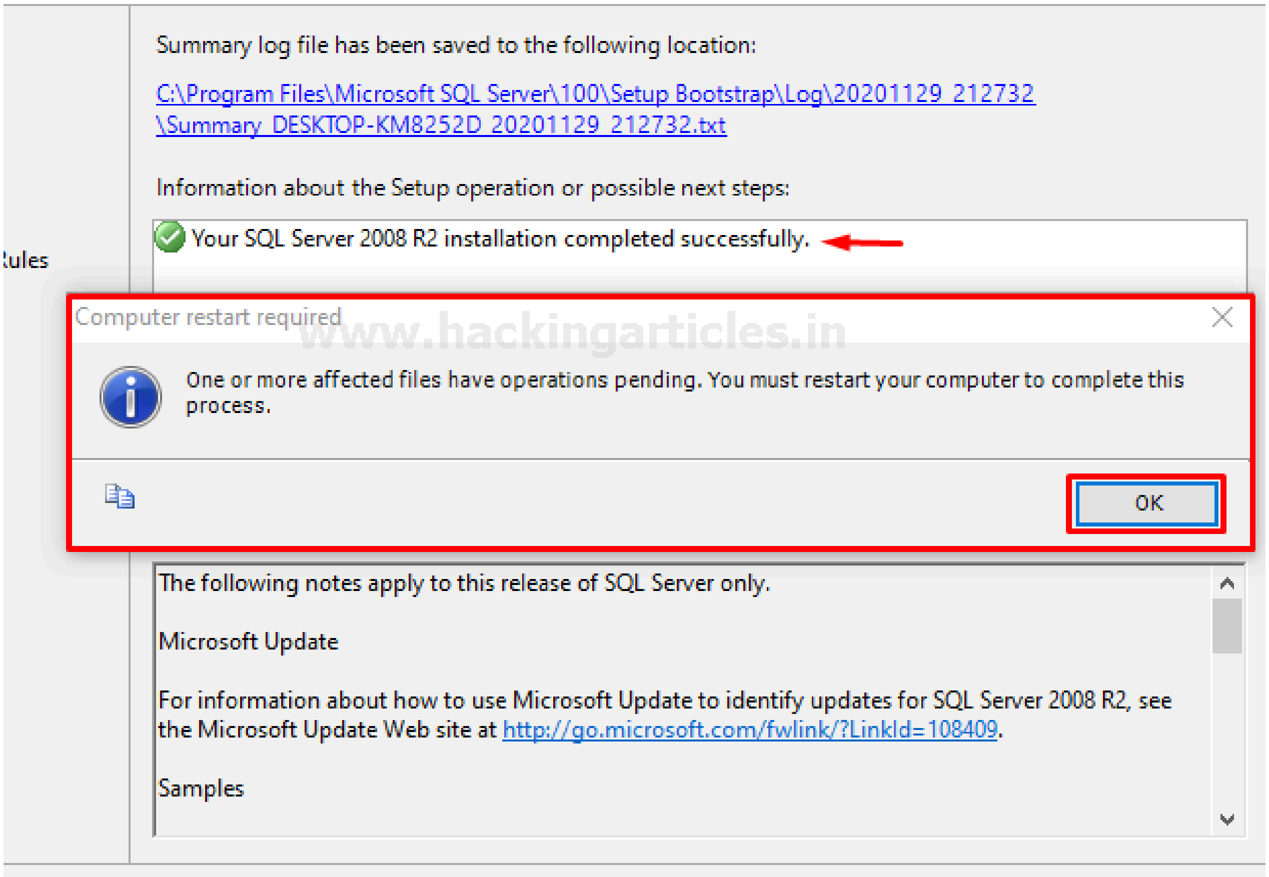
Description:

Server features are instance-aware and have their own registry hives. They support multiple instances on a computer.

Shared feature directory: c:\Program Files\Microsoft SQL Server\

Shared feature directory (x86): c:\Program Files (x86)\Microsoft SQL Server\

Further then hit the next and next button then it will perform error checks after that move to the next step without doing any changes and install the management studio. After, successfully installing the management studio it will needs to restart.



Summary log file has been saved to the following location:

C:\Program Files\Microsoft SQL Server\100\Setup Bootstrap\Log\20201129_212732
\Summary_DESKTOP-KM8252D_20201129_212732.txt

Information about the Setup operation or possible next steps:

Your SQL Server 2008 R2 installation completed successfully.

Computer restart required

One or more affected files have operations pending. You must restart your computer to complete this process.

The following notes apply to this release of SQL Server only.

Microsoft Update

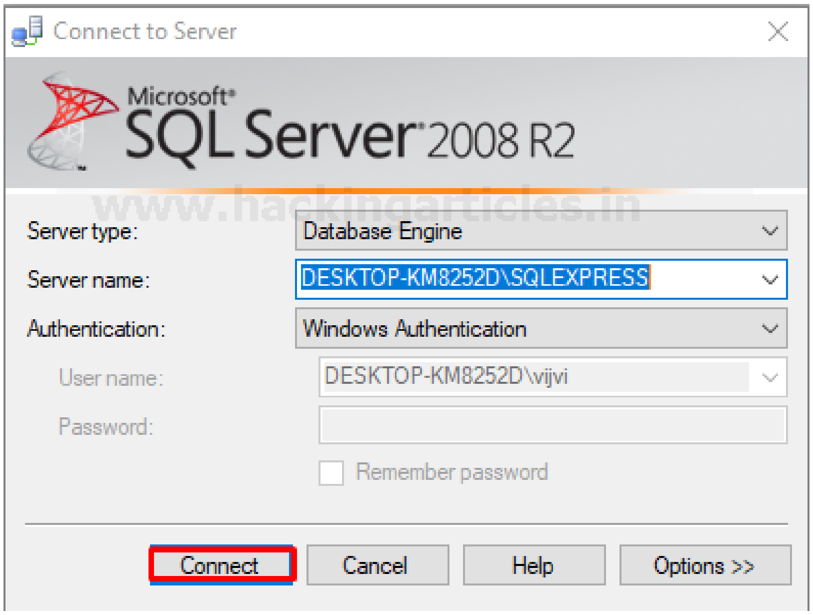
For information about how to use Microsoft Update to identify updates for SQL Server 2008 R2, see the Microsoft Update Web site at http://go.microsoft.com/fwlink/?LinkId=108409.

Samples

Now we’re done with the installation of SQL Server and SQL Server management studio but there are few more things need to do before moving to the installation of the next software

We’re good to go with SQL Server Management studio. Let’s open up the SQL Server management studio and by searching it in the start menu.

It may take some time just because of opening it for the first time. After that, it will open up a prompt something like shown below…. There are two options in the Authentication tab you can go with the windows authentication or else you can go with the SQL Server authentication. In my case I’m going to choose windows authentication because it doesn’t need to enter any credentials it will authenticate based on the windows session.



Server type: Database Engine

Server name: DESKTOP-KM8252D\SQLEXPRESS

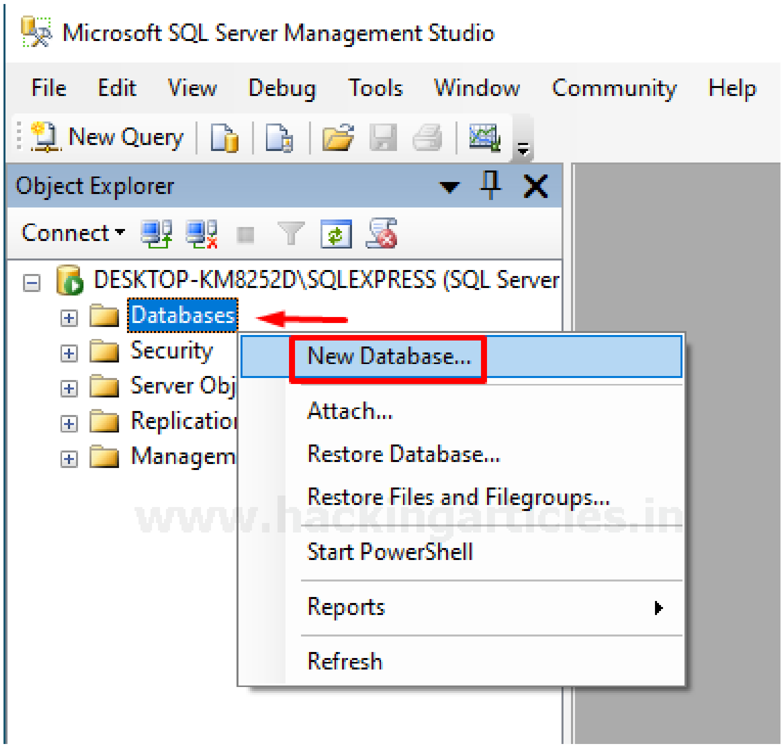
Authentication: Windows Authentication

User name: DESKTOP-KM8252D\vijvi

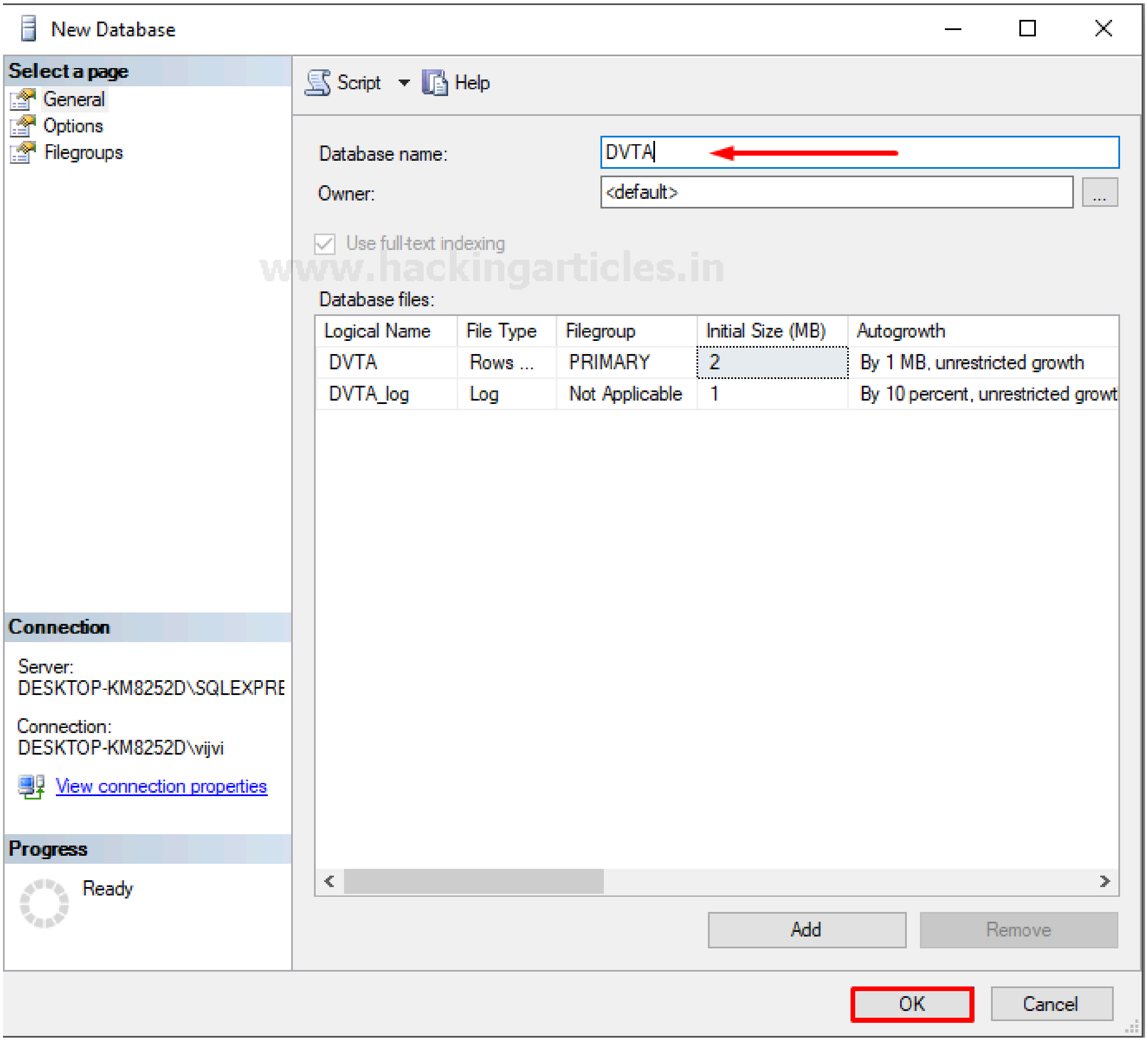
Password:

□ Remember password

Hit the connect button to access the database that we have installed earlier. Great, we've successfully connected with the database. As you can see there are some databases and when you expand Databases there are a couple of system databases but there are not user-defined databases yet. So, Let's give a right-click to databases to create a new database



Give a suitable name to the database in my case I'm defining the database by the name of DVTA and click ok



Database name: DVTA

Owner: <default>

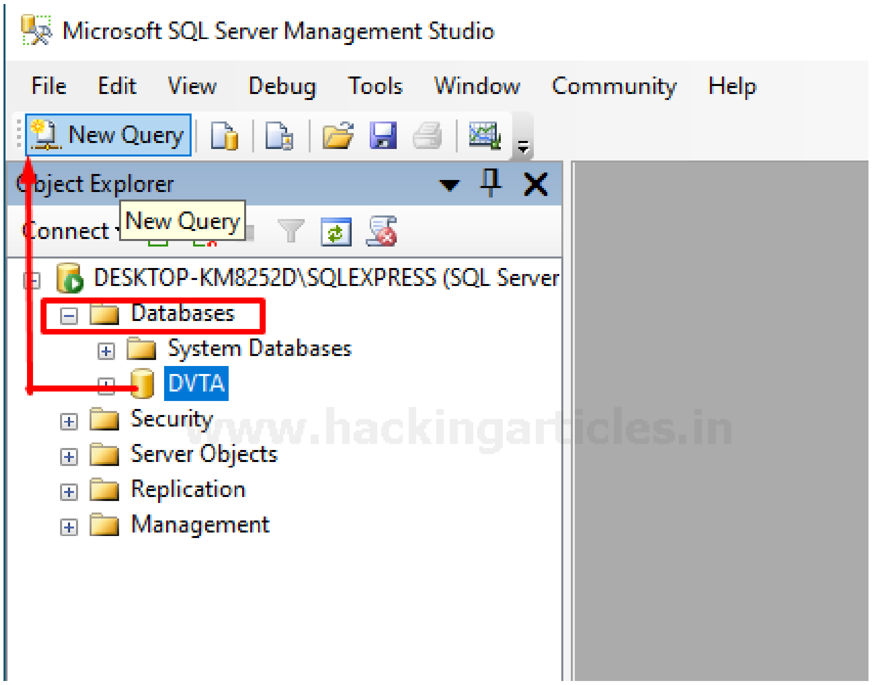
☑ Use full-text indexing

Database files:

Logical Name	File Type	Filegroup	Initial Size (MB)	Autogrowth
DVTA	Rows ...	PRIMARY	2	By 1 MB, unrestricted growth
DVTA_log	Log	Not Applicable	1	By 10 percent, unrestricted growt

Once again when you expand the Database section you can notice that there is a Database created named DVTA. Again, when you expand the DVTA database you can see Tables when you expand it there is a system table there are not any user-defined tables are available.

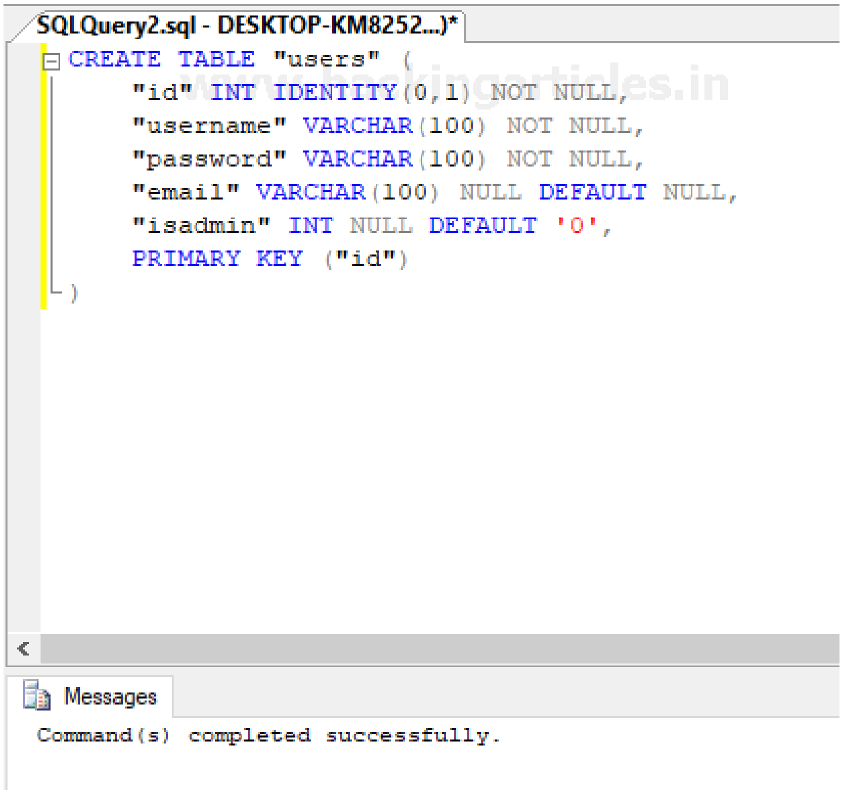
Now, we will have to create some tables and insert some data into it for the DVTA application. To create a new Table click on DVTA and select new Query as shown below.



Let’s create some tables, The first table we’re going to create is called users. To create a new table, we need to create a query as shown below

```
CREATE TABLE "users" (
    "id" INT IDENTITY(0,1) NOT NULL,
    "username" VARCHAR(100) NOT NULL,
    "password" VARCHAR(100) NOT NULL,
    "email" VARCHAR(100) NULL DEFAULT NULL,
    "isadmin" INT NULL DEFAULT '0',
    PRIMARY KEY ("id")
)
```

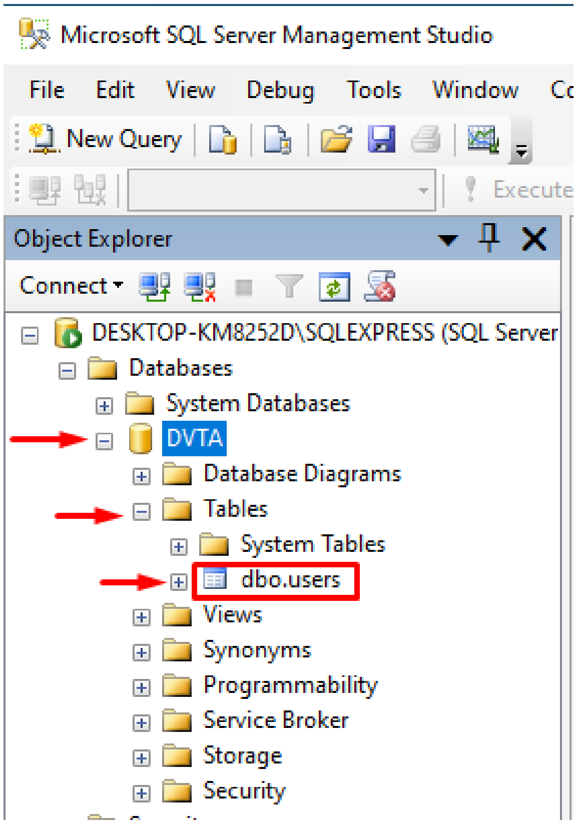
After creating the Query don’t forget to execute it.



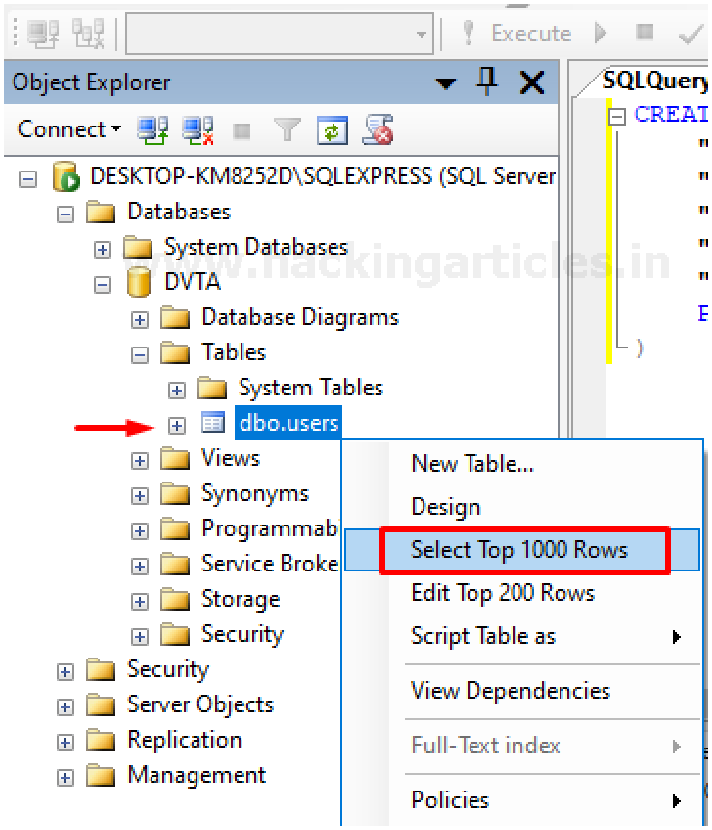
```
CREATE TABLE "users" (
    "id" INT IDENTITY(0,1) NOT NULL,
    "username" VARCHAR(100) NOT NULL,
    "password" VARCHAR(100) NOT NULL,
    "email" VARCHAR(100) NULL DEFAULT NULL,
    "isadmin" INT NULL DEFAULT '0',
    PRIMARY KEY ("id")
)
```

```
Command(s) completed successfully.
```

Now, once again when you expand the Tables section under DVTA where a table is created called dbo.users

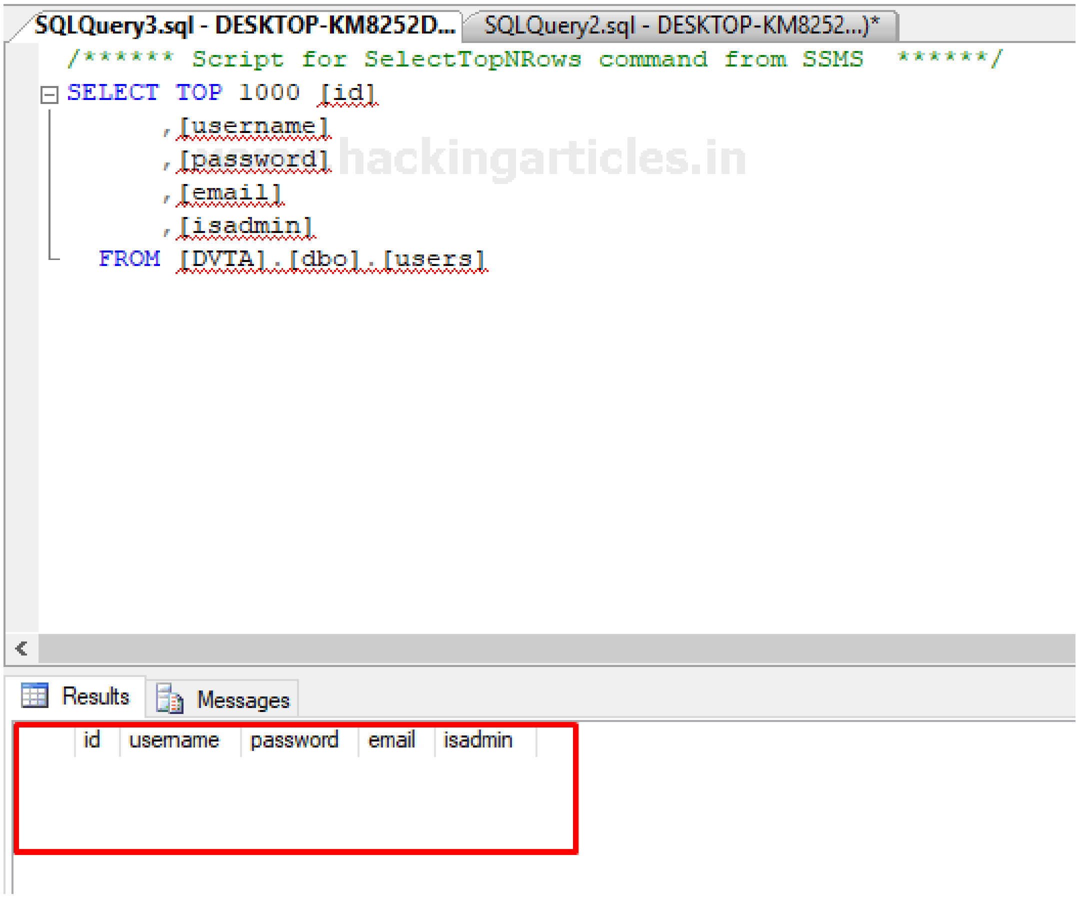


select the top 1000 rows of dbo.users



There you can see the top five-column named

- Id
- Username
- Password
- Email
- Isadmin

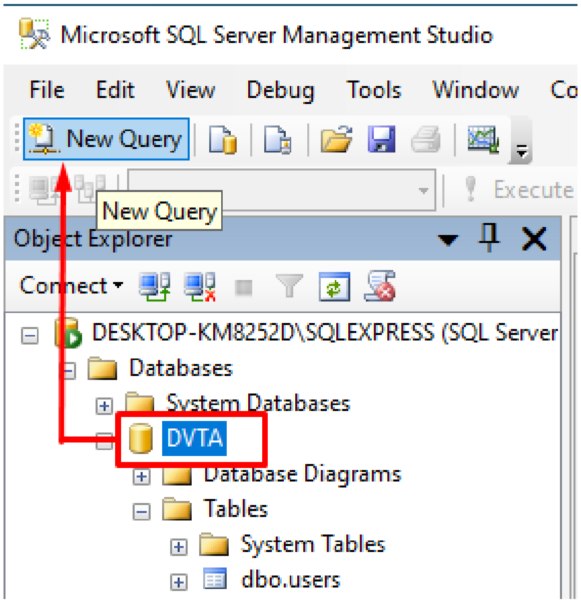


SQLQuery3.sql - DESKTOP-KM8252D...
SQLQuery2.sql - DESKTOP-KM8252...)*
Results
Messages

```
/****** Script for SelectTopNRows command from SSMS  ******/
SELECT TOP 1000 [id]
      ,[username]
      ,[password]
      ,[email]
      ,[isadmin]
  FROM [DVTA].[dbo].[users]
```

id	username	password	email	isadmin

But these tables are still empty. So let's insert some data into that table. Once again select DVTA and create a New Query.



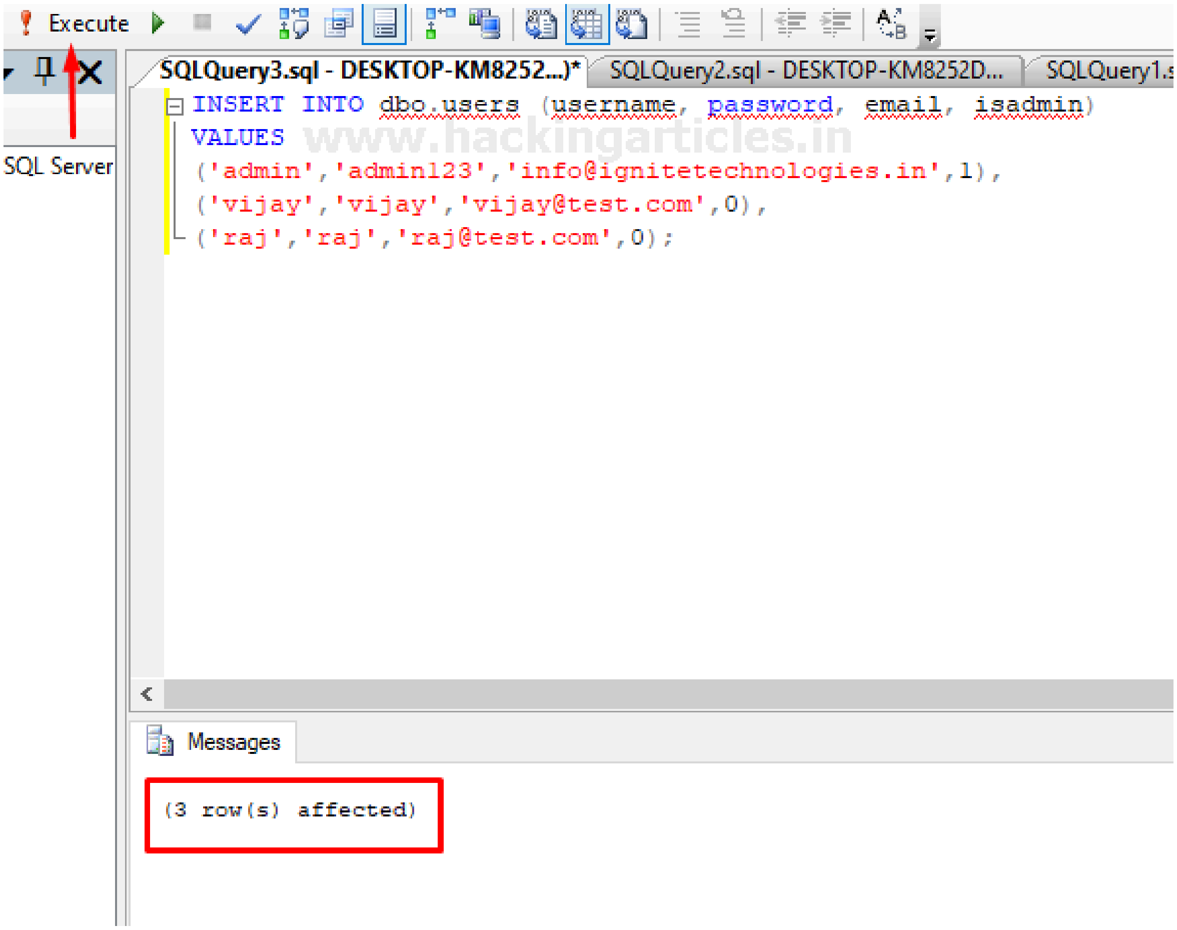
In order to fill some data in dbo.user table we need to create another query as to where we define the id, username, password, email, and role

INSERT INTO dbo.users (username, password, email, isadmin)

VALUES

```
    ('admin','admin123','info@ignitetechnologies.in',1),
    ('vijay','vijay','vijay991133@gmail.com',0),
    ('raj','raj','info@ignitetechnologies.in',0);
```

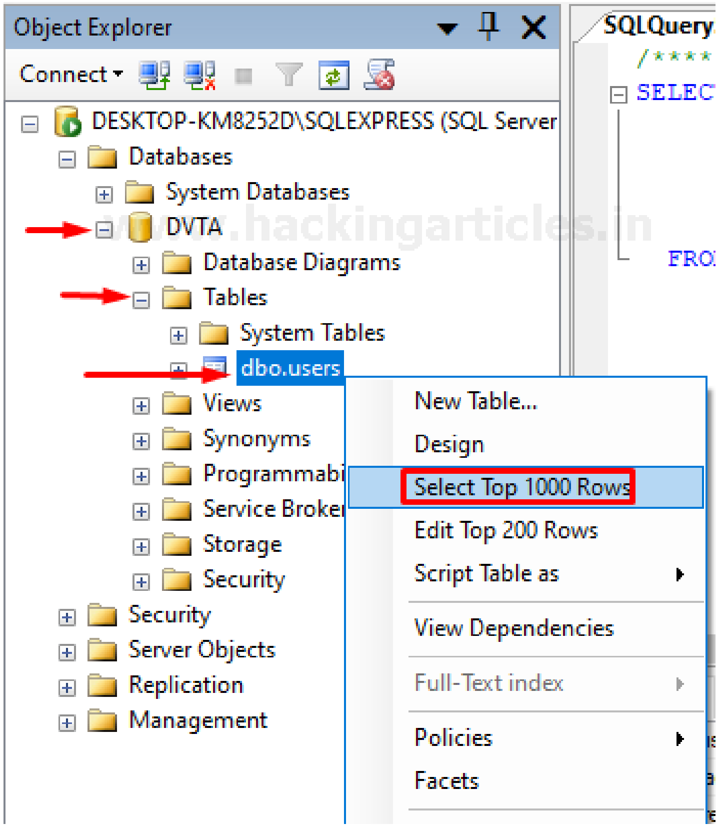
And don't forget to execute it as shown below


Execute
SQLQuery3.sql - DESKTOP-KM8252...)*
SQLQuery2.sql - DESKTOP-KM8252D...
SQLQuery1.s
SQL Server
www.hackingarticles.in
Messages

```
INSERT INTO dbo.users (username, password, email, isadmin)
VALUES
 ('admin','admin123','info@ignitetechnologies.in',1),
 ('vijay','vijay','vijay@test.com',0),
 ('raj','raj','raj@test.com',0);
```

```
(3 row(s) affected)
```

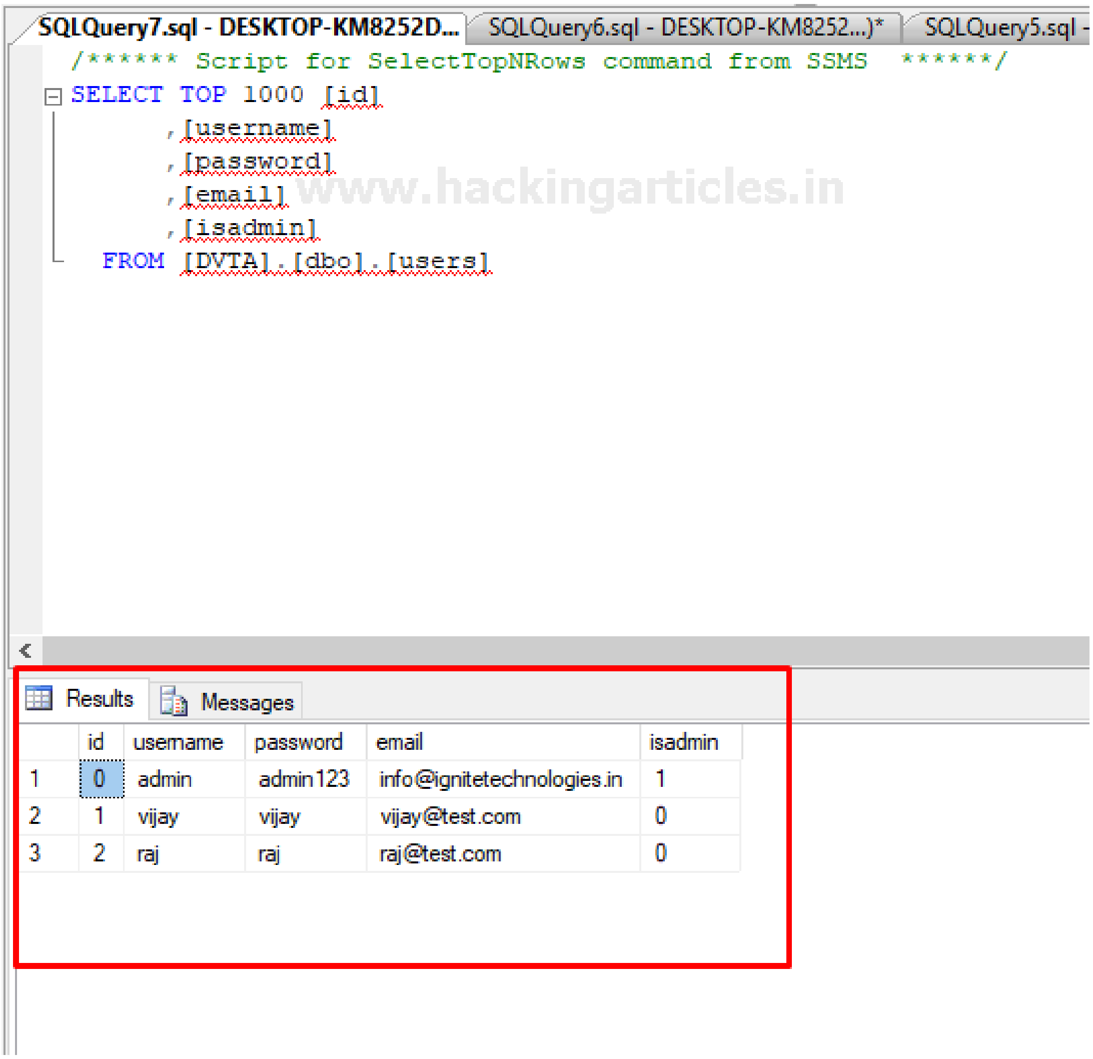
Again select the dbo.users table and open the top 1000 rows



And there you go, if you notice there are three records now

- Admin
- Vijay
- Raj

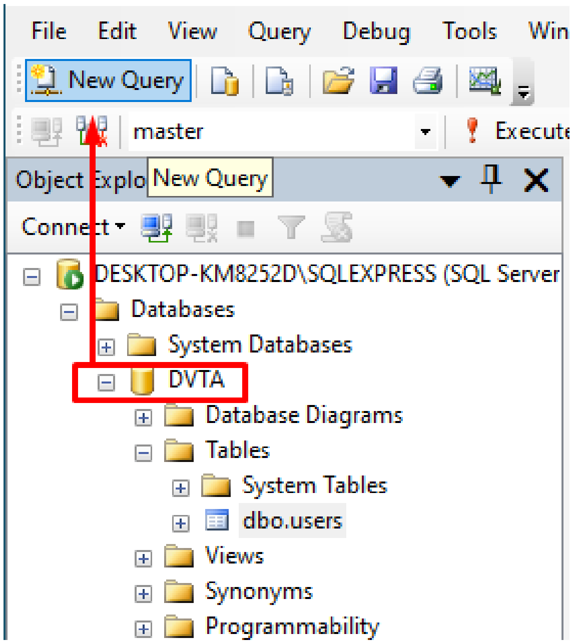
Each have their own credentials. Admin have administrator privileges and the rest of the two users are standard users.


SQLQuery7.sql - DESKTOP-KM8252D...
SQLQuery6.sql - DESKTOP-KM8252...)*
SQLQuery5.sql -
Results
Messages

```
/****** Script for SelectTopNRows command from SSMS  ******/
SELECT TOP 1000 [id]
      ,[username]
      ,[password]
      ,[email]
      ,[isadmin]
  FROM [DVTA].[dbo].[users]
```

	id	username	password	email	isadmin
1	0	admin	admin123	info@ignitetechnologies.in	1
2	1	vijay	vijay	vijay@test.com	0
3	2	raj	raj	raj@test.com	0

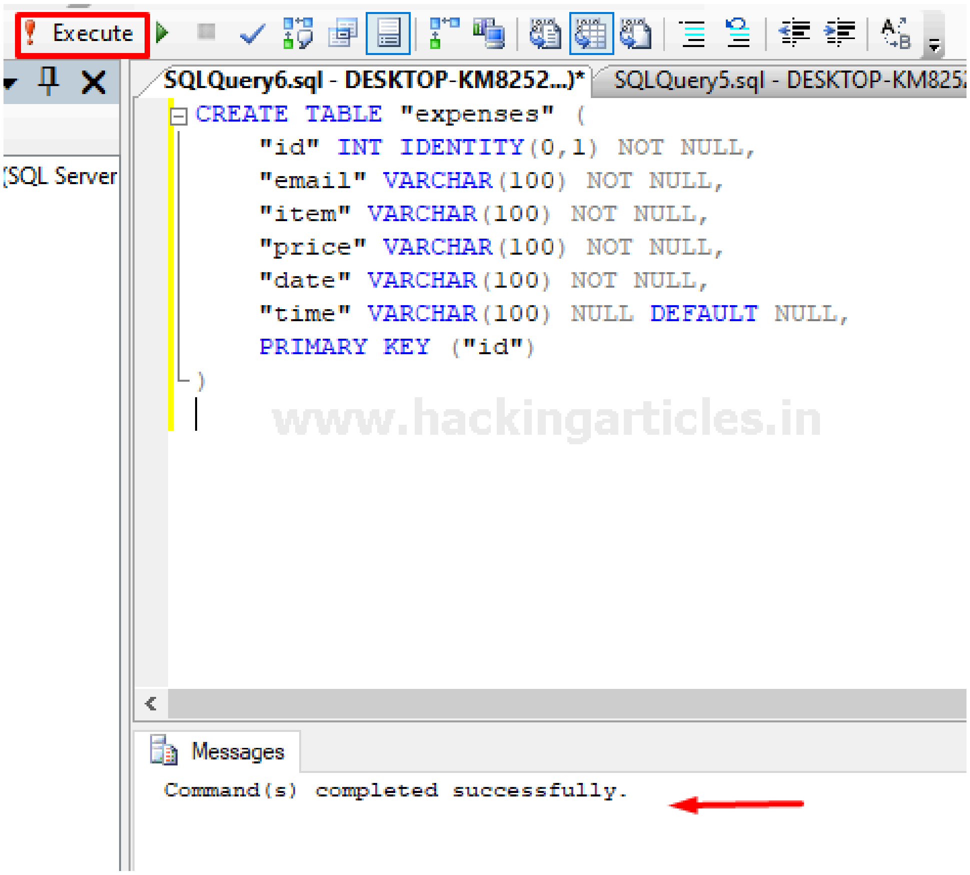
Let’s create another table called expenses. Select the DVTA database and create a new Query



Use the following Query to create the expenses table

```
CREATE TABLE "expenses" (
    "id" INT IDENTITY(0,1) NOT NULL,
    "email" VARCHAR(100) NOT NULL,
    "item" VARCHAR(100) NOT NULL,
    "price" VARCHAR(100) NOT NULL,
    "date" VARCHAR(100) NOT NULL,
    "time" VARCHAR(100) NULL DEFAULT NULL,
    PRIMARY KEY ("id")
)
```

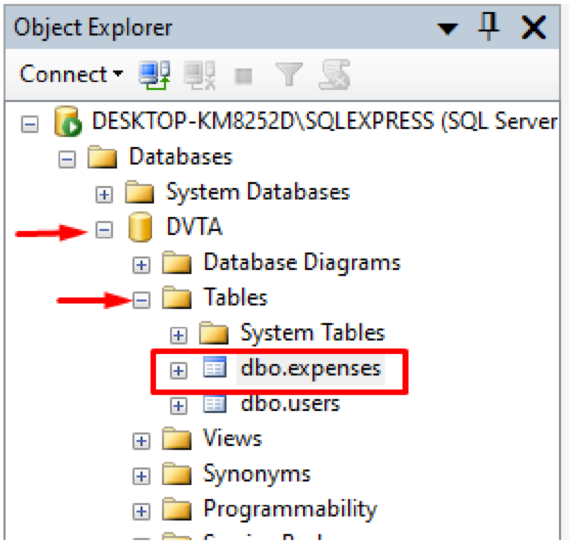
After creating the query execute it.


Execute
SQLQuery6.sql - DESKTOP-KM8252...)*
SQLQuery5.sql - DESKTOP-KM825
SQL Server
Messages

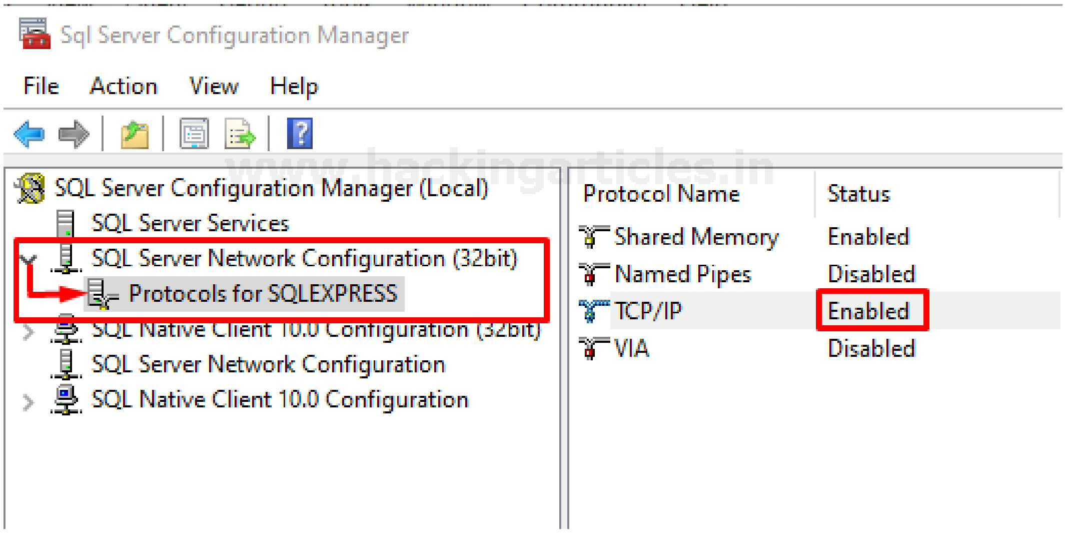
```
CREATE TABLE "expenses" (
    "id" INT IDENTITY(0,1) NOT NULL,
    "email" VARCHAR(100) NOT NULL,
    "item" VARCHAR(100) NOT NULL,
    "price" VARCHAR(100) NOT NULL,
    "date" VARCHAR(100) NOT NULL,
    "time" VARCHAR(100) NULL DEFAULT NULL,
    PRIMARY KEY ("id")
)
```

```
Command(s) completed successfully.
```

Now we’ve successfully created two different Tables for the DVTA application

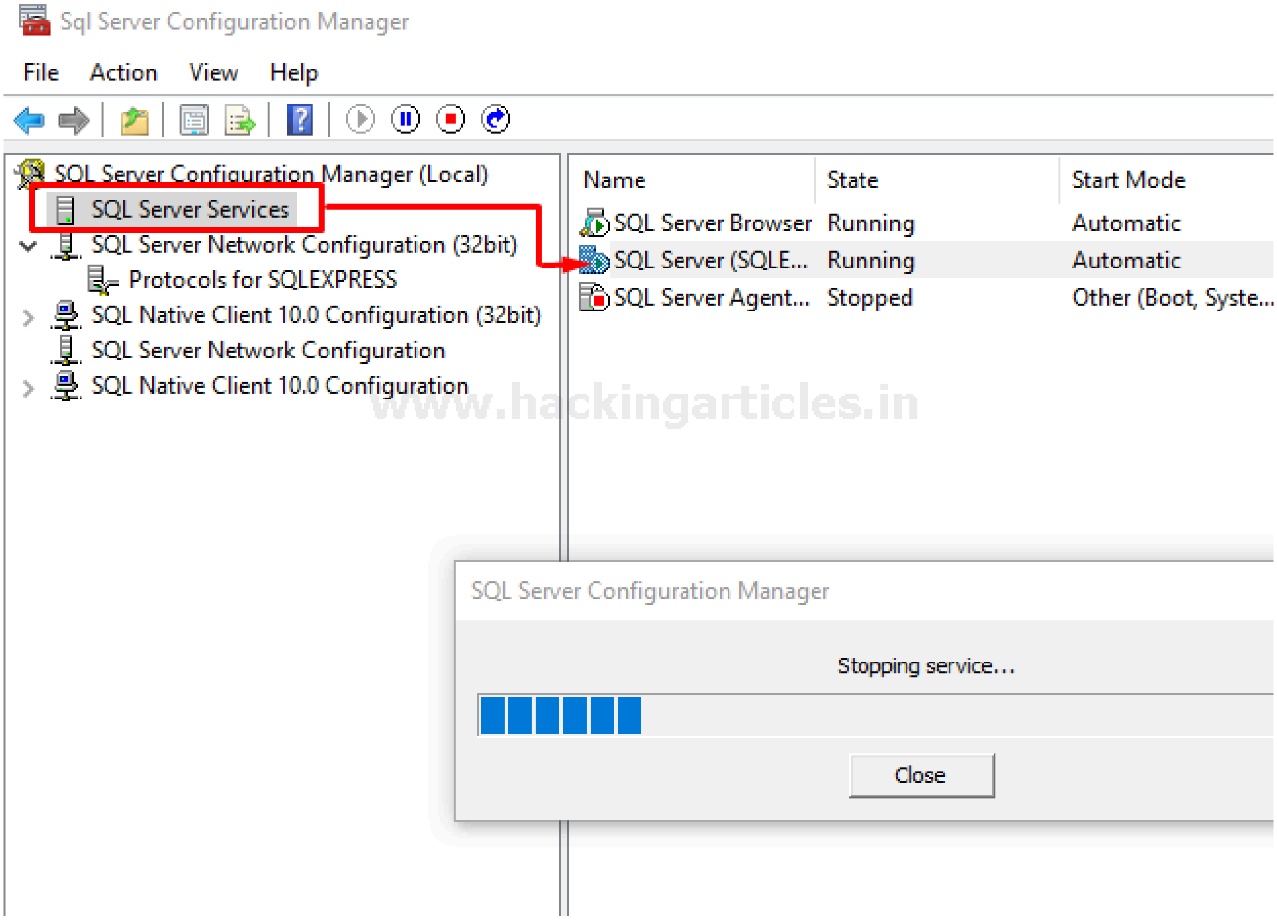


Now there is one more last step left then we can move to the installation of FileZilla Server. Open up the **"SQL Server Configuration Manager"** by searching it on the start menu. Expand the **"SQL Server Network Configuration"** and click on Protocols for SQLEXPRESS and enable the TCP/IP protocol as shown below.


Sql Server Configuration Manager
File
Action
View
Help
www.hackingarticles.in
SQL Server Configuration Manager (Local)
SQL Server Services
SQL Server Network Configuration (32bit)
Protocols for SQLEXPRESS
SQL Native Client 10.0 Configuration (32bit)
SQL Server Network Configuration
SQL Native Client 10.0 Configuration

Protocol Name	Status
Shared Memory	Enabled
Named Pipes	Disabled
TCP/IP	Enabled
VIA	Disabled

Now it requires a restart. To restart this service, click on SQL Server Services and give a right-click on SQL SERVER EXPRESS and restart it.


Sql Server Configuration Manager
File Action View Help
SQL Server Configuration Manager (Local)
SQL Server Services
SQL Server Network Configuration (32bit)
Protocols for SQLEXPRESS
SQL Native Client 10.0 Configuration (32bit)
SQL Server Network Configuration
SQL Native Client 10.0 Configuration
Close

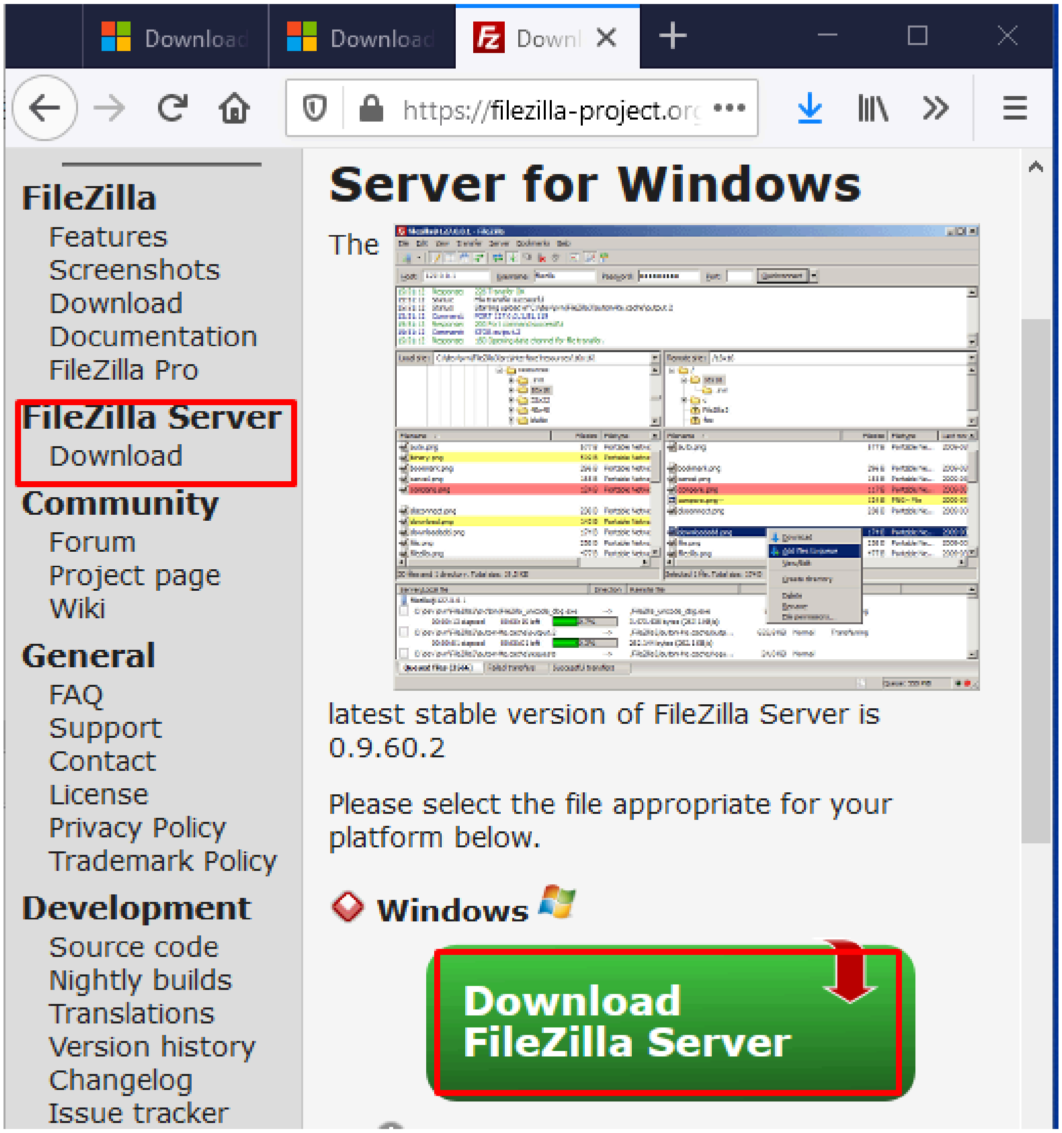
Name	State	Start Mode
SQL Server Browser	Running	Automatic
SQL Server (SQLE...	Running	Automatic
SQL Server Agent...	Stopped	Other (Boot, Syste...

SQL Server Configuration Manager

Stopping service…

Great, now we're done with SQL Server Setup. Download and install FileZilla Server. You can directly download the FileZilla server by the below link

https://filezilla-project.org/download.php?type=server



Server for Windows

The latest stable version of FileZilla Server is 0.9.60.2

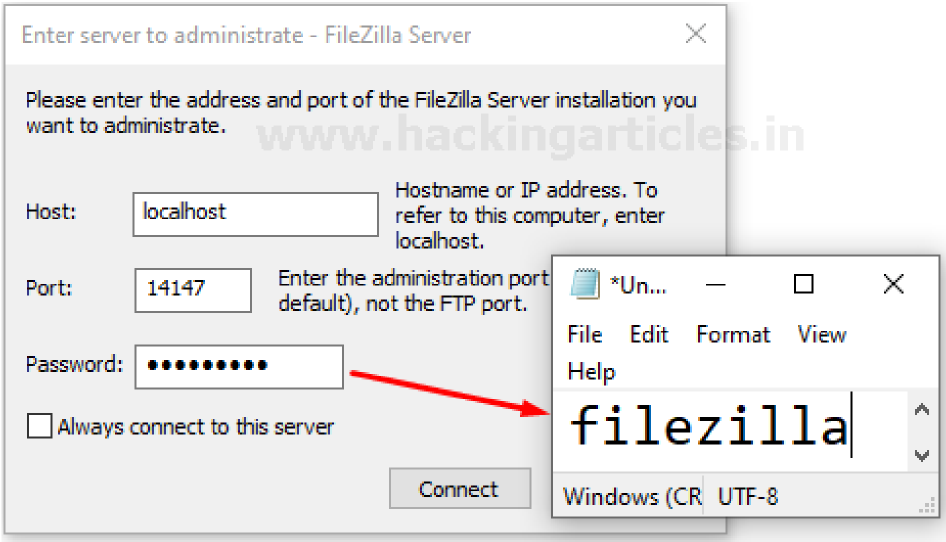
Please select the file appropriate for your platform below.

Windows

Once that is downloaded give a double click to the installation package and install the FileZilla server. Accept the License terms and hit next and next and install without making any changes.

Once this is done The FileZilla Server should be automatically started. Now, we need to do a bit of configuration here

Let’s enter **Filezilla** as the Password and then click connect



Enter server to administrate - FileZilla Server

Please enter the address and port of the FileZilla Server installation you want to administrate.

Host: localhost

Hostname or IP address. To refer to this computer, enter localhost.

Port: 14147

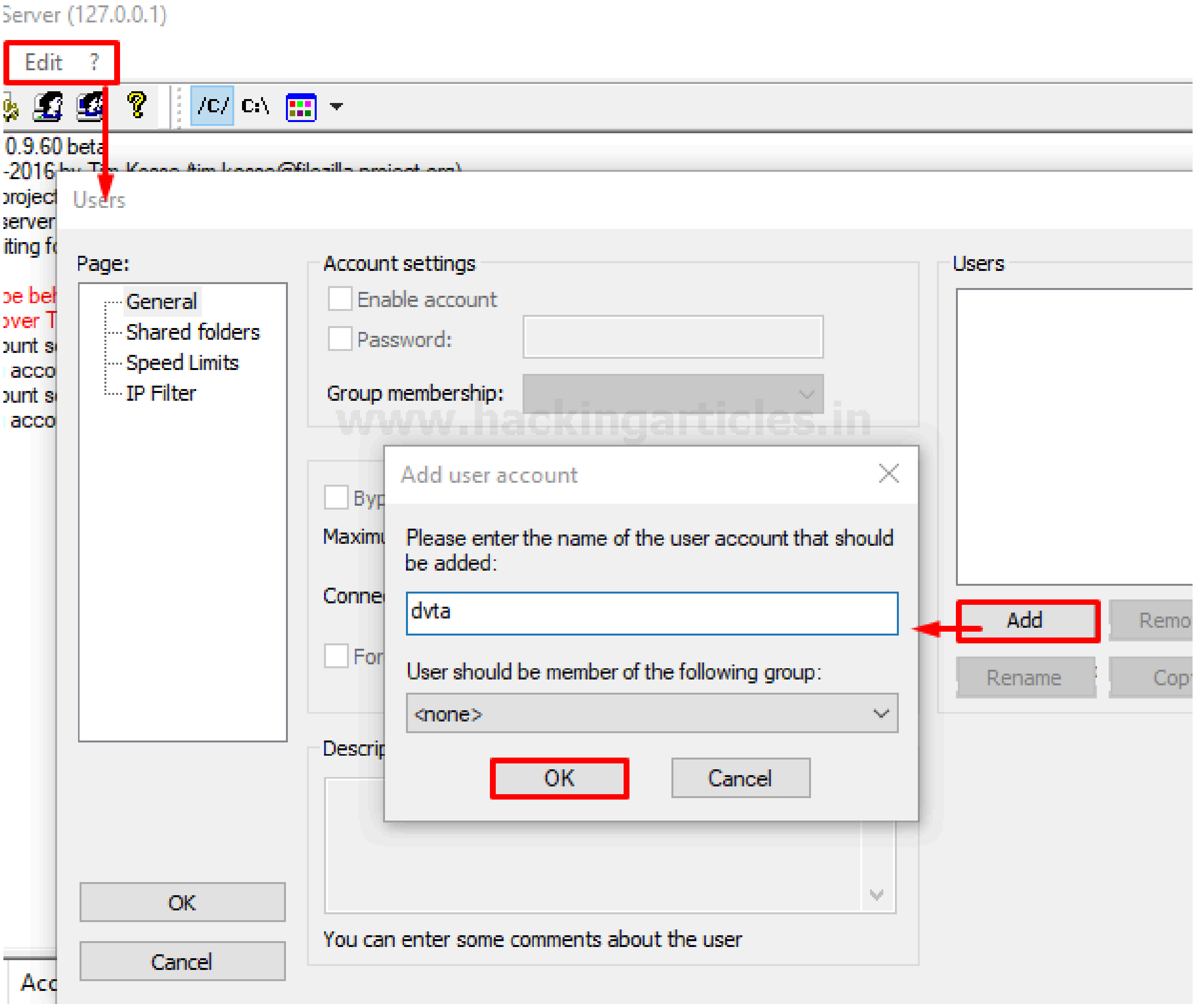
Enter the administration port default), not the FTP port.

Password: •••••••••

□ Always connect to this server

filezilla

Click on Edit and select users. Now we’re going to create a new FTP user account by clicking ADD button. The username is **dvta** and then click ok



Add user account

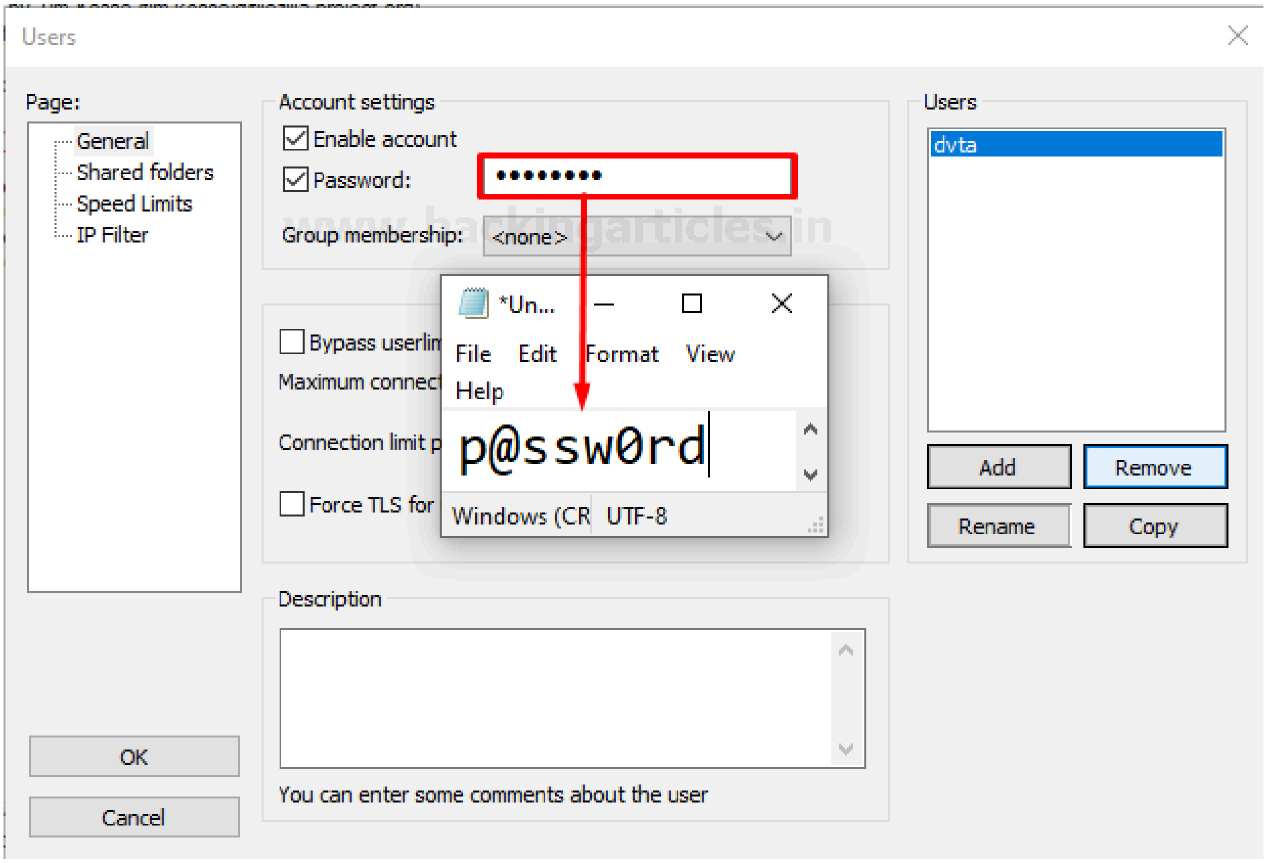
Please enter the name of the user account that should be added:

dvta

User should be member of the following group:

<none>

Now, click on the Password This is the same password that we have previously used on the SQL Server that is **p@ssw0rd** because this is already setup in the DVTA client so, we need to give this same account configuring FileZilla server that’s why I’m choosing this password here along with the user name dvta.



Account settings

☑ Enable account

☑ Password: •••••••••

Group membership: <none>

☐ Bypass userlim

Maximum connect

Connection limit p

☐ Force TLS for

p@ssw0rd

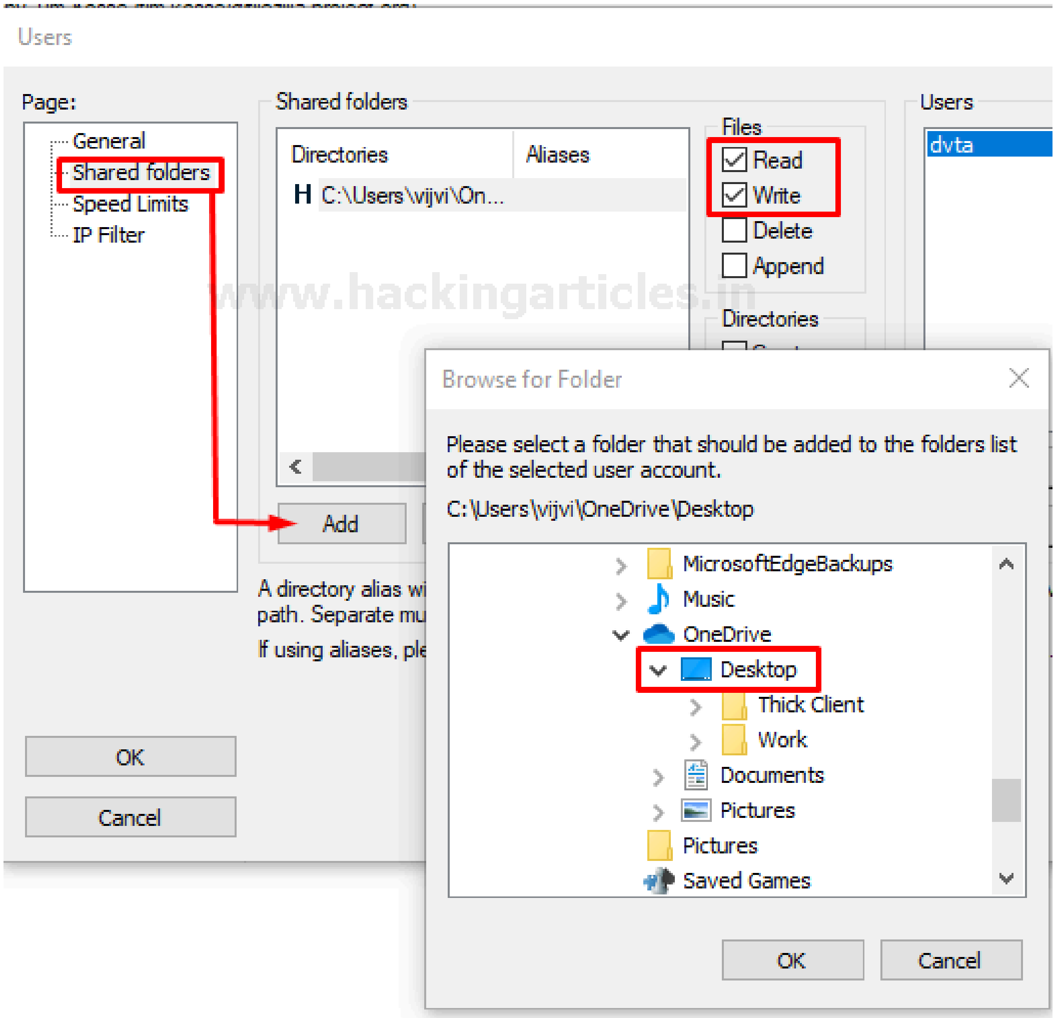
Users

dvta

Description

You can enter some comments about the user

Now one more last step is left to complete the server setup. Navigate to Shared folders and click on the add button and choose a directory that is going to be used by the FileZilla server to place the uploaded files. Further, then give it read and write permissions and finally click ok.



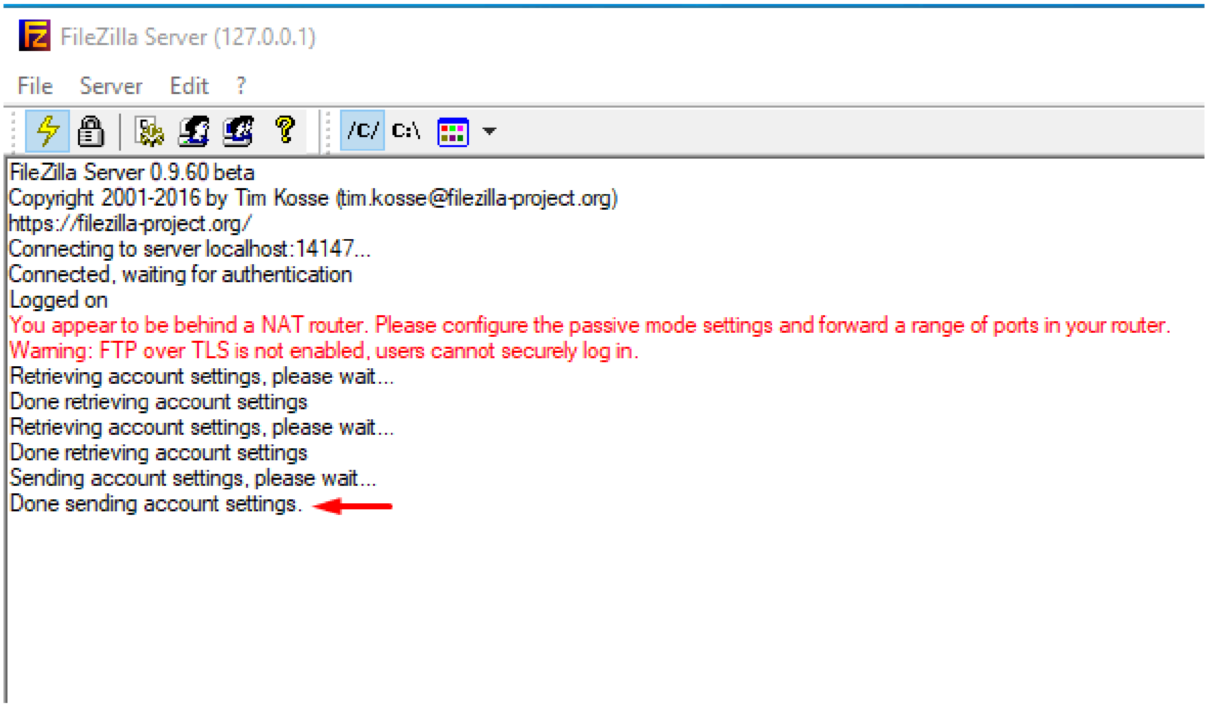
☑ Read
☑ Write
□ Delete
□ Append

A directory alias wi
path. Separate mu
If using aliases, ple

Please select a folder that should be added to the folders list of the selected user account.

C:\Users\vijvi\OneDrive\Desktop

As you can see we have successfully completed the setup of the FileZilla server.



```
FileZilla Server 0.9.60 beta
Copyright 2001-2016 by Tim Kosse (tim.kosse@filezilla-project.org)
https://filezilla-project.org/
Connecting to server localhost:14147...
Connected, waiting for authentication
Logged on
You appear to be behind a NAT router. Please configure the passive mode settings and forward a range of ports in your router.
Warning: FTP over TLS is not enabled, users cannot securely log in.
Retrieving account settings, please wait...
Done retrieving account settings
Retrieving account settings, please wait...
Done retrieving account settings
Sending account settings, please wait...
Done sending account settings.
```

Now we do have FTP Server Setup as well.

Let’s end up here In the next part, we will discuss how to DVTA application to connect to this server.