

# AZURE STACK HCI: HIGH-PERFORMANCE MICROSOFT SQL SERVER

Leverage your Azure Stack HCI investment to run Microsoft SQL Server for highly available and highly performant enterprise database applications. Azure Stack HCI with Microsoft SQL Server also provides the ability to use Azure Site Recovery to migrate, restore, and protect customers' data. Below, you will find a how-to guide for deploying Microsoft SQL Server on Azure Stack HCI that includes:

- Solution Overview
- Step by step documentation to deploy Microsoft SQL Server on Azure Stack HCI

## Overview of High-performance Microsoft SQL Server

Azure Stack HCI provides enterprise customers a highly available, cost efficient, flexible platform to run a high-performance Microsoft SQL Server leveraging the power of state-of-the-art hardware and Storage Spaces Direct. Azure Stack HCI presents a highly competitive solution for delivering exceptionally performant Microsoft SQL Server. Whether running Online Transaction Processing (OLTP) workloads, or Data Warehouse and BI, to AI and advanced analytics over Big Data, you will benefit from the resiliency that Azure Stack HCI offers. This is especially important for mission critical databases. Leveraging the flexibility to run SQL Server in VMs (Windows Server or Linux), it allows you to consolidate multiple database workloads and easily scale out by adding additional VMs to the Azure Stack HCI environment as needed.

Additionally, Azure Stack HCI enables you to integrate Microsoft SQL Server with Azure Site Recovery service to provide a cloud-based migration, restoration, and protection solution for your organization's data that is reliable and secure.

## How to deploy Microsoft SQL Server on Azure Stack HCI

1. Thomas-Krenn.AG Azure Stack HCI Systems
  - [Azure Stack HCI Rack-Series Variants](#)
  - [Azure Stack HCI Micro-Cluster Variants](#)
2. Plan your Azure Stack HCI environment with [Azure Stack HCI Solutions from Thomas-Krenn.AG](#)
  - Maximum flexibility and scalability
  - 2x Intel 3<sup>rd</sup> Generation Scalable CPUs each Node
  - Up to 4 TB RAM each Node
  - Up to 2x 200 GbE RDMA-Network each Node
  - Individual calculated Storage-Capacity available <sup>(1)</sup>
    - NVMe-Storage

<sup>(1)</sup> [Nested two-way Mirror](#) is highly recommended for 2-Node-Azure-Stack-HCI-Clusters

Please consider backup and restore times for large-capacity configurations. Most data protection solutions are not able to ingest and restore at speeds businesses expect.

3. Network and Switch Connectivity
  - [RoCE/RDMA](#) technology for Storage Spaces Direct Traffic.  
With RoCE there is additional DCB and PFC configuration required. Network devices have to support this capabilities.
  - Available as switch-connected or direct-attached solution <sup>(2)</sup>
    - One single/standalone switch
    - Two redundant/stacked switches
    - Direct-attached for RDMA (storage & cluster) traffic

<sup>(2)</sup> Thomas-Krenn.AG recommends a switched configuration. The switch helps the cluster determine whether loss of node connectivity is due to node or network failure, ensuring more predictable failover behavior.

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**Step by Step guide** to [deploy Azure Stack HCI](#).

Install [Windows Admin Center \(WAC\)](#) for managing Azure Stack HCI.

## 1. Set up Microsoft SQL Server on Azure Stack HCI

Set up a Windows-Server or Linux VM for SQL-Server

- a. Install [SQL Server on Linux](#)
- b. Install [SQL Server on Windows](#)

## 2. Monitoring and performance tuning

To ensure performance and health of your Microsoft SQL Server instances on Azure Stack HCI, it is important that appropriate [monitoring and tuning](#) is put in place. Additional SQL Server database engine tutorials are included [here](#). For tuning SQL Server 2016/2017 for high performance, the following [recommended practices](#) are provided.

## 3. High Availability (HA)

Azure Stack HCI leverages [Windows Server Failover Clustering](#) (WSFC) and can be utilized to support Microsoft SQL Server running in VMs (designed to help with hardware failure). Microsoft SQL Server also offers [Always On availability groups](#) (AG) which provides database-level high availability and is designed to help with application and software faults. In addition to WSFC and AG, Azure Stack HCI can also leverage [Always On Failover Cluster Instance](#) (FCI) based on using [Storage Spaces Direct](#) technology for shared storage. All of these options can leverage the Microsoft Azure [Cloud witness](#) for quorum control. It is recommended that cluster [AntiAffinity](#) rules in WSFC be leveraged for the VMs to be placed on different physical nodes in order to maintain uptime for SQL Server in the event of host failures when you configure Always On availability groups.

## 4. Set up Azure hybrid services

[Azure Site Recovery](#) offers business continuity and disaster recovery (BCDR) strategy. [Set up disaster recovery for SQL Server](#) allows organizations to protect the SQL Server back end of an application to help keep your data safe, and your apps and workloads online, when planned and unplanned outages occur.

[Azure Backup](#) supports backing up and restoring Microsoft SQL Server with application consistency. [Install Azure Backup Server](#) to start backup of your on-prem SQL data.

Alternatively, you can also leverage [Azure Blob Storage service for SQL Server](#) to [backup and restore to Azure Blob Storage service](#). This is suitable for off-site archiving. To manage the Azure Blob Storage backups, you can leverage the [Managed SQL Backup](#) feature included in Microsoft SQL Server.

In addition to the backup scenario, you can setup other database services that Microsoft SQL Server (Microsoft SQL Server 2016/2017/2019) offers, connecting to Azure services such as (but not limited to) [Azure Data Factory](#), and [Azure Feature Pack for Integration Services \(SSIS\)](#).

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## Summary

With completion of a Microsoft SQL Server deployment using Azure Stack HCI, you now have a platform capable of running complex, highly available database workloads in VMs.