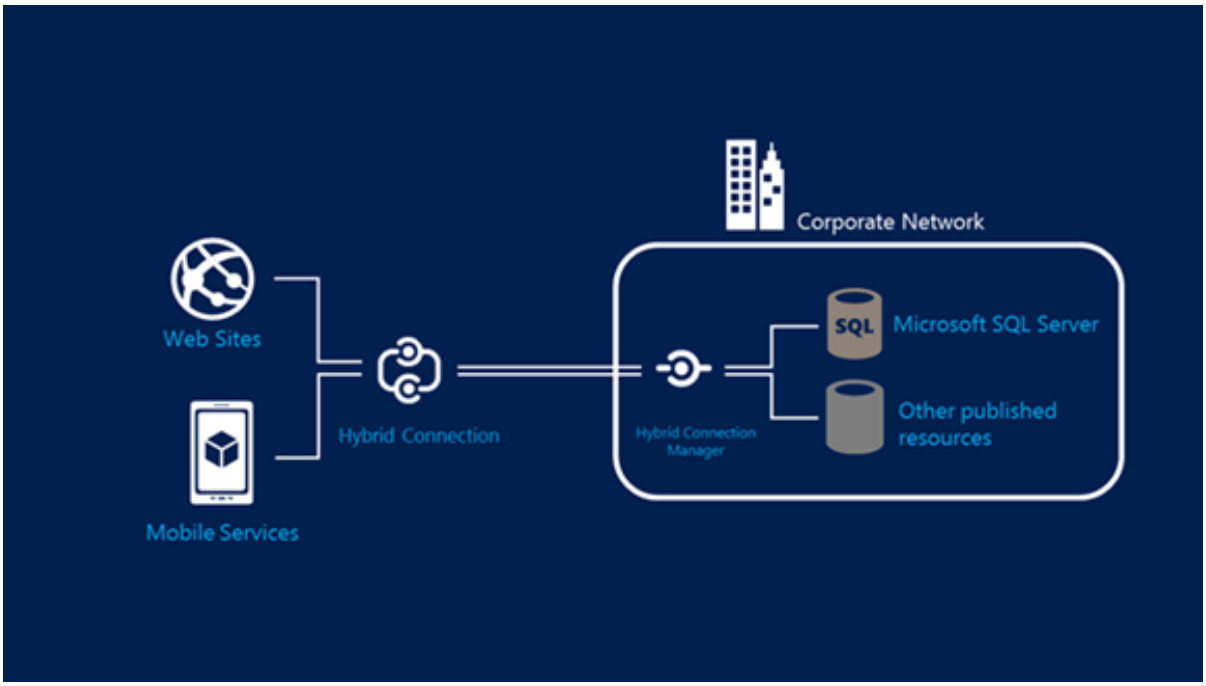
Hybrid Connection to On-Premises SQL Server

Overview:

Hybrid connections are used to let the azure applications (Web Apps, mobile Apps, etc.) to connect to on premises resources behind some firewalls or NATs. Based on HTTP and Web-sockets, allows bidirectional binary stream communication between to network application.

Following is a diagrammatic elaboration of its architecture:



It supersedes the former, equally named BizTalk Services feature (now retired) that was based on proprietary protocol foundation.

Following are the frameworks and application combination that are currently supported by the Hybrid Connection:

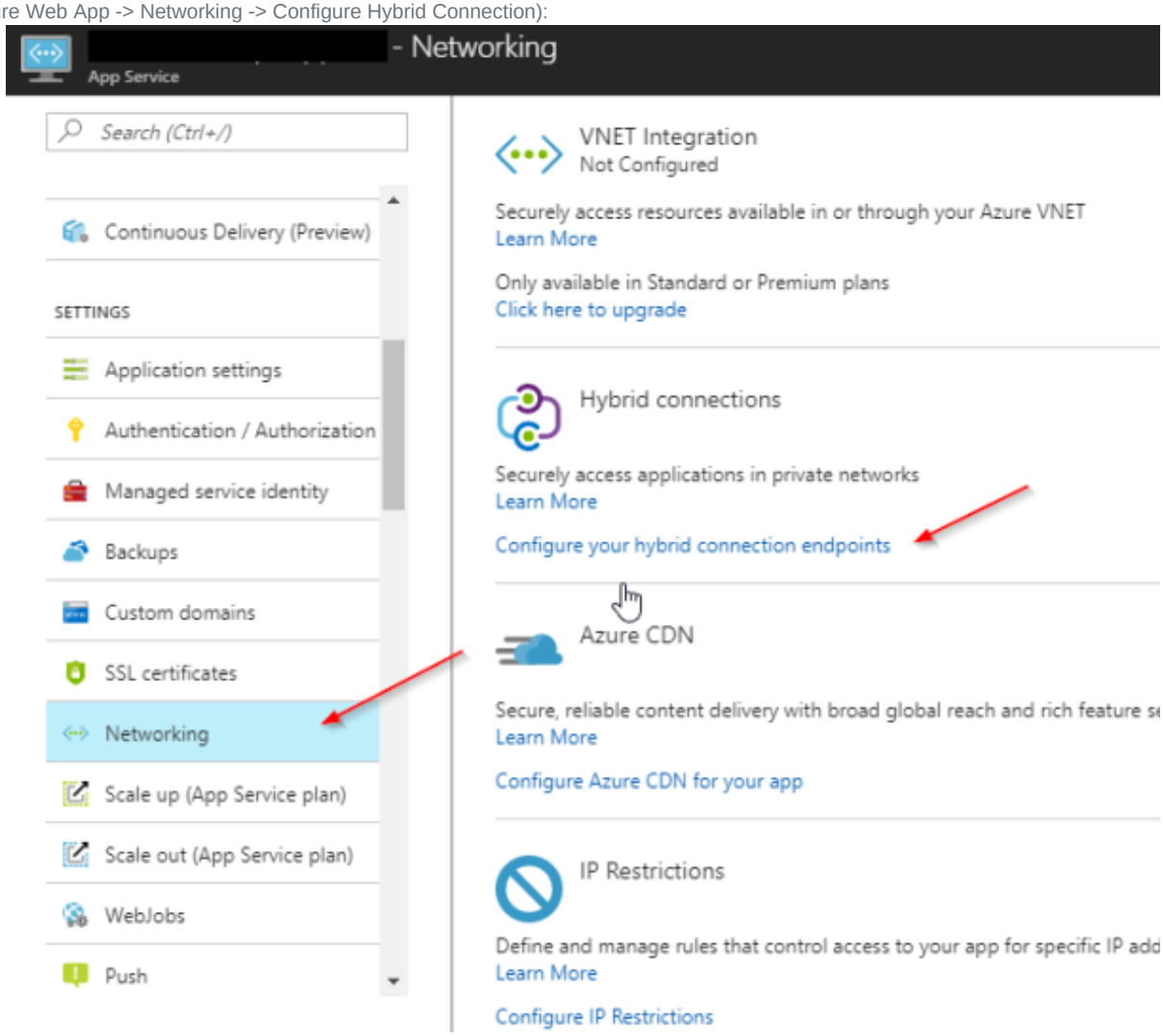
- .NET framework access to SQL Server
- .NET framework access to HTTP/HTTPS services with Web-client
- PHP access to SQL Server, MySQL
- Java access to SQL Server, MySQL and Oracle
- Java access to HTTP/HTTPS services

Hybrid Connection to On-Premises SQL Server:

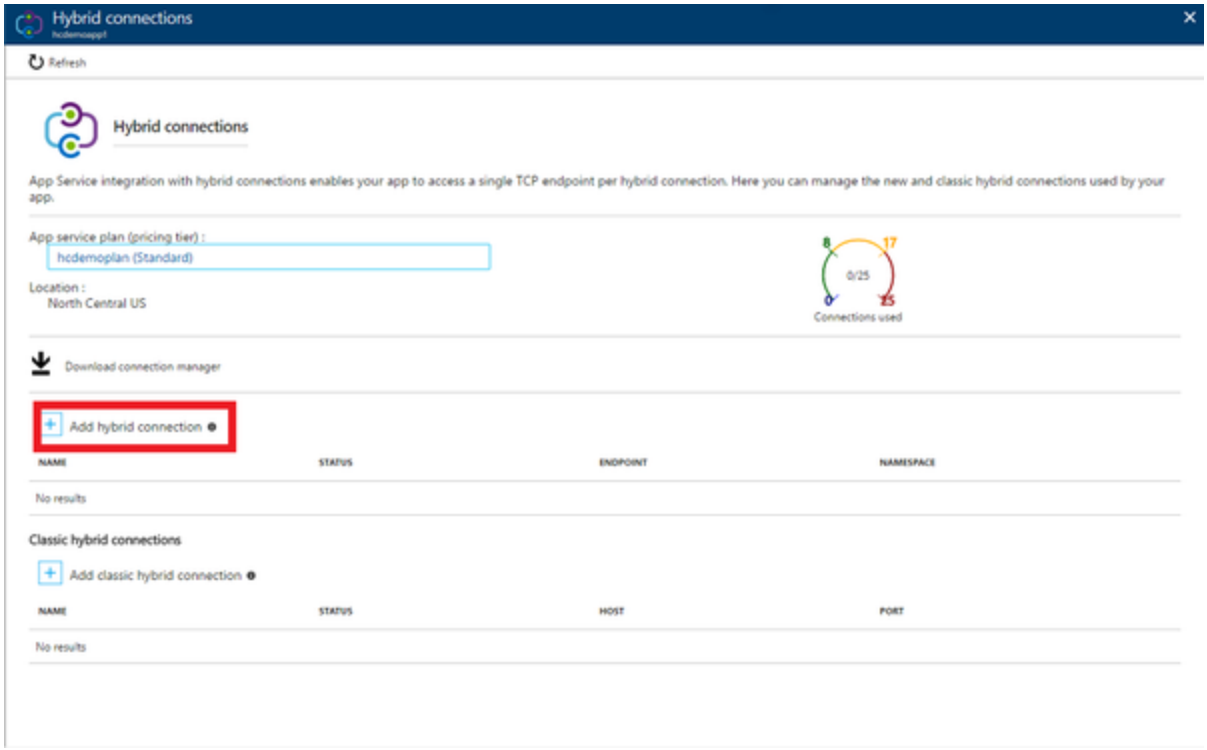
Now let's get back to the actual topic that this post addresses that is how it can be used to provide a connection between an azure application and an on-premises SQL Server. It actually provides a rendezvous point (a joining point) on the Azure Cloud which would be used to communicate between the azure application and the on premises resource. This rendezvous point is called "Hybrid Connection". Actually both the Azure Application and the on-premises resource will act as the clients that will connect to the Hybrid Connection which in turn will be responsible to provide communication between the two.

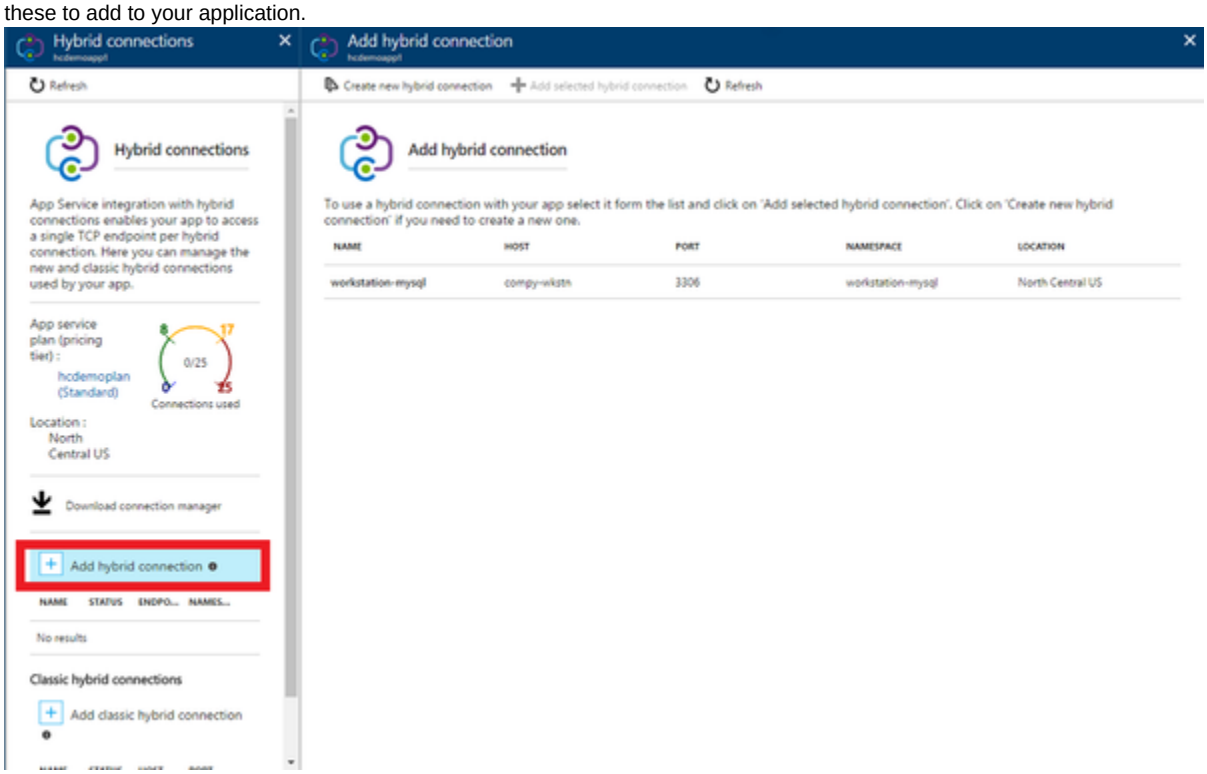
Following is a step by step guide to how to use the hybrid connection to communicate between an azure web application and an on premises SQL Server.

Step-by-step guide

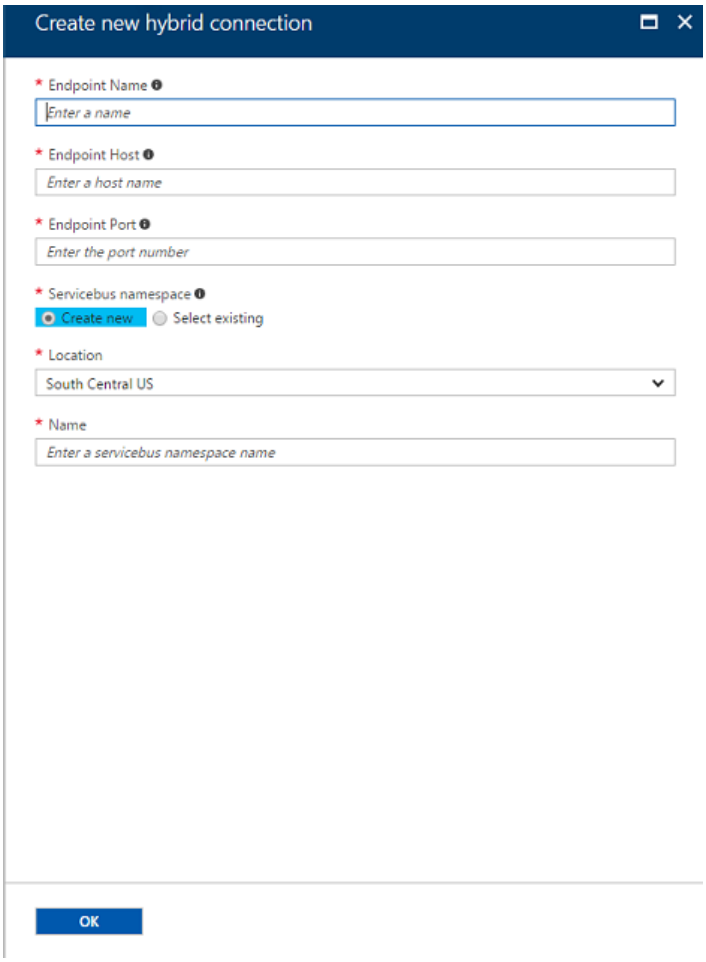
1. Log into the Azure Portal and create a Resource Group
2. Add an Azure Web App, and then add a Hybrid Connection from Networking section
   (Azure Web App -> Networking -> Configure Hybrid Connection):
3. 

4. Clicking the "Configure your hybrid connection endpoints" will yield the following interface:
5.

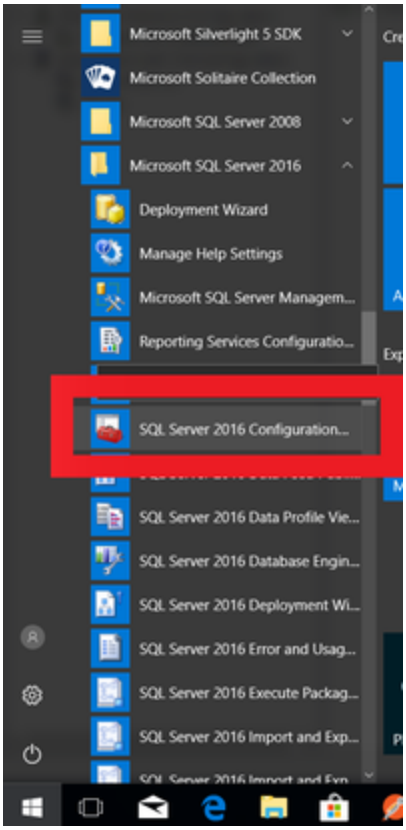


6. To add a new hybrid connection, you click the "Add hybrid connection" the one highlighted.
7. A new page with all the existing hybrid connections will appear once the "Add hybrid connection" was clicked. You can select any one from these to add to your application.
8. 

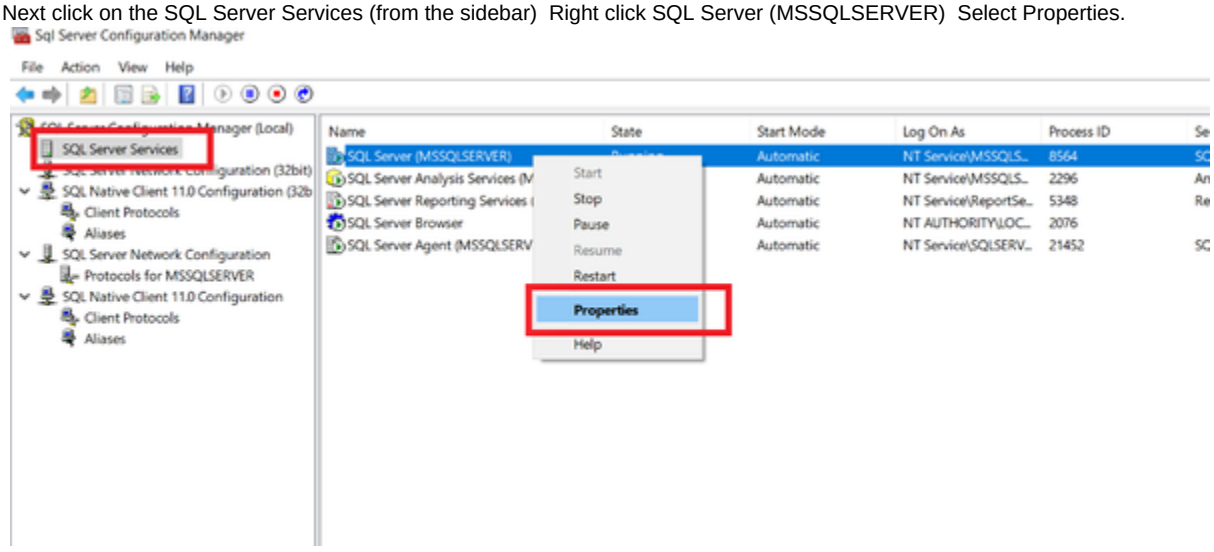
9. Once you have added the hybrid connection the following form will appear which you will use to configure the endpoint.
10.



11. Here in the Endpoint Name specify any name of your wanting.
12. Endpoint Host would be either the IP of the machine where your SQL Server resides or the Hostname provided by the SQL server. You can find your Hostname from the SQL Server Configuration Manager as explained in the following:
    a. Open the SQL Server Configuration Manager.
    b.

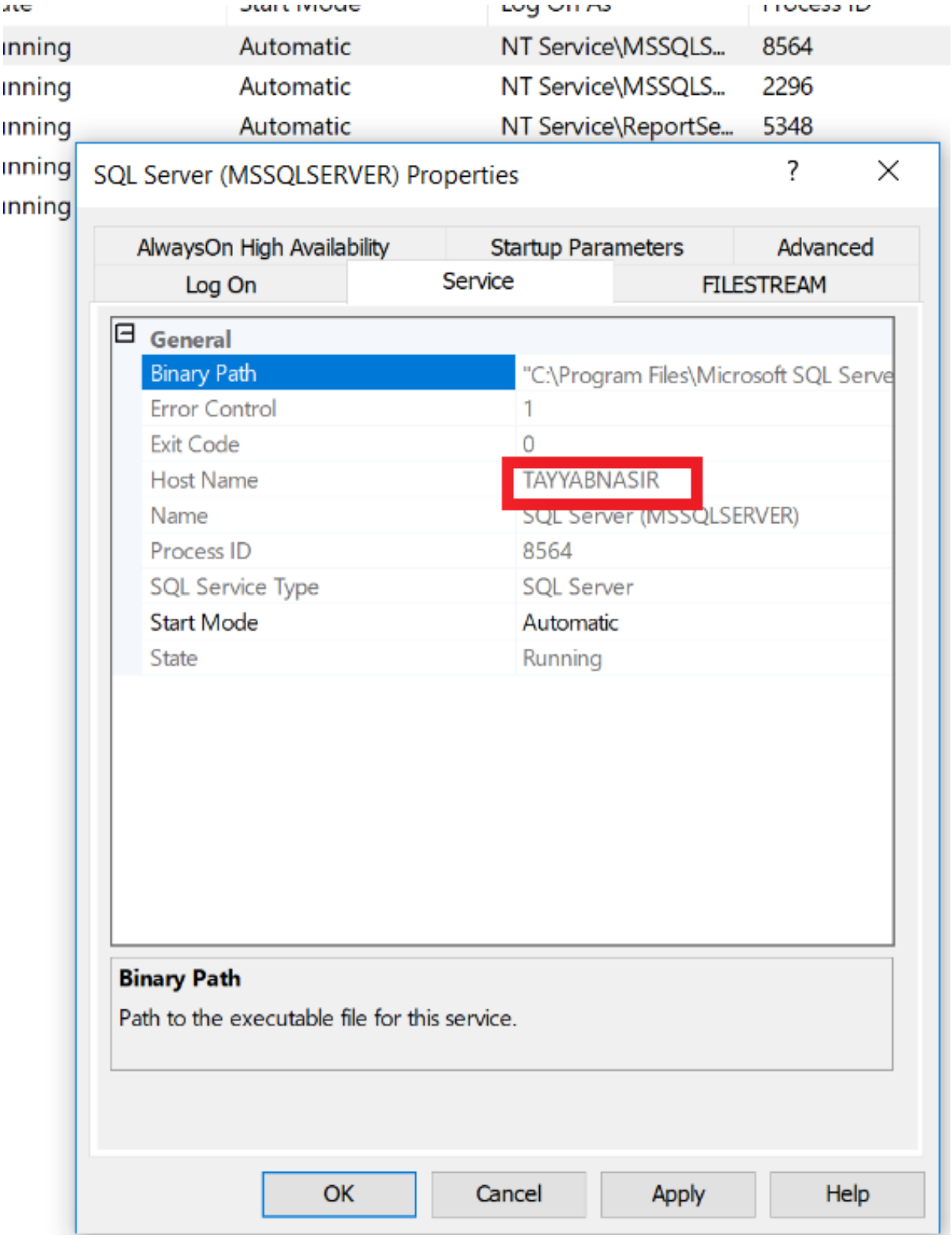


c. Next click on the SQL Server Services (from the sidebar) Right click SQL Server (MSSQLSERVER) Select Properties.

d. 

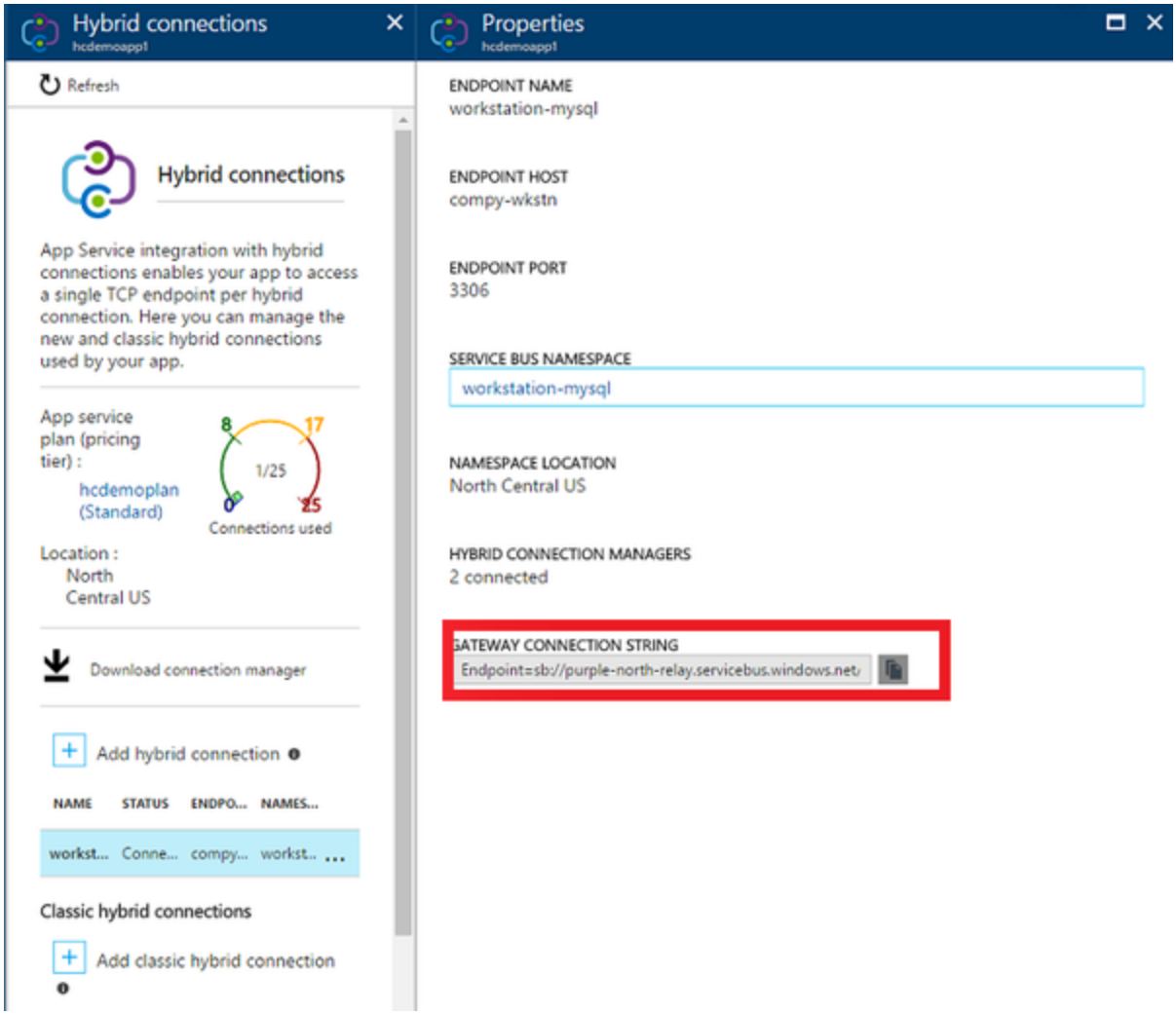
e. Following Window will open up:

f.

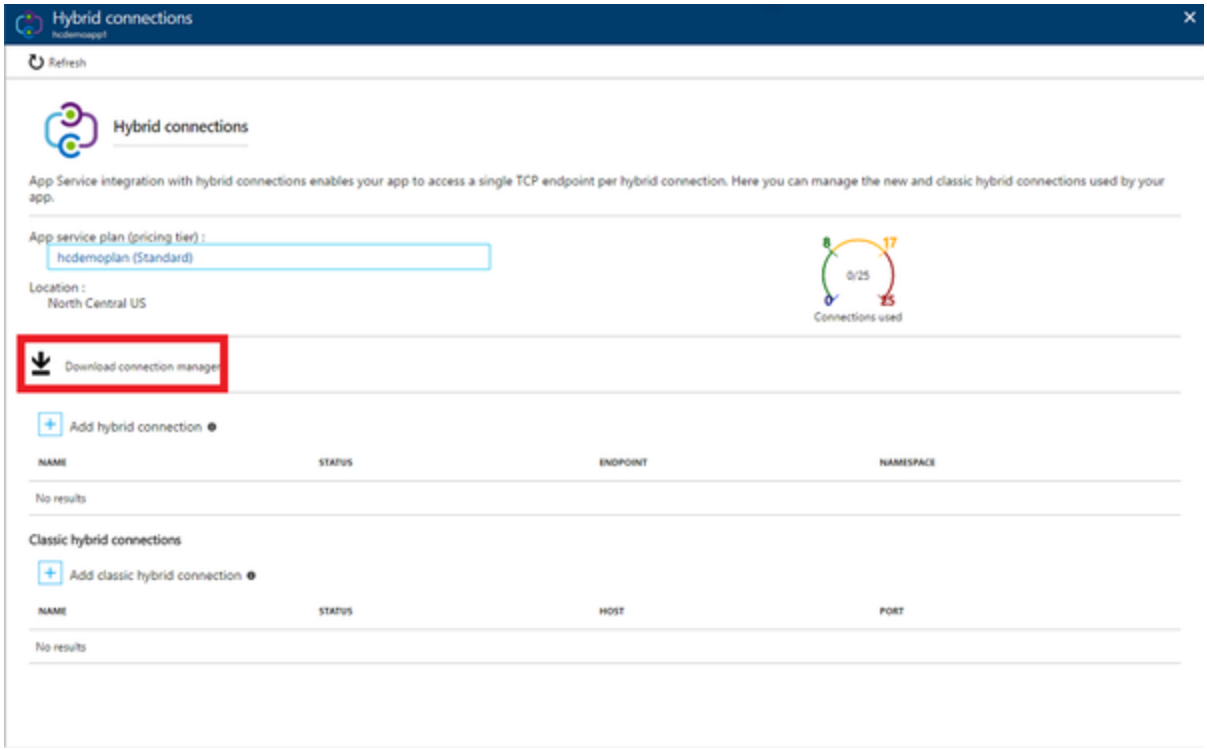


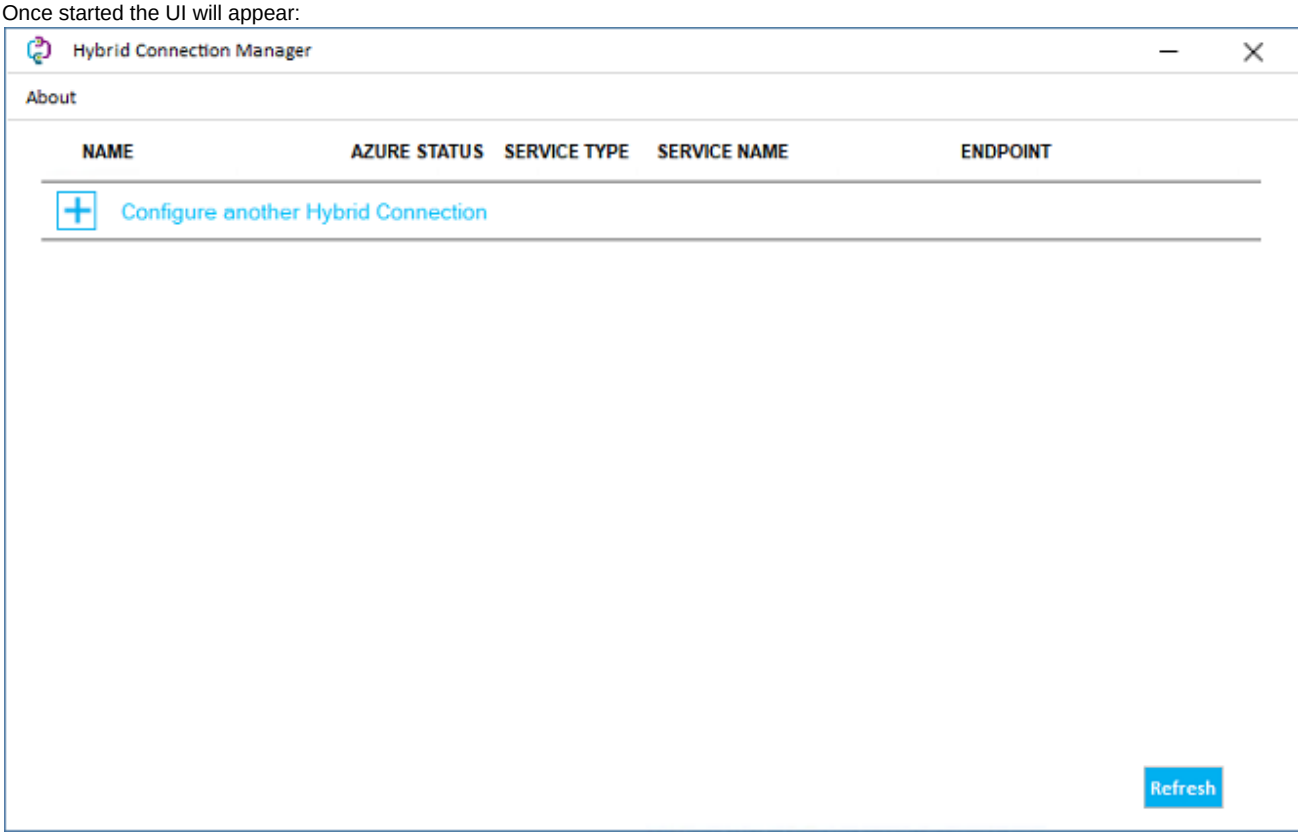
g. The highlighted part is your Hostname that can be used instead of ip address.

13. For the Endpoint Port you have to specify the port on which your SQL Server is listening. By default, it is 1433.
14. For Location you can select any data center location and can use any name for namespace.
15. Finally click on Ok button to Configure a new Hybrid Connection.
16. Once the connection is created the following will appear:
17.

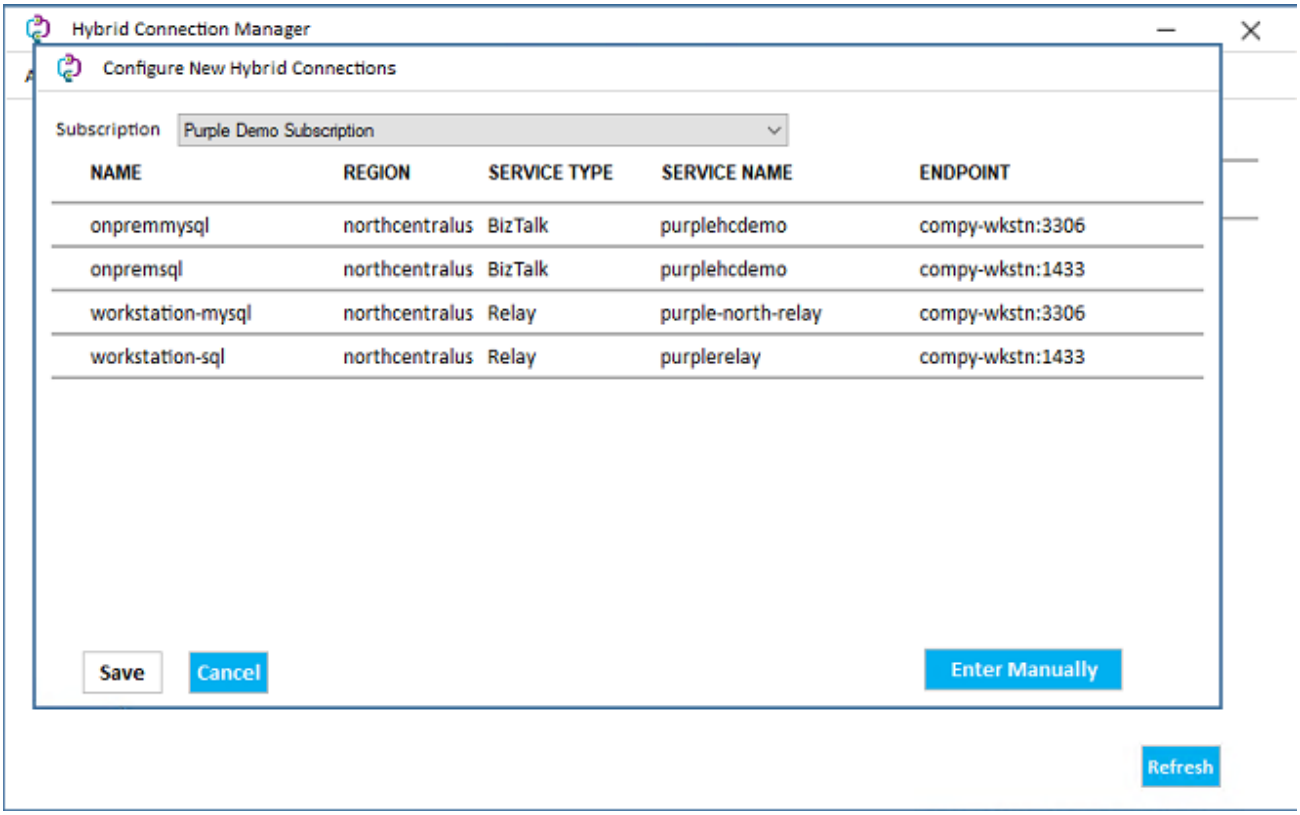


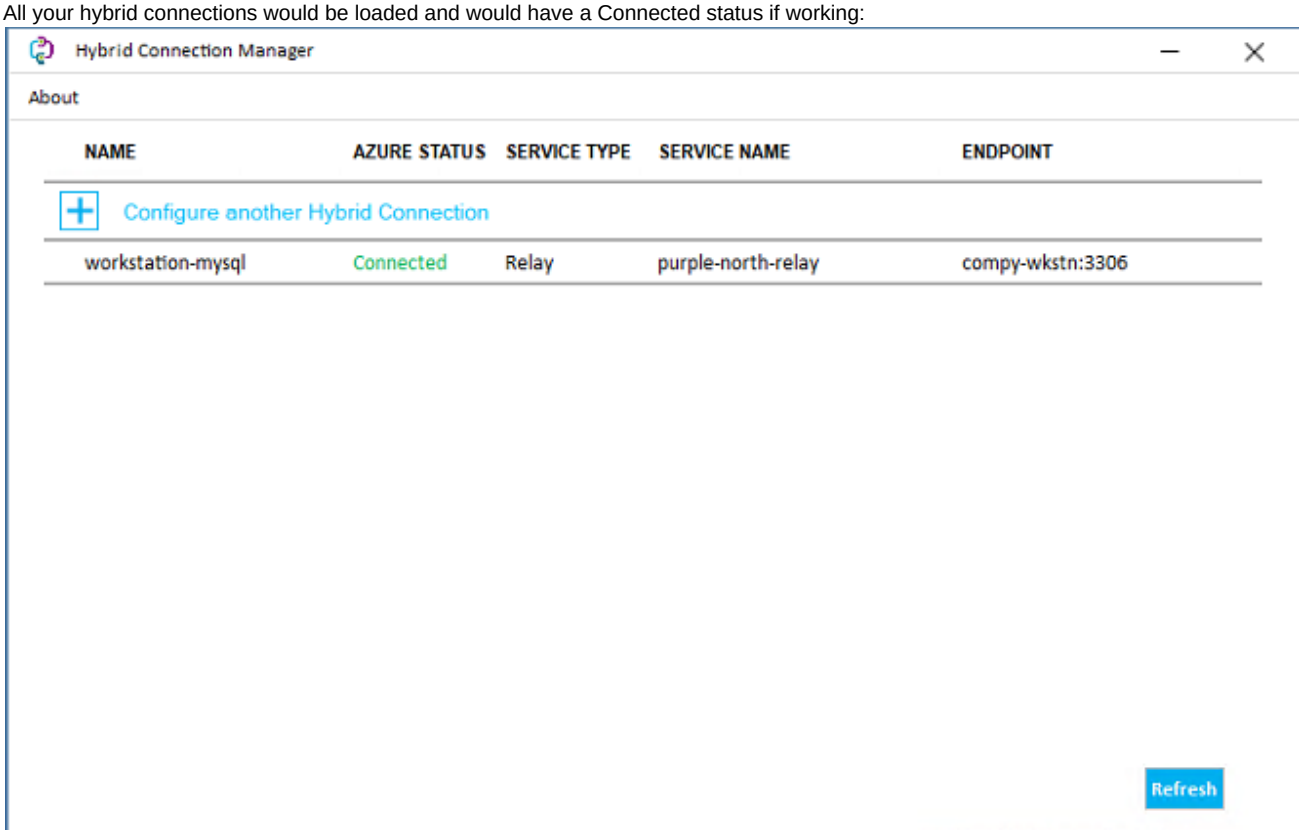
18. Copy the Endpoint as it will be used later while configuring the connection on the local machine.
19. Next you will need to install HCM (Hybrid Connection Manager) on the same machine on which your SQL Server is running.
20. You can download it from the link provided on the same page that you used to Add a Hybrid Connection as shown below:
21.



22. Once downloaded and installed you run it from the start menu.
23. Once started the UI will appear:
24. 

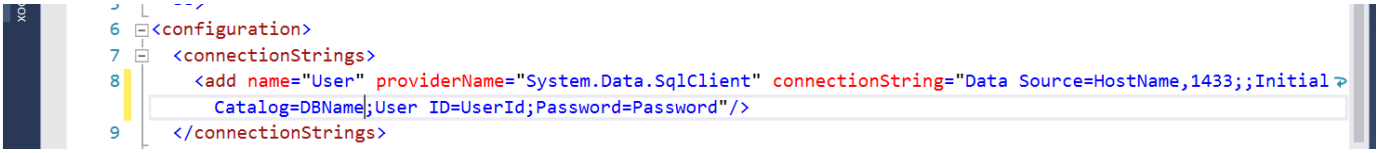
25. Click on the Configure another Hybrid Connection. A login form window will appear. Sign In with your azure account to continue.
26. Select your subscription from the dropdown and wait for the connections to load.
27.



28. Select the connection you want to configure on your machine and then click Enter Manually Button. A new window will appear where you have to put the generated endpoint (generated on creating connection on azure portal).
29. Click Save.
30. All your hybrid connections would be loaded and would have a Connected status if working:
31. 

32. Next go back to the azure portal and verify if the status of your connection is Connected.
33. If yes then you can access your on-premises SQL Server from your azure application.

Note: the connection string that you will use in your web application will be like following:



Here DataSource would be the same as the Endpoint Host we specified at time of Hybrid Connection Creation followed by a comma (',') and the port name we selected at the time of connection creation. Initial Catalog is the name of your database. User Id and Password are the user credentials for your database.

Know Issues and Additional Configurations:

- ### Hybrid Connection Not Working With SQL Server Named Instances:

  Hybrid Connection may only work with Default Instance of SQL Server and may fail in case of using a Named Instance. Even if the named instance is configured to use static TCP port yet might not work with the Hybrid Connection. Yet no solution for the problem has been found but if the solution is found the document will be updated. For further details of this issue refer to https://stackoverflow.com/questions/47050466/azure-hybrid-connection-not-working-with-sql-server-named-instance.

- ### Required SQL Authentication:

  The hybrid connection will only work if the connection string uses SQL Authentication i.e., specifying the username and password in the connection string. Thus you can not use Windows Authentication.

- ### Allowing Outbound Connections to Certain Ports:

  Although you do not need to open any firewall ports for inbound connectivity yet you are required to allow outbound connections to the following list of ports:

  1. **9350 – 9354**
  2. **5671**
  3. **80**
  4. **443**

- ### Azure Hybrid Connection Do not work with Windows Server 2008:

  Azure hybrid connection requires Windows 8/Windows Server 2012 or later to work with. The reason for this is that hybrid connection uses Web sockets that are not supported in the earlier windows version than these. Although you can use the classic hybrid connection (now depricated) to work with the earlier Windows.

- ### Recomended to use Fully-Qualified Machine names rather than IP Address:

  It is prefered to use the Fully-Qualified machine names for the endpoint and not the IP address. In cases where the IP of your machine is unlikely to chnage there it might have no effect but in cases where the IP might change, you shuold use the machine name and let the HCM handle everything else for you.

Related articles

- **https://docs.microsoft.com/en-us/azure/app-service/app-service-hybrid-connections**
- **https://docs.microsoft.com/en-us/azure/service-bus-relay/relay-hybrid-connections-protocol**
- **https://github.com/Huachao/azure-content/blob/master/articles/app-service-api/app-service-api-hybrid-on-premises-sql-server.md**