

# **R o g e r   A c c e s s   C o n t r o l   S y s t e m   5 v 2**

Application note no. 017

Document version: Rev. D

## **Operation with MS SQL Server database**

Note: This document refers to RACS 5 v2.0.4 or newer

### ***Introduction***

RACS 5 system requires Windows 10 (or newer) operating system and it enables use of MS SQL Server 2012 SP4 (or newer) database management system in order to apply centralized type database e.g. Express, Standard, Enterprise.

Centralized database can be used in small, medium and large systems managed from multiple workstations so all operators could communicate with database on a server. RogerSVC software with RACS 5 servers is usually installed on the same computer as database.

This document explains installation and configuration of centralized database using MS SQL Server 2019 Express as an example and it includes procedures for database backup, database transfer to another server, migration from local type to centralized database and encryption of database. Description of features and requirements for free of charge MS SQL Express edition database is available on Microsoft webpage.

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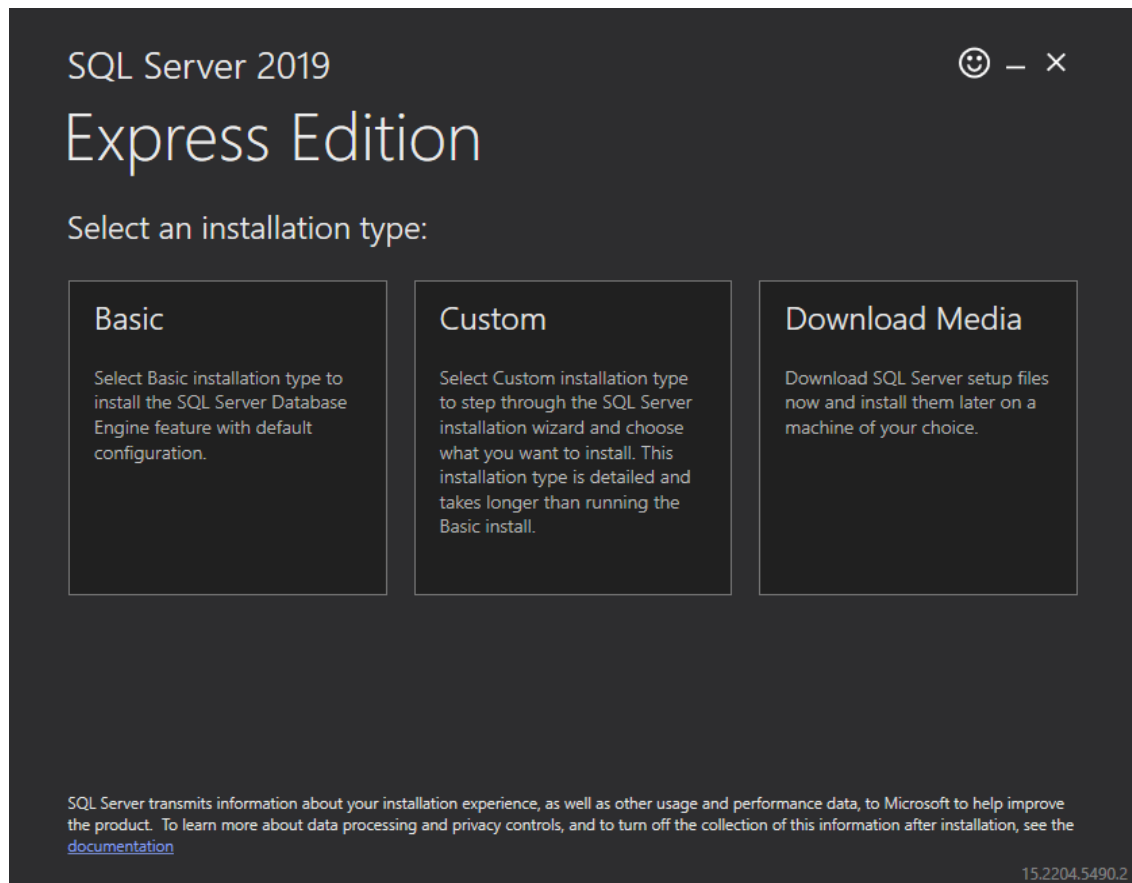
Note: The RACS 5 v1 system could work with local type Microsoft SQL Server Compact 4.0 database or centralized type Microsoft SQL Server 2012 SP4 (or higher) database. Due to discontinued support of Microsoft company for local type databases, only centralized type Microsoft SQL Server 2012 SP4 (or higher) database can be applied in RACS 5 v2 system.

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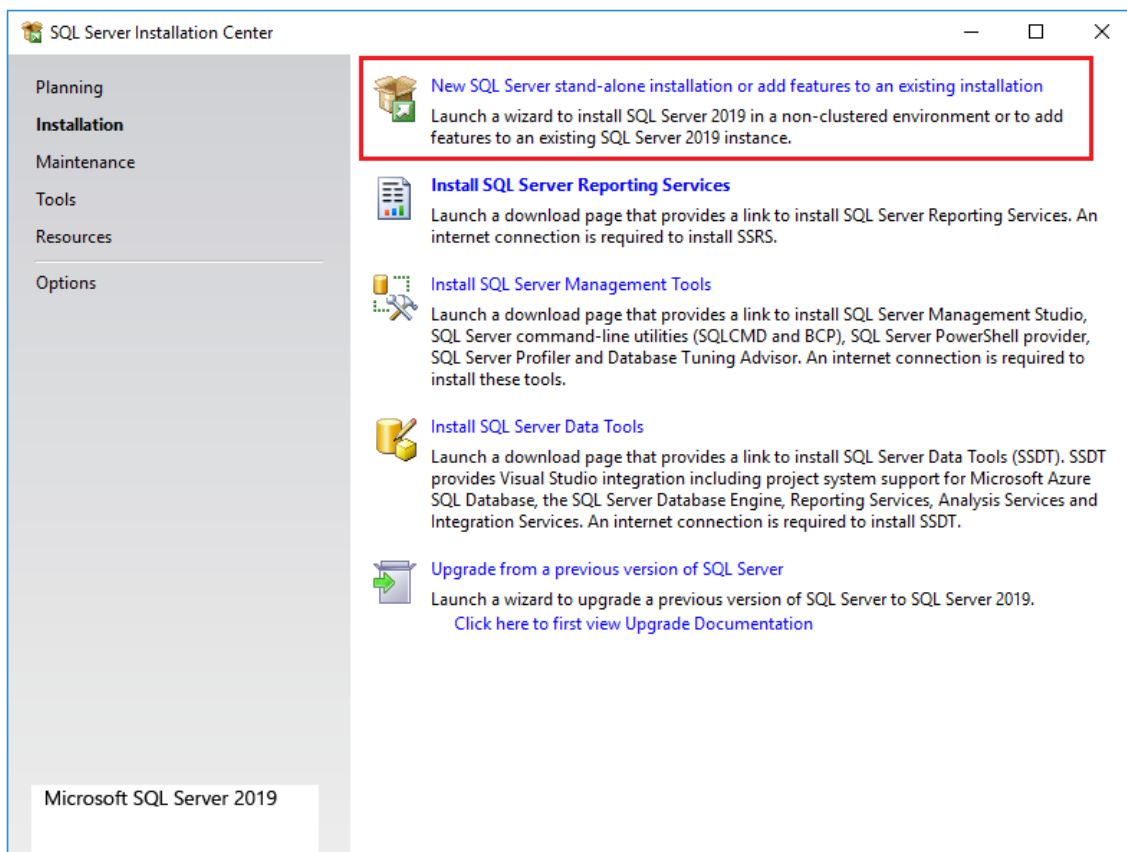
### ***MS SQL Server 2019 Express system***

#### **Downloading, installation and configuration**

- Search for MS SQL Server 2019 at Microsoft website or use following link in your web browser: <https://www.microsoft.com/pl-pl/sql-server/sql-server-downloads>
- Start downloaded installation file and after unpacking select the option *Custom* and define installation path.



- In the next step select as below.



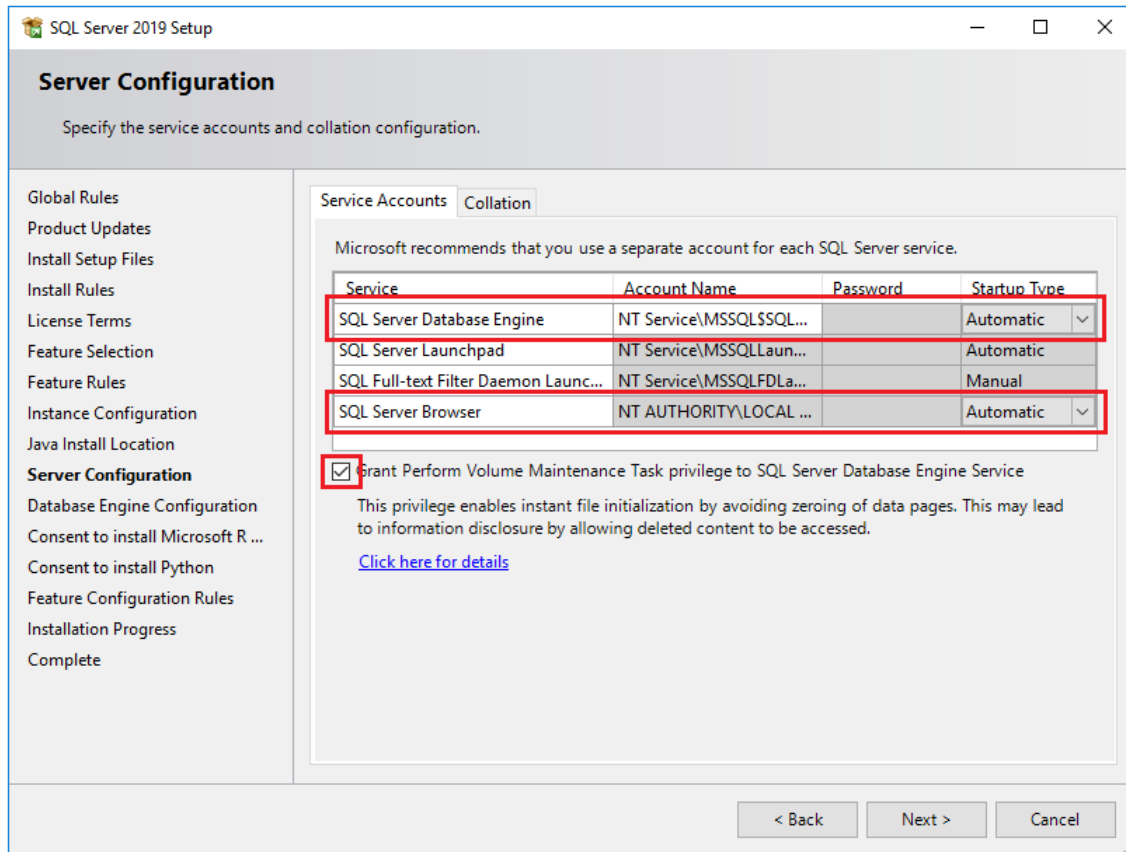
- Select *Next*, accept license agreement and choose as below.

The screenshot shows the 'Feature Selection' window of the SQL Server 2019 Setup. The left sidebar lists various setup steps, with 'Feature Selection' highlighted. The main area is titled 'Feature Selection' and includes a sub-header 'Select the Express features to install.' Below this, there's a section 'Looking for Reporting Services?' with a link to 'Download it from the web'. The 'Features' list on the left includes 'Instance Features' (selected), 'Database Engine Services', 'SQL Server Replication', 'Machine Learning Services and Language' (with sub-items 'R', 'Python', and 'Java'), 'Full-Text and Semantic Extractions for Search', 'PolyBase Query Service for External Data', and 'Java connector for HDFS data sources'. The 'Feature description' on the right explains that this is for the configuration and operation of each instance feature. It also lists prerequisites: 'Already installed: Windows PowerShell 3.0 or higher' and 'Microsoft Visual C++ 2017 Redistributable'. The 'Disk Space Requirements' section shows 'Drive C: 3154 MB required, 39618 MB available'. At the bottom, there are buttons for '< Back', 'Next >', and 'Cancel'.

- Select named instance and enter any name.

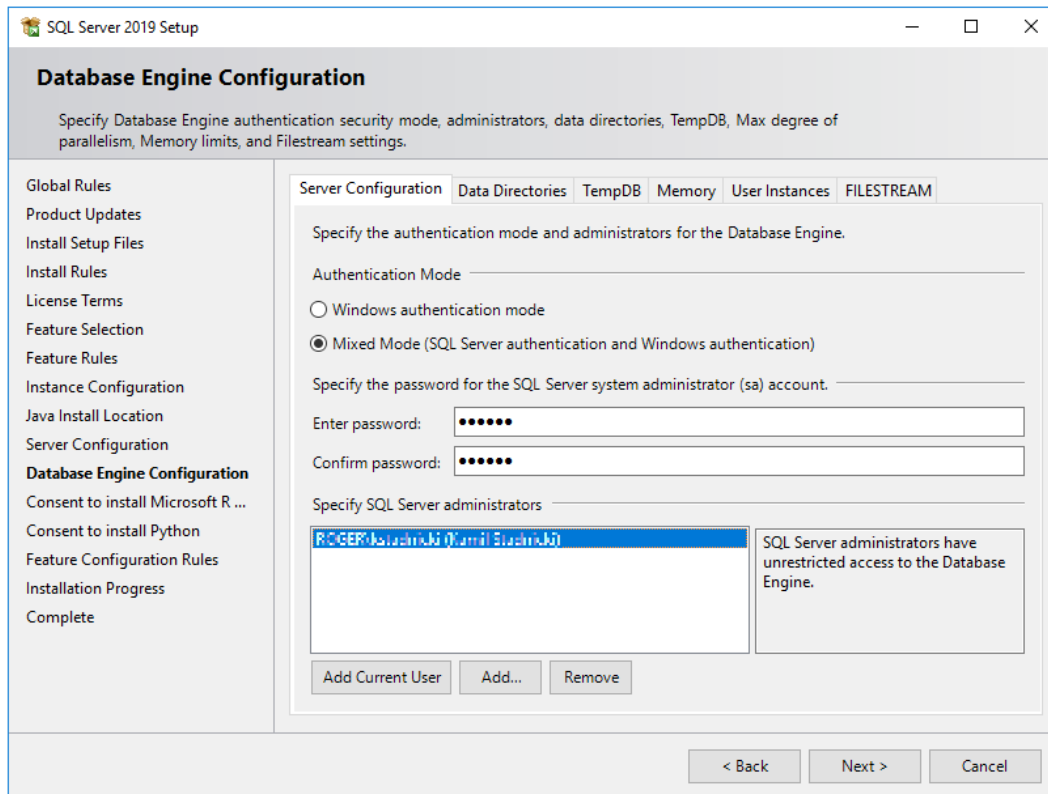
The screenshot shows the 'Instance Configuration' window of the SQL Server 2019 Setup. The left sidebar lists various setup steps, with 'Instance Configuration' highlighted. The main area is titled 'Instance Configuration' and includes a sub-header 'Specify the name and instance ID for the instance of SQL Server. Instance ID becomes part of the installation path.' Below this, there are two radio buttons: 'Default instance' and 'Named instance:'. The 'Named instance' is selected, and the text 'SQLExpress' is entered in the adjacent field. Below this, the 'Instance ID' field contains 'SQLEXPRESS'. The 'SQL Server directory' is shown as 'C:\Program Files\Microsoft SQL Server\MSSQL15.SQLEXPRESS'. The 'Installed instances' section contains a table with the following columns: 'Instance Name', 'Instance ID', 'Features', 'Edition', and 'Version'. The table is currently empty. At the bottom, there are buttons for '< Back', 'Next >', and 'Cancel'.

- In the next window select default settings for Java and then enable automatic startup for services.

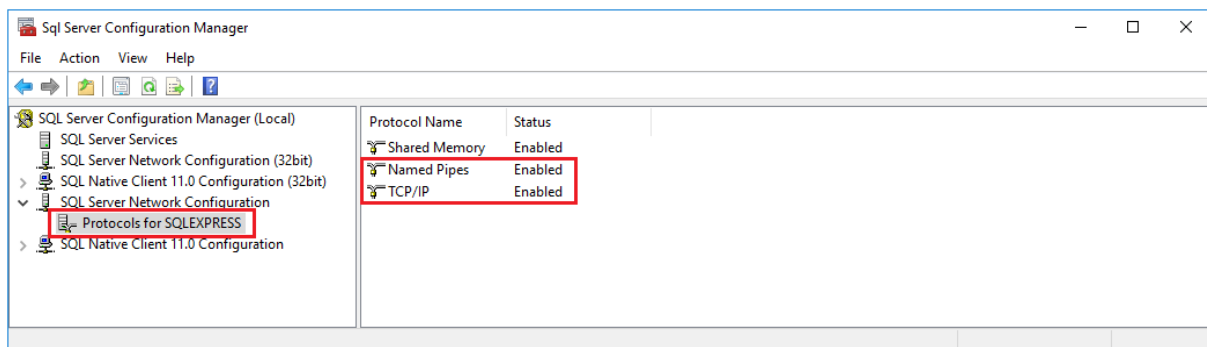


Note: It is recommended not to change the parameter *Collation* in *Collation* tab for the value different than \*\_CI\_AS. Database should be case insensitive and accent sensitive in regard of sorting.

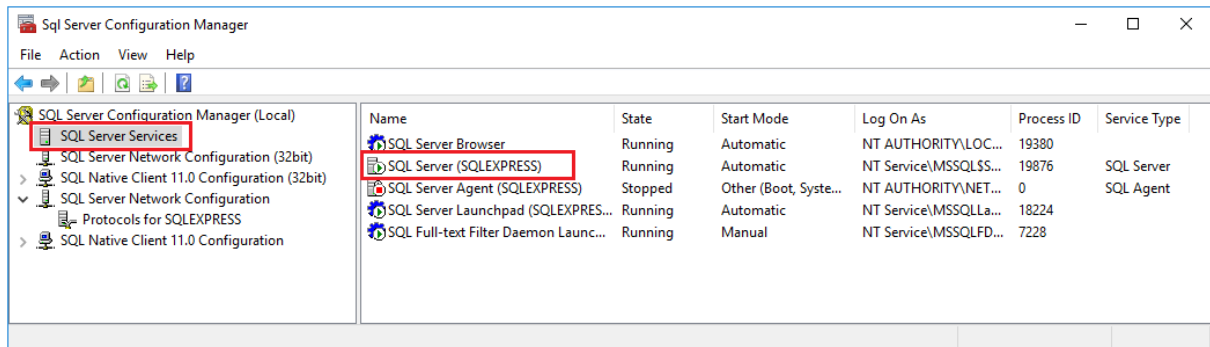
- Define authentication parameters as below. It is recommended to select *Mixed Mode*. Password for system administrator (sa) must be remembered for further use.



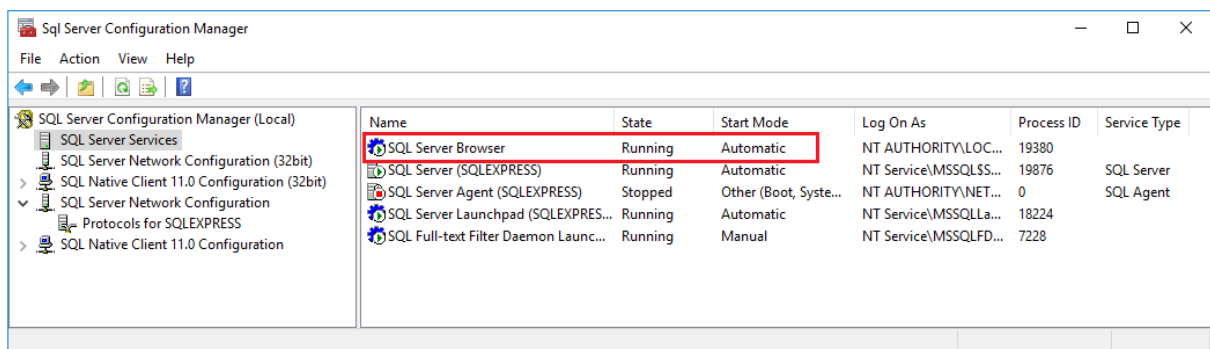
- Consent to installation of additional elements and select *Next*.
- Close all windows when the installation is finished
- Start SQL Manager typing *Sql Server 2019 Configuration Manager* phrase in Windows Start menu.
- In the navigation tree select *Protocols for SQLEXPRESS* and then enable *Named Pipes* and *TCP/IP* protocols as below.



- Restart SQL service selecting *SQL Server Services*, then right click *SQL Server (SQLEXPRESS)* and select *Restart*.



- Verify if *SQL Server Browser* service is running and automatic start mode is selected.

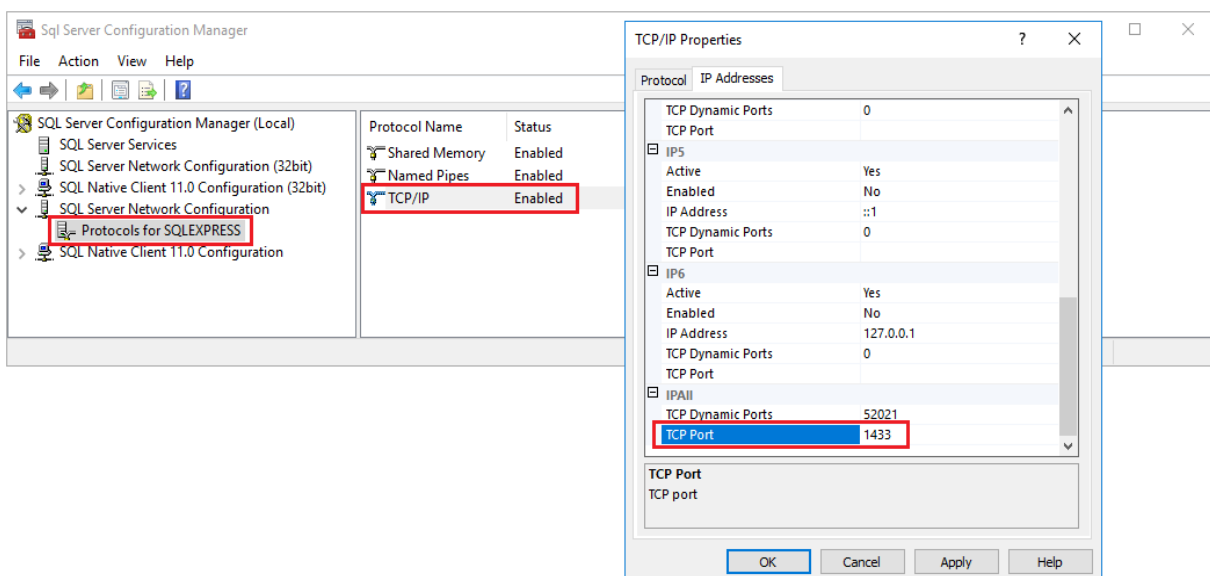


## Firewall configuration

After MS SQL Express system installation it is necessary to unblock ports in Windows firewall:

- Start firewall typing *Windows Firewall with Advanced Security* in Windows Start menu.
- In the newly opened window select *Inbound rules* command and then *New Rule...*
- In the next window select *Port* rule type and then configure allowed connection for TCP port 1433 and another rule for UDP port 1434.
- Similarly configure *Outbound rules* for the same protocols and ports.

If particular instance of MS SQL Server is configured for dynamic ports then 1433 TCP port can be defined by starting SQL Server Configuration Manager as in the figure below.



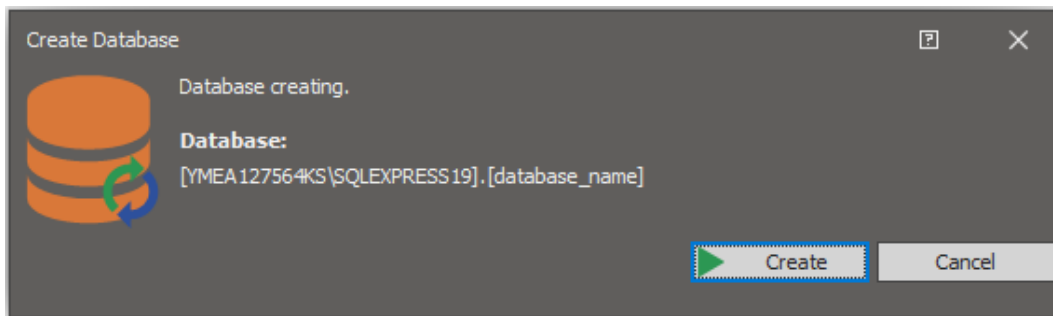
## Database (VISO)

VISO software for configuration and management of RACS 5 system enables creation of database in MS SQL Server system.

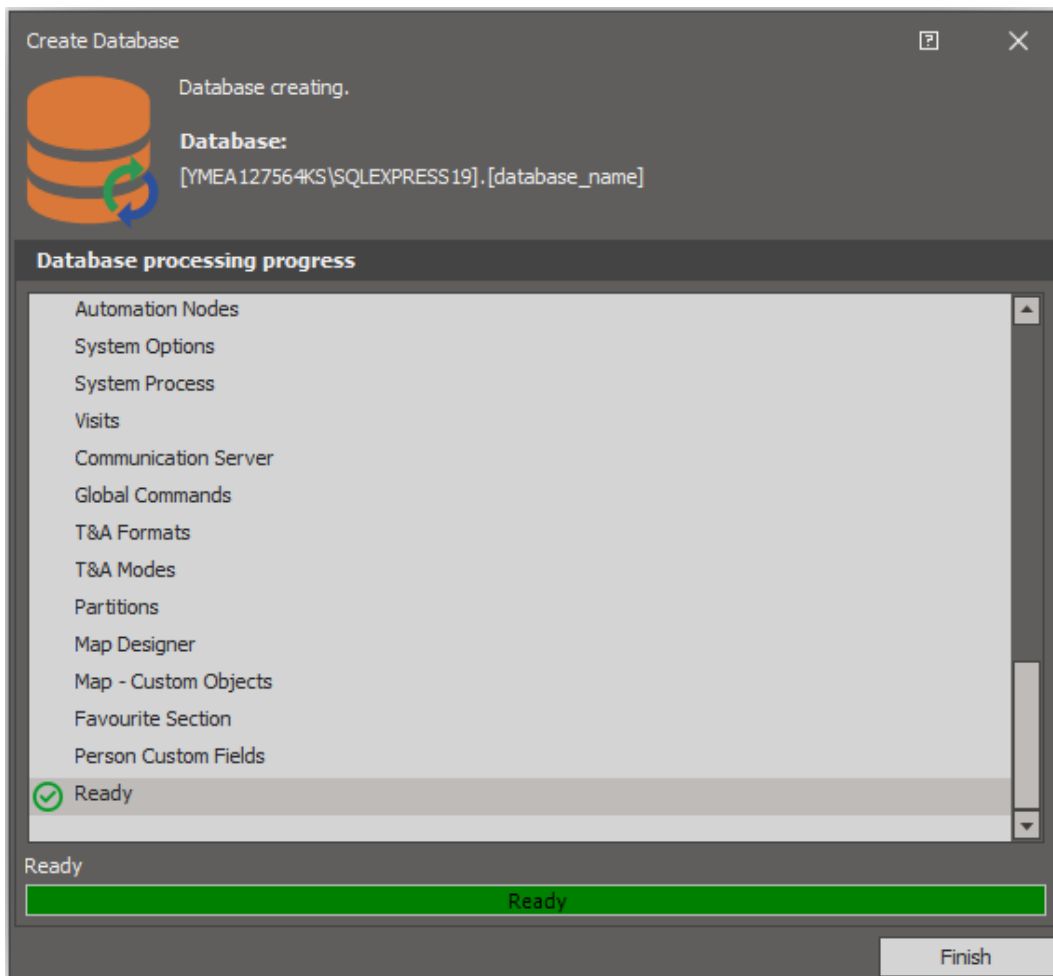
In order to create centralized type database:

- Download and start VISO software installation file from [www.roger.pl](http://www.roger.pl).
- After installation, start VISO in order to display *Connection configuration* window. The window can also be accessed by selection of *System* command in VISO top menu and then *Add connection...*
- In the opened window in the *Name* field enter any connection name.
- Select server from the list using *Select...* button. It should be listed if it is available in local network or via properly configured VPN. If the server is not on the list then enter its IP address manually in the *Server* field.
- When *Mixed Mode* option is selected then enter previously defined password for sa user. This mode will be used in this note due to simpler configuration. However it is recommended to apply *Windows authentication* mode due to higher security. In this mode it is additionally necessary to configure the service of Communication Server from RogerSVC package so it would log on with authorized Windows account instead of Local System account.
- Enter any database name in the field *Create and name new database*.
- Use *Test connection* button to verify connection with MS SQL Server.

- Confirm with *OK* button and proceed.
- In the next window select *Create* in order to create your new database.



- Summary shall be displayed when the database is created. Close the window with *Finish* button.



## ***Servers (RogerSVC)***

After exemplary MS SQL Express system installation and data base creation with VISO software it is necessary to configure Communication Server for the communication of VISO software and RACS 5 devices with database. It might also be necessary to configure License and Integration Servers.


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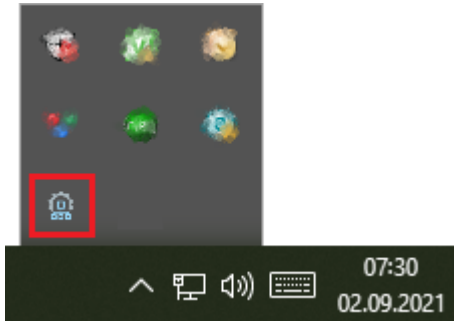
Note: In RACS 5 v1 system the Communication Server from RogerSVC program can be installed only on single computer in the network. In RACS 5 v2 multiple Communication Servers can be installed and operated as explained in AN008 application note.

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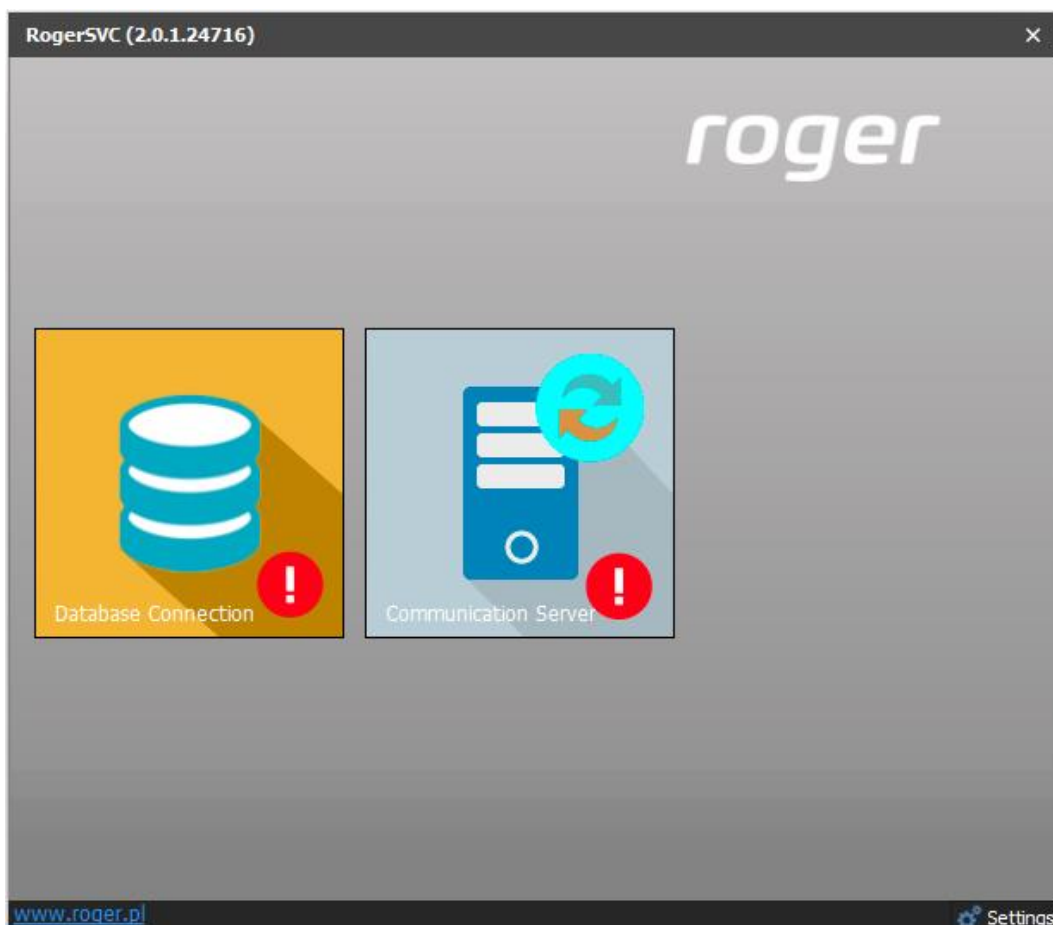
In order to configure Communication Server:



- Install RogerSVC software, select Communication Server and if needed also other servers. If servers are supposed to be operated on individual computers then install RogerSVC on each computer selecting required servers.
- Start RogerSVC program selecting *Start->ROGER->RogerSVC* in Windows menu.
- Click RogerSVC icon  in Windows tray.



- In the RogerSVC window select *Database Connection* tile and then *Configuration* to indicate previously created RACS 5 database. Such indication requires the same parameters as used in database creation i.e. server, authentication parameters and database name. Return to the main window.



- In the RogerSVC window select *Communication Server*, click *Configuration*, enter IP address of the computer with the server installed e.g. 192.168.11.13 and define port (8890 by default).
- Select *Start* and return to the main window. The server will be started and operated in the background whenever the computer is switched on even if RogerSVC window is closed.
- Start VISO software and add Communication Server indicating the server which has been just created with RogerSVC.

## Management from multiple workstations

RACS 5 system can be managed from multiple workstations and then it requires proper configuration on the level of VISO and RogerSVC programs and it may additionally require Windows firewall ports unblocking.

In order to configure RACS 5 for operation with multiple workstations:

- Install MS SQL Server management system on a dedicated server computer or on any workstation.
- Install VISO software on one of workstations and use it to create centralized database within MS SQL system for RACS 5 system.
- Install RogerSVC software on a dedicated server computer or on any workstation.
- Using RogerSVC program indicate connection with database. In the properties of Communication Server enter IP address of the computer with installed server and define port (by default 8890) so the server could be accessed by other workstations with VISO software. Start or restart the server.
- If necessary start Windows Firewall with Advanced Security on computer with installed Communication Server and define new allowing inbound rule for TCP protocol and server port (by default 8890).
- Install and start VISO software on all remaining workstations indicating previously created centralized database when connection with database is configured.

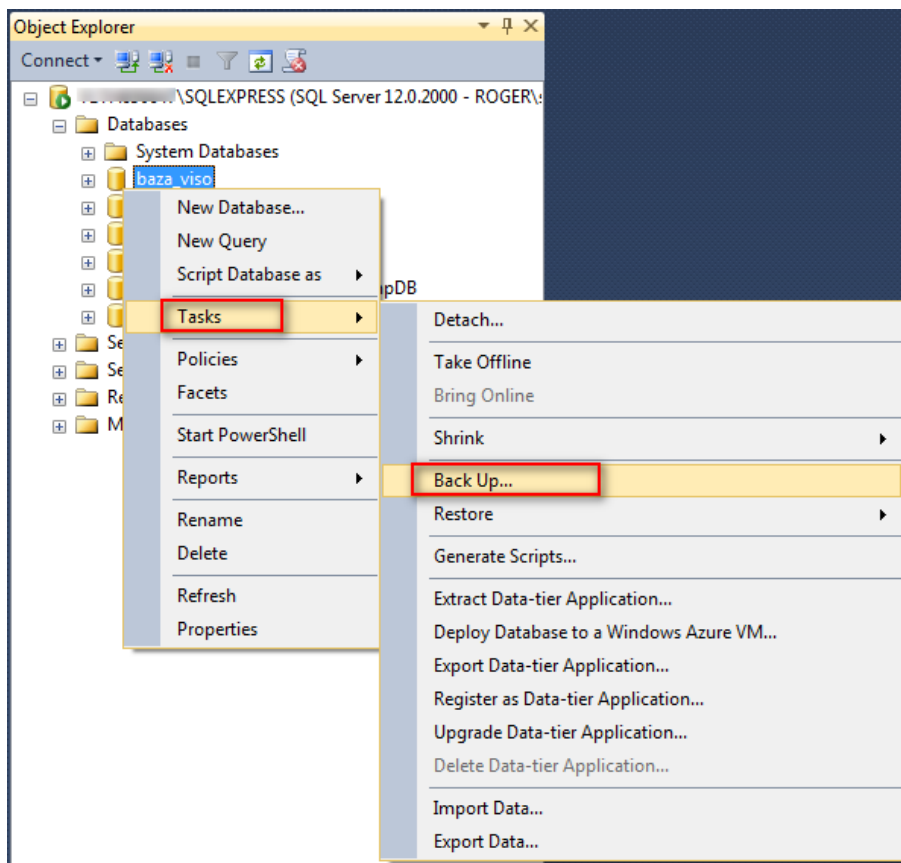
- If necessary start Windows Firewall with Advanced Security on each workstation with installed VISO software and define new allowing outbound rule for TCP protocol and server port (by default 8890).
- At each workstation in VISO software add Communication Server indicating the server created with RogerSVC program.
- If necessary start Windows Firewall with Advanced Security on computer with installed Communication Server and define new allowing outbound rule for UDP protocol and 21063 port to unblock server communication with MC16 controllers.

## Database backup

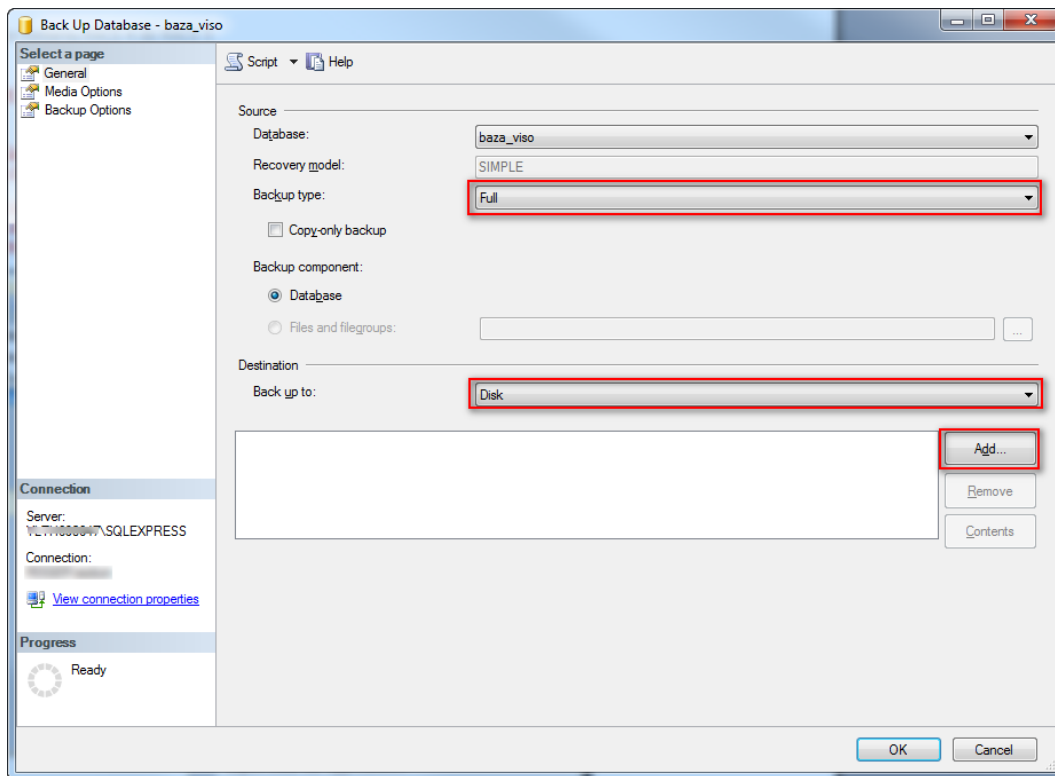
Database can be backed up with MS SQL Server Management Studio program which is installed as a component of MS SQL Server system.

### Backup export

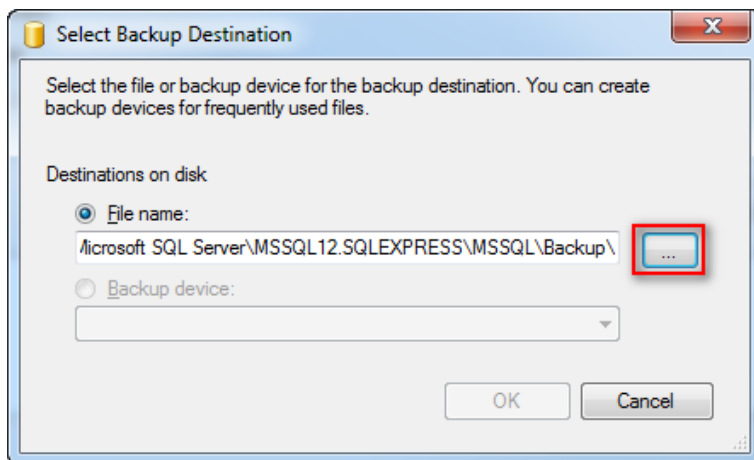
- Stop event collecting to database by stopping Communication Server in RogerSVC.
- Start MS SQL Server Management Studio and enter previously defined login and password.
- Expand *Databases*, right click the database for backup, select *Tasks* and then *Back Up...*

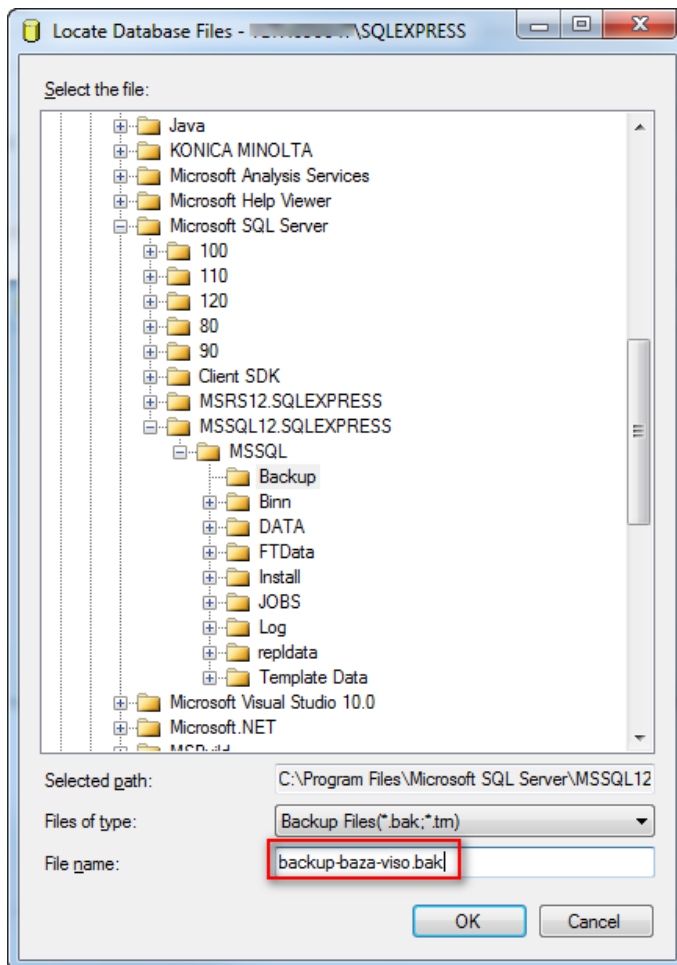


- In the newly opened window specify backup parameters. In case of default *Backup type: Full* and *Back up to: Disk* settings a full local backup is made.



- Select *Add...* button and in the next window specify backup file name and destination.

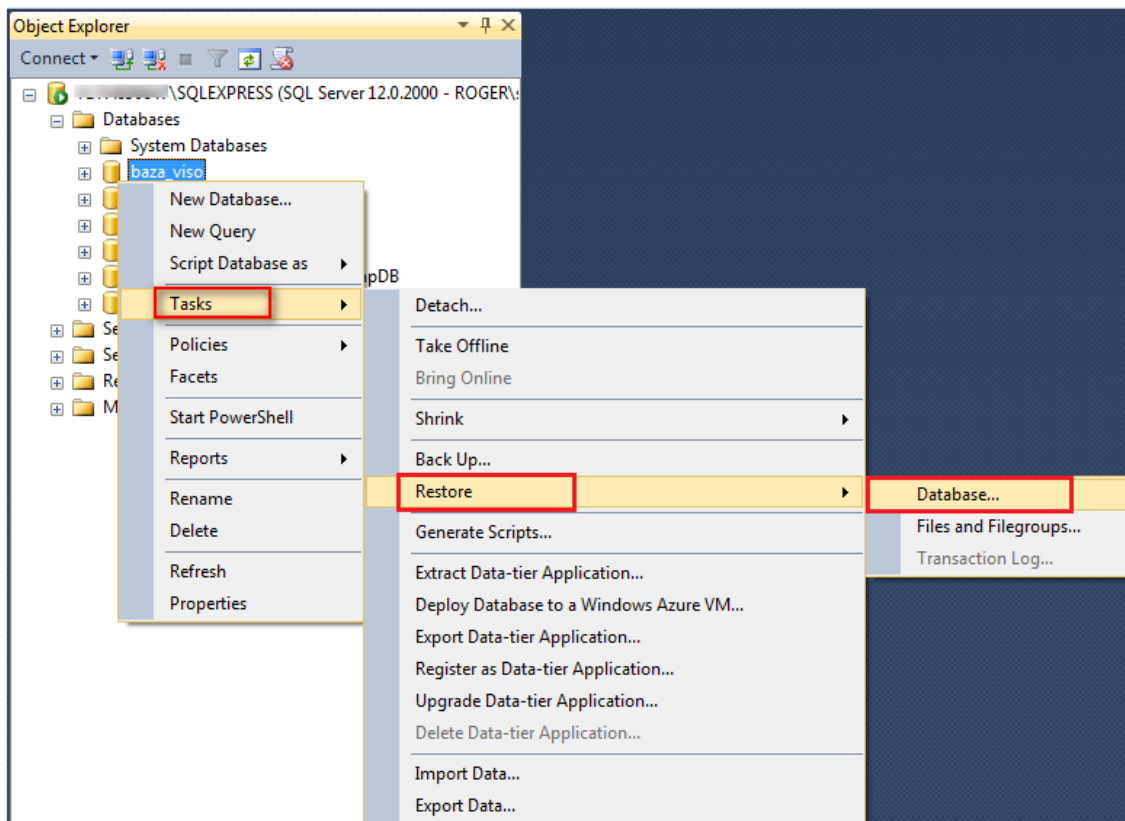




- Restore event collecting to database by starting Communication Server in RogerSVC.

### Backup import

- Stop event collecting to database by stopping Communication Server in RogerSVC.
- Start MS SQL Server Management Studio and enter previously defined login and password.
- Expand *Databases*, right click the database to be restored, select *Tasks*, then *Restore-> Database...* and indicate the backup file.
- Restore event collecting to database by starting Communication Server in RogerSVC.

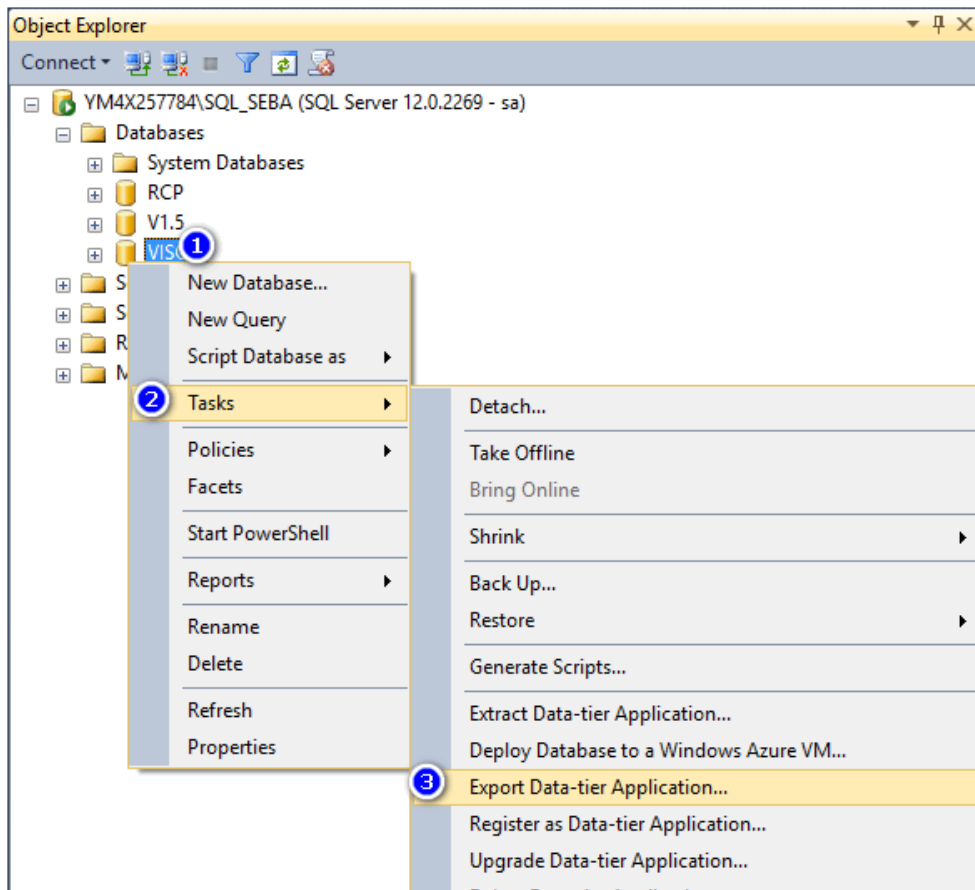


### ***Database transfer to another server***

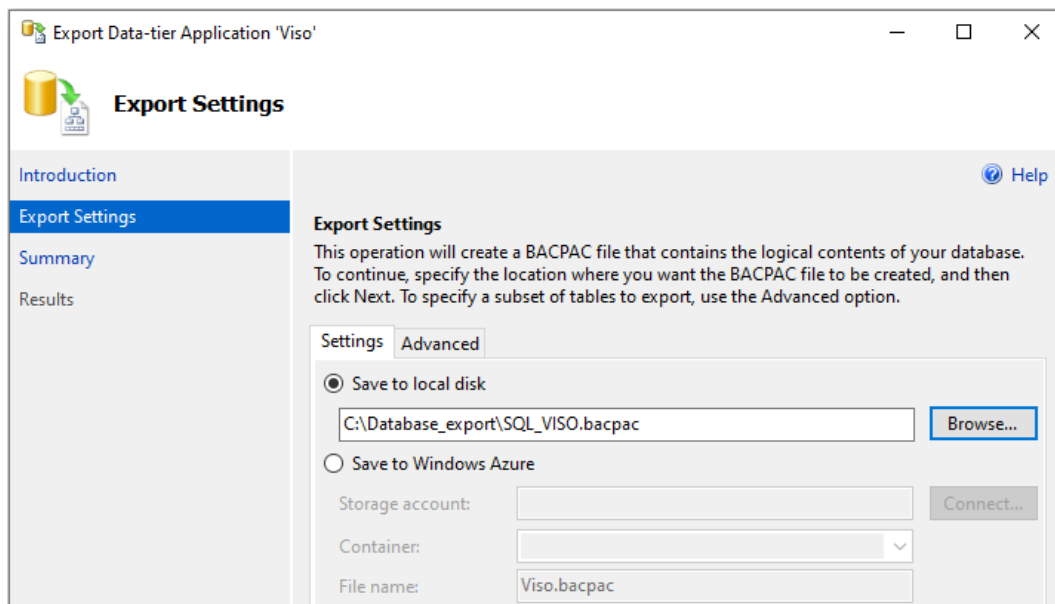
Database can be moved to another computer using Microsoft SQL Server Management Studio program as explained below. Alternatively, the method which is given in previous section can also be applied.

#### **Database export**

- Stop event collecting to database by stopping Communication Server in RogerSVC program.
- Start MS SQL Server Management Studio and enter previously defined login and password.
- Expand *Databases*, right click the database for transfer, select *Tasks* and then *Export Data-tier Application*

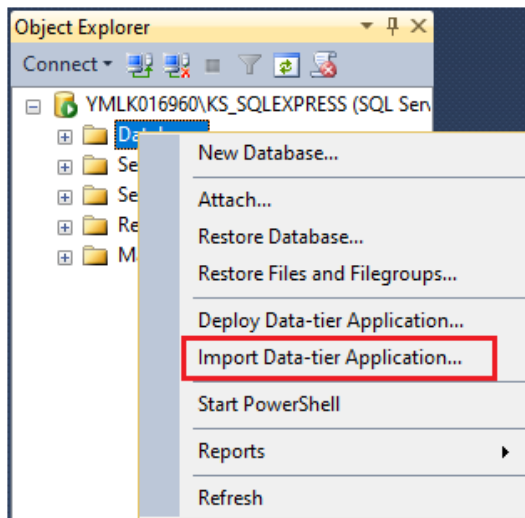


- Specify backup file name and destination. Proceed to finish the export.

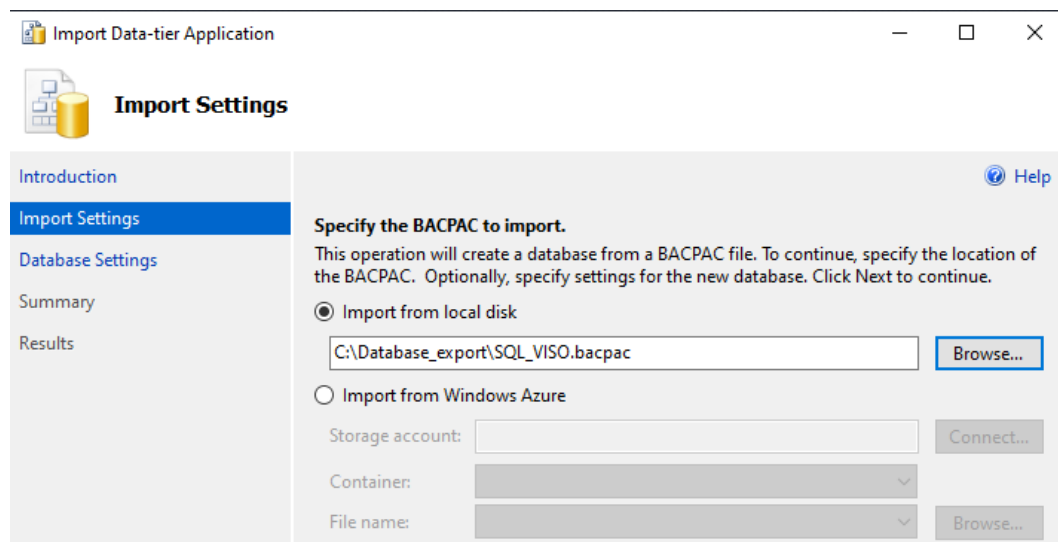


## Database import

- Install MS SQL Server system on new server.
- Start MS SQL Server Management Studio and enter previously defined login and password.
- Right click *Databases* and select *Import Data-tier Application*.



- Indicate previously exported database file and proceed to finish the import.



- Start VISO, in the top menu select *System->Add connection...* and indicate new database.
- Start RogerSVC, select *Database connection* and then *Configure* to indicate new database.
- Start Communication Server in RogerSVC program.

## ***Migration from local type to centralized type database***

Note: The local type database could be used in previous RACS 5 v1 system but in case of RACS 5 v2 it must be migrated to centralized type database. Migration method which is described below is based on third party programs and Roger cannot guarantee full cohesion and integrity between databases after migration.

Note: The present document explains one of possible migration methods. The migration can be also done with other available tools.

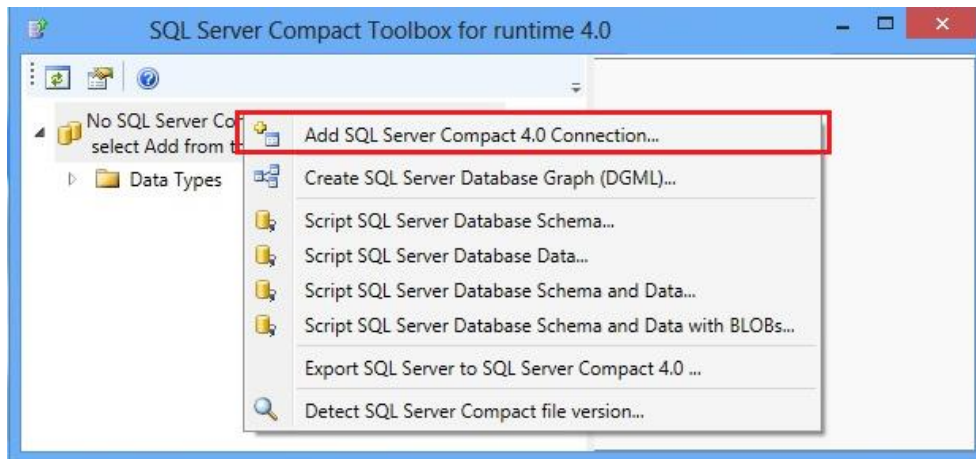
### **Export from local type database**

Data can be exported from local type database with SQL Server Compact Toolbox 4.0 program.

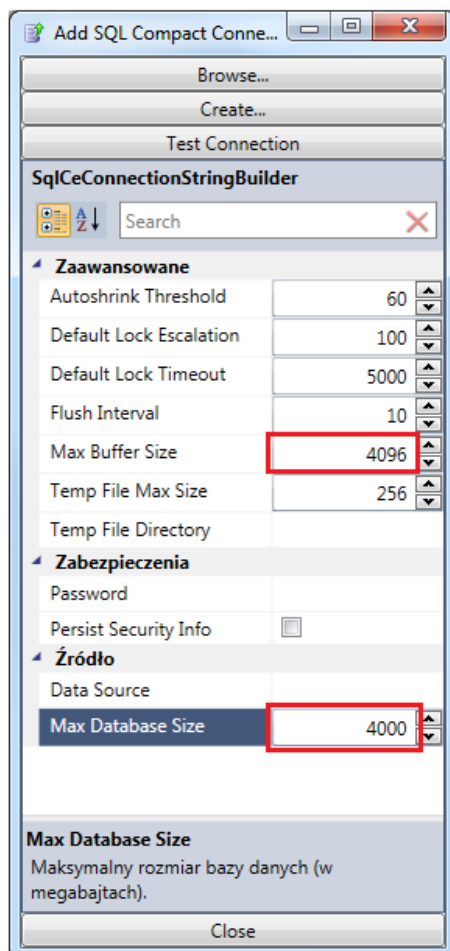
- Stop event collecting to local type MS SQL Server Compact database by stopping Communication Server in RogerSVC program.



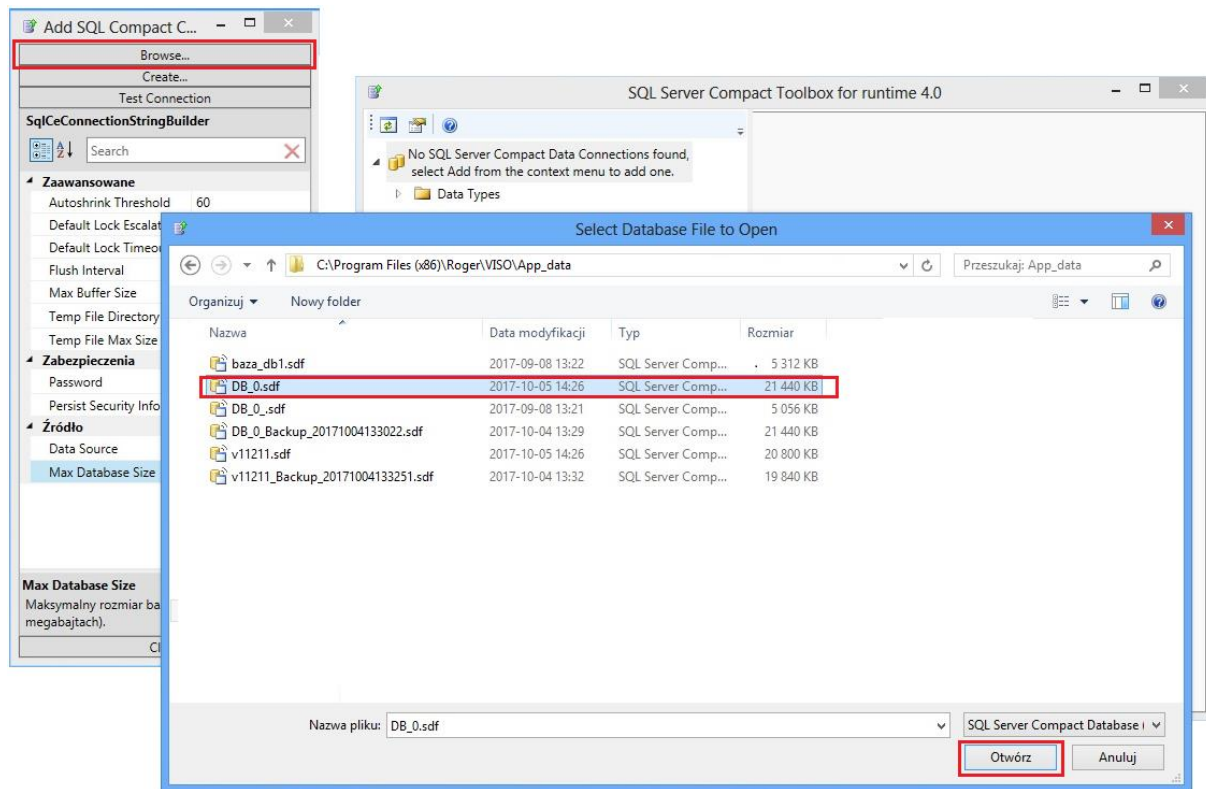
- Search for SQL Server Compact 4.0 at Microsoft website or use following link in your web browser and install the software:  
<https://www.microsoft.com/en-us/download/details.aspx?id=30709>
- Download SQL Server Compact Toolbox 4.0 software in a standalone version and start it as Windows administrator.  
<https://github.com/ErikEJ/SqLceToolbox> (project link)
- Select the command *Add SQL Server Compact 4.0 Connection*.



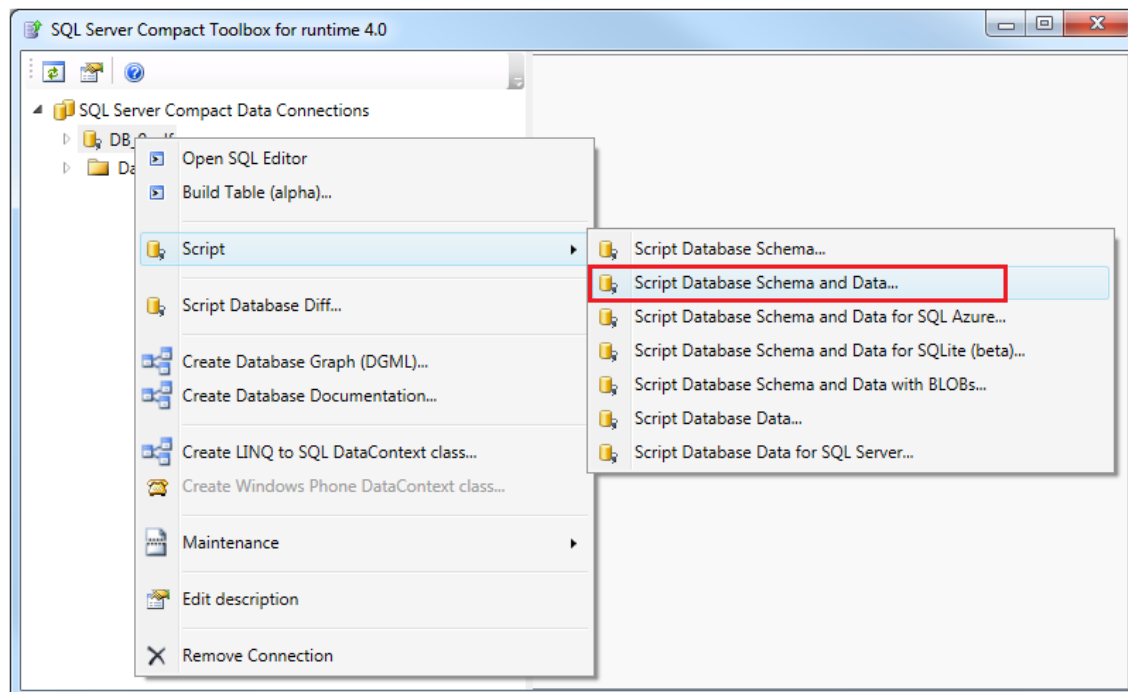
- In the newly opened window enter *Max Buffer Size* = 4096 and *Max Database Size* = 4000. Additionally enter password if it is required for your database.



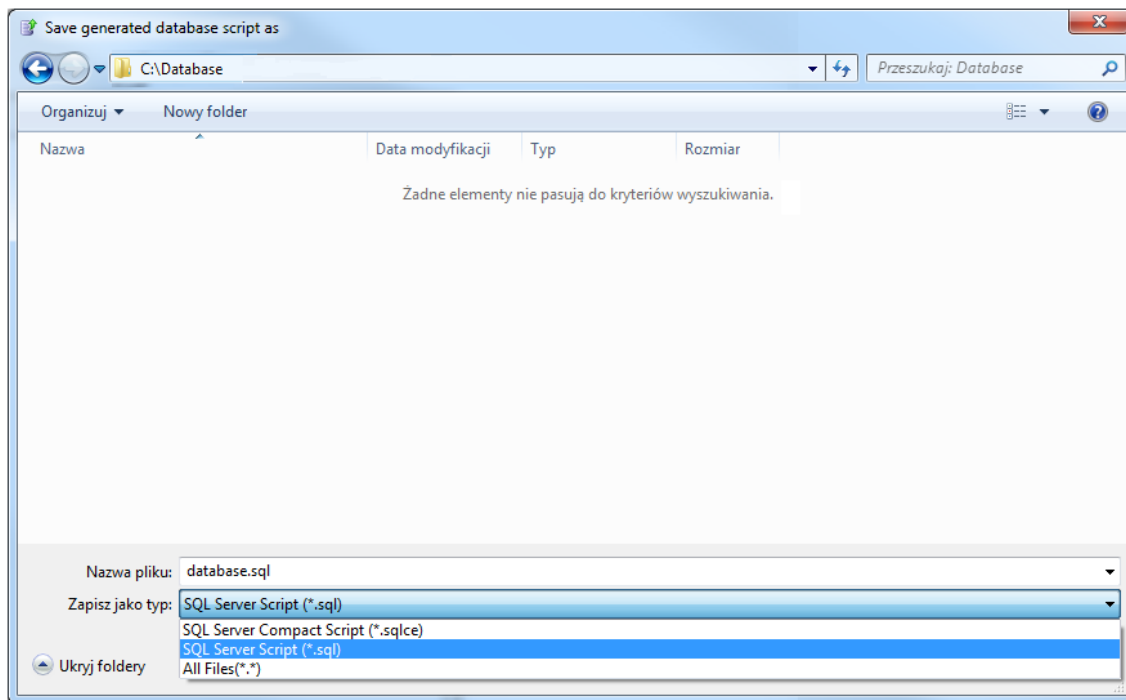
- Indicate your local type database using *Browse* button.



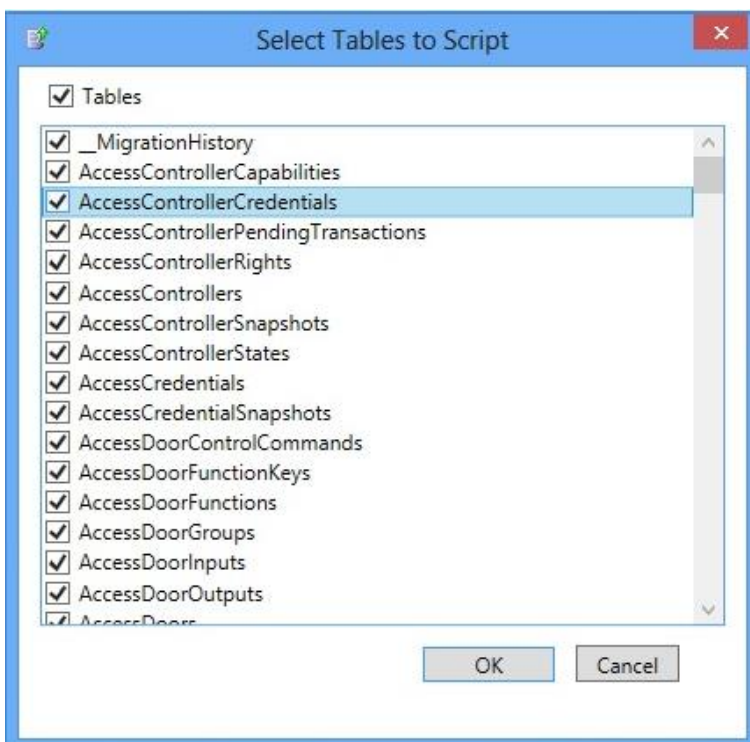
- Start scripts creating by right clicking the database connection and selecting *Script->Script SQL Server Database Schema and Data*.



- Define location and name for SQL (\*.sql) and additionally SQL CE (\*.sqlce) script file(s).



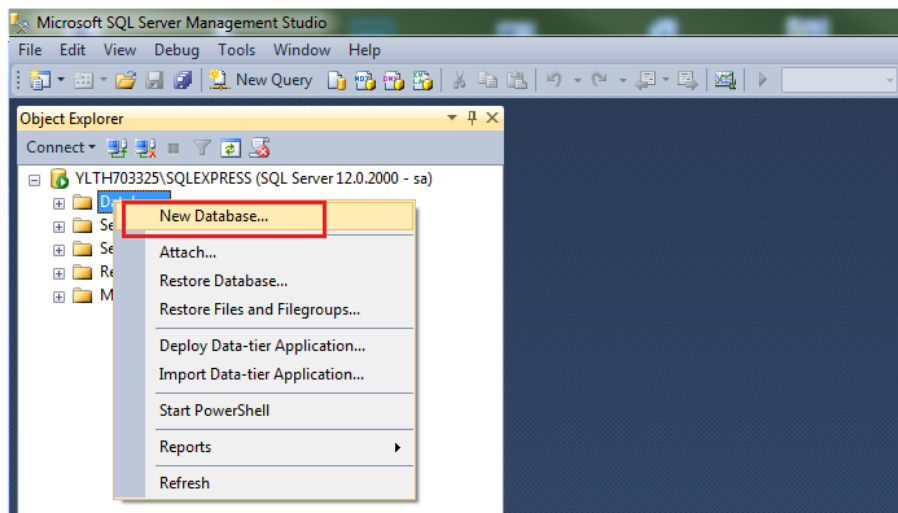
- Select all tables displayed on the list, including \_MigrationHistory which is deselected by default.



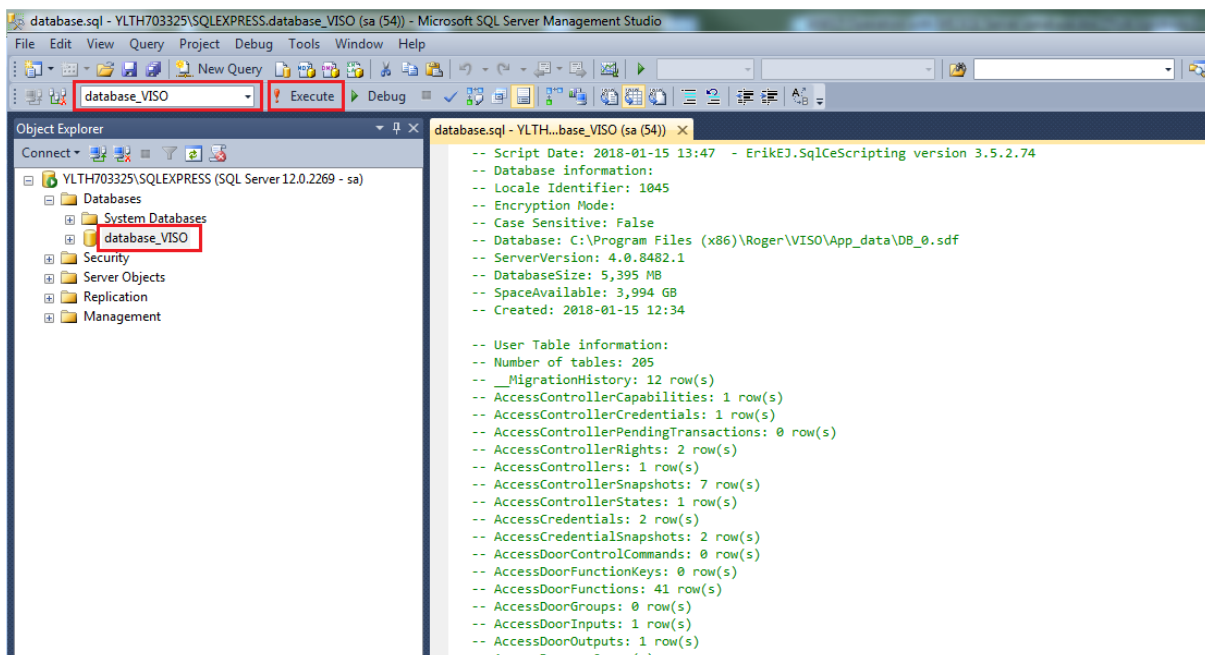
- Wait till program displays message confirming that all script files are created.

### Import to centralized type database (MS SQL Management Studio)

- Install MS SQL Server system on a server.
- Start MS SQL Server Management Studio and enter previously defined login and password.
- Right click *Databases*, select *New Database...* name the database e.g. database\_VISO and click *OK*.



- Expand *Databases* command and select just created database on the list.
- In the top menu select *File->Open->File...* and indicate the first of previously created script files SQL (\*.sql).
- Click *Execute* button to start the script.



- Repeat the same steps for the remaining scripts files in the order specified by their numbers.
- Start VISO, in the top menu select *System->Add connection...* and indicate new database.
- Start RogerSVC, select *Database connection* and then *Configure* to indicate new database.
- Start Communication Server in RogerSVC program.

### Import to centralized type database (command line)

- Install MS SQL Server system on a server.
- Start MS SQL Server Management Studio and enter previously defined login and password.
- Right click *Databases*, select *New Database...* name the database e.g. database\_VISO and click *OK*.
- Start Windows cmd with administrator rights and execute following command for all script files in the order specified by their numbers.

`sqlcmd -S server_name\Instance -d database_name -i script_file`

e.g. sqlcmd -S 192.168.100.99\SQLEXPRESS -d database\_VISO -i C:\database\database.sql

- Start VISO, in the top menu select *System->Add connection...* and indicate new database.
- Start RogerSVC, select *Database connection* and then *Configure* to indicate new database.
- Start Communication Server in RogerSVC program.

## Database encryption (TDE)

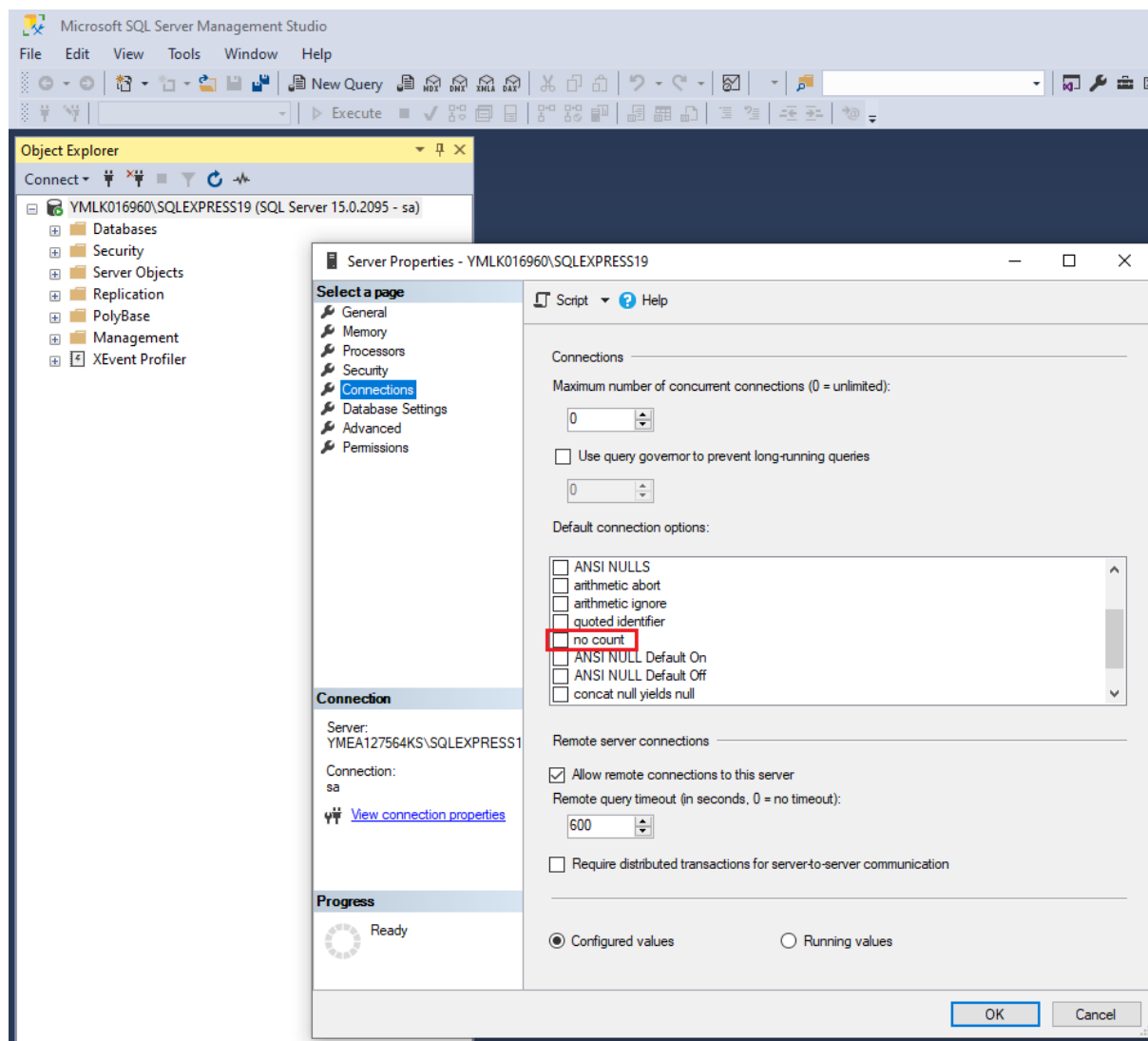
The encryption of MS SQL database as well as its logs and backups based on TDE (Transparent Data Encryption) can be applied for database used in RACS 5 system. Such encryption protects database transparently for the application. Certificate or asymmetric key is created during encryption and it must be known to access the database. According to Microsoft webpage the encryption of exemplary 'test\_database' with 'MyServerCert' and 'testpassword' can be done with following commands:

```
USE master;
GO
CREATE MASTER KEY ENCRYPTION BY PASSWORD = 'testpassword';
go
CREATE CERTIFICATE MyServerCert WITH SUBJECT = 'My DEK Certificate';
go
USE baza_test;
GO
CREATE DATABASE ENCRYPTION KEY
WITH ALGORITHM = AES_256
ENCRYPTION BY SERVER CERTIFICATE MyServerCert;
GO
ALTER DATABASE baza_test
SET ENCRYPTION ON;
GO
```

No additional configuration in RACS 5 system is necessary to operate with database encrypted with TDE method.

## Notes and hints

When SQL server is configured then the parameter *no count cannot be* enabled. RACS 5 is using methods which result in excessive event generating, quick database filling and overall lower performance if the parameter is enabled.



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