

# **Configuration Manager on MS SQL Database** Managing large installations by using a central database



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# 1 Introduction

The Bosch Configuration Manager is a free and the central tool to scan, configure and manage Bosch devices. Over the years, it has seen a lot of enhancements, always keeping it up with newly introduced and evolving Bosch security products.

So far, Configuration Manager has been designed and used as a solitary client, holding its own local database. Though this could be centralized, working on this with multiple clients simultaneously had its challenges and restrictions.

Now, with version 7.70, we introduce the possibility to use a SQL database instead of the local database, at the same time enabling multiple simultaneous client access.

Since database installations and setups may vary extensively, only a certain number of setups could be tested and verified, so we need to consider this still an experimental feature. Feedback is welcomed to help us further improving this feature.

Configuration Manager 7.70 supports MS SQL Server 2019 and 2022, both as on-premises installation or in an Azure cloud.

In this tech note we assume a pre-installed SQL server that only needs to be configured for use with Configuration Manager.

If this is not the case, please refer to the appendix for installation hints and the references section for further documentation sources.

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# 2 Configuration Manager setup for MS SQL as root DB

Navigate to Preferences  $\rightarrow$  Page Access  $\rightarrow$  Group Database. From the combo-box dropdown list Database Mode, select MSSQL Database.

The Configuration Manager offers 2 configuration modes:

1. Parameter-based configuration allows selecting basic connection parameters using Configuration Manager UI.

Database Mode	
MSSQL Database	$\sim$
Configuration type	$\sim$
Parameters	
Server name	
-DEV-HP\SQLEXPRESS	
The second se	
Database name	
cm	
Authentiaction type	
Authentication type	$\sim$
SQL Server Authentication	
Login	
cm	
Password	
•••••	
Connection encryption	$\sim$
Encrypted with trust checking	-
Sensitive data encryption passphrase	

2. **Connection String-based** mode allows for a possibility to define custom parameters that are not configurable via CM UI.

$\sim$
$\sim$

Connection string

Sensitive data encryption passphrase

In this tech note we will focus on Parameter-based mode only.

# 2.1 Configuring Parameter-based mode

Possible parameters:

- Server name Host name combined with instance id by "\"
- Database name

Database to be used. This can be an existing database, or a non-existing database in case a user with database creation rights is used.

Authentication type

Can be chosen as Windows authentication, or SQL Server authentication. In case of Windows authentication, no additional input is required. In case of SQL Server authentication, a username and password are required (*see chapter 3.3.1*).

- Connection encryption
   Defines if traffic between client and server is encrypted as well as if server certificate is being verified.
   Recommended option is: Encrypted with trust check.
- Sensitive database encryption passphrase
   A passphrase used to encrypt data in the database.
   Recommended for small environments where column encryption is not enabled on the server.
   For corporate environments, a method that uses built-in column encryption is recommended (see chapter 3.4.).

After successful database connection, Configuration Manager will verify the version of the database and try to update the database schema.



Successful connection is indicated by status message in the application's footer.

Serven-Internet DEV-HP\SQLEXPRESS Database: cm

# 2.2 Initial importing a local database

In case it is the first time a user switched from file-based database to SQL database, Configuration Manager will offer the possibility to import the local database into the SQL server.



## 2.3 Sensitive database encryption passphrase

If provided, sensitive data, like access credentials for devices, will be encrypted with this passphrase. Changing of the sensitive data encryption passphrase on existing database will trigger re-encryption of all sensitive records.

🛆 Warning	×
Warning	
Database will be encrypted with new password.	
	ОК

#### Note:

For corporate environments, a method that uses built-in column encryption is recommended (see chapter 3.4.).

After enabling this option, all clients must use the same passphrase to access sensitive data. If the database uses built-in column encryption and a sensitive data encryption passphrase is provided, this will be used as additional encryption. Though it is not needed to use both encryptions, it is still possible.

# 3 Appendix

In this guideline we aim to provide hints for a SQL Server installation and setup that works with Configuration Manager. This is based on our own work processes and does not claim completeness nor correctness.

# 3.1 Installation of MS SQL Server

Download one of following versions of MS SQL server:

- SQL Server 2022 Express <u>https://go.microsoft.com/fwlink/p/?linkid=2216019&clcid=0x409&culture=en-us&country=us</u>
- SQL Server 2019 Express
   <a href="https://www.microsoft.com/en-us/download/confirmation.aspx?id=101064">https://www.microsoft.com/en-us/download/confirmation.aspx?id=101064</a>

To install SQL Server, select 'New SQL Server standalone installation'.

🃸 SQL Server Installation Center			×
Planning Installation	New SQL Server standalone installation or add features to an existing inst Launch a wizard to install SQL Server 2022 in a non-clustered environmer features to an existing SQL Server 2022 instance.	<u>allation</u> nt or to add	]
Maintenance Tools Resources	Install SQL Server Reporting Services           Launch a download page that provides a link to install SQL Server Report internet connection is required to install SSRS.	ing Services.	An
Options	Install SQL Server Management Tools Launch a download page that provides a link to install SQL Server Manag SQL Server command-line utilities (SQLCMD and BCP), SQL Server Powe SQL Server Profiler and Database Tuning Advisor. An internet connection install these tools.	ement Studi rShell provid is required t	o, er, :o
	Install SQL Server Data Tools Launch a download page that provides a link to install SQL Server Data To provides Visual Studio integration including project system support for N SQL Database, the SQL Server Database Engine, Reporting Services, Analy Integration Services. An internet connection is required to install SSDT.	ools (SSDT). S Aicrosoft Azu rsis Services a	SDT Jre and
	Upgrade from a previous version of SQL Server Launch a wizard to upgrade a previous version of SQL Server to SQL Serv <u>Click here to first view Upgrade Documentation</u>	er 2022.	
Microsoft SQL Server 2022			

On the next screen, disable Azure Extension as shown below.

🃸 SQL Server 2022 Setup				_		×
Azure Extension for SQ	L Server					
Azure Extension for SQL Server	is required to enable Microsoft Defend	er for Cloud, Purview	w, and Azure Acti	ive Directory.		
Global Rules Microsoft Update Product Updates Install Setup Files Install Rules Installation Type License Terms <b>Azure Extension for SQL Serv</b> Feature Selection Feature Rules Instance Configuration Server Configuration Database Engine Configuration Feature Configuration Rules Installation Progress Complete	<ul> <li>Azure Extension for SQL Server</li> <li>Use Azure Login</li> <li>Use Service Principal Azure Service Principal ID* Azure Service Principal Secret*</li> <li>Azure Subscription ID* Azure Resource Group* Azure Region* Azure Tenant ID* Proxy Server URL (optional)</li> </ul>	To install Azure ex account or a servic instance to Azure. Resource Group, R registered. For mo https://aka.ms/arc	tension for SQL S ce principal to aut You also need to Region, and Tenan re information fo c-sql-server.	erver, provide you thenticate the SQL provide the Subso It ID where this ins r each parameter,	r Azure . Server :ription ID, .tance will H visit	
			< Back	Next >	Cance	2l

Select all necessary components from group Database Engine Service. Specify Instance root dictionary if needed.

🃸 SQL Server 2022 Setup			- 🗆 X
Feature Selection Select the Express features to in	nstall.		
License Terms Global Rules Microsoft Update Product Updates Install Setup Files Install Rules Azure Extension for SQL Server Feature Selection Feature Rules Instance Configuration Server Configuration Server Configuration Patabase Engine Configuration Feature Configuration Rules Installation Progress Complete		ces? <u>Download it fro</u>	Image: Second Structure Control of
	Select All Unselect All Instance root directory: Shared feature directory: Shared feature directory (x86):	C:\Program Files\Mi C:\Program Files\Mi C:\Program Files (x8	icrosoft SQL Server\ icrosoft SQL Server\ 6)\Microsoft SQL Server\
			< Back Next > Cancel

Configure and note down the Instance Name and Instance ID. They will be needed for connection configuration. In this case:

- Instance Name: SQLExpress
- Instance ID: SQLExpress

髋 SQL Server 2022 Setup					_		×	
Instance Configuration								
Specify the name and instance	ID for the instance of SC	QL Server. Instance ID b	becomes part of the in	stallation path.				
Global Rules	O Default instance							
Microsoft Update Product Updates Install Setup Files	Named instance: *	SQLExpress						
Install Rules Installation Type	Instance ID:	SQLEXPRESS						
License Terms Azure Extension for SQL Server	SQL Server directory:	C:\Program Files\Mic	rosoft SQL Server\MS	SQL16.SQLEXPRESS				
Feature Selection Feature Rules	Installed instances:							
Instance Configuration	Instance Name	Instance ID	Features	Edition	Vers	sion	_	
Server Configuration	SQLEXPRESS	MSSQL16.SQLEXPR	SQLEngine,SQLEn	Express	16.0	.1000.6		
Database Engine Configuration								
Feature Configuration Rules								
Installation Progress								
Complete								
			< Ba	ock Next >		Cancel		

Make sure the server is started automatically by service account as shown on picture below.

髋 SQL Server 2022 Setup				_		×
Server Configuration						
Specify the service accounts and	l collation configuration.					
License Terms	Service Accounts Collation					
Microsoft Update	Microsoft recommends that you u	use a separate account for each	SQL Server service			
Product Updates	Service	Account Name	Password	Startu	р Туре	
Install Setup Files	SQL Server Database Engine	NT Service\MSSQL\$SQL		Autom	atic	~
Install Rules	SQL Server Browser	NT AUTHORITY\LOCAL		Autom	atic	~
Azure Extension for SQL Server						
Feature Selection	Grant Perform Volume Mainter	nance Tasks privilege to SQL Ser	ver Database Engi	ne Servio	ce	
Feature Rules	This privilege enables instant f	ile initialization by avoiding zero	ing of data pages	This ma	y lead	
Instance Configuration	to information disclosure by al	lowing deleted content to be acc	cessed.			
Server Configuration	Click here for details					
Database Engine Configuration						
Feature Configuration Rules						
Installation Progress						
Complete						
		< Back	: Next >		Cance	I

For access configuration in Active Directory environment use Windows Authentication Mode; in other environments use Mixed Authentication Mode. Configure and note administrator password.

Such a configuration allows to login to the server using username Administrator and the configured password as well as access using Windows account defined as Server administrators.

髋 SQL Server 2022 Setup		_		×
Database Engine Confi	guration			
Specify Database Engine auther parallelism, Memory limits, and	ntication security mode, administrators, data directories, TempDB, Max degree of Filestream settings.			
License Terms Global Rules Microsoft Update Product Updates Install Setup Files Install Rules Azure Extension for SQL Server Feature Selection Feature Rules Instance Configuration Server Configuration Database Engine Configuration Feature Configuration Rules Installation Progress Complete	Server Configuration       Data Directories       TempDB       Memory       User Instances       FILE         Specify the authentication mode and administrators for the Database Engine.       Authentication Mode           Authentication Mode             Mixed Mode (SQL Server authentication and Windows authentication)            Specify the password for the SQL Server system administrator (sa) account.            Enter password:             Specify SQL Server administrators            VM-WIN10-SRV\//             Add Qurrent User       Add       Remove	LESTREAM	icted	
	< <u>B</u> ack <u>N</u> ex	ext >	Cancel	

# 3.1.1 Enable Network access

On the Standard or Enterprise Edition of the SQL-Server the network access is enabled by default. For the Express edition, you need to activate it.

To do that, open the Sql Server Configuration Manager, go to 'Sql Server Network Configuration'  $\rightarrow$  'Protocols for SQLEXPRESS'

🚟 Sql Server Configuration Manager			-	_	×
Datei Aktion Ansicht ?					
🗢 🌩 🛛 🚈 🖾 🔛					
<ul> <li>SQL Server Configuration Manager (Local)</li> <li>SQL Server Services</li> <li>SQL Server Network Configuration (32bit)</li> <li>SQL Native Client 11.0 Configuration (32bit)</li> <li>Azure Extension For SQL Server</li> <li>SQL Server Network Configuration</li> <li>Protocols for SQLEXPRESS</li> <li>SQL Native Client 11.0 Configuration</li> <li>Azure Extension For SQL Server</li> </ul>	Protocol Name	Status Enabled Disabled Enabled			
< >					

and double click 'TCP/IP' list item. Set 'Enabled' item to 'yes'

Eigenschaften von TCP/IP	?	$\times$
Protocol IP Addresses		
General		
Enabled Yes		-
Keep Alive 30000		
Listen All Yes		
Enabled		
Enable or disable TCP/IP protocol for this server instance		
OK Abbrechen Übernehmen	Н	lilfe

Next, go to tab "IP Addresses". Go to bottom of the list to item ""IPAII" and set port to 1433.

Afterwards set "Enabled" to "Yes" for each network interface that should listen for sql requests:

enschaften von TCP/IP		?	$\times$	Eigenschaften von TCP/IP	?	×
otocol IP Addresses				Protocol IP Addresses		
TCP Dynamic Ports	0		^	□ IP4		^
TCP Port	1433			Active Yes		
IP5				Enabled Yes		
Active	Yes			IP Address 192.168.40.11		
Enabled	No			TCP Dynamic Ports 0		
IP Address	::1			TCP Port 1433		
TCP Dynamic Ports	0			□ IP5		
TCP Port				Active Yes		
IP6				Enabled No		
Active	Yes			IP Address ::1		
Enabled	No			TCP Dynamic Ports 0		
IP Address	127.0.0.1			TCP Port		
TCP Dynamic Ports	0			□ IP6		
TCP Port				Active Yes		
IPAII				Enabled No		
TCP Dynamic Ports	49825			IP Address 127.0.0.1		
TCP Port	1433			TCP Dynamic Ports 0		
			¥	TCP Port		×
c <b>tive</b> ndicates whether the selecte	d IP Address is active.			Active Indicates whether the selected IP Address is active.		
	TCP Dynamic Ports TCP Dynamic Ports TCP Port IP5 Active Enabled IP Address TCP Dynamic Ports TCP Port	Active Yes Enabled No TCP Dynamic Ports 0 TCP Port 1433 IP5 Active Yes Enabled No IP Address ::1 TCP Dynamic Ports 0 TCP Port 0 IP6 Active Yes Enabled No TCP Port 1 IP6 Active Yes Enabled No IP7 Active Yes Enabled No IP7 Active Yes Enabled No IP6 Active Yes Enabled No IP7 Active Yes Enabled Yes IP7 Active Ye	enschaften von TCP/IP  TCP Dynamic Ports TCP Dynamic Ports TCP Port TCP Port TCP Dynamic Ports TCP Dyn	enschaften von TCP/IP ?	Protocol IP Addresses     TCP Dynamic Ports 0   TCP Dort 1433   IPS -   Active Yes   Enabled No   IP Address ::1   TCP Dynamic Ports 0   IP Address ::1   TCP Dynamic Ports 0   TCP Dynamic Ports 0   IP Address ::1   TCP Dynamic Ports 0   IP Port 1433   Ves Enabled   IP Address ::1   TCP Dynamic Ports 0   IP Port 1433        Active Yes   Enabled No   IP Address ::1   TCP Dynamic Ports 0   IP Port 1433    Active Yes    Enabled No   IP Address ::1   ICP Port 1433    Active Yes  Enabled  No	enschaften von TCP/IP ?   stacel IP Addresses   TCP Dynamic Ports 0   TCP Dynamic Ports 0   IPS

After saving, restart SQL Server.

#### 3.1.2 Configure firewall

Run Windows PowerShell as Administrator and execute following commands:

# *New-NetFirewallRule -DisplayName "SQLServer default instance" -Direction Inbound -LocalPort 1433 -Protocol TCP -Action Allow*

*New-NetFirewallRule -DisplayName "SQLServer Browser service" -Direction Inbound -LocalPort 1434 -Protocol UDP -Action Allow* 

# 3.2 Installation of SQL-Server Management Studio

Start "SQL Server Installation Center" and select "Install SQL Server Management tools".

髋 SQL Server Installation Center		- 🗆 X
Planning Installation	ŧ	<u>New SQL Server standalone installation or add features to an existing installation</u> Launch a wizard to install SQL Server 2022 in a non-clustered environment or to add features to an existing SQL Server 2022 instance.
Maintenance Tools Resources	Ī	Install SQL Server Reporting Services Launch a download page that provides a link to install SQL Server Reporting Services. An internet connection is required to install SSRS.
Options		Install SQL Server Management Tools Launch a download page that provides a link to install SQL Server Management Studio, SQL Server command-line utilities (SQLCMD and BCP), SQL Server PowerShell provider, SQL Server Profiler and Database Tuning Advisor. An internet connection is required to install these tools.
	K	Install SQL Server Data Tools Launch a download page that provides a link to install SQL Server Data Tools (SSDT). SSDT provides Visual Studio integration including project system support for Microsoft Azure SQL Database, the SQL Server Database Engine, Reporting Services, Analysis Services and Integration Services. An internet connection is required to install SSDT.
	1	<u>Upgrade from a previous version of SQL Server</u> Launch a wizard to upgrade a previous version of SQL Server to SQL Server 2022. <u>Click here to first view Upgrade Documentation</u>
Microsoft SQL Server 2022		

A web browser will be started with a page where you can download the "SQL Server Management Studio (SSMS)". Download it and start the setup. It is not necessary to install it on the SQL Server machine.

After installation, you can start the management studio, set the server name and connect.

🔀 Microsoft SQL Server Management Studio		
File Edit View Tools Window Help		
🖉 🖸 🗸 🗇 📩 📩 🖆 🚔 🔛 🚰 📳 New Query 📳 👧 👧 🕯	🗈 📾 👗 🗗 台 🛛 🗩 🔫 - 🛛 🚽 🗾	• 😡 🌶 🏛 🖂 • 🖕
🕺 🕆 🧐 🚽 👘	- 2 2 22 10 10 10 10 10 10 10 10 10 10 10 10 10	
Object Explorer 👻 부 🗙		
Connect ▼ ₩ ×₩ ≡ ▼ C →		
	🖵 Connect to Server	×
	SQL Server	
		_
	Server type: Database Engine	~
	Server name: VM-WIN10-SRV\SQLEXPRES	S ~
	Authentication: Windows Authentication	~
	User name: VM-WIN10-SRV\Work	
	Password:	
	Remember password	
	Connect Cancel	Help Options >>

# 3.3 **Database preparation**

The current implementation allows two possible database configurations.

The first one, using an account with table creation rights (i. e. Administrator), allowing the Configuration Manager to create database automatically, is **not recommended**.

Better create user and database for Configuration Manager manually, using SQL Server Management Studio.

In both cases users can be Active Directory managed or database managed, in this how to we focus on creation of the user and table for the Configuration Manager.

Using the SQL Server Management Studio select correct instance, configure administrator access and connect.

#### 3.3.1 User creation

Right click on directory Security, then select New $\rightarrow$ Login...



Set login name to desired value, for authentication type select SQL Server authentication, define password.

Select a page						
Je General	🖵 Script 🔻 😮 Help					
<ul> <li>Server Roles</li> <li>User Mapping</li> <li>Securables</li> <li>Status</li> </ul>	Login name: O Windows authentication SQL Server authentication	cm			Search	h
	Password:					
	Confirm password:	•••••				
	Specify old password	-		100		
	Old password:					
	Enforce password policy					
	Enforce password expira	tion				
	User must change password at next login					
	Mapped to certificate			~		
	Mapped to asymmetric key			~		
Connection	Map to Credential			~	Add	1
Server: dev-hp\SQLEXPRESS Connection: DEV-HP\ Vew connection properties	Mapped Credentials	Credential	Provider			
Progress				[	Remo	ve
Ready	Default database:	master		~		
.e <sup>410</sup> a.		(default)		~		

## 3.3.2 Database creation

Right click on directory Databases, then select New Database ...

File Edit View	<ul> <li>Tools Window Help</li> <li></li></ul>	■ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$
Object Explorer Connect • ¥ *¥	= ¥ C +	- ÷
e Secular e Secular e Secular e Secular	New Database Attach Restore Database	
⊕ <b>=</b> C ⊕ <b>=</b> A ⊕ <b>=</b> S ⊕ <b>=</b> Serve ⊕ <b>=</b> Repli	Restore Files and Filegroups Deploy Data-tier Application Import Data-tier Application	-
⊕ 📁 Polyl ⊕ 📁 Man ⊕ 🗐 XEve	Start PowerShell Reports	
	Refresh	

Define the desired database name (in this example cm) and select the owner (the user created before). The path to the database can be set as well.

R New Database							- 0	×
Select a page & General	🗊 Sout 🔹 😧 Heb							
με Options με Filegoues	Database name Owner Use full text releasing Database files	ion ion						
	Logical Name Rie Tyj on ROWS on_bg LOG	e Repixo FRMARY Nat Applicable	Heal Sor (MB)	Adoptivith / Navalae By 64 148, Universed By 64 148, Universed	Path C -Phagrain Reir Microsoft SQL Server MSSQL16 SQLDPRESS MSSQL104741 C -Phagrain Reir Microsoft SQL Server MSSQL16 SQLDPRESS MSSQL104741	Fie Nave		
Connection								
Server devide SOLDAPESS Connection DEVide and an angeletist of Maximum Connection angeletist								
Program								
O <sup>nuty</sup>	¢					Add	Percut	,
·						OK	0	ercel

## 3.4 Using built-in column encryption.

MS SQL offers built-in columns encryption based on PKI.

To use the feature, unset column password in Configuration Manager and use an enhanced connection string containing 'Column Encryption Setting=enabled;'.

Follow the tutorial to configure it correctly in the database: https://sqlsolutionsgroup.com/sql-server-always-encrypted/.

# 3.5 Using Cloud Database - Azure

After logging into Azure portal, select SQL databases.

Azure servio	ces								
+	SQL		••••	[]	6	+	*	<b>17</b>	$\rightarrow$
Create a resource	SQL databases	Virtual machines	Public IP addresses	Resource groups	Azure DevOps organizations	Subscriptions	Free services	Network interfaces	More services

Select create.

SQL databases ☆ … Bosch Group (bosch.onmicrosoft.com)	
+ Create S Reservations 🔅 Manage view 🗸	🖒 Refresh
Filter for any neid Subscription equals all	Resource

Showing 0 to 0 of 0 records.

Name 1

#### Create Server if needed:

# Create SQL Database Server

Microsoft

#### Server details

Enter required settings for this server, including providing a name and location. This server will be created in the same subscription and resource group as your database.

Server name *	btvs-cm2		
		.database.windows.net	
Location *	(US) East US	$\sim$	

#### Authentication

Select your preferred authentication methods for accessing this server. Create a server admin login and password to access your server with SQL authentication, select only Azure AD authentication Learn more & using an existing Azure AD user, group, or application as Azure AD admin Learn more &, or select both SQL and Azure AD authentication.

#### Configure database name and server used:

#### Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription * 🕡	Subskrypcja programu Visual Studio Professional	$\sim$
Resource group * 🗊	Broker-Azure	~
	Create new	

#### Database details

Enter required settings for this database, including picking a logical server and configuring the compute and storage resources

Database name *	cm 🗸
Server * 🕕	btvs-cm (West Europe)
	Create new
Want to use SQL elastic pool?	🔿 Yes 💿 No
Workload environment	Development
	○ Production
	Default settings provided for Development workloads. Configurations can be modified as needed.
Compute + storage * 🛈	General Purpose - Serverless Standard-series (Gen5), 1 vCore, 32 GB storage, zone redundant disabled
	Configure database
Backup storage redundancy	

Choose how your PITR and LTR backups are replicated. Geo restore or ability to recover from regional outage is only available when geo-redundant storage is selected.

Backup storage redundancy (i)

- Locally-redundant backup storage
- Zone-redundant backup storage
- Geo-redundant backup storage

Configure Database collation:						
Basics	Networking	Security	Additional settings	Tags	Review + create	
Customize additional configuration parameters including collation & sample data.						
Data sou	Data source					
Start with a blank database, restore from a backup or select sample data to populate your new database.						
Use existing data * None Backup Sample						
Database collation						
Database collation defines the rules that sort and compare data, and cannot be changed after database creation. The default database collation is SQL_Latin1_General_CP1_CI_AS. Learn more ♂						

Collation \* 🕕

SQL\_Latin1\_General\_CP1\_CI\_AS Find a collation

 $\sim$ 

#### Maintenance window

Select a preferred maintenance window from the drop down. Please note, during a maintenance event, Azure SQL Database are fully available and accessible but some of the maintenance updates require a failover as Azure takes SQL DB instances offline for a short time to apply the maintenance updates. If the database is part of elastic pool, the maintenance configuration of elastic pool will be applied. Learn more 🗗

Maintenance window

System default (5pm to 8am)

23 | 27

# Navigate to created server. Select Security $\rightarrow$ Networking. Set Public network access to Selected networks. In firewall rules add client's public IP.

L	« Reedback					
<ol> <li>Overview</li> </ol>	^ ·					
Activity log	Public access Private access	Connectivity				
Access control (IAM)	Public network access					
Tags	Public Endpoints allow access to this r	esource through the internet using a public IF	address. An application or resource that is granted ac	cess with the follo		
Diagnose and solve problems	Public network access	O Disable				
4 Quick start		Selected networks				
Settings		Connections from the IP addresses co	infinured in the Firewall rules section below will have access to	this database. By		
Azure Active Directory			angurea in the riceron rules sector ruleow mininter access o	ons dealerse. by		
SQL databases		O Please save public network access val	ue before adding new virtual networks.			
🚸 SQL elastic pools						
📀 DTU quota	Virtual networks Allow virtual networks to connect to vo	Virtual networks Allow virtual networks to connect to your resource using service endpoints. Learn more				
Properties						
🔒 Locks	+ Add a virtual network rule					
Data management	Rule Virtual network	Subnet Address range Er	ndpoint status Resource group Subscription	State		
ackups	No virtual network rules found.					
<ul> <li>Backups</li> <li>Deleted databases</li> </ul>	No virtual network rules found.					
<ul> <li>Backups</li> <li>Deleted databases</li> <li>Failover groups</li> </ul>	No virtual network rules found.	res to access your resource Learn more??				
Backups     Backups     Deleted databases     Failover groups     Import/Export history	No virtual network rules found. Firewall rules Allow certain public internet IP address	ses to access your resource. Learn more				
Backups     Backups     Deleted databases     Failover groups     Import/Export history Security	No virtual network rules found. Firewall rules Allow certain public internet IP address + Add your client IPv4 address (19)	ses to access your resource. Learn moreta				
Backups  Control Backups  Backups  Deleted databases  Failover groups  Import/Export history  Security  Networking	No virtual network rules found. Firewall rules Allow certain public internet IP address Add your client IPv4 address (19	ses to access your resource. Learn more 🕃				
<ul> <li>Backups</li> <li>Deleted databases</li> <li>Failover groups</li> <li>Import/Export history</li> <li>Security</li> <li>Networking</li> <li>Microsoft Defender for Cloud</li> </ul>	No virtual network rules found. Firewall rules Allow certain public internet IP address Add your client IPv4 address	ses to access your resource. Learn more@ 5) + Add a firewall rule Start IPv4 address	End IPv4 address			
<ul> <li>Backups</li> <li>Deleted databases</li> <li>Failover groups</li> <li>Import/Export history</li> <li>Security</li> <li>Networking</li> <li>Microsoft Defender for Cloud</li> <li>Transparent data encryption</li> </ul>	No virtual network rules found. Firewall rules Allow certain public internet IP address + Add your client IPv4 address (10) Rule name VCS Grey	ses to access your resource. Learn more ) + Add a firewall rule Start IPv4 address	End IPv4 address	8		
<ul> <li>Backups</li> <li>Deleted databases</li> <li>Failover groups</li> <li>Import/Export history</li> <li>Security</li> <li>Networking</li> <li>Microsoft Defender for Cloud</li> <li>Transparent data encryption</li> <li>Identity</li> </ul>	No virtual network rules found. Firewall rules Allow certain public internet IP address + Add your client IPv4 address (19) Rule name VCS Grey	ses to access your resource. Learn more 5) + Add a firewall rule Start IPv4 address	End IPv4 address	•		
<ul> <li>Backups</li> <li>Backups</li> <li>Deleted databases</li> <li>Failover groups</li> <li>Import/Export history</li> <li>Security</li> <li>Networking</li> <li>Microsoft Defender for Cloud</li> <li>Transparent data encryption</li> <li>Identity</li> <li>Auditing</li> </ul>	No virtual network rules found. Firewall rules Allow certain public internet IP address + Add your client IPv4 address (10) Rule name VCS Grey	ses to access your resource. Learn more 5) + Add a firewall rule Start IPv4 address	End IPv4 address	8		
<ul> <li>Backups</li> <li>Backups</li> <li>Deleted databases</li> <li>Failover groups</li> <li>Import/Export history</li> <li>Security</li> <li>Networking</li> <li>Microsoft Defender for Cloud</li> <li>Transparent data encryption</li> <li>Identity</li> <li>Auditing</li> <li>Intelligent Performance</li> </ul>	No virtual network rules found. Firewall rules Allow certain public internet IP address Add your client IPv4 address Rule name VCS Grey Exceptions	ses to access your resource. Learn more 5) + Add a firewall rule Start IPv4 address	End IPv4 address	Ø		

Recommendations

#### Navigate to created database:

SQL database	ở ★ ···	
₽ Search «	🗅 Copy 🗇 Restore 📅 Export 🛈 Set server firewall 💼 Delete 🖋 Connect with 🗸 🔊 Feedbac	ck
Overview		
Activity log	Resource group (move) : Broker-Azure	Server name : btvs-cm.dat/Imase.windows.net 🗅
🔷 Tags	Status : Online	Connection strings : Show database connection strings
Diagnose and solve problems	Location : West Europe	Pricing tier : General Purpose - Serverless: Gen5, 1 vCore
i Getting started	Subscription (move) : Subskrypcja programu Visual Studio Professional	Auto-pause delay : 1 hour
🗯 Query editor (preview)	Subscription ID : 83f7a668-0330-4c7b-9da6-01fef4a9e7c3	Earliest restore point : No restore point available
Settings	Tags (edit)     : Click here to add tags	
Compute + storage	Getting started Monitoring Properties Features Notifications (0) Integrations Tutorials	5

#### Select Show database connection strings:

🗅 Copy 🗇 Resto	ore  Export 🕕 Set server firewall 🛍 Delete	${\mathscr I}$ Connect with ${\mathord{ee}}$ $$ Fe	edback	
Resource group (mov	e) : Broker-Azure		Server name	: btvs-cm.database.window
Status	: Online		Connection strings	: Show database connection strings 🌆
Location	: West Europe		Pricing tier	: General Purpose - Serverless: Gen5, 1 vCore
Subscription (move)	: Subskrypcja programu Visual Studio Professional		Auto-pause delay	: 1 hour
Subscription ID	: 83f7a668-0330-4c7b-9da6-01fef4a9e7c3		Earliest restore poir	nt:No restore point available
Tags ( <u>edit</u> ) :	Click here to add tags			

## Copy ADO.NET (SQL authentication) connection string.

ADO.NET JDBC ODBC PHP Go
ADO.NET (Active Directory passwordless authentication)
Microsoft.Data.SqlClient Quickstart 🗗
Server=tcp:btvs-cm.database.windows.net,1433;Initial Catalog=cm;Encrypt=True;TrustServerCertificate=False;Connection Timeout=30;Authentication="Active Directory Default";
ADO.NET (SQL authentication)
Server=tcp:btvs-cm.database.windows.net_1433;Initial Catalog=cm;Persist Security Info=False;User ID=btvs-cm;Password=(your_password);MultipleActiveResultSets=False;Encrypt=True;TrustServerCertificate=False;Connection Timeout=30;

Set Connection string configuration mode in Configuration Manager, paste copied connection string, change password ({your\_password}) used in connection string.

	Database Mode MSSQL Database	$\sim$	
	Configuration type Connection String	$\sim$	
Connection stri Info=False;Us	ing ser ID=btvs-		
cm;Password \$MultipleActiv	d= veResultSets=False;Encrypt=True;T	rustServerCertificate=False;C	onn
	Sensitive data encryption passphras	e	

# 4 References

Limitations from database perspective are described by Microsoft. There are many of them depending on DB version, or OS version (e. g. CPU cores need licenses). More details can be found in MS documents:

- 1. https://learn.microsoft.com/en-us/sql/sql-server/maximum-capacity-specifications-for-sql-server?view=sql-server-ver16
- 2. https://learn.microsoft.com/en-us/sql/sql-server/compute-capacity-limits-by-edition-of-sql-server?view=sql-server-ver16

## There are reference documents that may help users to set up an SQL database:

- 3. <u>https://learn.microsoft.com/en-us/sql/relational-databases/security/authentication-access/create-a-database-user?view=sql-server-ver16</u>
- 4. <u>https://learn.microsoft.com/en-us/sql/relational-databases/security/authentication-access/create-a-database-schema?view=sql-server-ver16</u>
- 5. <u>https://learn.microsoft.com/en-us/sql/relational-databases/security/authentication-access/create-a-login?view=sql-server-ver16</u>

## Bosch Sicherheitssysteme GmbH

Robert-Bosch-Ring 5 85630 Grasbrunn Germany www.boschsecurity.com © Bosch Sicherheitssysteme GmbH, 2023