

Advanced Application Manual

Database Server

This manual walks through the steps to set up MS SQL Server

V1.00

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1. Overview

MS SQL is supported in EasyBuilder Pro V6.01.01 and later versions. This user manual explains step by step on how to create and configure MS SQL server, and how to design an EasyBuilder Pro project.

2. Installing MS SQL

The SQL server used in the following demonstration is MS SQL.

- Download MS SQL Express from the link provided in Chapter 6. Recommended version for Windows[®] 10: MS SQL Express 2017 Windows[®] 7: MS SQL Express 2014
- 2. Open the downloaded installation file.
- MS SQL Express 2017: Install online MS SQL Express 2014: Install the following files.
 - a. Express 32/64 BIT\SQLEXPR x86/x64 ENU.exe
 - b. MgmtStudio 32/ 64 BIT\SQLManagementStudio_x86/x64_ENU.exe

MS SQL Express 2014 is used in the following demonstration. MS SQL Express 2017 can be configured in the same way.

 After running Express 64 BIT\SQLEXPR_x64_ENU.exe, a "SQLEXPR_x64_ENU" folder will be generated. Run "SETUP.EXE" file in this folder to start installing.

If the OS of your PC is Windows[®] 7 32BIT x86, please install Express 32 BIT\SQLEXPR_x86_ENU.exe.

퉬 1033_ENU_LP	2018/9/21 下午 0	檔案資料夾	
퉬 redist	2018/9/21 下午 0	檔案資料夾	
🐌 resources	2018/9/21下午 0	檔案資料夾	
퉬 хб4	2018/9/21下午 0	檔案資料夾	
autorun.inf	2014/2/6 下午 12	安裝資訊	1 KB
MEDIAINFO.XML	2014/2/21 下午 0	XML Document	1 KB
PackageId.dat	2018/9/21下午 0	DAT 檔案	1 KB
SETUP.EXE	2014/2/21 上午 0	應用程式	75 KB
isetup.exe.config	2014/1/17 上午 0	XML Configurati	1 KB
SQLSETUPBOOTSTRAPPER.DLL	2014/2/21 上午 0	應用程式擴充	219 KB
🚳 SQMAPI.DLL	2014/2/21 上午 0	應用程式擴充	180 KB



 Click [New SQL Server stand-alone installation or add features to an existing installation].

🐮 SQL Server Installation Center	
Planning Installation	New SQL Server stand-alone installation or add features to an existing installation Launch a wizard to install SQL Server 2014 in a non-clustered environment or to add features to an existing SQL Server 2014 instance.
Maintenance Tools Resources Options	Upgrade from SQL Server 2005, SQL Server 2008, SQL Server 2008 R2 or SQL Server 2012 Launch a wizard to upgrade SQL Server 2005, SQL Server 2008, SQL Server 2008 R2 or SQL Server 2012 to SQL Server 2014.
Microsoft SQL Server 2014	

6. Use default settings in Feature Selection window.

🐮 SQL Server 2014 Setup			
Feature Selection			
Select the Express features t	o install.		
Global Rules Product Updates Install Setup Files Install Rules License Terms Feature Selection Feature Rules Instance Configuration Server Configuration Database Engine Configurati Feature Configuration Rules Installation Progress Complete	Eeatures: Instance Features Database Engine Services SQL Server Replication Shared Features SQL Client Connectivity SDK Redistributable Features		Feature description: The configuration and operation of each instance feature of a SQL Server instance is isolated from other SQL Server instances. Prerequisites for selected features: Already installed: Windows PowerShell 2.0 Windows PowerShell 2.0 Disk Space Requirements Drive C: 1058 MB required, 204945 MB available
	Instance <u>r</u> oot directory:	C:\Program Files\M	licrosoft SQL Server\
	<u>S</u> hared feature directory: Shared feature directory (<u>x</u> 86):	C:\Program Files\M C:\Program Files (x)	licrosoft SQL Server\
		< <u>B</u> ack	Next > Cancel Help

7. In Instance Configuration window, new instances can be installed. Running multiple SQL Servers on the same computer needs multiple instances.



Every new instance should start from executing SETUP.EXE. The default name of the instance is MSSQLSERVER.

📆 SQL Server 2014 Setup					
Instance Configuration					
Specify the name and instanc	e ID for the instance of	SQL Server. Instance	ID becomes part of	the installation path	L
Global Rules	Oefault instance				
Product Updates	Named instance:	MSSQLSERVER			
Install Rules					
Installation Type	Instance ID:	MSSQLSERVER			
Feature Selection					
Feature Rules	eature Rules SQL Server directory: C:\Program Files\Microsoft SQL Server\MSSQL12.MSSQLSERVER			ERVER	
Instance Configuration	Installed instances:				
Database Engine Configurati	Instance Name	Instance ID	Features	Edition	Version
Feature Configuration Rules	SQLEXPRESS	MSSQL12.SQLEX	SQLEngine,SQLE	Express	12.3.6024.0
Installation Progress	WINCCPLUSMIG2	MSSQL12.WINCC	SQLEngine	Express	12.2.5207.0
Complete	WINCC	MSSQL12.WINCC	SQLEngine	Express	12.2.5207.0
complete	WINCCPLUSMIG2	MSSQL10_50.WI	SQLEngine,SQLE	Express	10.52.4042.0
	<shared compon<="" td=""><td></td><td>SSMS, Adv_SSMS</td><td></td><td>12.3.6024.0</td></shared>		SSMS, Adv_SSMS		12.3.6024.0
< Back Next > Cancel Help					

8. In Server Configuration window select [Automatic] for both SQL Server Database Engine and SQL Server Browser.

🐔 SQL Server 2014 Setup				
Server Configuration				
Specify the service accounts a	nd collation configuration.			
Global Rules	Service Accounts Collation			
Product Updates Install Setup Files	Microsoft recommends that you	use a separate account for	each SQL Serve	r service.
Install Rules	Service	Account Name	Password	Startup Type
Installation Type	SQL Server Database Engine	NT Service\MSSQL\$FI		Automatic
License Terms	SQL Server Browser	NT AUTHORITY\LOCA		Automatic
Instance Configuration Server Configuration Database Engine Configurati Feature Configuration Rules Installation Progress Complete				
		< Back Next	> Can	cel Hel

9. Select [Mixed Mode] in Database Engine Configuration window and enter



password.

📸 SQL Server 2014 Setup		- • •
Database Engine Conf	figuration	
Specify Database Engine auth	nentication security mode, administrators and data directories.	
Global Rules	Server Configuration Data Directories User Instances FILESTREAM	
Product Updates Install Setup Files	Specify the authentication mode and administrators for the Database Engine.	
Install Rules	Authentication Mode	
License Terms Feature Selection	\bigcirc <u>W</u> indows authentication mode	
Feature Rules	<u>Mixed Mode (SQL Server authentication and Windows authentication)</u>	
Instance Configuration	Specify the password for the SQL Server system administrator (sa) account.	
Server Configuration	Enter password:	
Feature Configuration Rules	C <u>o</u> nfirm password: ●●●●●●	
Installation Progress	Specify SQL Server administrators	
Complete	SEANHUANG\seanhuang (seanhuang) SOL Serve	er
	administr. unrestricte the Data	ators have ad access to
		alo Engine.
	Add <u>C</u> urrent User <u>A</u> dd <u>R</u> emove	
	< <u>B</u> ack <u>N</u> ext > Cancel	Help

 Install and run "MgmtStudio 64 BIT\SQLManagementStudio_x64_ENU.exe" file, a "SQLManagementStudio_x64_ENU" folder will be generated. Run "SETUP.EXE" file in this folder to start installing.

If the OS of your PC is Windows 7 32BIT x86, please install "MgmtStudio 32 BIT\SQLManagementStudio_x86_ENU.exe".

名稱	修改日期	類型	大小	
🐌 1033_ENU_LP	2018/9/21 下午 0	檔案資料夾		
퉬 redist	2018/9/21 下午 0	檔案資料夾		
퉬 resources	2018/9/21 下午 0	檔案資料夾		
퉬 х64	2018/9/21 下午 0	檔案資料夾		
AUTORUN.INF	2014/2/6 下午 12	安裝資訊	1 KB	
MEDIAINFO.XML	2014/2/21 下午 0	XML Document	1 KB	
PackageId dat	2018/9/21 下午 0	DAT 檔案	1 KB	
SETUP.EXE	2014/2/21 上午 0	應用程式	75 KB	
🖄 SETUP.EXE.CONFIG	2014/1/17 上午 0	XML Configurati	1 KB	
SQLSETUPBOOTSTRAPPER.DLL	2014/2/21 上午 0	應用程式擴充	219 KB	
🚳 SQMAPI.DLL	2014/2/21 上午 0	應用程式擴充	180 KB	

11. Click [New SQL Server stand-alone installation or add features to an existing installation].



🖀 SQL Server Installation Center		
Planning Installation Maintenance Tools Resources Options	 New SQL Server stand-alone installation or add features to an existing installation Launch a wizard to install SQL Server 2014 in a non-clustered environment or to add features to an existing SQL Server 2014 instance. Upgrade from SQL Server 2005, SQL Server 2008, SQL Server 2008 R2 or SQL Server 2012 Launch a wizard to upgrade SQL Server 2005, SQL Server 2008, SQL Server 2008 R2 or SQL Server 2012 to SQL Server 2014. 	
Microsoft SQL Server 2014		

12. Use default settings in Feature Selection window.

📸 SQL Server 2014 Setup		
Feature Selection Select the Express features to	o install.	
Global Rules Product Updates Install Setup Files Install Rules Installation Type License Terms Feature Selection Feature Rules Feature Configuration Rules Installation Progress Complete	Eeatures: Instance Features Shared Features I Client Tools Connectivity Client Tools Backwards Compatibility Client Tools SDK Management Tools - Basic Management Tools - Complete SQL Client Connectivity SDK Redistributable Features	Feature description: The configuration and operation of each instance feature of a SQL Server instance is isolated from other SQL Server instances. Prerequisites for selected features: Already installed: Windows PowerShell 2.0 Windows PowerShell 2.0 Disk Space Requirements Drive C: 1616 MB required, 203895 MB available
	Select All Unselect All Instance root directory: C:\Program Files\M Shared feature directory: C:\Program Files\M Shared feature directory (x86): C:\Program Files (x8)	licrosoft SQL Server\
	< <u>B</u> ack	<u>N</u> ext > Cancel Help



13. When finish installing, open "SQL Server Configuration Manager".

Microsoft SQL Server 2008	=
Microsoft SQL Server 2014	+2
Oownload Microsoft SQL Server Com	12
🔜 SQL Server 2014 Import and Export D	荬
🔜 SQL Server 2014 Import and Export D	
💺 SQL Server 2014 Management Studic	預
퉬 Analysis Services	
Configuration Tools	新
SQL Server 2014 Configuration Mana	iger
SQL Server 2014 Error and Usage	
髋 SQL Server 2014 Installation Cente	
💀 SQL Server 2014 Reporting Service	

14. Under "SQL Server Network Configuration", enable TCP/IP.

<u>File Action View H</u>elp

(-)	🔿 🚈 🛅 🔒 👔		
8	SQL Server Configuration Manager (Local)	Protocol Name	Status
	SQL Server Services	Shared Memory	Enabled
	SQL Server Network Configuration (32bit	Named Pipes	Disabled
>		TCP/IP	Enabled
~	SQL Server Network Configuration		Endored
	Protocols for MSSQLSERVER		

> 💂 SQL Native Client 11.0 Configuration

TCP/IP Properties	? 💌
Protocol IP Addresses	
General	
Enabled	Yes 💌
Keep Alive	30000
Listen All	Yes
Enabled	
Enable or disable TCP/IP protocol for	r this server instance
OK Can	Apply Help

15. SQL Server port number can be found in IP Addresses tab.

Database Server



	TCP Dynamic Ports	0	
	TCP Port		
Ξ	IP5		
	Active	Yes	
	Enabled	No	
	IP Address	fe80::100:7f:fffe%12	
	TCP Dynamic Ports	0	
	TCP Port		
Ξ	IP6		
	Active	Yes	
	Enabled	No	
	IP Address	fe80::5efe:192.168.1.128%17	
	TCP Dynamic Ports	0	
	TCP Port		-
Ξ	IPAII		
	TCP Dynamic Ports	3810	
	TCP Port		_

16. Under "SQL Server Services", right-click on "SQL Server" and then click



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3. Building Database

After installing MS SQL, a Database must be created in MS SQL for synchronizing HMI historical data to the database with the same name.

1. Launch Microsoft SQL Server Manage Studio (SSMS). Right-click on the server and select [Properties].



2. Under Security select [SQL Server and Windows Authentication mode] for Server Authentication.

0000



Server Properties - MAO-LA	РТОР	-		×
Select a page	🖵 Script 🔻 😮 Help			
Processors Security Connections Database Settings Advanced Permissions	Server authentication			
Connection	Enable server proxy account			
Server: MAO-LAPTOP Connection: MAO-LAPTOP\Mao	Proxy account: Password: Options			
₩ <u>View connection properties</u>	Enable C2 audit tracing <u>C</u> ross database ownership chaining			
Progress				
Ready				
		ОК	Cano	cel

3. Select [Connect] and then select [Database Engine].



4. Select a server name. For the first login, select [Windows Authentication] and then click [Connect].



Connect to Serve	er SQL Server 2014	×
Server type:	Database Engine	-
Server name:	SEANHUANG'SEAN	-
<u>A</u> uthentication:	Windows Authentication	•
<u>U</u> ser name:	SEANHUANG\seanhuang	-
<u>P</u> assword :	Remember password	
Com	ect Cancel Help Options >>	,

5. Double click the left mouse button to select [Security] » [Logins] » [sa].



6. Enter password and then click OK. When setting Database Server in EasyBuilder Pro, the username will be "sa" and the password will be the password entered here.



🔒 Login Properties - sa			
Selecta page	🔄 Script 🔻 📑 Help		
General Server Roles The User Mapping	Login name:		S <u>e</u> arch
🚰 Status	 <u>W</u>indows authentication SQL Server authentication 		
	<u>P</u> assword:	•••••	
	<u>C</u> onfirm password:	•••••	
	Specify old password		
	<u>O</u> ld password:		
	Enforce password policy	tion	
	User must change passwo	ord at next login	
	Mapped to certificate		-
	🔘 Mapped <u>t</u> o asymmetric key		-
Connection	📄 <u>M</u> ap to Credential		▼ <u>A</u> dd
Server: SEANHUANGVSEAN	Mapped Credentials	Credential Provider	
Connection: SEANHUANG\seanhuang			
View connection properties			
Progress			Remove
Ready	Default <u>d</u> atabase:	master	•
, A ⁴² 6.	Default language:	English	•
	I	OK	Cancel

 To add new login, open [Security], right-click on [Logins], and then select [New Login].



8. Enter [Login name], select [SQL Server authentication] and then enter the password.



📕 Login - New				- • ×
Selectapage	🔄 Script 🔻 🚺 Help			
General Server Roles User Mapping Securables Status	Login name: Windows authentication SQL Server authentication Password: Confirm password: Specify old password Old password: Enforce password policy Enforce password policy Mapped to certificate Mapped to password to password	test		Sgamh
Connection	Map to Credential	[- bbA
Server: SEANHUANG'SEAN Connection: SEANHUANG'seenhuang <u>View connection properties</u>	Mapped Credentials	Credential	Provider	
Progress				Remove
Ready	Default <u>d</u> atabase: Default language:	master <default></default>		•
			OK	Cancel

9. Select [sysadmin] in [Server roles].

📙 Login - New		×
Select a page	🕄 Script 👻 🖪 Help	
General Server Roles User Mapping Securables	Server role is used to grant server-wide security privileges to a user.	
Siatus	Server roles:	
	🔲 bulkadmin	
	dbcreator	
	V public	
	securityadmin	
	serveradmin	
	setupadmin	-11
Connection		
Server: SEANHUANG'SEAN		
Connection: SEANHUANG\seanhuang		
View connection properties		
Progress		
CO Ready		
	OK	

10. Click [OK] when finish setting.



4. Designing Project File

This chapter goes through the configuration in EasyBuilder Pro.

- 1. In EasyBuilder Pro main menu click [Objects] » [Database Server].
- 2. In General tab set the Database Server parameters. The default port number for MS SQL is 1433. If connecting with this port number is not possible, please find the correct port number by referring to the steps in Chapter 2 in this manual.

Database Server	
General Status/Co	ontrol
Comment :	
Server system :	MS SQL Server 💌
Ip :	127 . 0 . 0 . 1 🔲 Use domain name
Port :	1469 🚖 * Default port of MS SQL Server is 1433
Username :	test
Password :	111111
Database name :	weintek

- 3. In Address tab set Status Address and Control Address. The status addresses can display the connection status with MS SQL server on HMI, and the control addresses can be used to change connection parameters dynamically on HMI.
- 4. Select [Sync to database] for both Data Sampling object and Event Log object, to synchronize the historical data to the Database Server.

Sampling mode	Hold address	
Time-based	Tenable Mode : ON	•]
Sampling time interval : 1 second(s)	PLC : Local HMI	Settings
	Control address	
Read address	PLC : Local HMI	Settings
PLC : [Local HMI Address : [LW 0	Address : LW 🗸 20	16-bit Unsigned
	History files	
Jata Record Data Format Data length: 6 word(s)	Enable Name : Datalog	
	Sync. to SD card Sync. to USB disk	
	Sync to database	
	Tenable	
	Database : 1. 127.0.0.1	•
	1	0.0



	Category :	All [1]		•				
No.	Category	Text	Mode	Condition	Read address	Notification address	Buzzer	e-Mail
1	0	Event 0	WORD	< 0.00	Local HMI : LW-0	Disable	Disable	Disable
Con	ntrol addres	55						
Hist	Cory files							
Hist	cory files Enable Sync to	SD card		Sync	to USB disk			
Sy	ory files ✓ Enable Sync to ync to data ✓ Enable Databa	SD card abase ase : 1. :	127.0.0.	C Sync	to USB disk			•

Note: The data will be synchronized to MS SQL server only when the number of data log / event log records reaches 10000. To start synchronization manually, please select [Enable] check box in the Control Address group box in the settings window of Data Sampling / Event Log object, and then give command by entering the corresponding value in the designated address.

Value	Command
1	Clear data in cMT HMI.
2	Synchronize data to the external device.
3	Synchronize data to the external device and then
	clear data in cMT HMI.

Please see EasyBuilder Pro User Manual Chapter 7 Event Log and Chapter 8 Data Sampling for more details on the synchronization rules of historical data.



5. SQL Query

This chapter explains how to use SQL Query.

 Launch Microsoft SQL Server Manage Studio(SSMS). Select [Connect] » [Database Engine].



 Select a Server Name, and select [SQL Server Authentication]. Enter Login Name and Password. (Login name can be "sa" as configured in the preceding chapter: 3: Building Database, or any user-defined name.) In Connection Properties tag select TCP/IP for [Network protocol], and then click [Connect].

	SQL Server	
Login Connection Propert	ties Additional Connection Parameters	
Server		
Type the server name, o	or choose it from the drop-down list.	
Serverture	Database Engine	
Server game:		
Authentication:	SQL Server Authentication	
Login:	sa	
Password:		
	Remember password	
Connect to Server	SQL Server	
Connect to Server	SQL Server	
Connect to Server	SQL Server	
Connect to Server	SQL Server	
Connect to Server	SQL Server	
Connect to Server	SQL Server	
Connect to Server	SQL Server ties Additional Connection Parameters the database for the connection. cdefault> TCP/IP 4096 bytes	
Connect to Server Login Connection Proper Type or select the name of Connect to database: Network Metwork protocol: Network protocol: Network gacket size: Connection Connection time-out:	SQL Server ties Additional Connection Parameters the database for the connection. <a href="https://doi.org/10.1000/1000/1000000000000000000000000</td> <td></td>	
Connect to Server	SQL Server	
Connect to Server Login Connection Proper Type or select the name of I Connect to gatabase: Network protocol: Network protocol: Network packet size: Connection Connection time-out: Execution time-out: Execution time-out: Execution time-out:	SQL Server ties Additional Connection Parameters the database for the connection. <default> TCP/IP 4096 \$ bytes 30 \$ seconds 0 \$ seconds 0 \$ seconds</default>	
Connect to Server Login Connection Proper Type or select the name of Connect to gatabase: Network Network protocol: Network protocol: Network packet size: Connection Connection time-out: Execution time-out: Execution time-out: Trust gerver certifica	SQL Server ties Additional Connection Parameters the database for the connection. 	



3. Right-click on [Database] and then select [New Database].



4. Enter a [Database name], click [OK]. The Database Name is defined in [Database Server] » [Database name] in EasyBuilder Pro.

🗄 New Database							
Selecta page	🛒 Script 👻 🛐	Help					
General							
Filegroups	Database <u>n</u> ame:		test	test			
	– Owner:		<default></default>				
	<u>V</u> se full-text i	ndexing					
	Database <u>f</u> iles:						
	Logical Name	File Type	Filegroup	Initial Size (MB)	Autogrowth / Maxsize		
	test	ROWS	PRIMARY	5	By 1 MB, Unlimited		
	test_log	LOG	Not Applicabl	e 2	By 10 percent, Unlimited		
Connection							
Server:							
SEANHUANGWEAN							
Connection: test							
View connection properties							
Progress							
Ready	•			<u>A</u> dd	► <u>R</u> emove		
					OK Cancel		

 Right-click on [Tables] under the new database, and then click [Table...] or [Add Table]. **Database Server**





6. Create [Column Name] and [Data Type].



7. Right-click on the column name to be set as Primary Key and then select [Set Primary Key]. Setting Primary Key is necessary for the SQL Query General Setting in EasyBuilder Pro. For Advanced Mode, this step can be skipped.





 Set Yes for [Column Properties] » [Identity Specification] » [Is Identity]. (This step can be skipped for Advanced Mode)

SE	ANHUANG\SEANt - dbo.'	Table_1* 🗙 SEANHU	JANG\SEAN1	11 - dbo.new3	SEANHUANG\SEANtest
	Column Name	Data Type	Allow Nulls		
ÞP	aa	int			

Column Properties	
Condensed Data Type	int
Description	
Deterministic	Yes
DTS-published	No
Full-text Specification	No
Has Non-SQL Server Subscriber	No
 Identity Specification 	Yes
(Is Identity)	Yes
Identity Increment	1
Identity Seed	1
Indexable	Yes
Is Columnset	No
Is Sparse	No
Merge-published	No
Not For Replication	No
Replicated	No
RowGuid	No
Size	4

9. Click [Save].



File Edit Vi <u>ew Proj</u> ect Debug TableDesigner Tools Window Help				
🛅 🕶 🖅 🛃 🚰 🛄 New Query 📑 📸 📸 🦝 🍇 🖮 隆 🔊 - (** - 💷 • 🖳 🖄	1 1	-	-	2
Object Explorer 👻 🕂 🗙	SE.	ANHUANG\SEANt - dbo.	Table_1* 🗙 SEANHI	JANG\SEAN11
Connect 🕶 🛃 📕 🍸 🛃 🍒		Column Name	Data Type	Allow Nulls
😑 🐻 SEANHUANG\SEAN (SQL Server 12.0.2269 - test)	M	aa	int	
😑 🚞 Databases		ļ		(m)
🕀 🚞 System Databases				
😠 🧻 111				
🖃 📒 test				
🗉 🧰 Database Diagrams				
🖃 🧰 Tables				
🗉 🚞 System Tables				
🗉 🧰 FileTables				
🗉 🔲 dbo.one				
🗉 🧰 Views				
🗉 🧰 Synonyms				
🗉 🧰 Programmability				
🗉 🧰 Service Broker				
🕀 🧰 Storage				
🕀 🧰 Security				
Ecurity				
Eplication	0000			
🗄 🛅 Management				
	0	Column Properties		

 A dialog box for naming the table will pop up. Enter the same name as in EasyBuilder Pro » [SQL Query] » [Table name].

Choose Name	? <mark>- ×</mark>
Enter a name for the table:	
new	
	OK Cancel

11. Select [Table] and then press the F5 key on the keyboard to see the added tables.





12. To change the data in the table, right-click on [Columns] and then select [New Column].



For more information on SQL Query in EasyBuilder Pro, see EasyBuilder Pro User Manual Chapter 13.44.2 SQL Query.

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6. References

- The download link of MS SQL 2014 Express: <u>https://www.microsoft.com/en-us/download/details.aspx?id=42299</u>
- 2. The download link of MS SQL 2017 Express: https://www.microsoft.com/en-us/sql-server/sql-server-downloads