

Tech Data

# SQL Server on Windows RHEL - Step by Step Guide

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## 1. Introduction

This is a step by step guide for deploying Tech Data SQL Server on Red Hat Enterprise Linux (RHEL) Server in an Azure CSP subscription that was purchased through the StreamOne Portal. Prior knowledge is required with SQL Server, RHEL Server, and Microsoft Azure. In depth training on these technologies is outside of this guide. Most of the Figures and some technology definitions provided in this guide are extracted directly from Microsoft online official documentations (<https://docs.microsoft.com>), if necessary some definitions are modified for simplicity. Screenshots are taken as an example.

SQL Server on Azure virtual machines enables you to use full versions of SQL Server in the Cloud without having to manage any on-premises hardware. SQL on Red Hat Enterprise Linux (RHEL) includes a SQL Server 2017 image installed on a Red Hat Enterprise Linux 7.4 and with different version options:

- Enterprise edition of SQL Server 2017 on Red Hat Enterprise Linux 7.4
- Standard edition of SQL Server 2017 on Red Hat Enterprise Linux 7.4
- Web edition of SQL Server 2017 on Red Hat Enterprise Linux 7.4
- Free Express edition of SQL Server 2017 on Red Hat Enterprise Linux 7.4
- Free Developer edition of SQL Server 2017 on Red Hat Enterprise Linux 7.4

Azure virtual machines run in many different geographic regions around the world. They also offer a variety of machine sizes. The virtual machine image gallery allows you to create a SQL Server VM with the right version, edition, and operating system. This makes virtual machines a good option for a many different SQL Server workloads.

Although it is not a PaaS solution, it provides several advantages such as automated patching, automated Backup high availability, instant scaling, pay for what you consume, and high-availability.

The solution provides a validated pre-architected design with the recommended configurations and the necessary assessment to choose the right version and facilitates SQL Server deployment. It also provides the necessary deployment documentation and the Performance best practices for SQL Server in Azure Virtual Machines. Everything is deployed with a simple click.

Installing SQL server on Azure VMs as an IaaS have several advantages mainly in terms of cost reduction and administration burden as described in Figure 1.

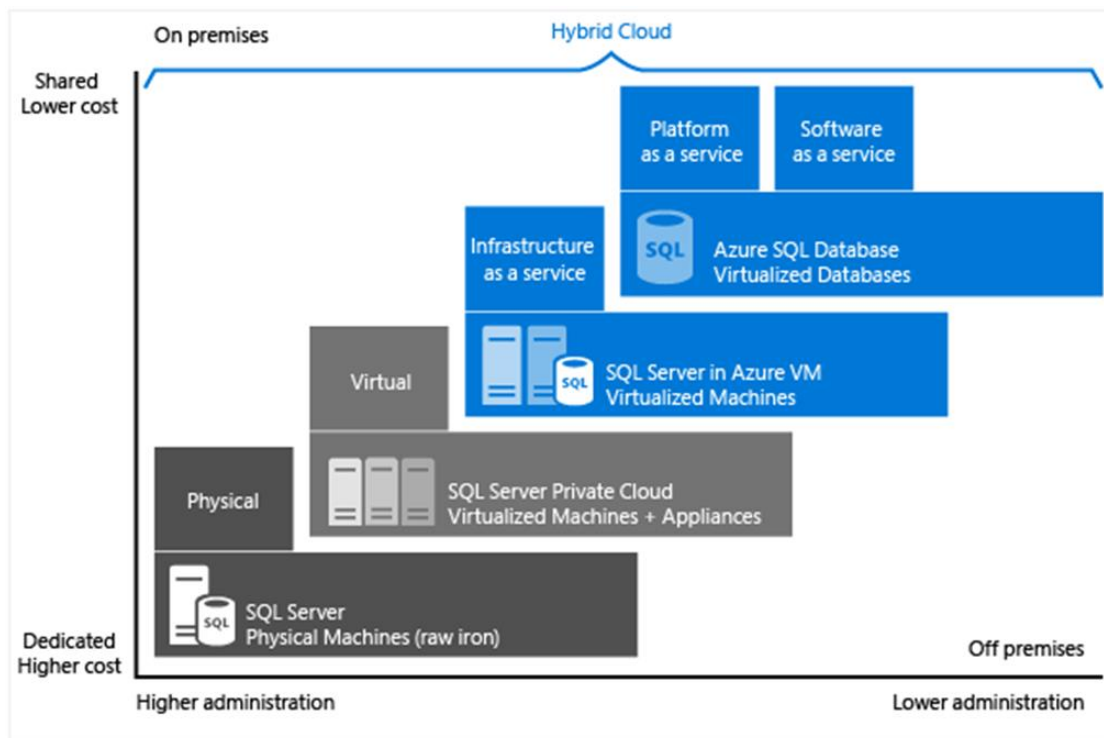


Figure 1. Advantages of SQL Server as an IaaS

A brief description of each image is provided as follows:

### Enterprise edition of SQL Server 2017 on Red Hat Enterprise Linux 7.4

This image contains the full version of SQL Server 2017 Enterprise edition on Red Hat Enterprise Linux 7.4. SQL Server 2017 represents a major step towards making SQL Server a platform that gives you choices of development languages, data types, on-premises or cloud, and operating systems by bringing the power of SQL Server to Linux, Linux-based Docker containers, and Windows.

After provisioning, please run `$sudo /opt/mssql/bin/mssql-conf set-sa-password` to configure SQL Server.

### Standard edition of SQL Server 2017 on Red Hat Enterprise Linux 7.4

This image contains the Standard edition of SQL Server 2017 on Red Hat Enterprise Linux 7.4. Standard edition provides core data management capabilities for medium-size transactional processing.

After provisioning, please run `$sudo /opt/mssql/bin/mssql-conf set-sa-password` to configure SQL Server.

### Web edition of SQL Server 2017 on Red Hat Enterprise Linux 7.4

This image contains the Web edition of SQL Server 2017 on Red Hat Enterprise Linux 7.4. This provides a low-cost database solution for medium-size web applications.

After provisioning, please run `$sudo /opt/mssql/bin/mssql-conf set-sa-password` to configure SQL Server.

### Free Express edition of SQL Server 2017 on Red Hat Enterprise Linux 7.4

This image contains the Express edition of SQL Server 2017 on Red Hat Enterprise Linux 7.4. This is a free (no SQL Server licensing cost) database system for lightweight applications. It includes the core database engine, limited to 1 GB memory and 10 GB storage, and Management Studio for integrated administration and development.

After provisioning, please run `$sudo /opt/mssql/bin/mssql-conf set-sa-password` to configure SQL Server.

### Free Developer edition of SQL Server 2017 on Red Hat Enterprise Linux 7.4

This image contains the Developer edition of SQL Server 2017 on Red Hat Enterprise Linux 7.4. This free edition (no SQL Server licensing cost) includes all the functionality of Enterprise edition, but it is licensed for development and testing only, not production. It provides comprehensive capabilities for mission-critical transactional processing, data warehousing, and real-time business intelligence.

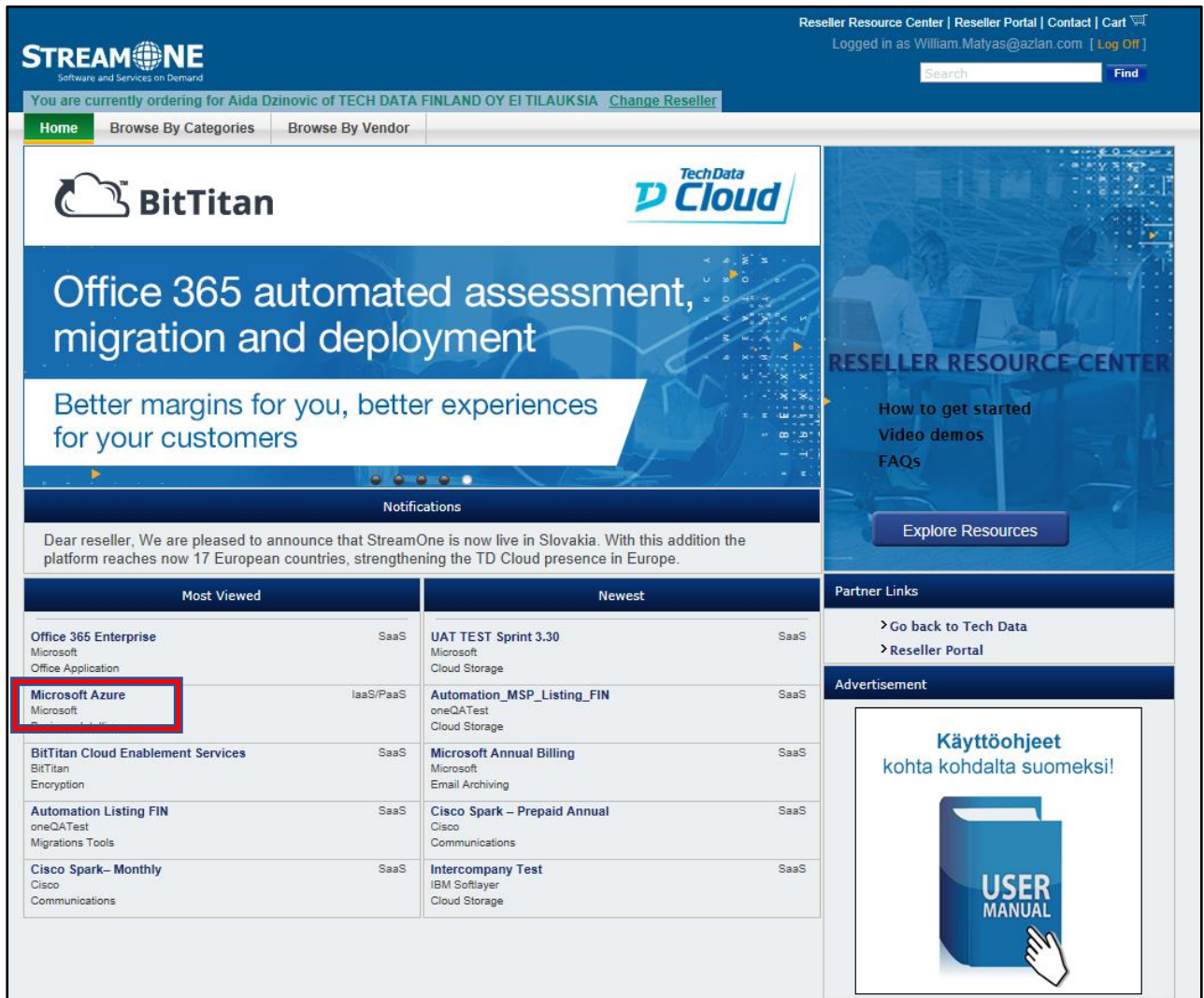
After provisioning, please run `$sudo /opt/mssql/bin/mssql-conf set-sa-password` to configure SQL Server.

Enterprise	Standard	Express	Developer
<ul style="list-style-type: none"> <li>✓ Mission critical high availability</li> <li>✓ Enhanced in-memory performance</li> <li>✓ Faster performance with Adaptive Query Processing</li> <li>✓ Unparalleled data security</li> <li>✓ End-to-end mobile BI with rich visualizations on all major platforms</li> <li>✓ In-database advanced analytics built-in at scale with R and Python</li> </ul>	<ul style="list-style-type: none"> <li>✓ End-to-end database security with Always Encrypted</li> <li>✓ Enhanced in-memory performance for all workloads</li> <li>✓ Basic reporting</li> <li>✓ Basic analytics</li> </ul>	<ul style="list-style-type: none"> <li>✓ Development and management tools</li> <li>✓ Free to use (no software costs)</li> </ul>	<ul style="list-style-type: none"> <li>✓ Build, test, and demo apps in non-production environments</li> <li>✓ Free to use (no software costs)</li> <li>✓ All Enterprise Edition features available</li> </ul>

Figure 2. SQL Server Version Comparison

## 2. Deploy in StreamOne Cloud Marketplace.

- Connect to StreamOne Cloud Marketplace and search for the Microsoft Azure SKU in Most Viewed, browsing by Categories or Vendor, or directly searching for it in the upright search field



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### Office 365 automated assessment, migration and deployment

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Dear reseller, We are pleased to announce that StreamOne is now live in Slovakia. With this addition the platform reaches now 17 European countries, strengthening the TD Cloud presence in Europe.

Most Viewed		Newest	
Office 365 Enterprise Microsoft Office Application	SaaS	UAT TEST Sprint 3.30 Microsoft Cloud Storage	SaaS
<b>Microsoft Azure</b> Microsoft	IaaS/PaaS	Automation_MSP_Listing_FIN oneQATest Cloud Storage	SaaS
BitTitan Cloud Enablement Services BitTitan Encryption	SaaS	Microsoft Annual Billing Microsoft Email Archiving	SaaS
Automation Listing FIN oneQATest Migrations Tools	SaaS	Cisco Spark – Prepaid Annual Cisco Communications	SaaS
Cisco Spark– Monthly Cisco Communications	SaaS	Intercompany Test IBM Softlayer Cloud Storage	SaaS

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Käyttöohjeet  
kohta kohdalta suomeksi!

**USER MANUAL**

- Click on Microsoft Azure



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PRODUCT SEARCH RESULTS FOR 'Azure'

IaaS/PaaS



**Microsoft Azure**  
Microsoft

Microsoft Azure is a market leading cloud platform that enables you to quickly build, deploy, and manage applications across a global network of Microsoft-managed datacentres. Microsoft provides Cloud Infrastructure as a Service, Application Platform as a Service, and Cloud Storage Services

With Tech Data, you can sell the complete Azure experience. This covers everything from assessing cloud readiness to spinning up a VM instance, and migrations to ongoing management of assets. Tech Data have partnered with NetEnrich allowing resellers to offer white-labelled services for Azure.

[CLICK FOR DETAILS](#)

[Details](#)
[Screenshots](#)

- You will then be able to browse the different skus, Click on "ADD TO CART" button of registration SKU

Shop by Product Name

Search: 
[Clear Filters](#)
Display:

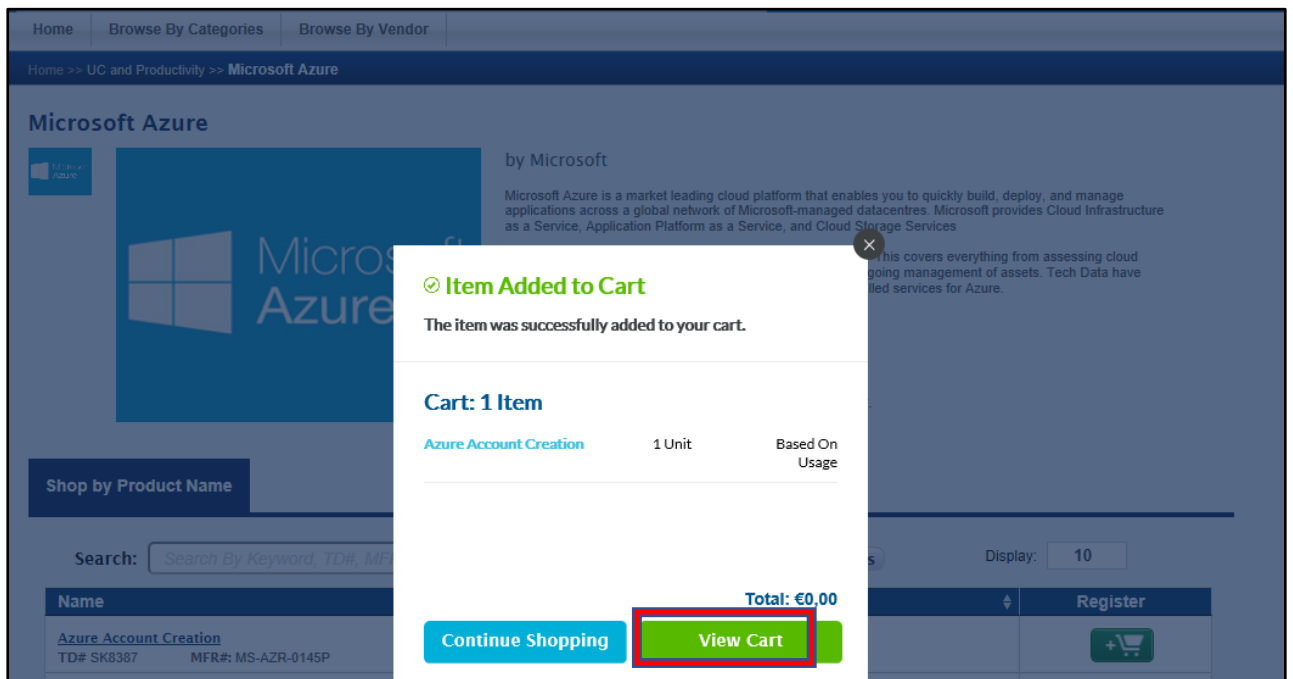
Name	Register
<a href="#">Azure Backup</a> TD# SK8398 MFR#: td-backup-on-ms-azure	<a href="#" style="background-color: #0070c0; color: white; padding: 5px 10px;">+ </a>
<a href="#">Azure Registration - For Sandbox testing</a> TD# SK35380 MFR#: td-on-ms-azure	<a href="#" style="background-color: #0070c0; color: white; padding: 5px 10px;">+ </a>
<a href="#">Azure Site Recovery</a> TD# SK8399 MFR#: td-site-recovery-ms-azure	<a href="#" style="background-color: #0070c0; color: white; padding: 5px 10px;">+ </a>
<a href="#">Azure SQL DBaaS</a> TD# SK8401 MFR#: td-sqlserver-ms-cloud	<a href="#" style="background-color: #0070c0; color: white; padding: 5px 10px;">+ </a>
<a href="#">Azure Storage</a> TD# SK8400 MFR#: td-file-storage-ms-azure-std	<a href="#" style="background-color: #0070c0; color: white; padding: 5px 10px;">+ </a>
<a href="#">Azure Virtual Machine</a> TD# SK35322 MFR#: MS-AZR-0146P22	<a href="#" style="background-color: #0070c0; color: white; padding: 5px 10px;">+ </a>
<a href="#">Backup On Azure Production</a> TD# SK35316 MFR#: td-backupp-on-ms-azure	<a href="#" style="background-color: #0070c0; color: white; padding: 5px 10px;">+ </a>
<a href="#">NetApp Cloud Volumes</a> TD# SK35323 MFR#: MS-AZR-0146PM	<a href="#" style="background-color: #0070c0; color: white; padding: 5px 10px;">+ </a>
<a href="#">Red Hat OpenShift</a> TD# SK35327 MFR#: MS-AZR-0146P	<div style="border: 2px solid red; padding: 5px; display: inline-block;"><a href="#" style="background-color: #0070c0; color: white; padding: 5px 10px;">+ </a></div>
<a href="#">Small Business Cloud Server v2</a> TD# SK35343 MFR#: azure-sbcsv2-uk-sku	<a href="#" style="background-color: #0070c0; color: white; padding: 5px 10px;">+ </a>

Showing 1 to 10 of 11 entries

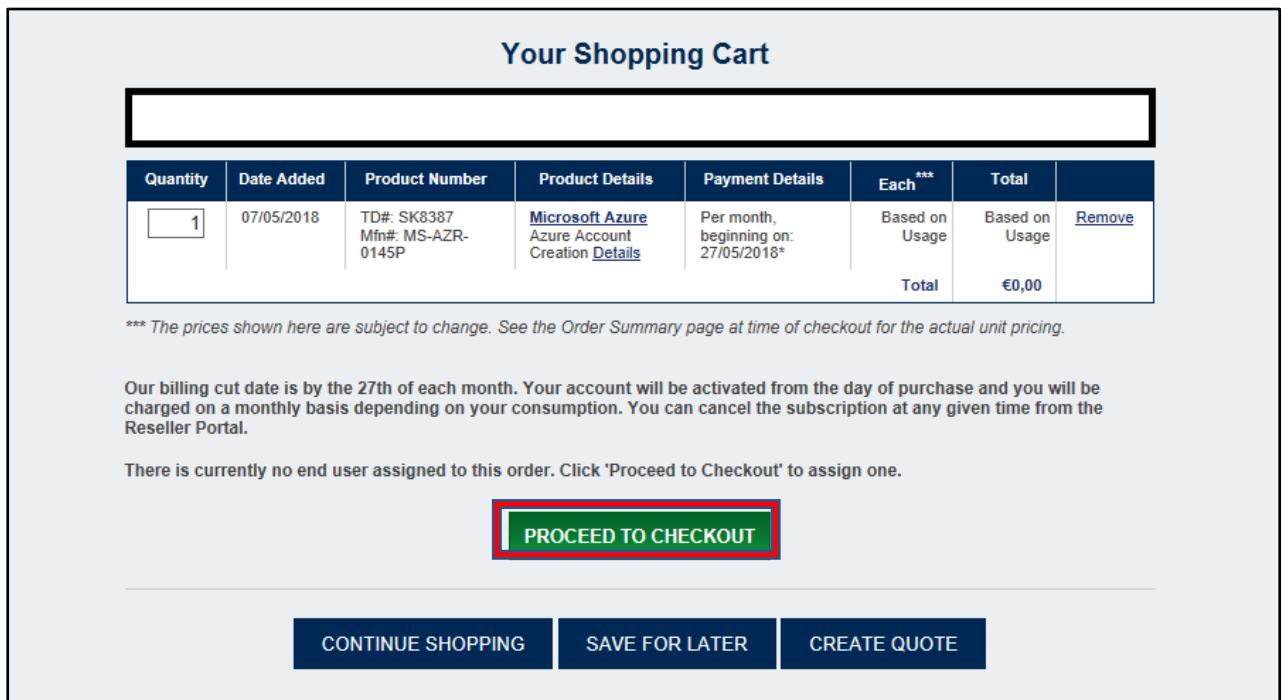
[First](#)
[Previous](#)
[1](#)
[2](#)
[Next](#)
[Last](#)

- Click on "View Cart" button







- Click on 'Proceed to Checkout' button




- Fill End User information or select any end user using your email and click on "Continue to Configuration" button




 Checkout  
 Logged in with ID: 345802 | [Log Out](#)

[Cart](#) → [End Customer Info](#) → [Azure Settings](#) → [Configuration](#) → [Payment](#) → [Summary](#) → [Complete](#)

[< Return to Shopping](#)

 Sales and Customer Support: [+358 20 1553 694](#)

 End Customer Info

The following products require end user information: \*Indicates a required field

- [Azure Account Creation](#)

Please select or enter an end user for the products above:

[Select From Address Book](#)

**Company Name:\***

**First Name:\***

**Last Name:\***

**Title/Position:**


**Phone Number:\***

**End Customer Email:\***

**Confirm End Customer Email:\***

**Address Line 1:\***

**Address Line 2:**

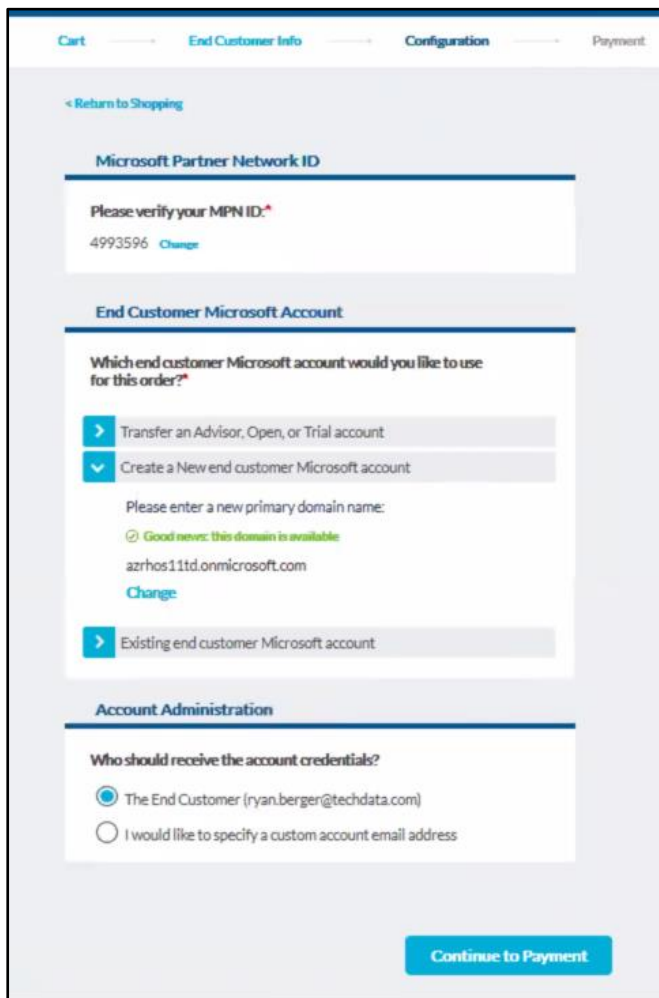
 This email address MUST be associated with the end customer domain to set up the account properly. If you do not wish to send communication directly to this email you will have the option to specify a different email address during the next step in the Account Administration section.

Configuration page should be displayed.

Fill in your Microsoft Partner Network ID.

Click on Create a New end customer Microsoft account button.

Enter any unique domain name and click on Check Availability button.



The screenshot shows a web interface with a navigation bar at the top containing links: Cart, End Customer Info, Configuration, and Payment. Below the navigation bar is a breadcrumb trail: < Return to Shopping. The main content area is divided into three sections:

- Microsoft Partner Network ID:** A section with a header "Please verify your MPN ID:" and a text input field containing "4993596" with a "Change" link next to it.
- End Customer Microsoft Account:** A section with a header "Which end customer Microsoft account would you like to use for this order?". It contains three radio buttons:
  - ☒ Transfer an Advisor, Open, or Trial account
  - ☒ Create a New end customer Microsoft account
  - ☐ Existing end customer Microsoft account
 Below the radio buttons, there is a text input field for "Please enter a new primary domain name:" with a green checkmark and the text "Good news: this domain is available" above it. The input field contains "azrhos11td.onmicrosoft.com" and a "Change" link below it.
- Account Administration:** A section with a header "Who should receive the account credentials?". It contains two radio buttons:
  - ☒ The End Customer (ryan.berger@techdata.com)
  - ☐ I would like to specify a custom account email address

At the bottom right of the form is a blue button labeled "Continue to Payment".

Select "The End Customer email" radio button from the "Account Administration" module.  
Or select "I will administer the account" radio button from the account administration module and enter the Delegate admin email ID.

Click on "Continue to Payment" button.

Click on "Continue to Summary" button.  
Verify the information shown and click on "Place Order" button.

[Cart](#)
[End Customer Info](#)
[Configuration](#)
[Payment](#)
[Summary](#)
[Complete](#)

[Return to Shopping](#)
Sales and Customer Support: +44 1256 788 050

☒ **End Customer Information** [Change](#)

**Ryan Berger's Burgers**  
 Ryan Berger  
 B+B York  
 15 St. Peters Grove  
 York, YO30 6AQ, United Kingdom  
 ryan.berger@techdata.com

☒ **Configuration** [Change](#)

Microsoft Account Domain:  
 azrhos11td.onmicrosoft.com  
  
 Credentials will be sent to:  
 ryan.berger@techdata.com

☒ **Order Summary** [Edit Cart](#)

Quantity	Product	Price Each	Total
1	<a href="#">Red Hat OpenShift</a>	Based on Usage	Based on Usage
	Red Hat OpenShift		
	You will be billed based on account usage		

Have a promo code?  
 [Apply](#)

**Total: £0.00**

☒ **Payment Method** [Change](#)

Reseller PO Number:  
 1234  
  
 Payment Method:  
 Terms

☒ **Terms and Conditions**

☒ I have read and agree to the [Reseller Marketplace Terms](#)  
☒ I have read and agree to Vendor Terms For [Microsoft](#)

[Place Order](#)

Your order should be complete.

## ✓ Order Complete

Order #S000186103

[Return to Shopping](#)

**Thank you for your business.**  
**Your order is currently being processed.**

To check the status of your order please visit the [Reseller Portal](#) and view [Order Tracking](#)

When we have completed processing your order:

- An email will be sent to your end user with getting started instructions,

### Order Summary

**Order Date:** 07-05-2018 12:54 PM CEST

**Reseller PO #:** 123456789

#### Sold To:

TECH DATA FINLAND OY EI TILAUKSIA  
TALLE ASIAKASNUMEROLLE SOKERILINNANTIE 11 C  
ESPOO, 02600 FI  
9999999999  
S1QATestingEmail@techdata.com

#### End Customer Information:


Techdata France  
William Matyas  
142 avenue de Stalingrad  
Colombes 92700  
France  
william.matyas@techdata.com

### Items Purchased

Qty	M/Part#	Vendor	Description	Date	Promo	Each	Total
1	MS-AZR-0145P	Microsoft	Azure Account Creation	07/05/2018		Based on usage	Based on usage
Total							€0,00

[Return to Shopping](#)

You should receive an email with your Microsoft Subscription Information:




Dear William Matyas,

Your Microsoft account has been setup.

Please continue to <https://login.microsoftonline.com> and login with the username and password below for your Office 365 subscriptions.  
For Azure, please use <https://portal.azure.com/>

**Username:** [admin@williamtestocp.onmicrosoft.com](mailto:admin@williamtestocp.onmicrosoft.com)


**Password:** \*\*\*\*\*



**Your Subscriptions:**

Name	Quantity
Azure Account Creation	1

And another email regarding the deployment of your Azure Bundle:



**Hi!**

**Your Azure Bundle has been deployed!**

This is to inform you that the Azure Bundle has been deployed successfully. Please find the details below.

**Sales Order Details**

**Sales Order #:** S000186148

**Reseller PO:** test

**End Customer PO:**

**Account Number:** 0000345802

**End Customer Email:** [william.matyas@techdata.com](mailto:william.matyas@techdata.com)

**Bundle Details**

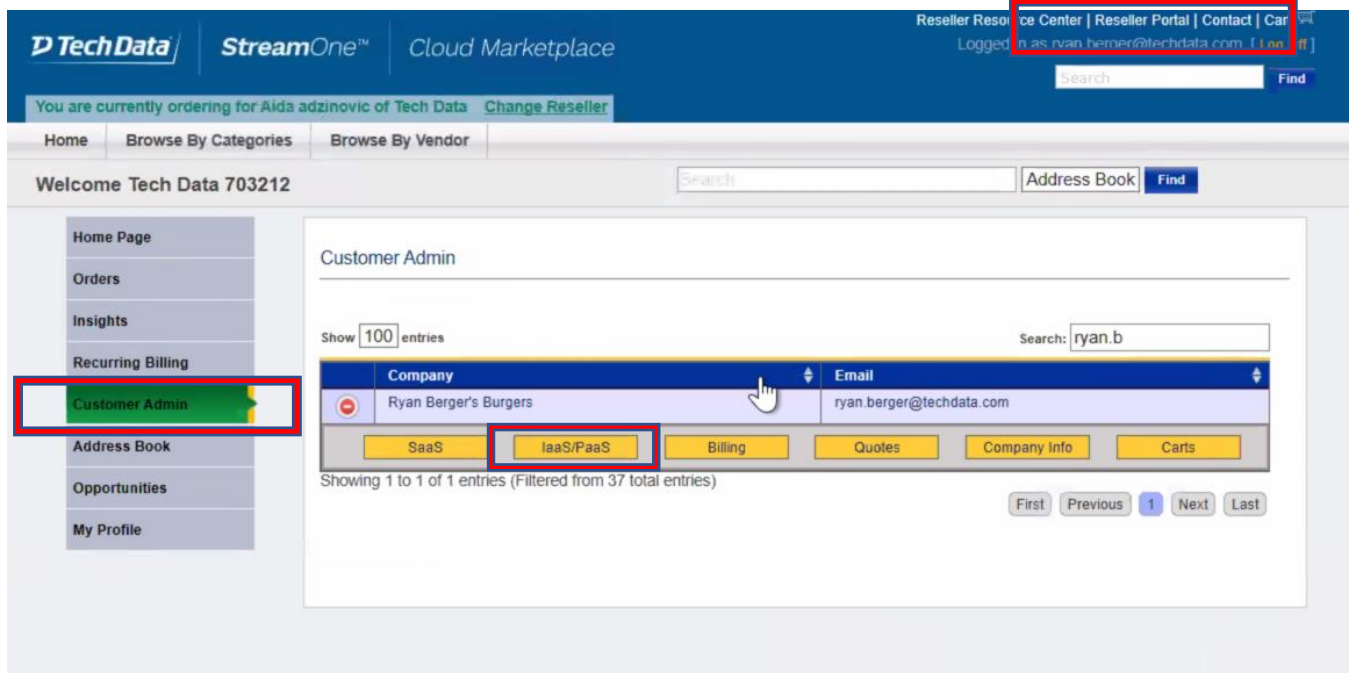
**Bundle Name:** Red Hat OpenShift

**Subscription Id:** 475e5e96-bf99-4ab9-ab76-a9d5fbfd9a32

**Datacenter Location:** West Europe

**Credentials**

Now click on Reseller Portal, then Customer Admin. Look for your Customer and click on IaaS/PaaS.



Reseller Resource Center | Reseller Portal | Contact | Cart

Logged in as ryan.berger@techdata.com

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Welcome Tech Data 703212

Search Address Book Find

Home Page  
Orders  
Insights  
Recurring Billing  
**Customer Admin**  
Address Book  
Opportunities  
My Profile

Customer Admin

Show 100 entries Search: ryan.b

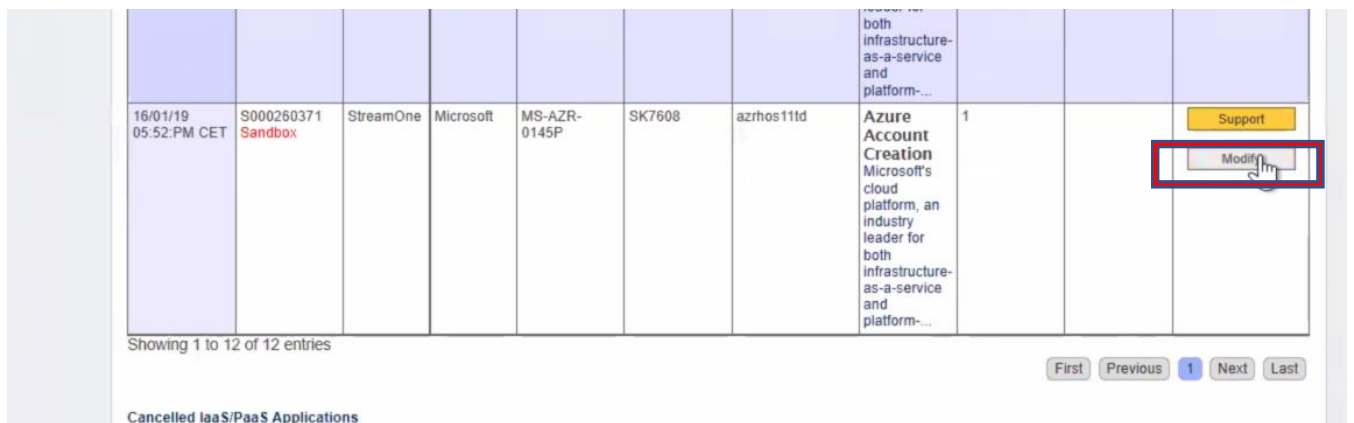
Company	Email
Ryan Berger's Burgers	ryan.berger@techdata.com

SaaS IaaS/PaaS Billing Quotes Company Info Carts

Showing 1 to 1 of 1 entries (Filtered from 37 total entries)

First Previous 1 Next Last

Then Click on Modify:



Date	Order ID	Vendor	Product	SKU	SKU	SKU	SKU	Description	Quantity	Price	Support
16/01/19 05:52:PM CET	S000260371 Sandbox	StreamOne	Microsoft	MS-AZR-0145P	SK7608	azrhos11td		Azure Account Creation Microsoft's cloud platform, an industry leader for both infrastructure-as-a-service and platform-as-a-service	1		Support

Showing 1 to 12 of 12 entries

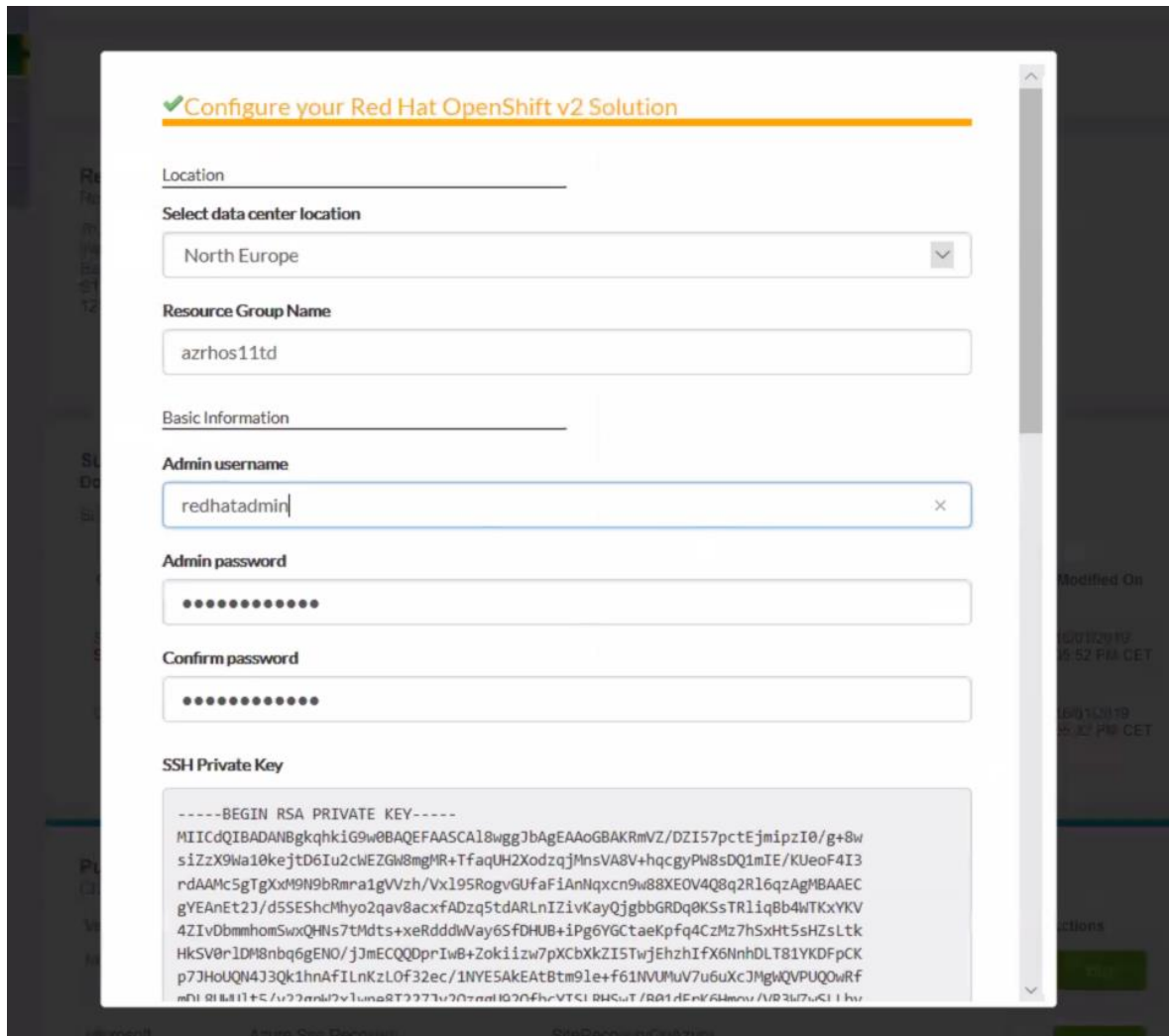
First Previous 1 Next Last

Cancelled IaaS/PaaS Applications





Information related to selected bundle should be displayed.



✓ Configure your Red Hat OpenShift v2 Solution

Location

Select data center location

North Europe

Resource Group Name

azrhos11td

Basic Information

Admin username

redhatadmin

Admin password

Confirm password

SSH Private Key

```
-----BEGIN RSA PRIVATE KEY-----
MIICdQIBADANBgkqhkiG9w0BAQEFAASCAl8wggJbAgEAAoGBAKRmVZ/DZI57pctEjmipzI0/g+8w
sIZzX9Wa10kejtD6Iu2cWEZGh8mgMR+TfaqUH2XodzqjMnsVA8V+hqcyPw8sDQ1mIE/KUeoF4I3
rdAAMc5gTgXoM9N9bRmra1gVVzh/Vx195RogvGUfaFiAnNqxcn9w88XE0V4Q8q2R16qzAgMBAAEC
gYEAneT2J/d5SEShcMhyo2qav8acxfADzq5tdARLnIZivKayQjgbbGRDq0KSsTR1iqBb4wTKxYKV
4ZIVDbmmhomSwxQHns7tMds+xeRdddWway6SfDHUB+iPg6YGCtaeKpfq4CzMz7hSxHt5sHZsLtk
HkSV0r1DM8nbq6gENO/jmECQQDprIwB+Zokiizw7pXCbXkZISTwJEhzhIFX6NnhDLT81YKDFpCK
p7JHoUQN4J3Qk1hnAfILnKzLOf32ec/1NYE5AkEAtBtm9le+f61NVUPluV7u6uXcJMgwQVPUQwRf
mNl 8lIl11+S/v77nnd7v1una8T2777u777nnd10777fhrVTSI BHSuT /B01dEn/6dew /V/B3u7uSI 1hv
```

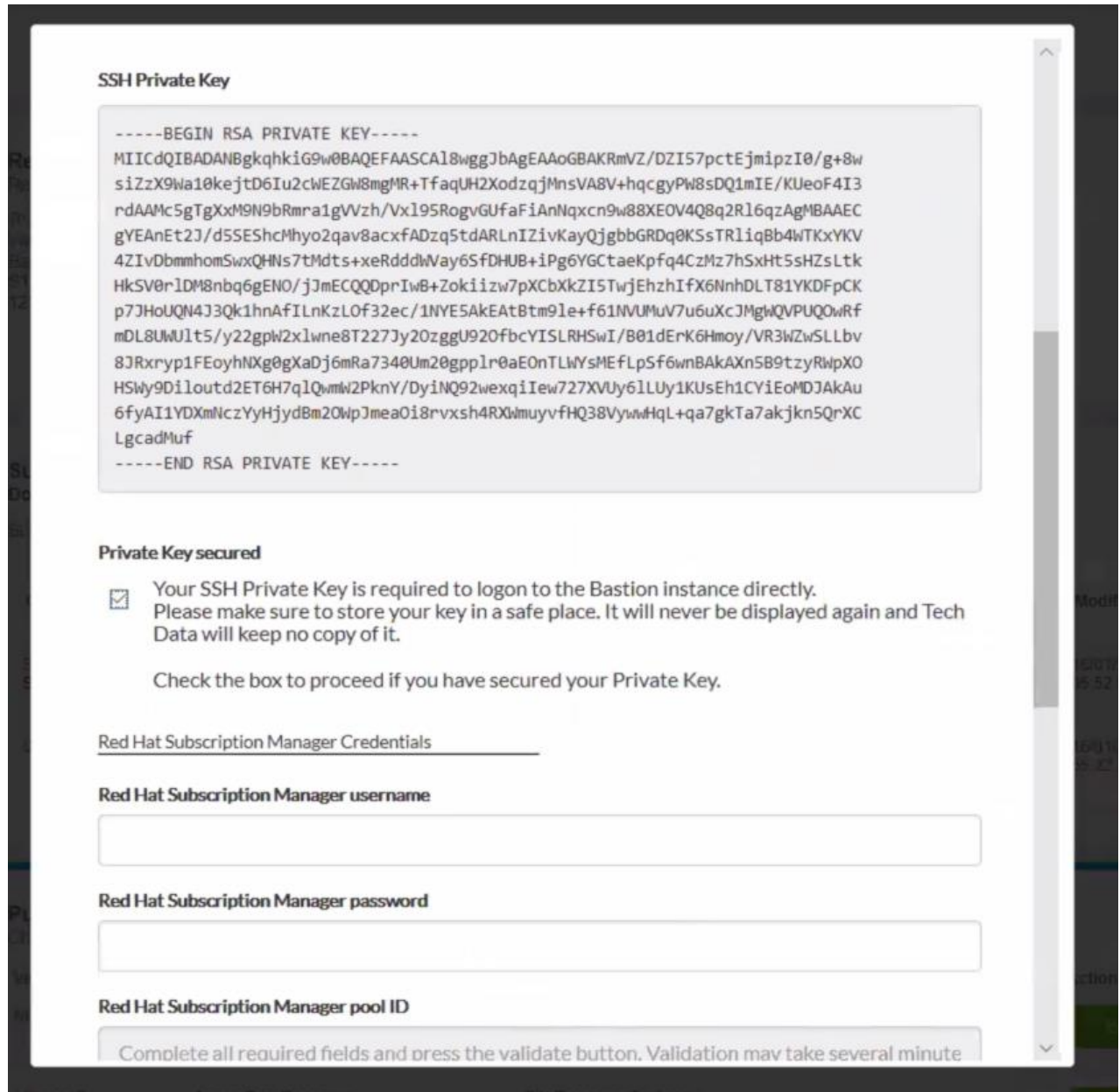
Fill the Basic Information.

**Please note that the Admin Username and the Admin Password will be used to access the OpenShift Container Platform Console.**

Select Location from location drop down and fill in the Resource Group Name.

A SSH key pair will get generated and you need to copy and save the private key. Once the OpenShift bundle is deployed in the Azure portal, you might need to use this Key to login into the underlying VMs.

Enter Red Hat Subscription Manager credentials:



**SSH Private Key**

```
-----BEGIN RSA PRIVATE KEY-----
MIICdQIBADANBgkqhkiG9w0BAQEFAASCAL8wggJbAgEAAoGBAKRmVZ/DZIS7pctEjmipzI0/g+8w
siZzX9Wa10kejtd6Iu2cWEZGw8mgMR+TfaqUH2XodzqjMnsVA8V+hqcgypW8sDQ1mIE/KUeoF4I3
rdAAMc5gTgXxM9N9bRmra1gVVzh/Vx195RogvGUfaFiAnNqxcn9w88XE0V4Q8q2Rl6qzAgMBAAEC
gYEAnEt2J/d5SEShcMhyo2qav8acxfADzq5tdARLnIZivKayQjgbbGRDq0KSsTRliq8b4wTKxYKV
4ZIVDbmmhomSwxQHns7tMdtS+xeRdddWVay6SfDHUB+iPg6YGCTaeKpfq4CzMz7hSxHt5sHZsLtk
HkSV0rLDM8nbq6gENO/jJmECQDprIwB+Zokiizw7pXCbXkZI5TwjEhzhIfX6NnhDLT81YKDFpCK
p7JHoUQN4J3Qk1hnAfILnKzLOf32ec/1NYESAkEAt8tm9le+f61NVUMuV7u6uXcJMghQVPUQwRf
mDL8UWU1t5/y22gpW2xlwne8T227Jy2OzggU920fbCYISLRHSwI/B01dErK6Hmoy/VR3WZwSLLbv
8JRxyr1FEoyhNXg0gXaDj6mRa7340Um20gpp1r0aEOnTLWysMEfLpSf6wnBAkAXn5B9tzyRwpXO
HSWY9Diloutd2ET6H7q1QwmlW2PknY/DyINQ92wexqiIew727XVUy61LUy1KUsEh1CYiEoMDJAKAu
6fyAI1YDXmNczYyHjydBm20WpJmea0i8rvxsh4RXWmuyvfHQ38VywwHqL+qa7gkTa7akjkn5QrXC
LgcadMuf
-----END RSA PRIVATE KEY-----
```

**Private Key secured**

☒ Your SSH Private Key is required to logon to the Bastion instance directly. Please make sure to store your key in a safe place. It will never be displayed again and Tech Data will keep no copy of it.

Check the box to proceed if you have secured your Private Key.

Red Hat Subscription Manager Credentials

**Red Hat Subscription Manager username**

**Red Hat Subscription Manager password**

**Red Hat Subscription Manager pool ID**

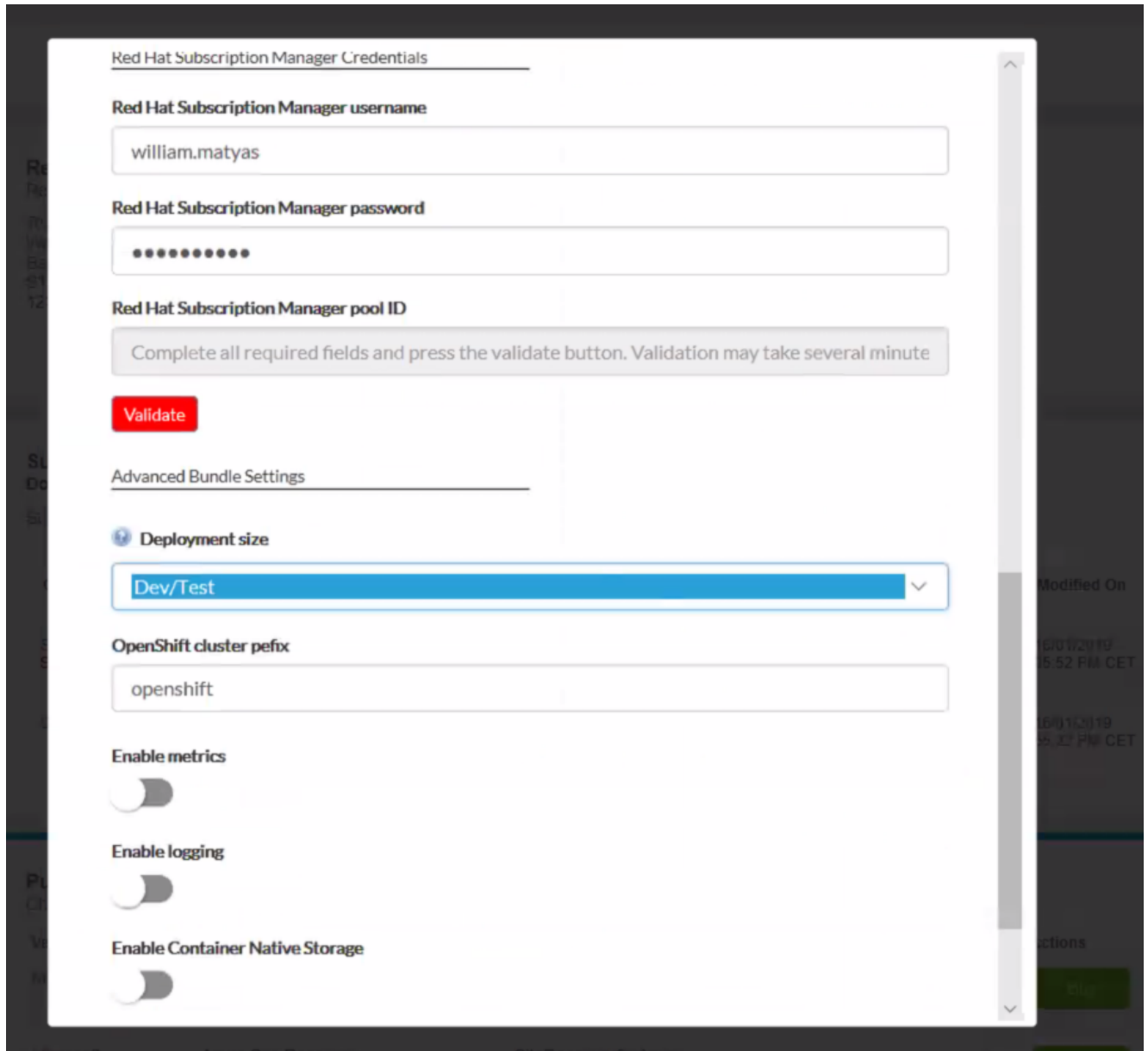
Complete all required fields and press the validate button. Validation may take several minutes.

### **SSH Private Key:**

You will be given your Private SSH Key during the order of your OpenShift Container Platform bundle. Please make sure you secure this key and store it in a safe place as you will need it for SSH access to any of your instances. Your key will be displayed only once and there is no way to recover it later on. For security reasons, Tech Data does not keep a copy.

Then, Click on Validate.

An API call will be hit from backend and validate the Red Hat Subscription Manager Username. It will also retrieve the Red Hat Subscription Manager Pool ID.



The screenshot shows a web form titled "Red Hat Subscription Manager Credentials" and "Advanced Bundle Settings". The "Red Hat Subscription Manager Credentials" section includes fields for "Red Hat Subscription Manager username" (filled with "william.matyas"), "Red Hat Subscription Manager password" (masked with dots), and "Red Hat Subscription Manager pool ID" (containing a message: "Complete all required fields and press the validate button. Validation may take several minute"). A red "Validate" button is below these fields. The "Advanced Bundle Settings" section includes a "Deployment size" dropdown menu (set to "Dev/Test"), an "OpenShift cluster prefix" text field (filled with "openshift"), and three toggle switches for "Enable metrics", "Enable logging", and "Enable Container Native Storage", all of which are currently turned off.

You can then select the Deployment Size.

OpenShift Cluster Prefix: Cluster Prefix used to configure hostnames for all nodes (bastion, master, infra and app nodes).

Enable Metrics: Enable Metrics if you wish to deploy Metrics

Enable Logging: Enable Logging if you wish to deploy Logging

Enable Container Native Storage: Enable CNS if you wish to deploy an extra Gluster File Storage for Container storage

Click on 'Continue Configuration' button.

### 3. Connect to Azure Portal

Connect to the Azure Portal <https://portal.azure.com> with your credentials. You would need to login using the same user name and password as the one created in StreamOne and what was emailed to you.

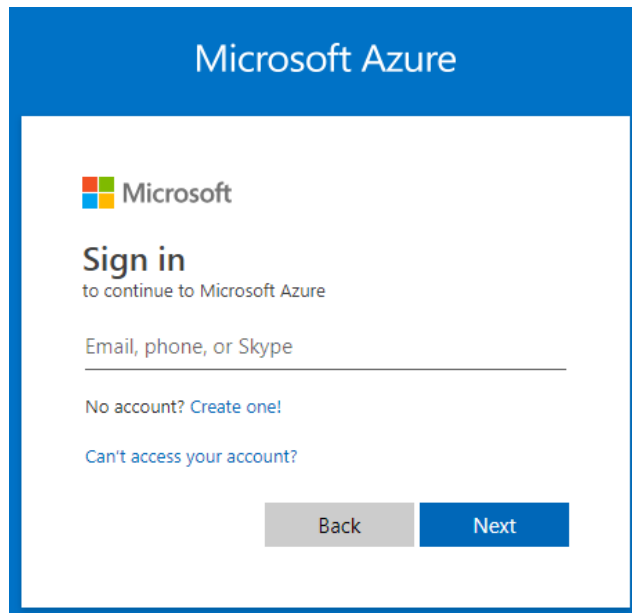


Figure 3. Sign-in to Azure Portal

You will then be connected to the Azure Portal. Go to Resource groups and choose the resource group name in which the resources are deployed, it is the resource group name you initially provided in Stream one.

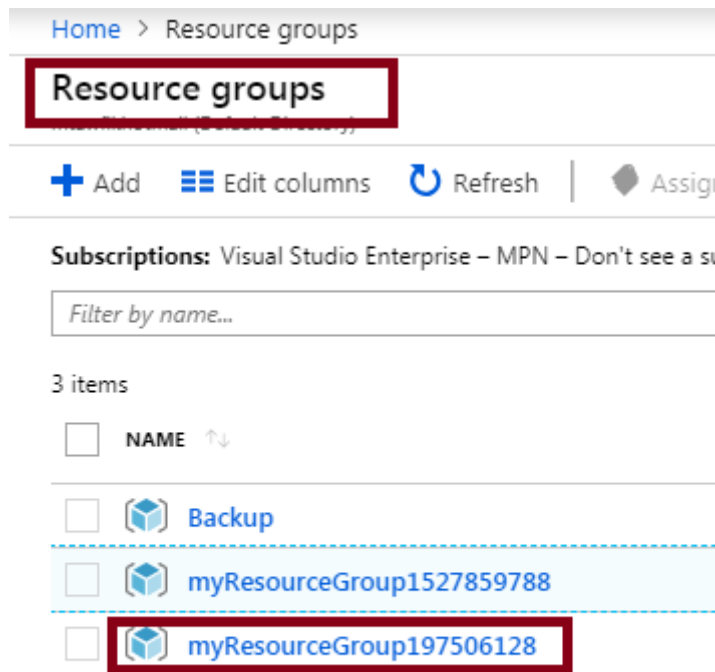


Figure 4.Resource groups list

After deployment, you would see the resources as follows

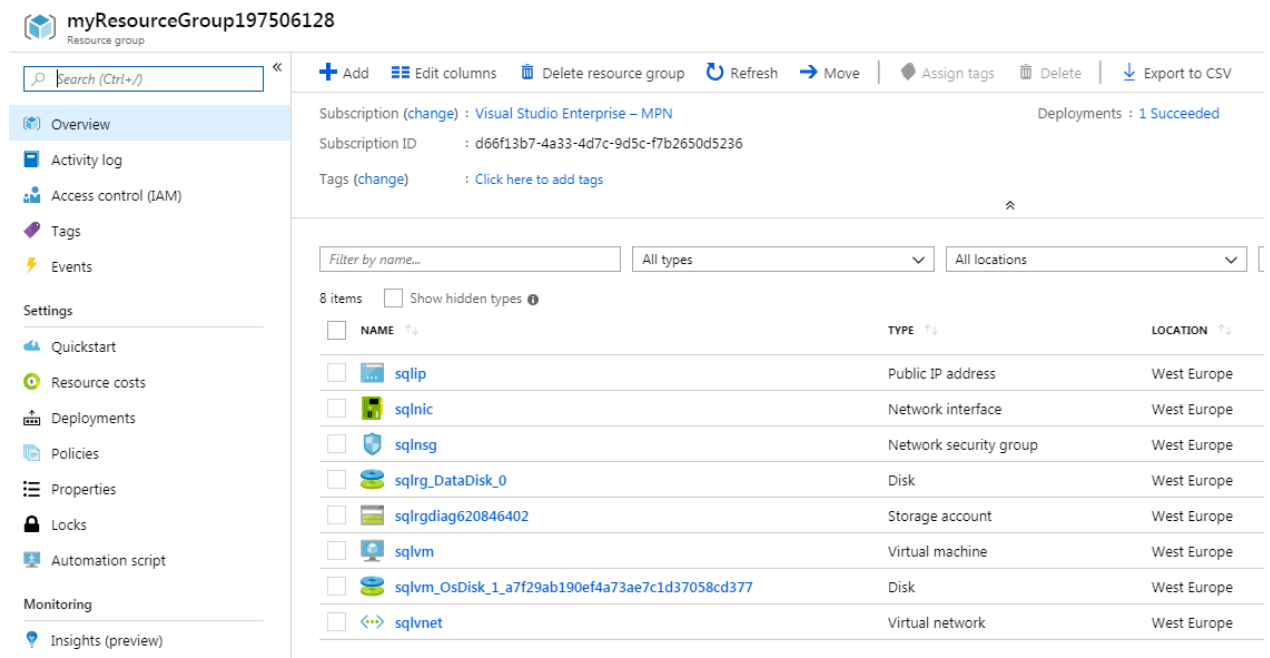


Figure 5.Resources within the provisioned resource group

## 4. Connect to the VM

Since SSH is by default enabled in this solution, you can go to the RHEL Server VM (sqlvm) and connect

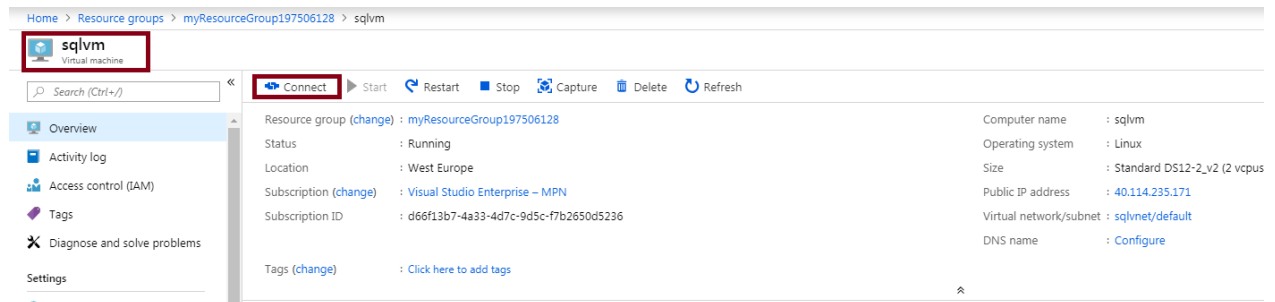


Figure 6. connect to Azure VM

Write down the required parameters to start the SSH session including Port number, Public IP address, and the Login name (it is the same Login name you initially provided in stream one).

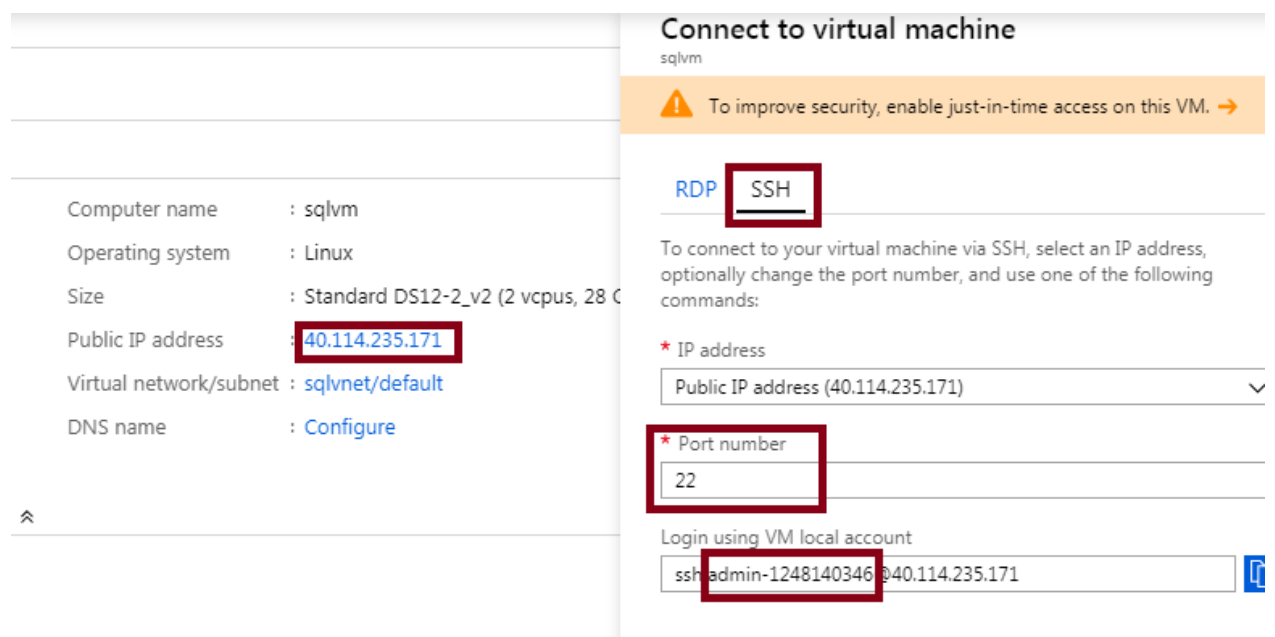


Figure 7. Connect using SSH

If you're running on Windows and don't have a BASH shell, install an SSH client, such as PuTTY: <https://www.chiark.greenend.org.uk/~sgtatham/putty/latest.html>

In Putty, add the server IP and the port number to initiate a SSH session.

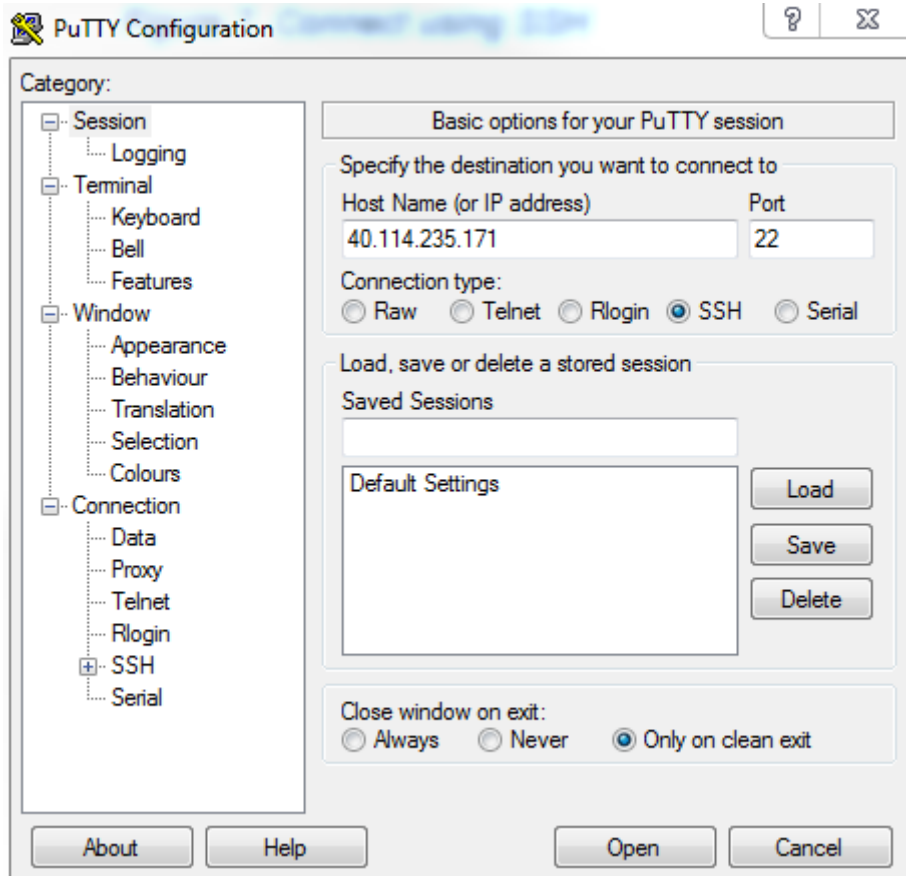


Figure 8. Initiate SSH session in Putty

If you are using SSH to connect to a server for the first time, you will probably see a message like the one below which is a procedure to help against spoofing. If you are connecting within a company network, you might accept by pressing “Yes” since spoofing attacks are unlikely. For more details, refer to PuTTY User Manual:

<https://the.earth.li/~sgtatham/putty/0.60/html/doc/Chapter2.html>

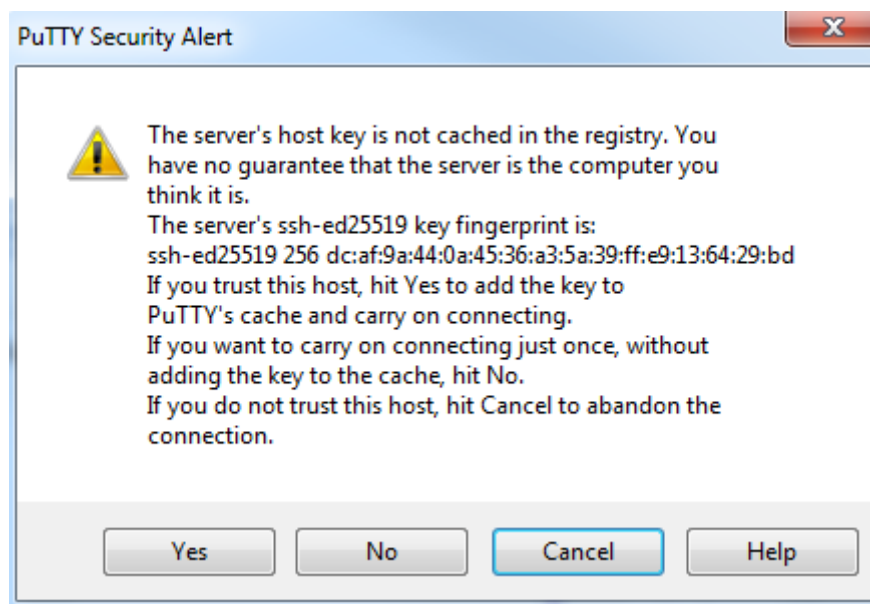


Figure 9. Warning against spoofing attacks

Once opened the SSH session, you can access the server using your Login and Password, the password you initially provided in stream one.

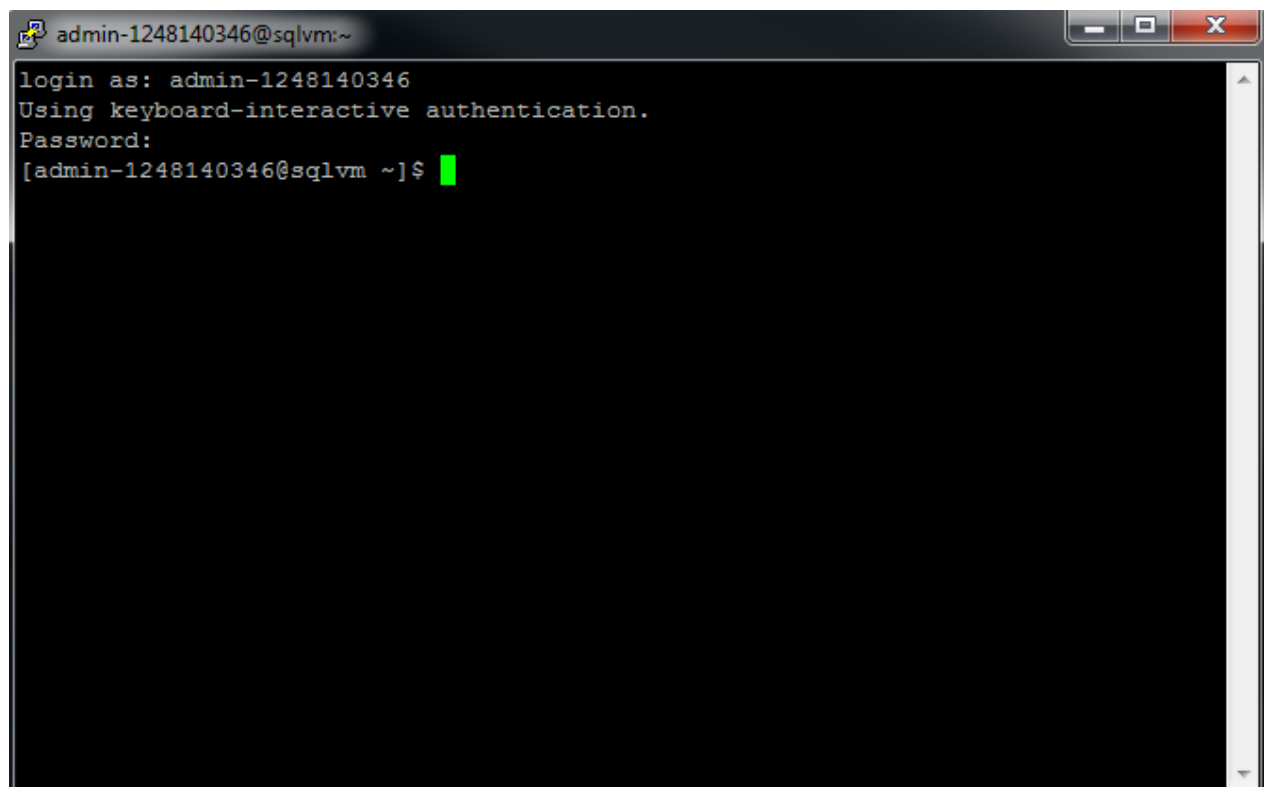


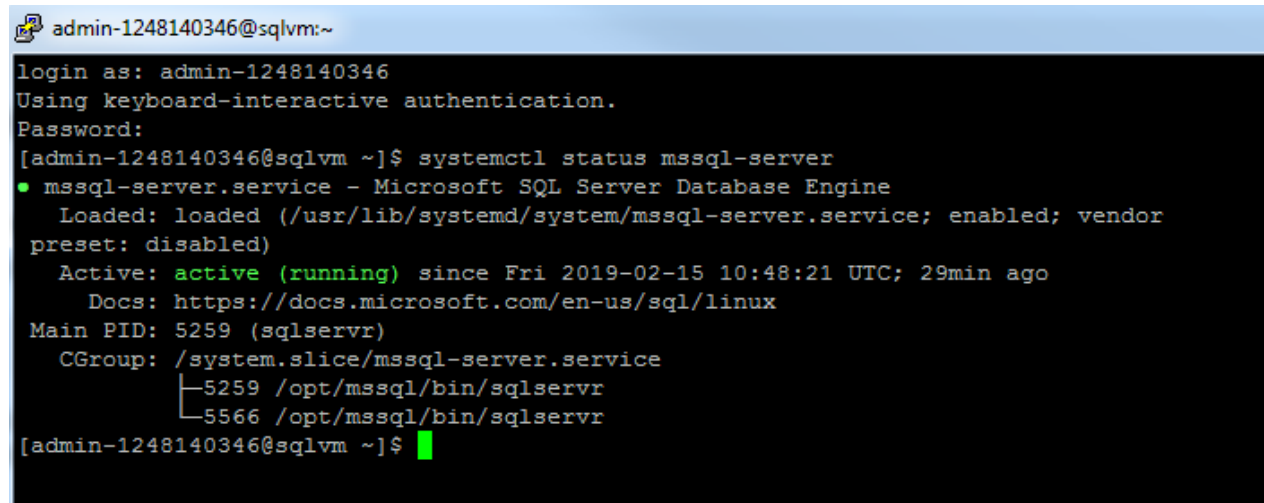
Figure 10. Accessing the Linux VM in a SSH session

Verify that the service is running by running the following Bash command:



```
systemctl status mssql-server
```

You should see the Active status running as shown in the Figure below.



```
admin-1248140346@sqlvm:~  
login as: admin-1248140346  
Using keyboard-interactive authentication.  
Password:  
[admin-1248140346@sqlvm ~]$ systemctl status mssql-server  
● mssql-server.service - Microsoft SQL Server Database Engine  
   Loaded: loaded (/usr/lib/systemd/system/mssql-server.service; enabled; vendor  
   preset: disabled)  
   Active: active (running) since Fri 2019-02-15 10:48:21 UTC; 29min ago  
     Docs: https://docs.microsoft.com/en-us/sql/linux  
  Main PID: 5259 (sqlservr)  
    CGroup: /system.slice/mssql-server.service  
            └─5259 /opt/mssql/bin/sqlservr  
              └─5566 /opt/mssql/bin/sqlservr  
[admin-1248140346@sqlvm ~]$
```

The new virtual machine installs SQL Server with a random SA password. Reset this password before you connect to SQL Server with the SA login. Change the SA password with the following commands:

```
sudo systemctl stop mssql-server
```

```
sudo /opt/mssql/bin/mssql-conf set-sa-password
```

Make sure you save this password afterwards.

Restart the SQL Server service:

```
sudo systemctl start mssql-server
```

To allow remote connections, open the SQL Server port on the firewall on RHEL by running the command below. The default SQL Server port is TCP 1433.

```
sudo firewall-cmd --zone=public --add-port=1433/tcp --permanent  
sudo firewall-cmd --reload
```

Once again, verify that the service is running by running the following Bash command:

```
systemctl status mssql-server
```

## 5. Connect to the Database Engine

At this stage, your SQL server is running and the firewall port is enabled and you should be able to access the SQL Database Engine, you can use SQL Server Management Studio on Windows. If you do not have a Windows machine to run SSMS on, consider the new Azure Data Studio (<https://docs.microsoft.com/en-us/sql/azure-data-studio/what-is?view=sql-server-2017>) . It provides a graphical tool for managing SQL Server and runs on both Linux and Windows.

SSMS is an integrated environment for managing any SQL infrastructure, from SQL Server to Azure SQL Database. SSMS provides tools to configure, monitor, and administer instances of SQL. Use SSMS to deploy, monitor, and upgrade the data-tier components used by your applications, as well as build queries and scripts.

SSMS 17.9.1 is the current General Availability (GA) version of SSMS:  
<https://go.microsoft.com/fwlink/?linkid=2043154>

Once downloaded and installed, open Microsoft SQL Server Management Studio 17

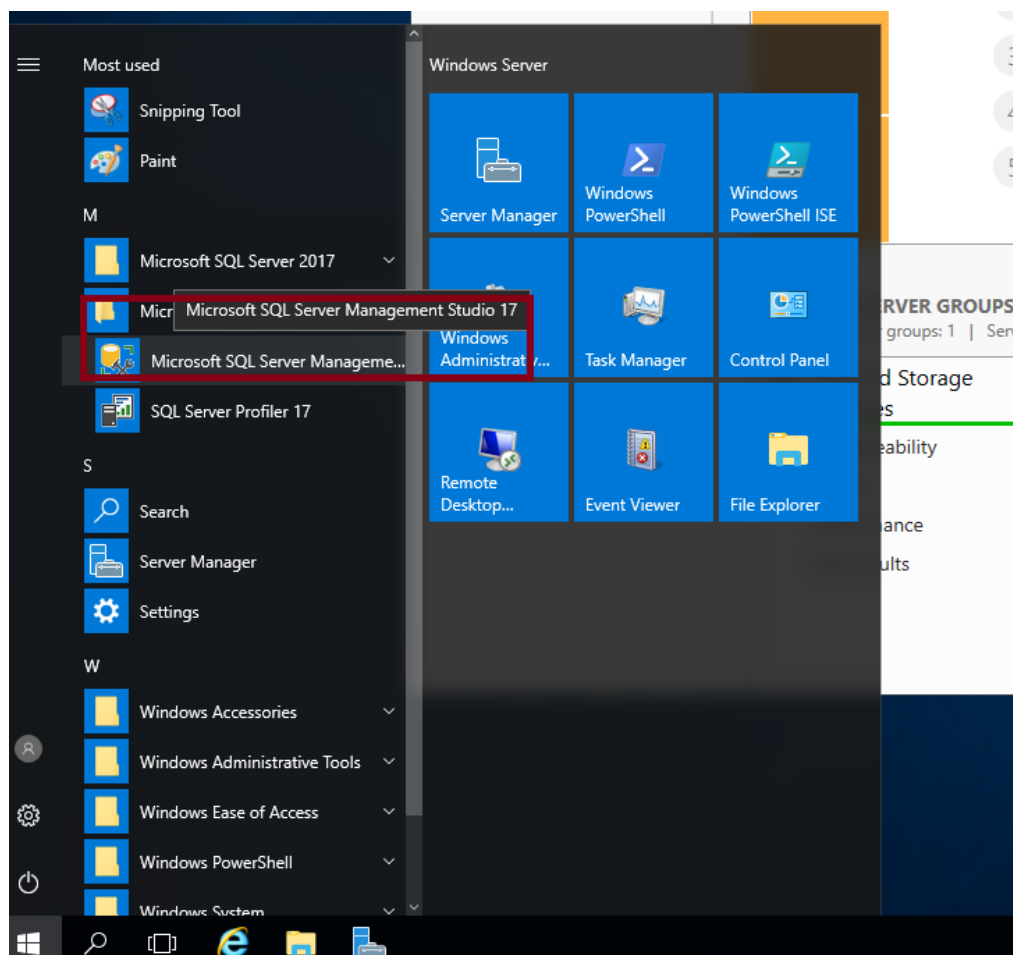


Figure 11. Open SSMS

You would be able to login into Database engine using SQL Server Admin account and password via SQL Server Authentication, the SQL Server Admin account (by default SA) and

password. The Password is the one you provided in the SSH session in the previous section of this guide.

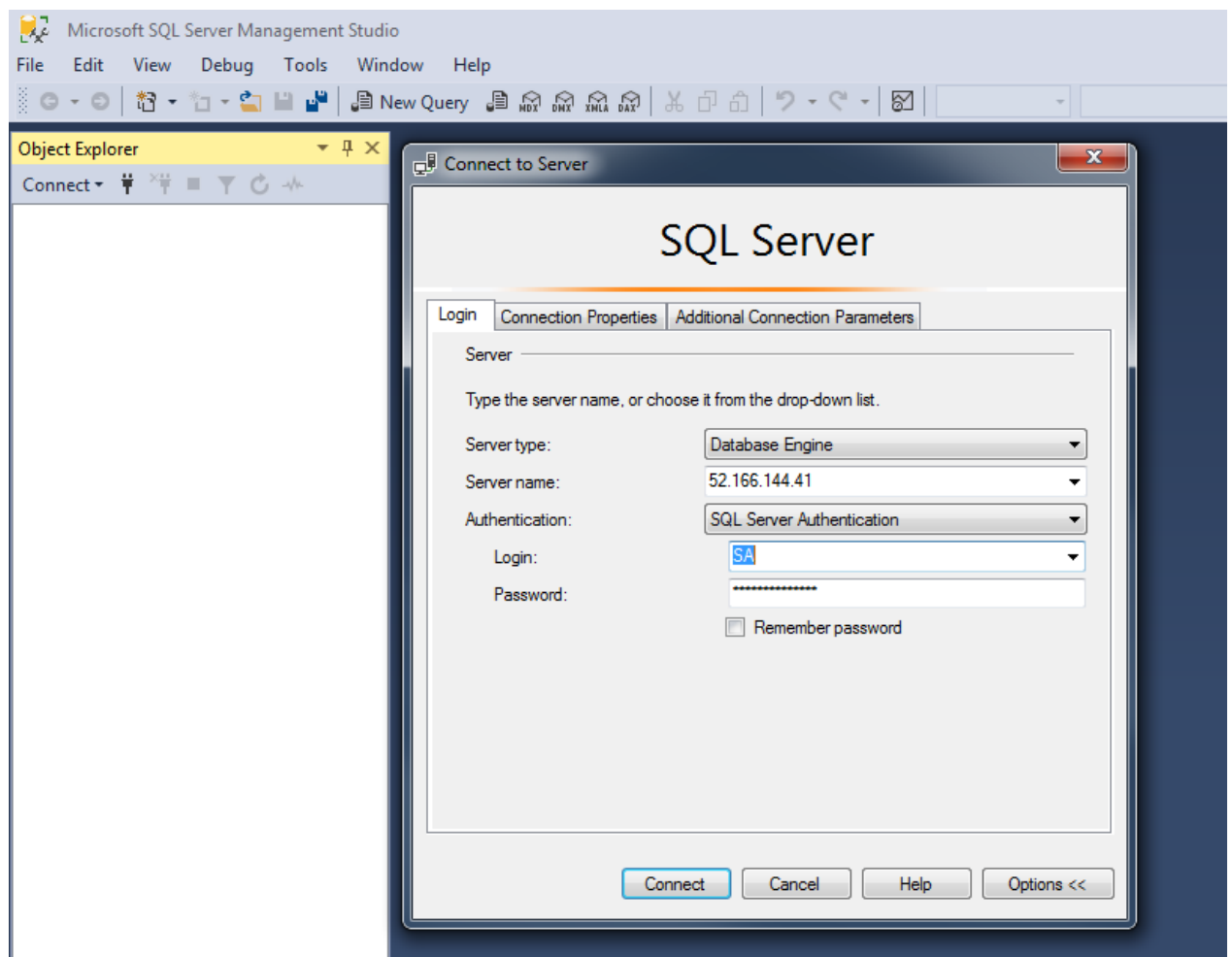


Figure 12. Login to the Database Engine using SQL server Authentication

Once successfully logged in, you would be able to access and administrate the Database engine using SSMS.

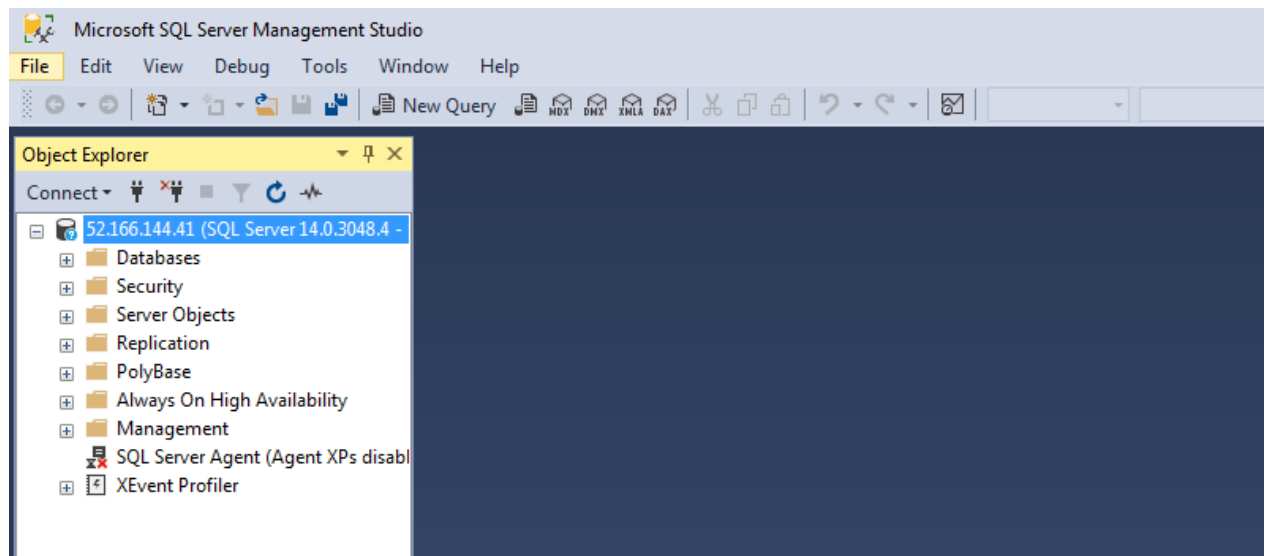


Figure 13. Object Explorer in SSMS

## 6. Post-Deployment Tasks

After you have successfully deployed the solution, you can configure additional items, among the:

### 6.1 Azure hybrid benefit

At this time, there are no BYOL Linux virtual machine images for SQL Server. However, you can manually install SQL Server on a Linux-only VM.

You cannot switch from pay-per-second licensing to using your own license. You must create a new Linux VM, install SQL Server, and migrate your data.

### 6.2 High Availability

Always On Availability Groups and Failover Clustering both require a clustering solution in Linux, such as Pacemaker. The supported Linux distributions for SQL Server do not support their high availability add-ons in the Cloud.


### 6.3 Size

The following VM sizes are selected for the provided versions:

- Standard\_DS12-2\_v2 (Enterprise, Standard or Web)
- Standard\_D2s\_v3 (Free Express or Developer)

You can still scale up and change VM size after deployment from size section.

Home > Resource groups > myResourceGroup496385002 > sqlvm - Size


**sqlvm - Size**  
Virtual machine

[Clear all filters](#)

Size: **Small (0-4)** | Generation: **Current** | Family: **General purpose** | Premium disk: **Supported**

Showing 12 of 41 VM sizes. | Subscription: Visual Studio Enterprise – MPN | Region: West Europe | Current size: Standard\_DS3\_v2

VM SIZE	OFFERING	FAMILY	VCPUS	RAM (GB)	DATA DISKS	MAX IOPS
B1ms	Standard	General purpose	1	2	2	800
B1s	Standard	General purpose	1	1	2	400
B2ms	Standard	General purpose	2	8	4	2400
B2s	Standard	General purpose	2	4	4	1600
B4ms	Standard	General purpose	4	16	8	3600
D2s_v3	Standard	General purpose	2	8	4	3200
D4s_v3	Standard	General purpose	4	16	8	6400
DS1_v2	Standard	General purpose	1	3.5	4	3200
DS2_v2	Standard	General purpose	2	7	8	6400
DS2_v2	Promo	General purpose	2	7	8	6400
<b>DS3_v2</b>	<b>Standard</b>	<b>General purpose</b>	<b>4</b>	<b>14</b>	<b>16</b>	<b>12800</b>
DS3_v2	Promo	General purpose	4	14	16	12800

Figure 14. Size SQL Server VM

## 6.4 Boot Diagnostics

By Default, Boot Diagnostics is enabled and captured serial console output and screenshots of the virtual machine running on a host are stored in a general purpose v2 LRS Azure storage account, which name is randomly generated.

You can disable or modify this configuration from the section Support + Troubleshooting>Boot Diagnostics> Settings

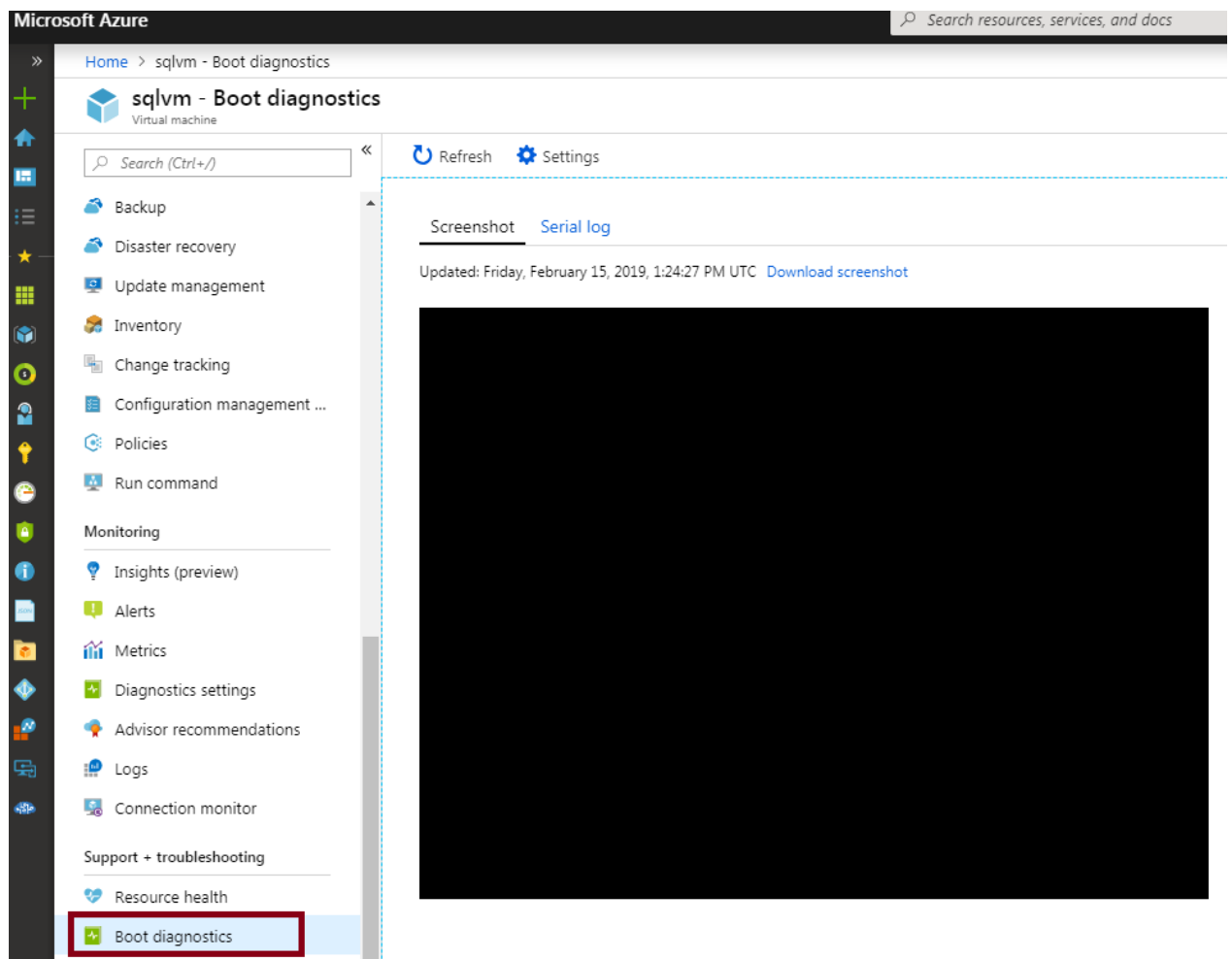


Figure 15. Boot Diagnostics Settings

## 7. Architecture

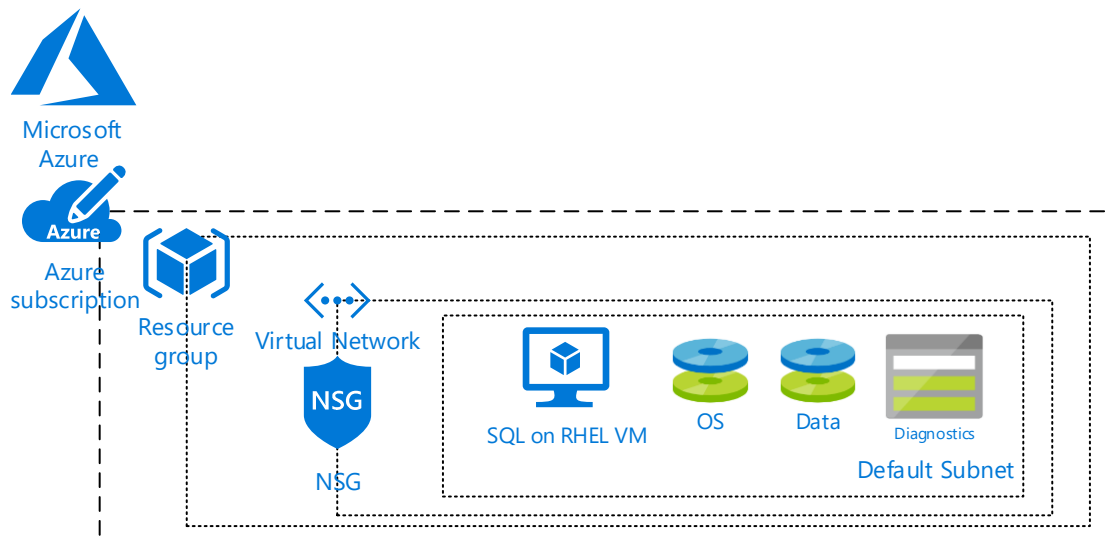


Figure 16. Provisioned Architecture of the solution

## 8. BOM

- Linux Virtual Machine (on which SQL server is installed)
  - Standard\_DS12-2\_v2 (Enterprise, Standard or Web)
  - Standard\_D2s\_v3 (Free Express or Developer)
- A Default subnet (address range: 10.0.0.0/24) within a virtual network
- Network interface card for the VM
- A Premium 1 TB SSD managed disks for Data
- A Premium 32 GB SSD managed disks for OS
- A Public dynamic IP address – Basic SKU
- Network security group: act as a firewall for the default subnet in which the VM is connected
- Locally redundant V2 storage account for boot diagnostics

In addition, the Linux virtual machine images for SQL server automatically install most packages for you. The following table shows which packages are installed for each distribution.

Distribution	Database Engine	Tools	SQL Server Agent	Full-Text Search	SSIS	HA add-on
RHEL	✓	✓	✓	✓	✓	✗
SLES	✓	✓	✓	✓	✗	✗
Ubuntu	✓	✓	✓	✓	✓	✓

Figure 17. Packages that come installed by default with the images.

## 9. Limitations

The below Figure summarizes the common limitations when deploying SQL server on a Linux VM as opposed to deploying it on a Windows VM.

		Windows	Linux
<b>Editions</b>	Developer, Express, Web, Standard, Enterprise	●	●
<b>Services</b>	Database Engine, Integration Services	●	●
	R Services, Analysis Services, Reporting Services, MDS, DQS	●	
<b>Mission critical performance</b>	Maximum number of cores	Unlimited	Unlimited
	Maximum memory utilized per instance	24 TB	12 TB
	Maximum database size	524 PB	524 PB
	Basic OLTP (Basic In-Memory OLTP, Basic operational analytics)	●	●
	Advanced OLTP (Advanced In-Memory OLTP, Advanced operational analytics)	●	●
	Basic high availability (2-node single database failover, non-readable secondary)	●	●
	Advanced HA (Always On - multi-node, multi-db failover, readable secondaries)	●	●
<b>Security</b>	Basic security (Basic auditing, Row-level security, Data masking, Always Encrypted)	●	●
	Advanced security (Transparent Data Encryption)	●	●
<b>Data warehousing</b>	PolyBase <sup>2</sup>	●	
	Basic data warehousing/data marts (Basic In-Memory ColumnStore, Partitioning, Compression)	●	●
	Advanced data warehousing (Advanced In-Memory ColumnStore)	●	●
	Advanced data integration (Fuzzy grouping and look ups)	●	
<b>Tools</b>	Windows ecosystem: Full-fidelity Management & Dev Tool (SSMS & SSDT), command line tools	●	●
	Linux/OSX/Windows ecosystem: Dev tools (VS Code), DB Admin GUI tool, command line tools	●	●
<b>Developer</b>	Programmability (T-SQL, CLR, Data Types, JSON)	●	●
	Windows Filesystem Integration - FileTable	●	
<b>Business intelligence</b>	Basic reporting, analytics & data integration	●	
	Basic Corporate Business Intelligence (Multi-dimensional models, Basic tabular model)	●	
	Advanced Corporate Business Intelligence (Advanced tabular model, DirectQuery, advanced data mining)	●	
	Mobile BI (Datazen)	●	
<b>Advanced analytics</b>	Basic "R" integration (Connectivity to R Open, Limited parallelism for ScaleR)	●	
	Advanced "R" integration (Full parallelism for ScaleR)	●	
<b>Hybrid cloud</b>	Stretch Database	●	

Figure 18. SQL Server on Linux vs SQL Server on Windows

The below are common references for features comparison, for more details please refer to the official documentations at:

<https://docs.microsoft.com/en-us/azure/sql-database/sql-database-paas-vs-sql-server-iaas?toc=%2fazure%2fvirtual-machines%2fwindows%2fsql%2ftoc.json#a-closer-look-at-azure-sql-database-and-sql-server-on-azure-vm>



SQL Server on VM	Managed instance in SQL Database	Single database / elastic pool in SQL Database
<p>You have full control over the SQL Server engine.</p> <p>Up to 99.95% availability.</p> <p>Full parity with the matching version of on-premises SQL Server.</p> <p>Fixed, well-known database engine version.</p> <p>Easy migration from SQL Server on-premises.</p> <p>Private IP address within Azure VNet.</p> <p>You have ability to deploy application or services on the host where SQL Server is placed.</p>	<p>High compatibility with SQL Server on-premises.</p> <p>99.99% availability guaranteed.</p> <p>Built-in backups, patching, recovery.</p> <p>Latest stable Database Engine version.</p> <p>Easy migration from SQL Server.</p> <p>Private IP address within Azure VNet.</p> <p>Built-in advanced intelligence and security.</p> <p>Online change of resources (CPU/storage).</p>	<p>The most commonly used SQL Server features are available.</p> <p>99.99% availability guaranteed.</p> <p>Built-in backups, patching, recovery.</p> <p>Latest stable Database Engine version.</p> <p>Ability to assign necessary resources (CPU/storage) to individual databases.</p> <p>Built-in advanced intelligence and security.</p> <p>Online change of resources (CPU/storage).</p>
<p>You need to manage your backups and patches.</p> <p>You need to implement your own High-Availability solution.</p> <p>There is a downtime while changing the resources(CPU/storage)</p>	<p>There is still some minimal number of SQL Server features that are not available.</p> <p>No guaranteed exact maintenance time (but nearly transparent).</p> <p>Compatibility with the SQL Server version can be achieved only using database compatibility levels.</p>	<p>Migration from SQL Server might be hard.</p> <p>Some SQL Server features are not available.</p> <p>No guaranteed exact maintenance time (but nearly transparent).</p> <p>Compatibility with the SQL Server version can be achieved only using database compatibility levels.</p> <p>Private IP address cannot be assigned (you can limit the access using firewall rules).</p>

Figure 19. Feature comparison among different SQL Database deployment options 1

	<b>Azure SQL Database</b> <b>Logical servers, elastic pools, and</b> <b>single databases</b>	<b>Azure SQL</b> <b>Database</b> <b>Managed Instance</b>	<b>Azure Virtual Machine</b> <b>SQL Server</b>
<b>Best for:</b>	New cloud-designed applications that want to use the latest stable SQL Server features and have time constraints in development and marketing.	New applications or existing on-premises applications that want to use the latest stable SQL Server features and that are migrated to the cloud with minimal changes.	Existing applications that require fast migration to the cloud with minimal changes or no changes. Rapid development and test scenarios when you do not want to buy on-premises non-production SQL Server hardware.
	Teams that need built-in high availability, disaster recovery, and upgrade for the database.	Same as SQL Database.	Teams that can configure, fine tune, customize, and manage high availability, disaster recovery, and patching for SQL Server. Some provided automated features dramatically simplify this.
	Teams that do not want to manage the underlying operating system and configuration settings.	Same as SQL Database.	You need a customized environment with full administrative rights.
	Databases of up to 100 TB.	Same as SQL Database.	SQL Server instances with up to 64 TB of storage. The instance can support as many databases as needed.
<b>Compatibility</b>	Supports most on-premises database-level capabilities.	Supports almost all on-premises instance-level and database-level capabilities.	Supports all on-premises capabilities.

<b>Resources:</b>	You do not want to employ IT resources for configuration and management of the underlying infrastructure but want to focus on the application layer.	Same as SQL Database.	You have some IT resources for configuration and management. Some provided automated features dramatically simplify this.
<b>Total cost of ownership:</b>	Eliminates hardware costs and reduces administrative costs.	Same as SQL Database.	Eliminates hardware costs.
<b>Business continuity:</b>	In addition to <a href="#">built-in fault tolerance infrastructure capabilities</a> , Azure SQL Database provides features, such as <a href="#">automated backups</a> , <a href="#">Point-In-Time Restore</a> , <a href="#">geo-restore</a> , and <a href="#">failover groups and active geo-replication</a> to increase business continuity. For more information, see <a href="#">SQL Database business continuity overview</a> .	Same as SQL Database, plus user-initiated, copy-only backups are available.	SQL Server on Azure VMs lets you set up a high availability and disaster recovery solution for your database's specific needs. Therefore, you can have a system that is highly optimized for your application. You can test and run failovers by yourself when needed. For more information, see <a href="#">High Availability and Disaster Recovery for SQL Server on Azure Virtual Machines</a> .
<b>Hybrid cloud:</b>	Your on-premises application can access data in Azure SQL Database.	<a href="#">Native virtual network implementation</a> and connectivity to your on-premises environment using Azure Express Route or VPN Gateway.	With SQL Server on Azure VMs, you can have applications that run partly in the cloud and partly on-premises. For example, you can extend your on-premises network and Active Directory Domain to the cloud via <a href="#">Azure Virtual Network</a> . In addition, you can store on-premises data files in Azure Storage using <a href="#">SQL Server Data Files in Azure</a> . For more information, see <a href="#">Introduction to SQL Server 2014 Hybrid Cloud</a> .
	Supports <a href="#">SQL Server transactional replication</a> as a subscriber to replicate data.	Replication is not supported for Azure SQL Database Managed Instance.	Fully supports <a href="#">SQL Server transactional replication</a> , <a href="#">Always On Availability Groups</a> , Integration Services, and Log Shipping to replicate data. Also, traditional SQL Server backups are fully supported

Figure 20. Feature comparison among different SQL Database deployment options 2