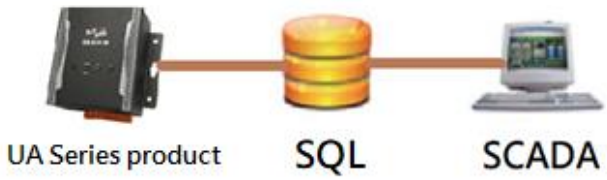
● How to save the UA collected data into SQL and then show trend chart in InduSoft? (Take MySQL Installer 5.7.31 as an example)

UA series products of ICP DAS provide a useful service to transfer TCP/RTU data to SQL. SQL is to store device data, and then by using InduSoft can retrieve the data to manage the database easily.

Due to the time format written by UA is different from the reading format of InduSoft, here is how InduSoft read data.

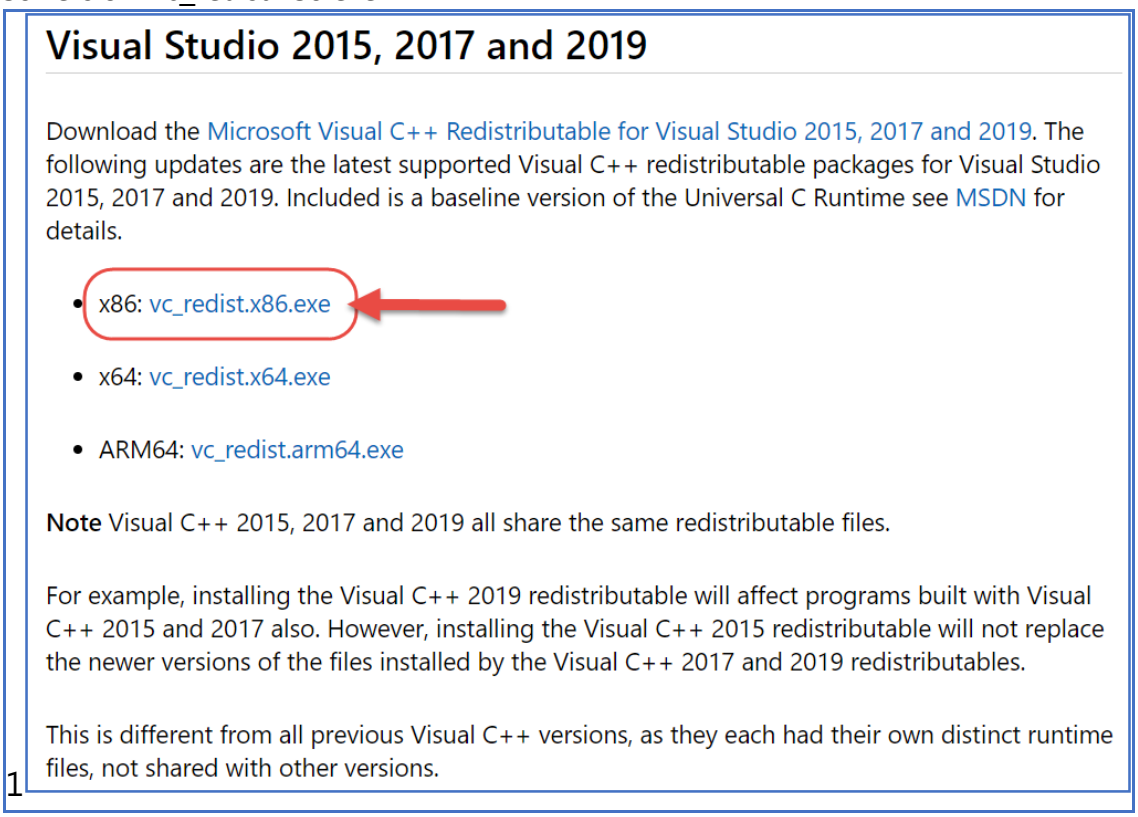
(In this example, we use UA-5231M-4GE + Windows 10 OS + MySQL 5.7.31 Database + DL-302 with Modbus RTU protocol)



1. How to Create MySQL Environment

1.1. Go to Microsoft Official Website to download and Install

Linkage: https://support.microsoft.com/en-us/help/2977003/the-latest-supported-visual-c-downloads
Choose x86 version: vc_redist.x86.exe



Visual Studio 2015, 2017 and 2019

Download the Microsoft Visual C++ Redistributable for Visual Studio 2015, 2017 and 2019. The following updates are the latest supported Visual C++ redistributable packages for Visual Studio 2015, 2017 and 2019. Included is a baseline version of the Universal C Runtime see MSDN for details.

- x86: vc_redist.x86.exe
- x64: vc_redist.x64.exe
- ARM64: vc_redist.arm64.exe

Note Visual C++ 2015, 2017 and 2019 all share the same redistributable files.

For example, installing the Visual C++ 2019 redistributable will affect programs built with Visual C++ 2015 and 2017 also. However, installing the Visual C++ 2015 redistributable will not replace the newer versions of the files installed by the Visual C++ 2017 and 2019 redistributables.

This is different from all previous Visual C++ versions, as they each had their own distinct runtime files, not shared with other versions.

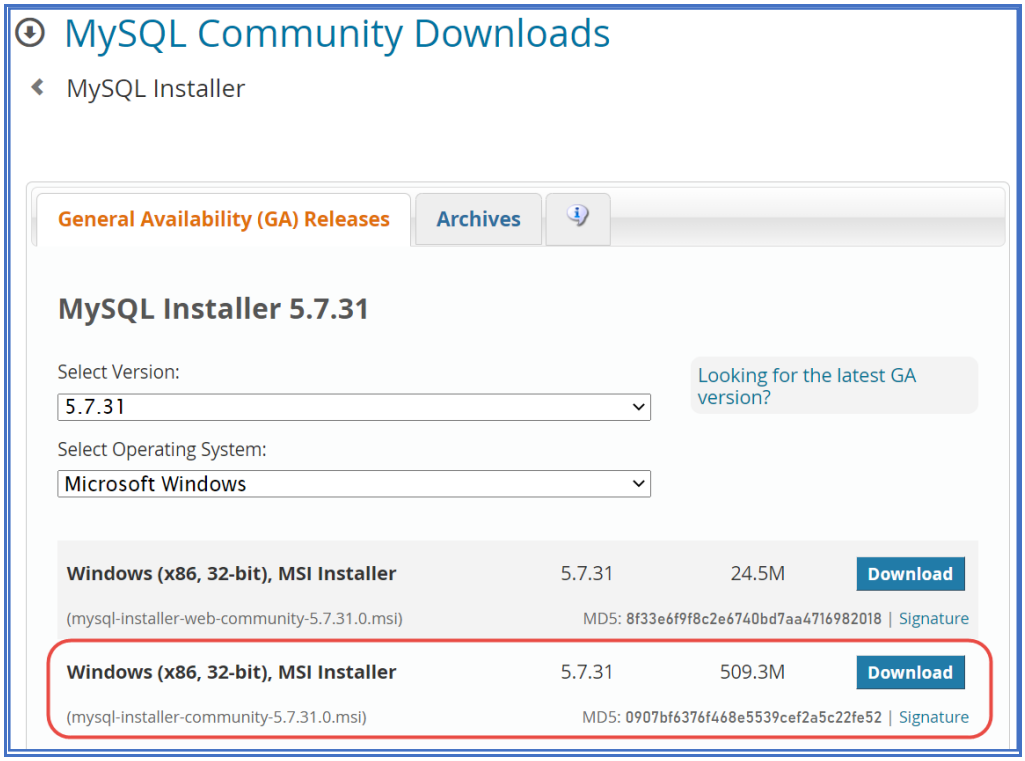
1

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1.2. Go to MySQL Official Website to download and install the program

Linkage: https://dev.mysql.com/downloads/windows/installer/5.7.html

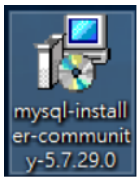
Choose the download program with larger file.

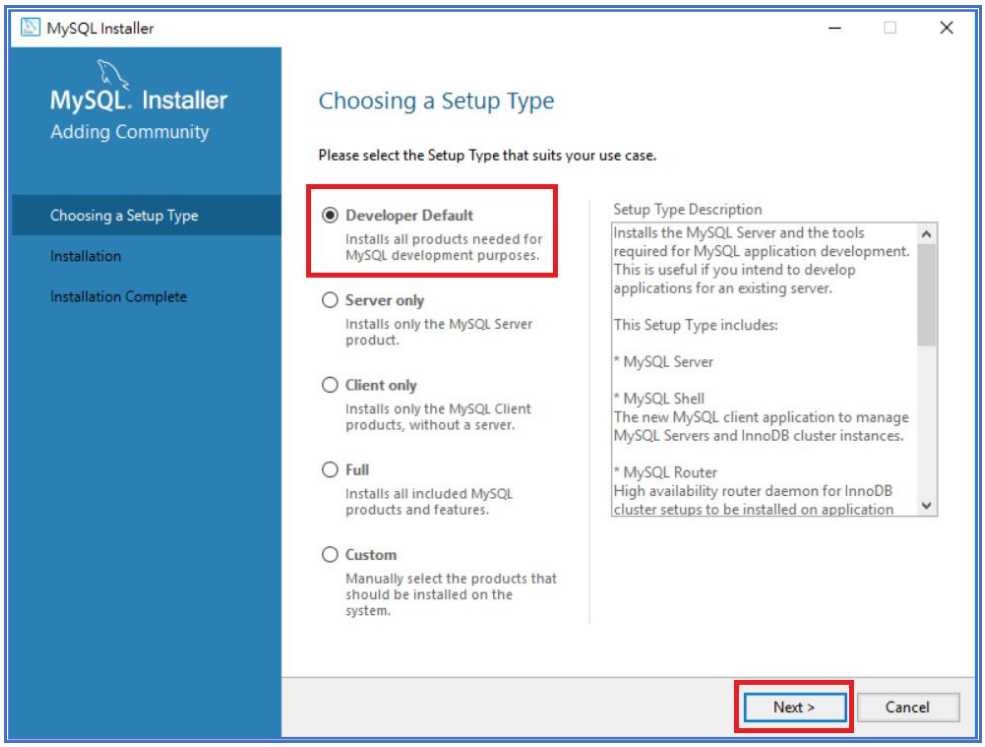


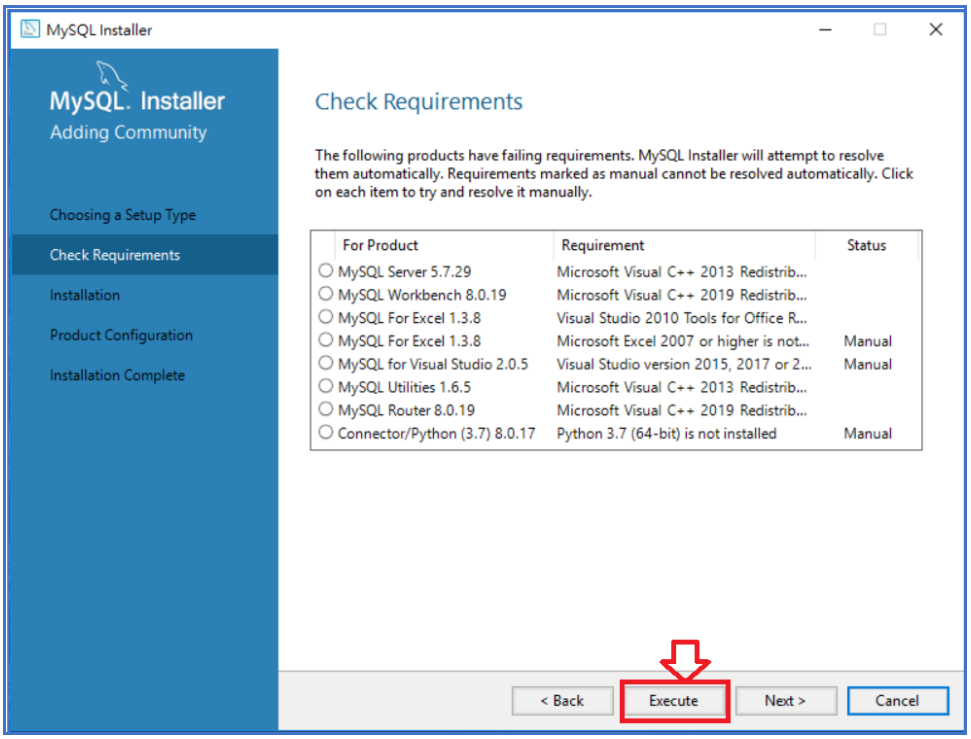


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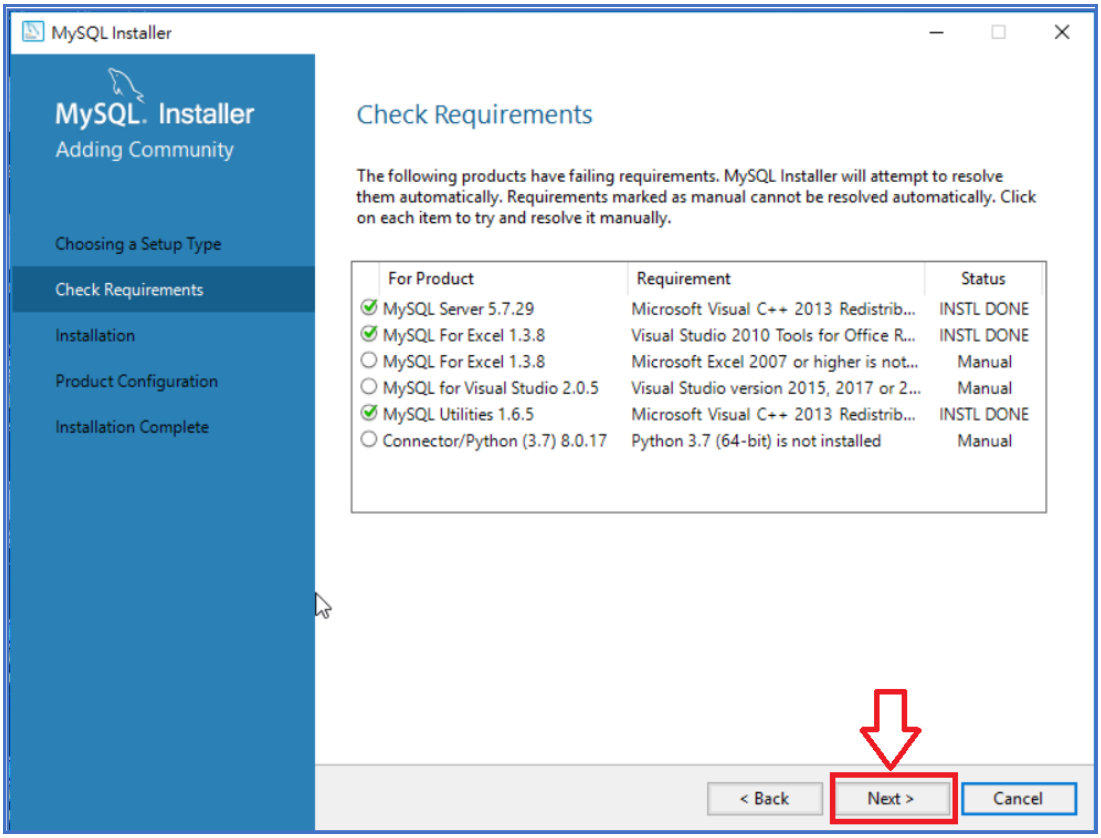
Execute to start Installation

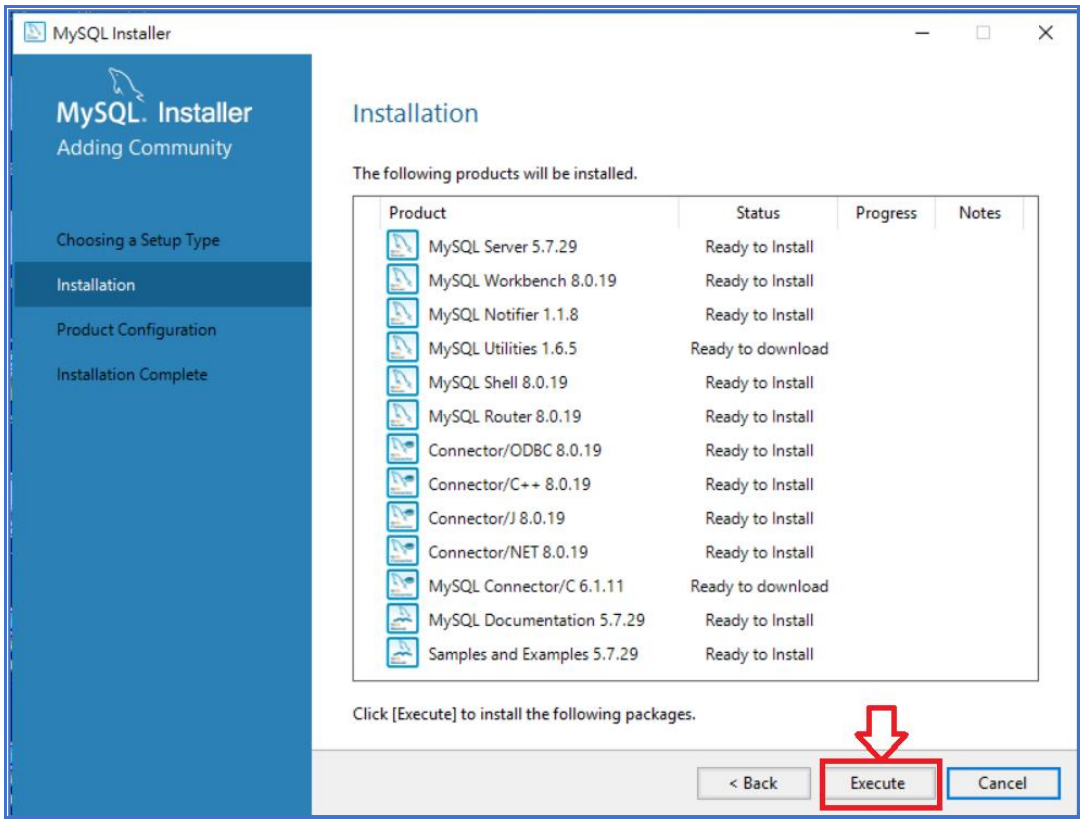




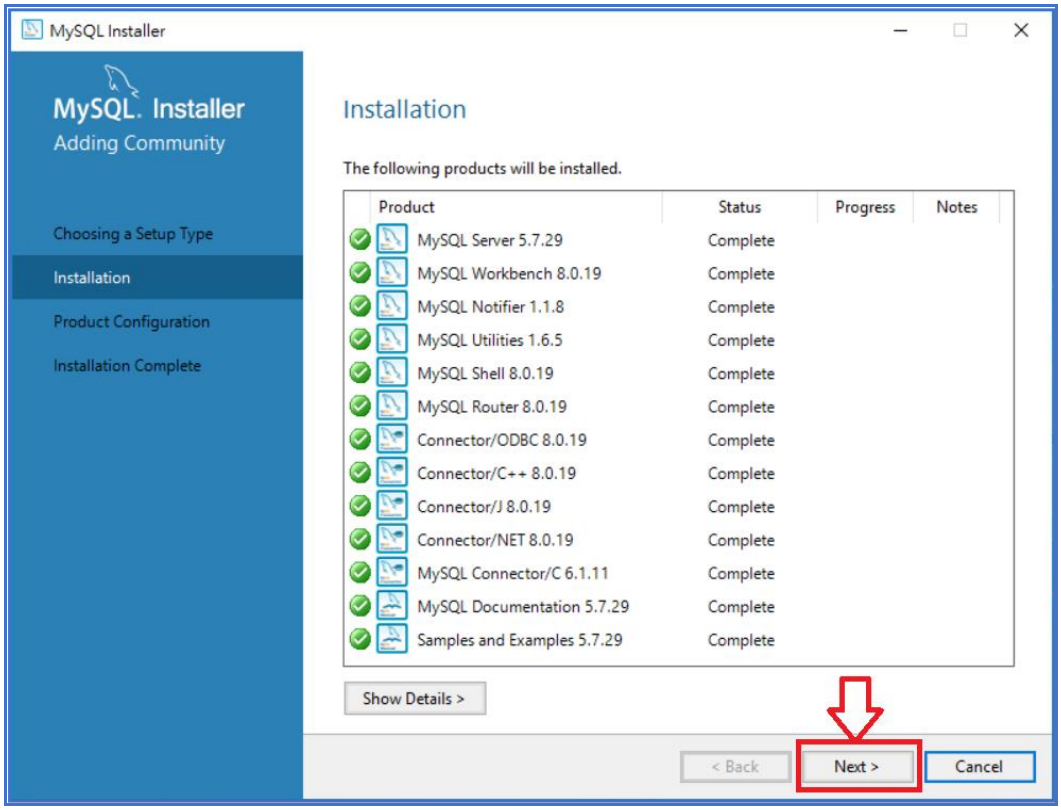


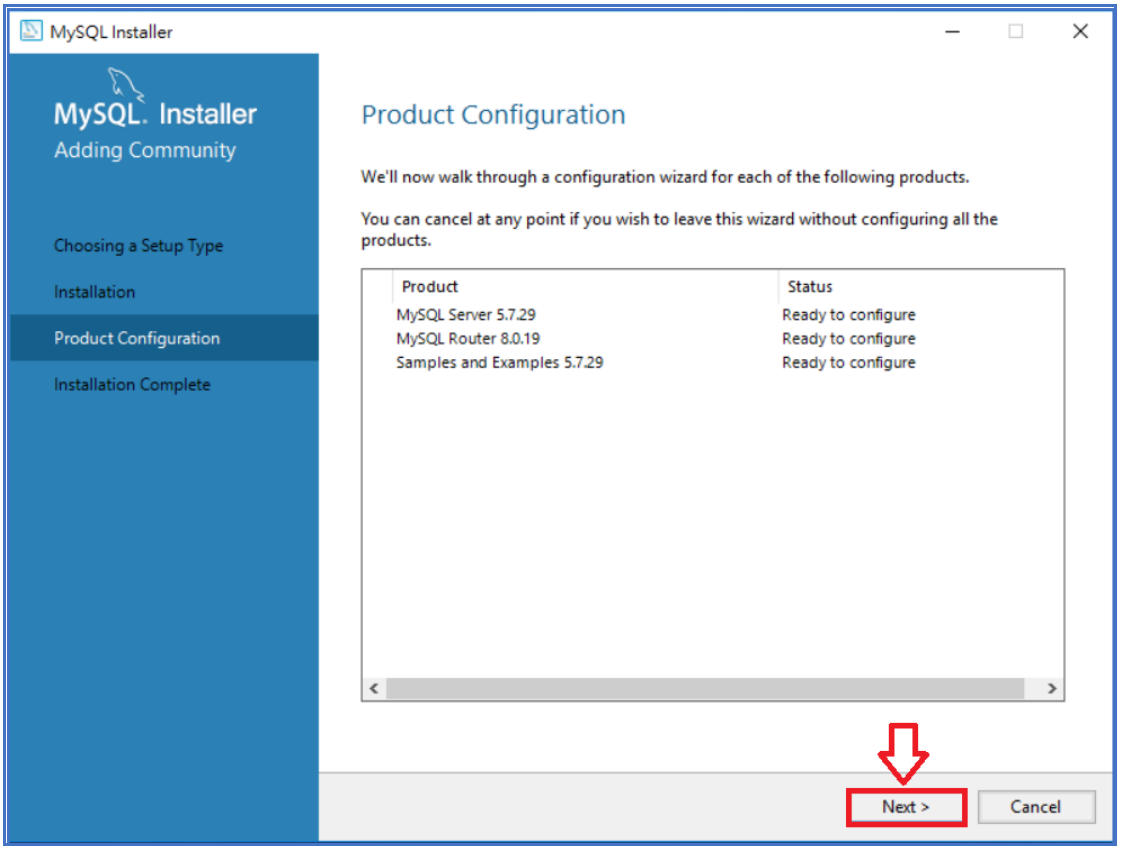
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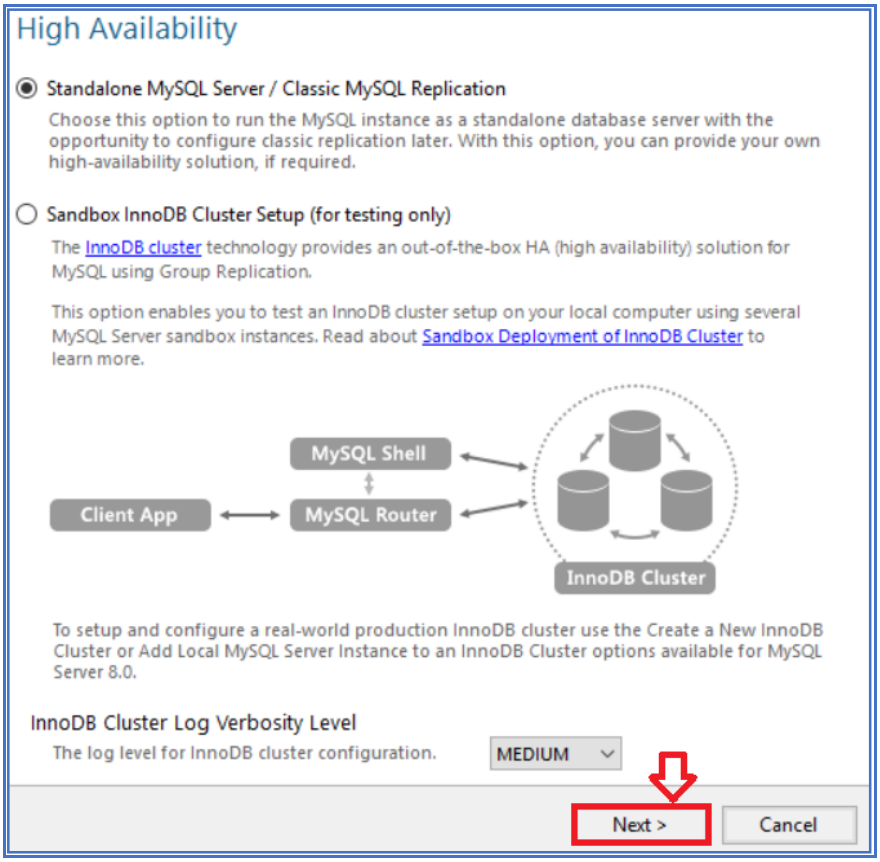


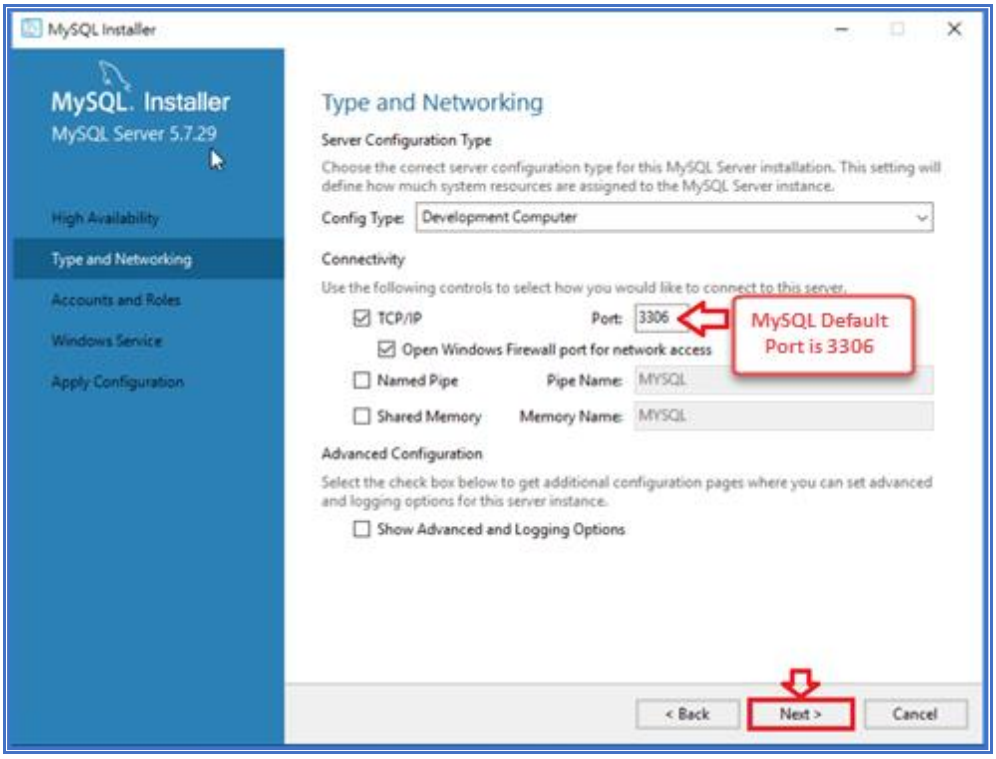
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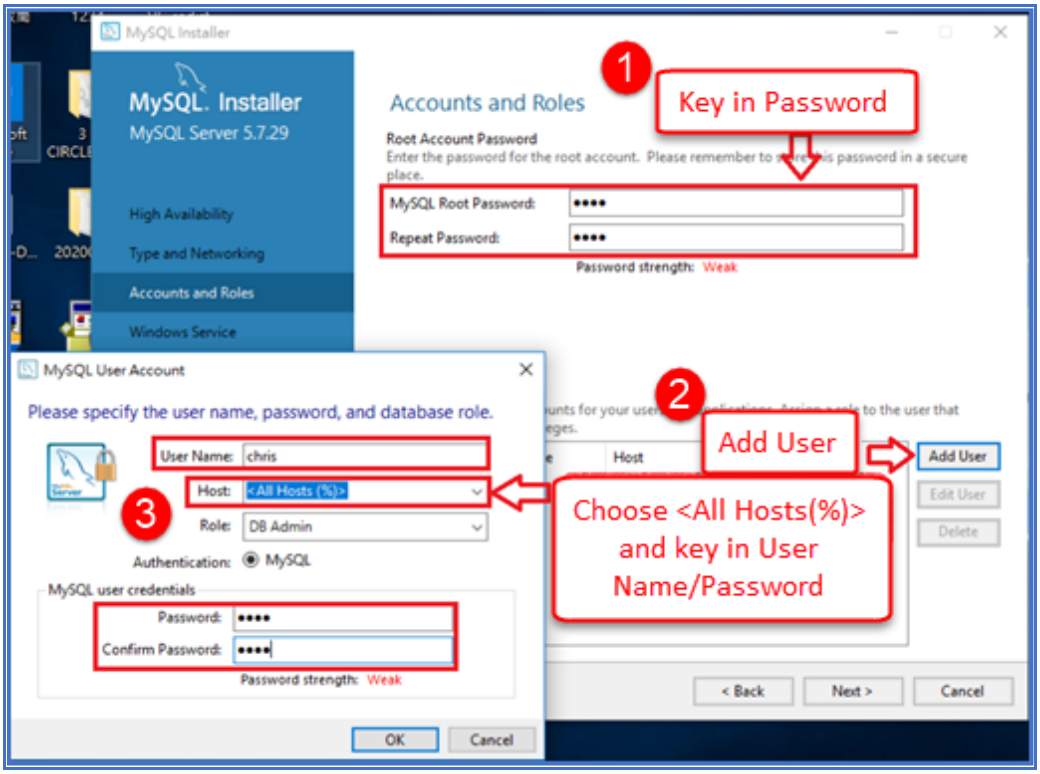


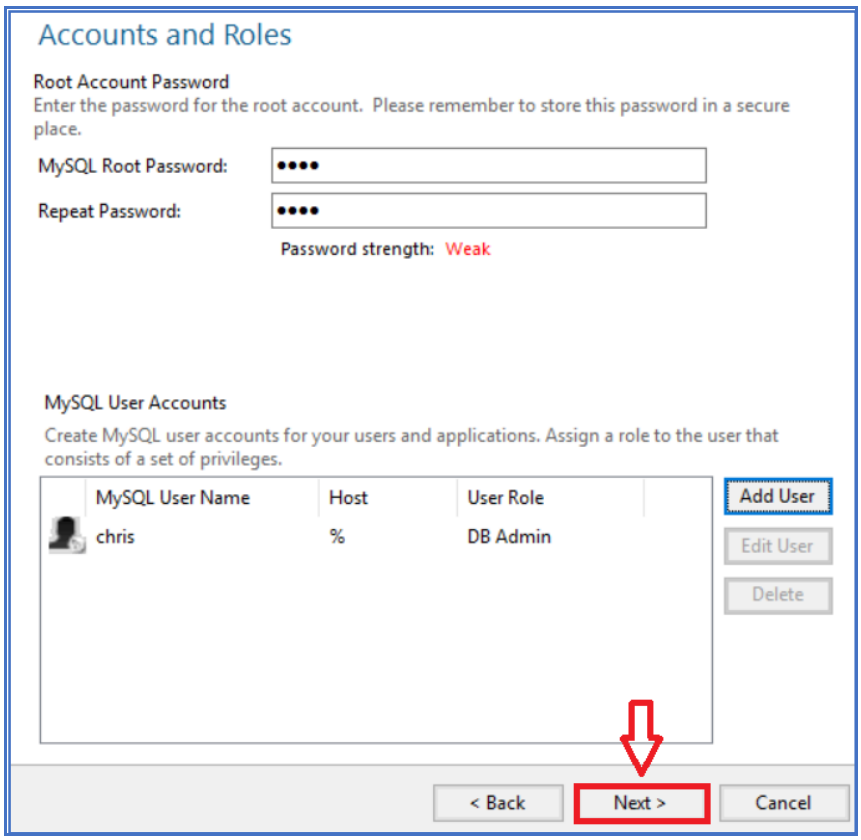
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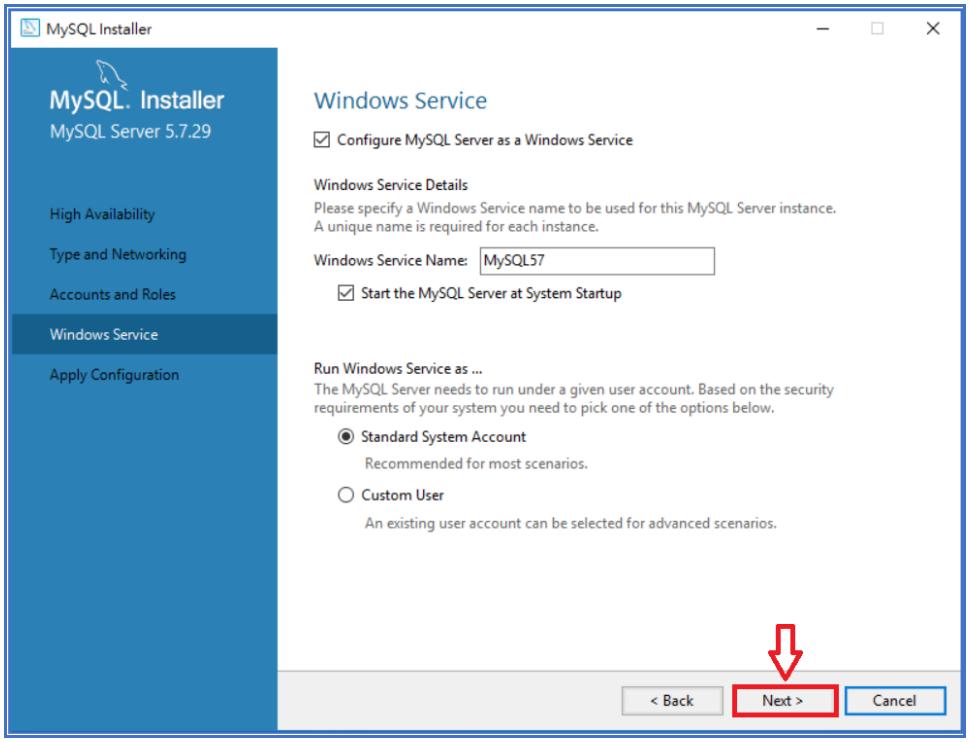


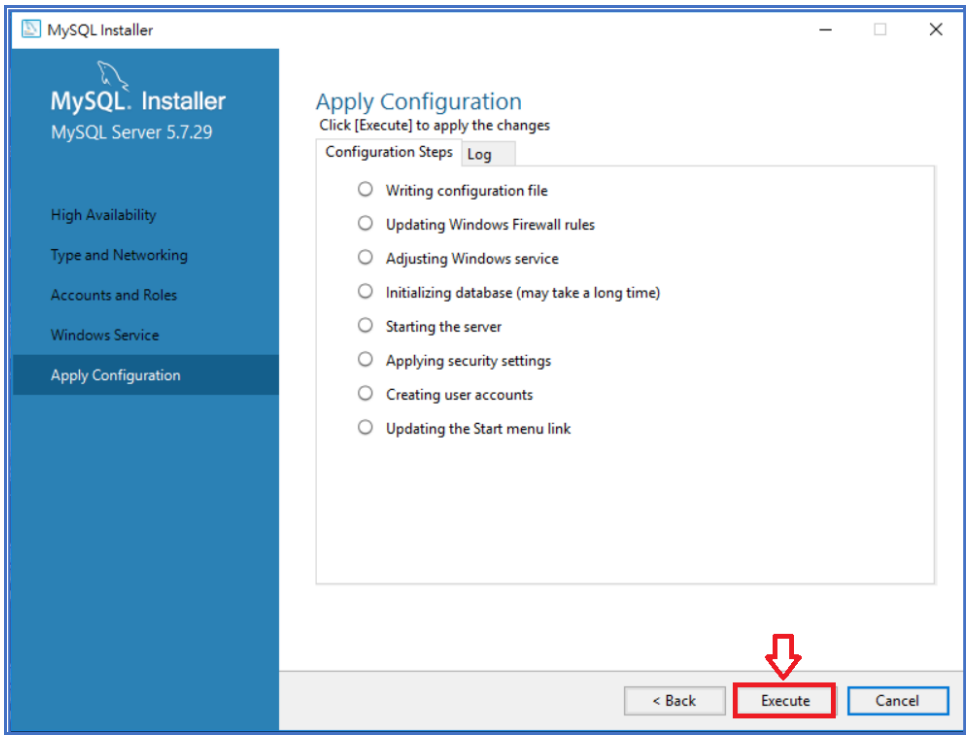
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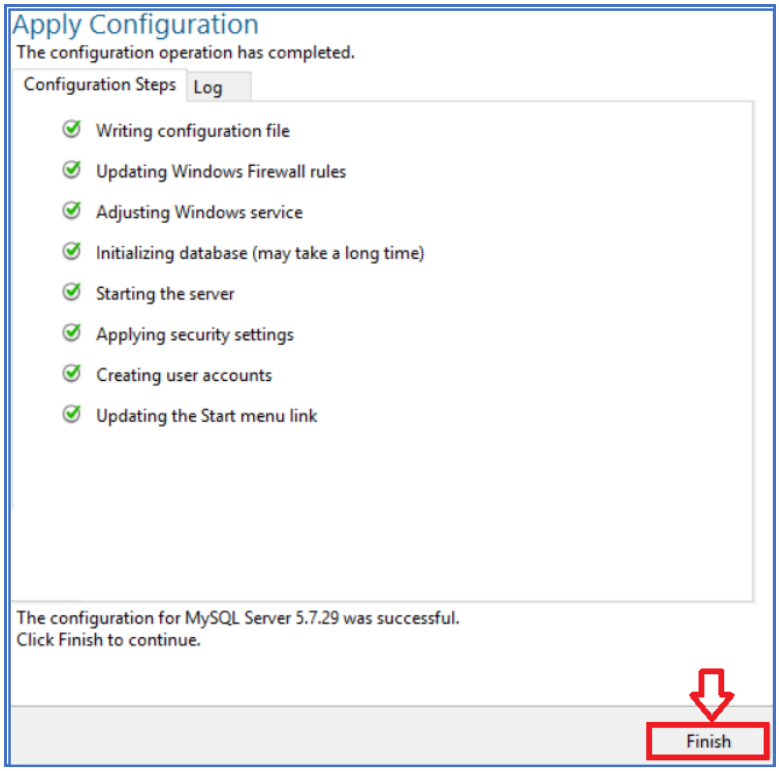


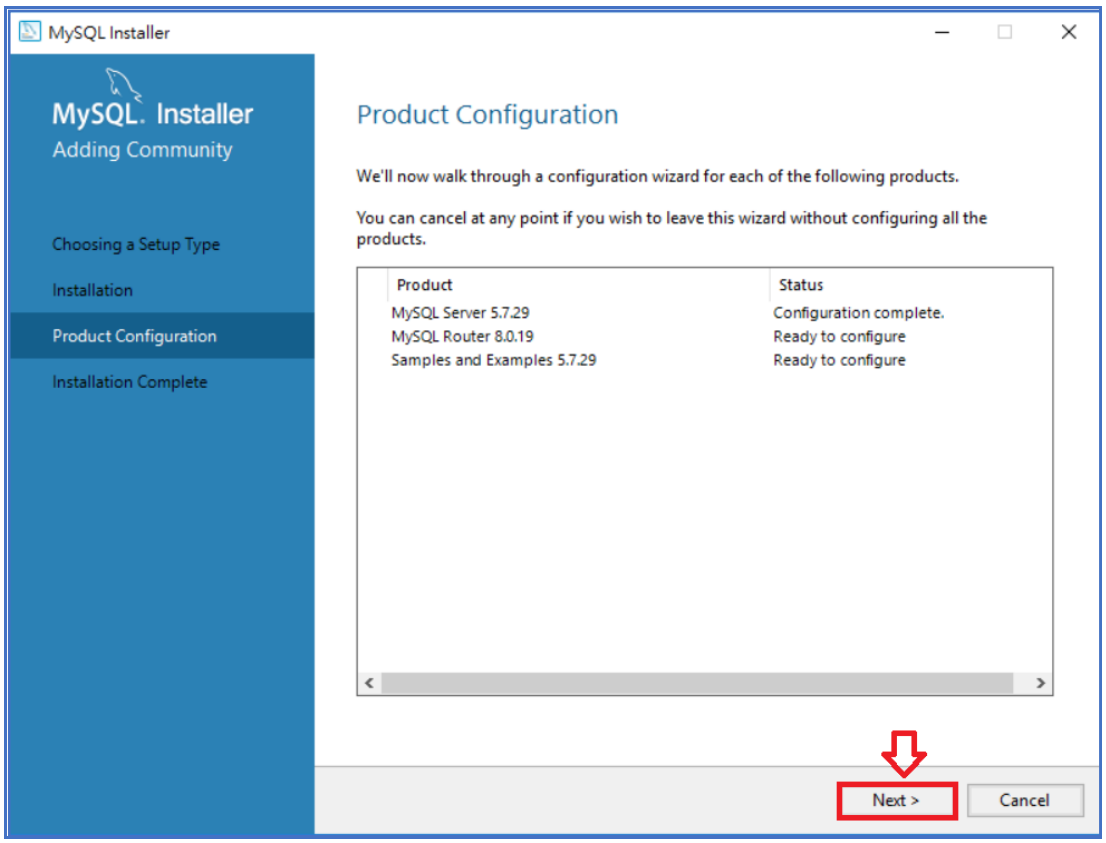
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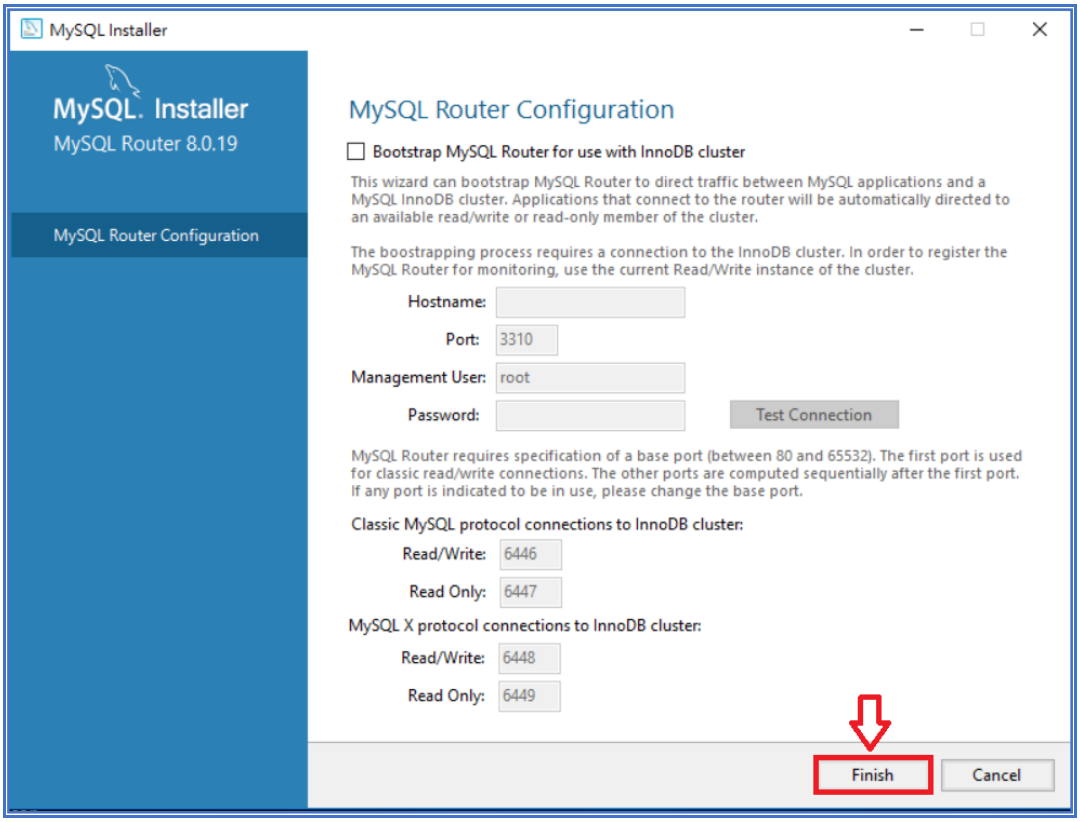


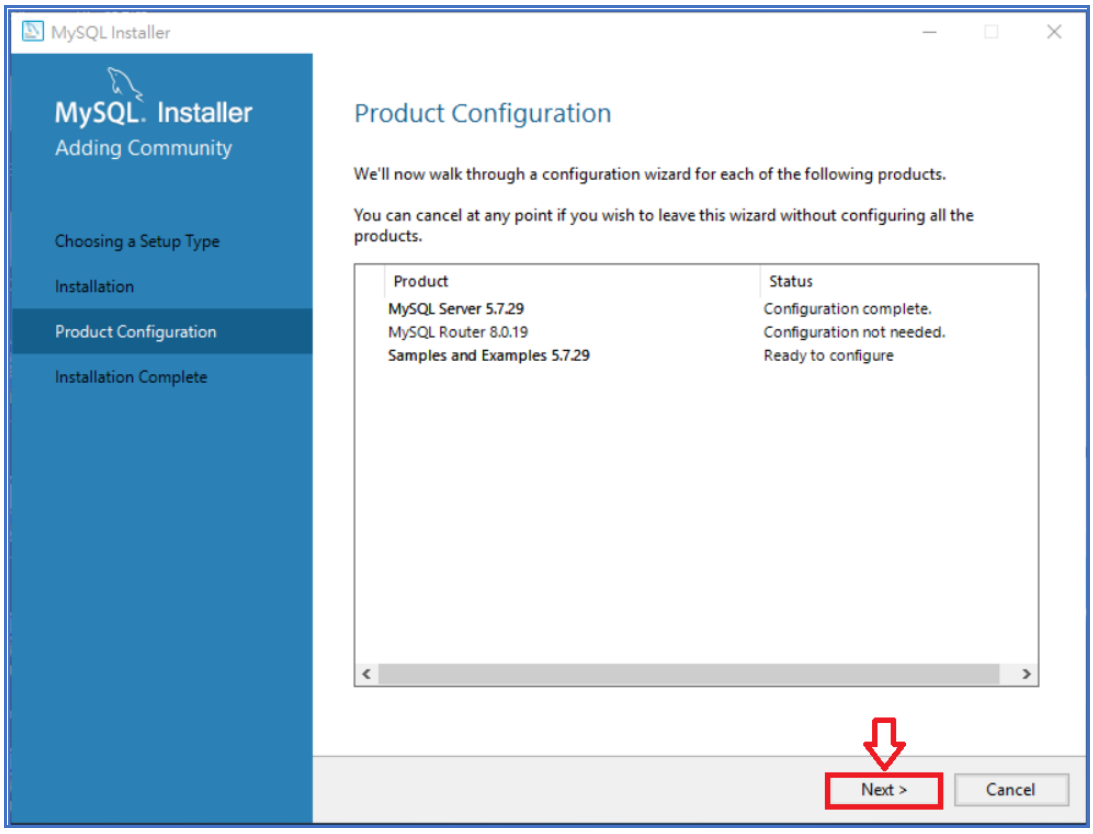
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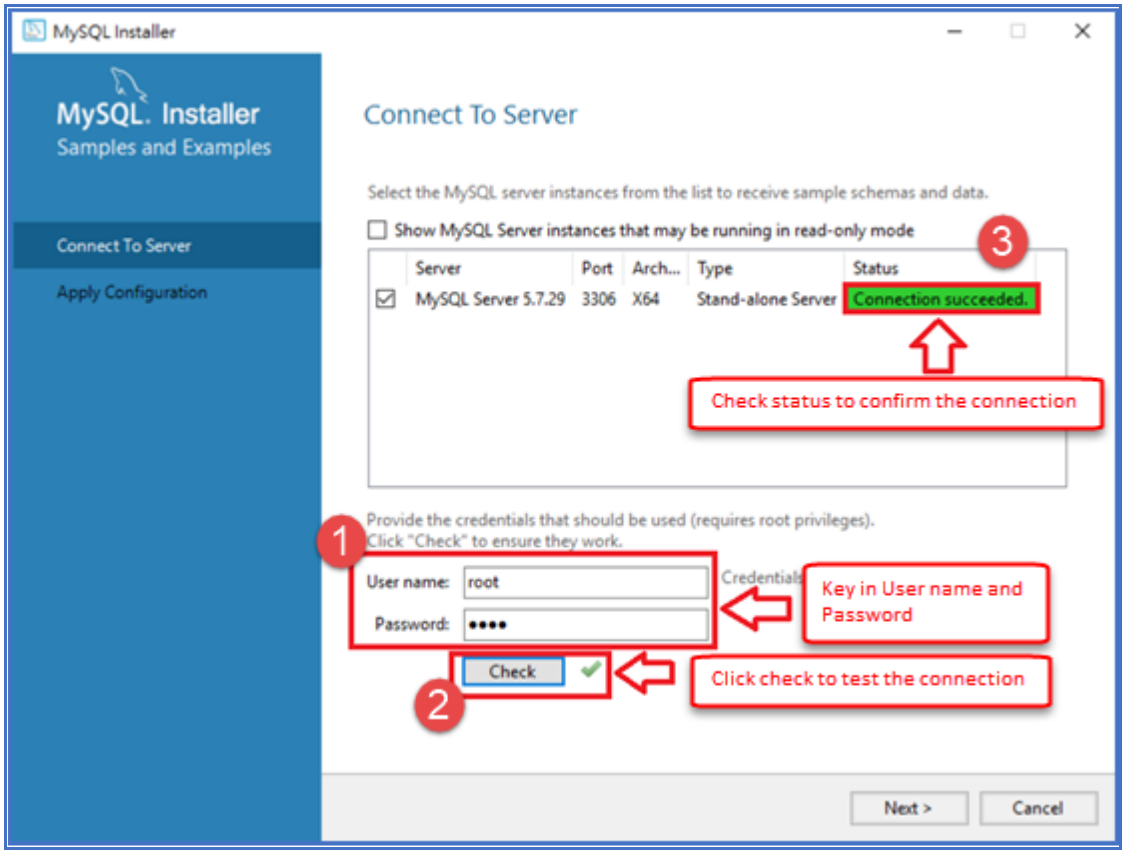


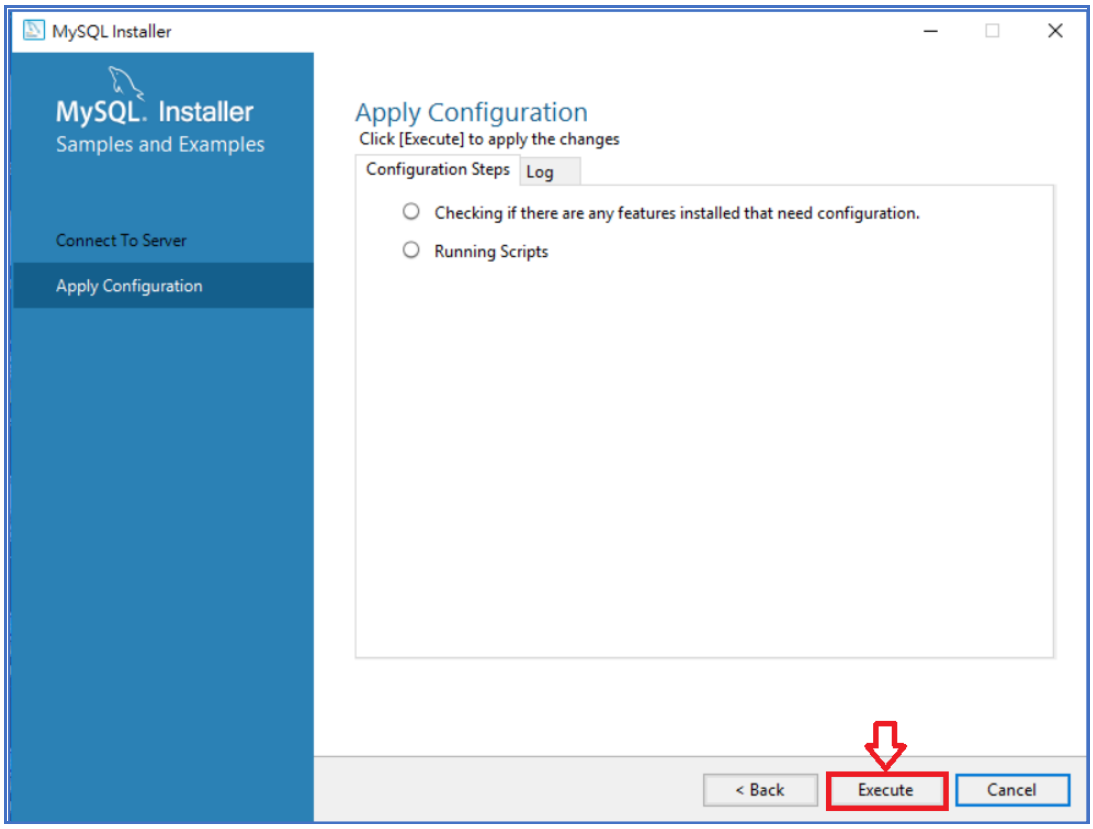
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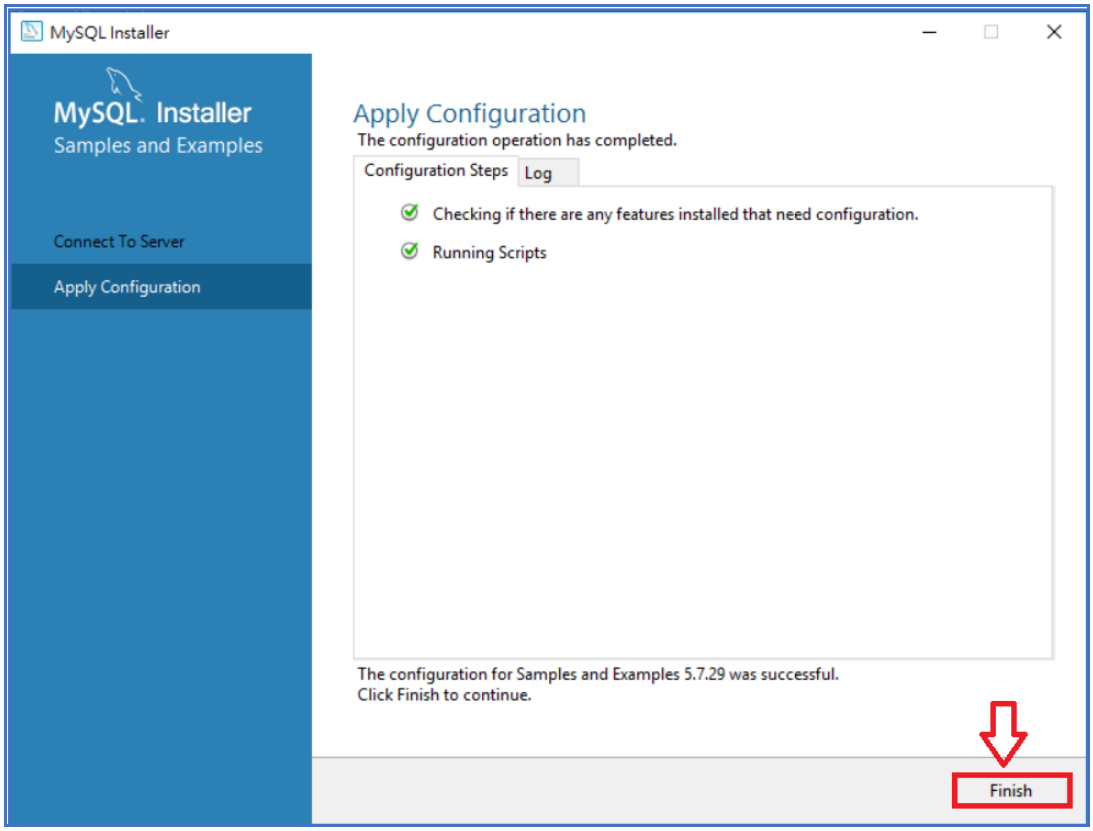


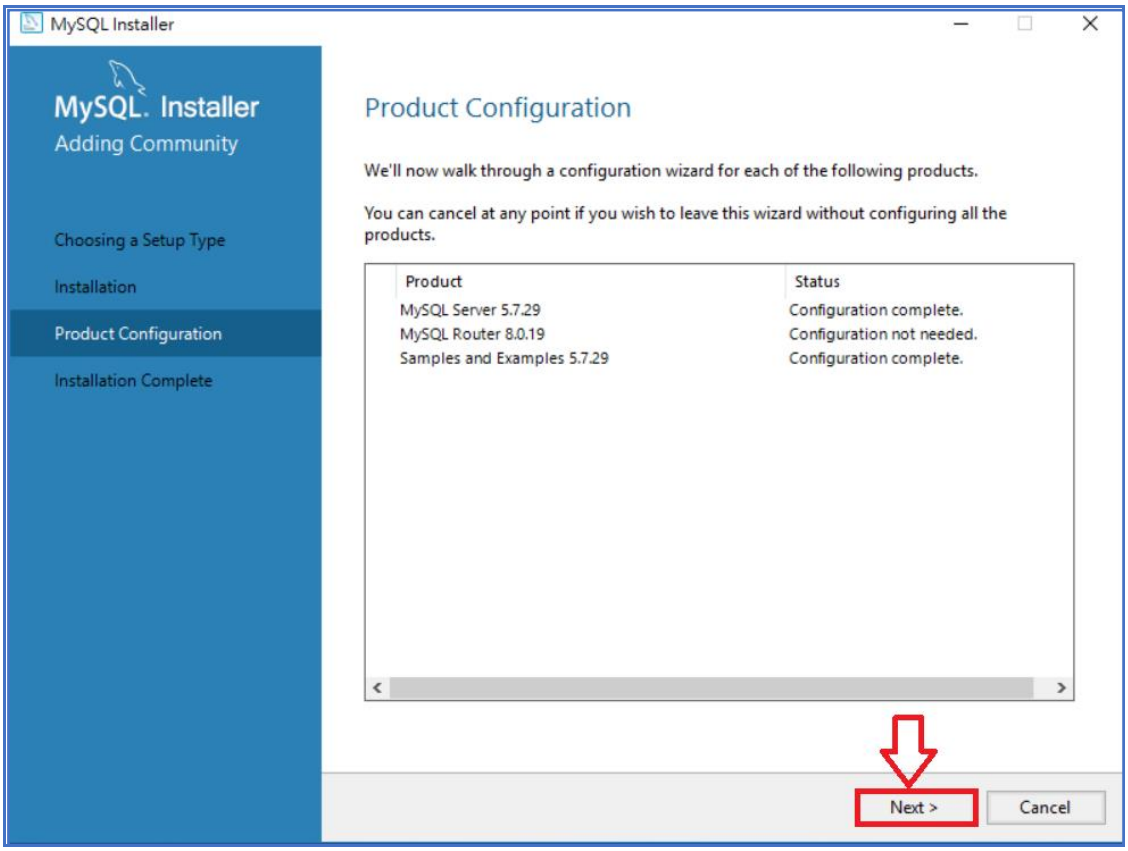
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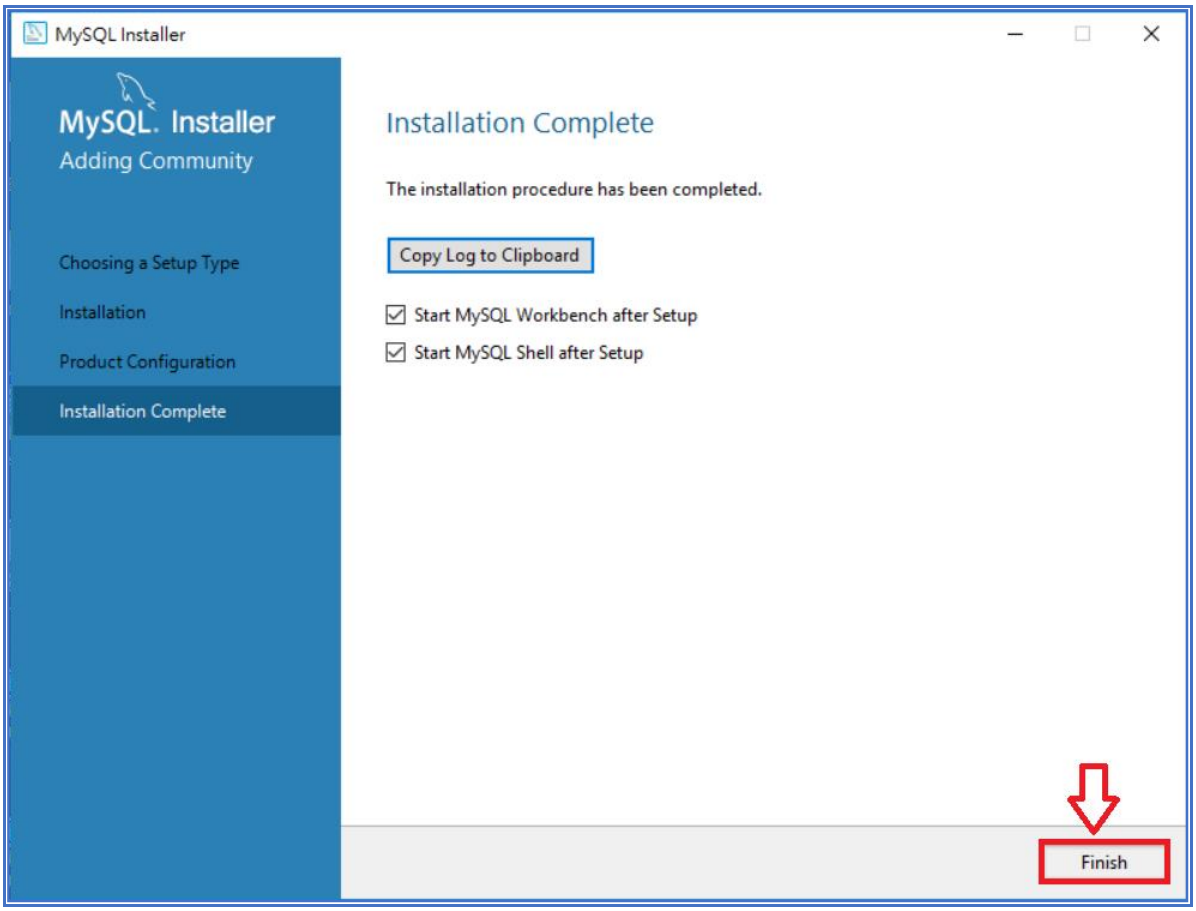
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Click [Finish] to complete the installation.



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1.3. Go to MySQL Official Website to download and Install MySQL ODBC

Linkage: https://dev.mysql.com/downloads/connector/odbc/
Choose Windows(x86, 32-bit), MSI Installer.

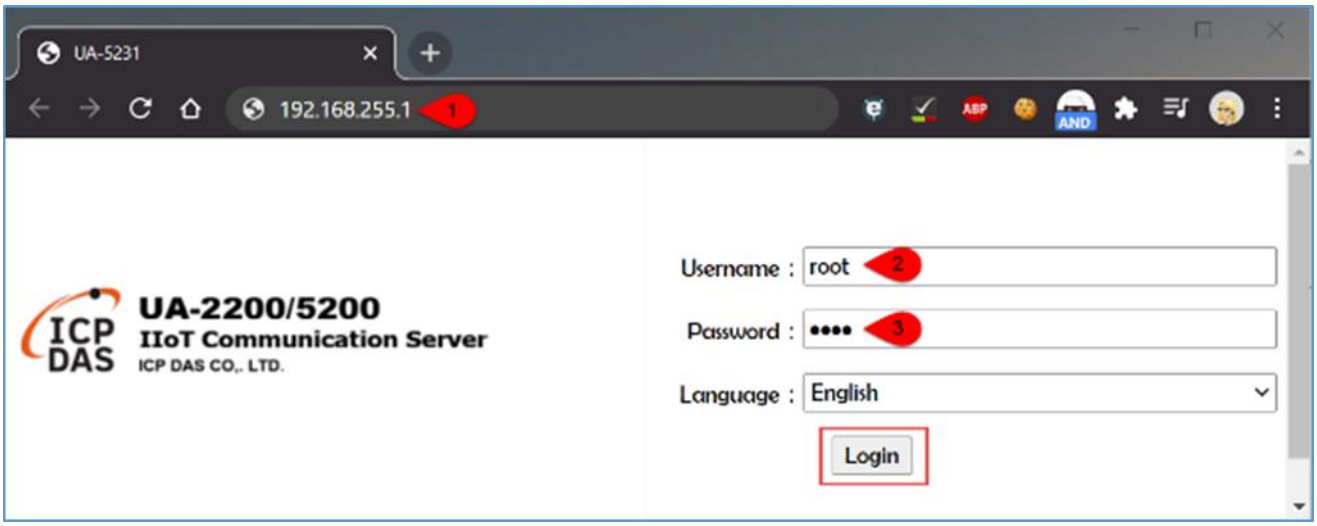




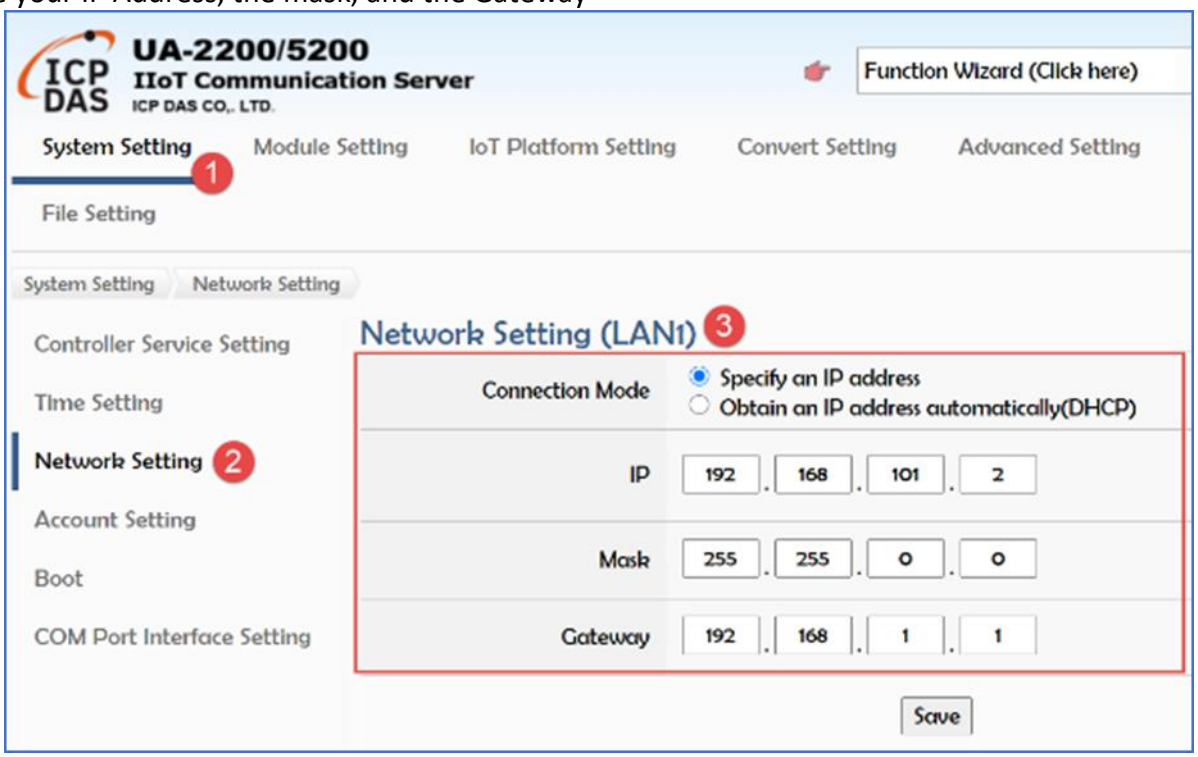
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2. How to set up UA products to save Modbus RTU data into SQL?

1. Key in following address in the URL bar: http://192.168.255.1
2. When the Web UI show up, key in default Username: root
3. Key in default Password: root



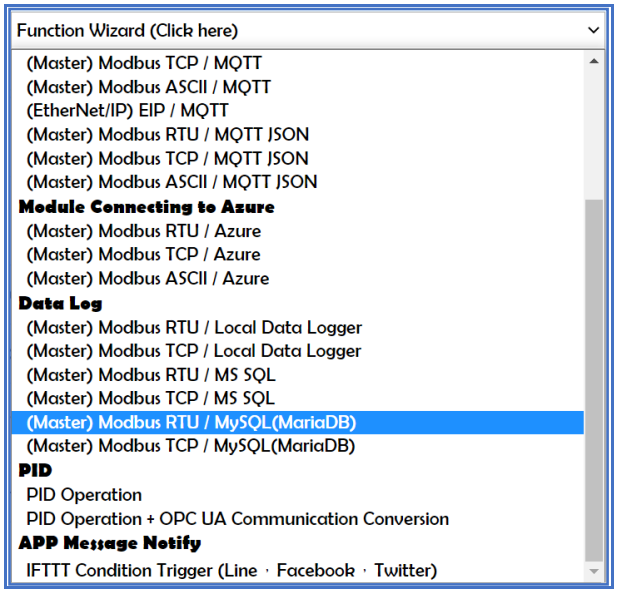
After successful Login, go to【System Setting】=>【Network Setting】=>【Network Setting (LAN1)】to change your IP Address, the mask, and the Gateway



Then click "Save".

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After reload the Web UI page, find "Data Log" and choose **"(Master) Modbus RTU / My SQL(MariaDB)"** from the drop-down menu on the upper-right corner.

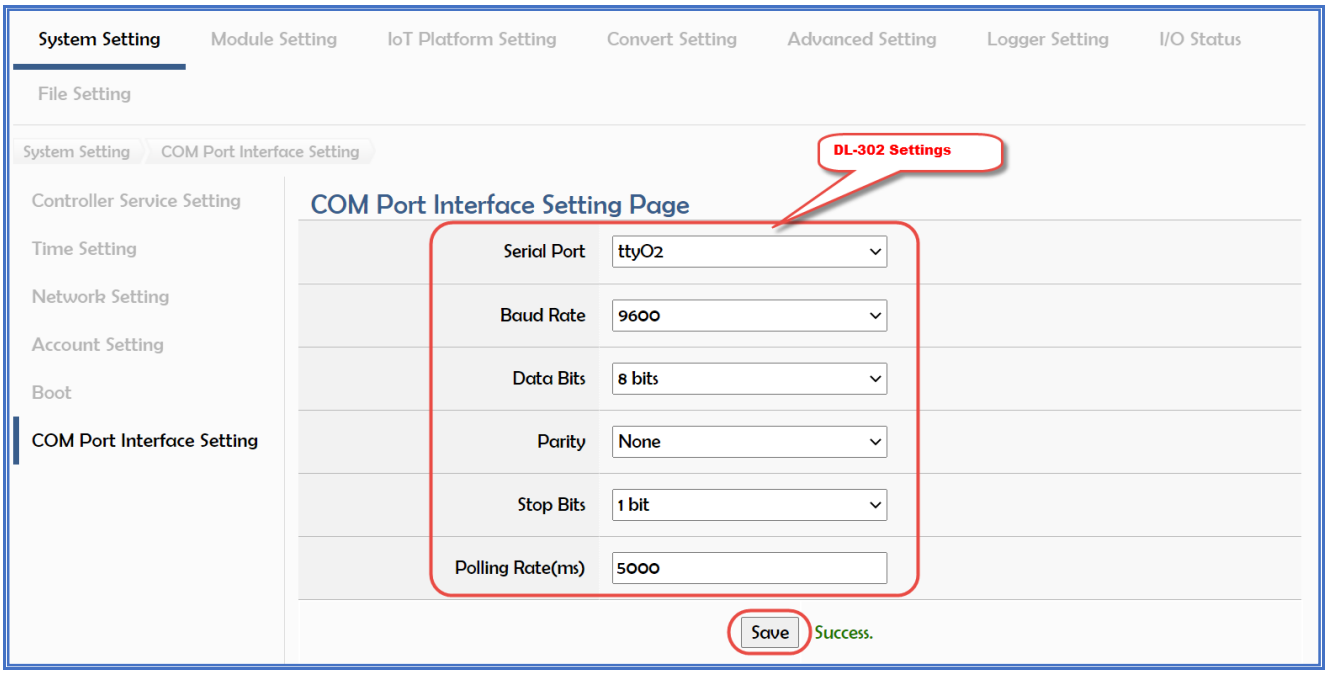


Follow the Wizard step-by-step to finish the Project.



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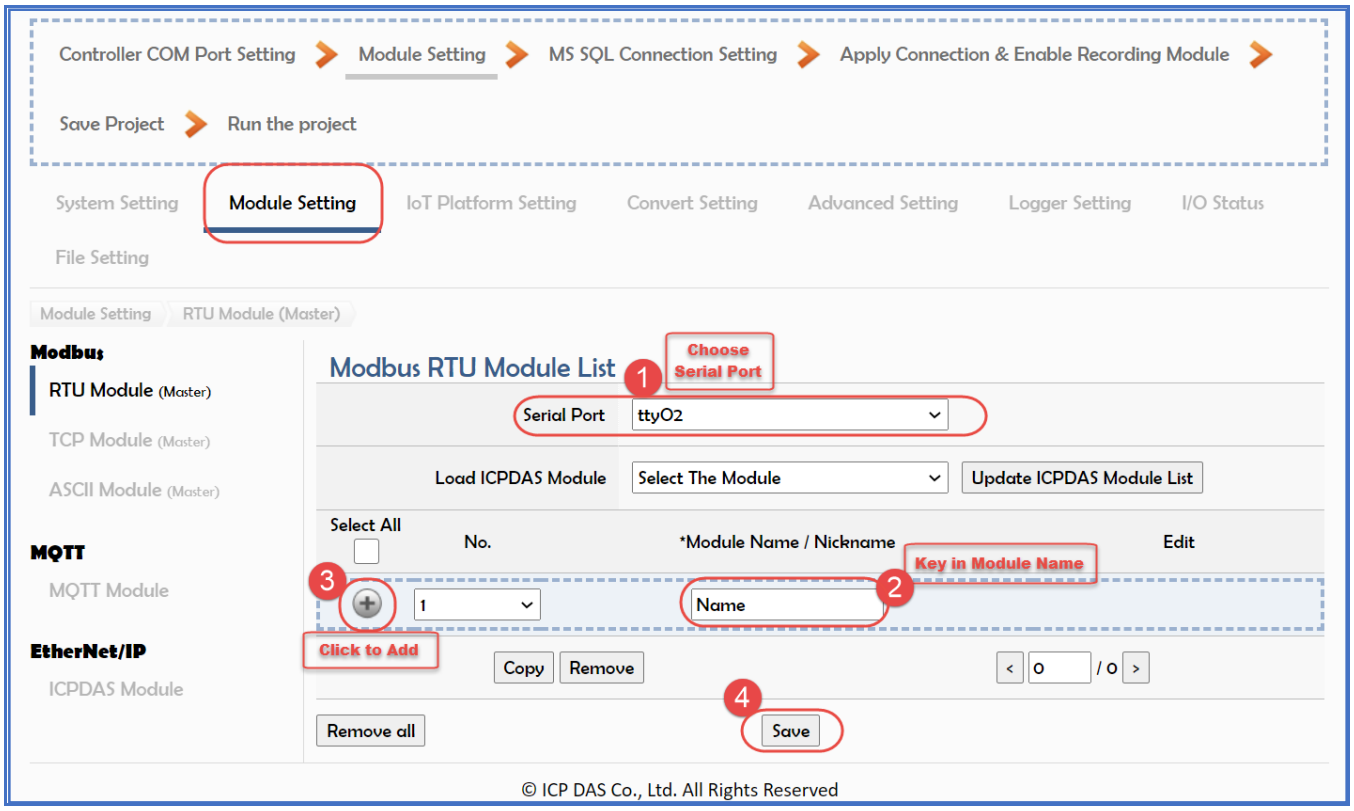
2.1. Step 1: COM Port Setting (Take DL-302 as an example)

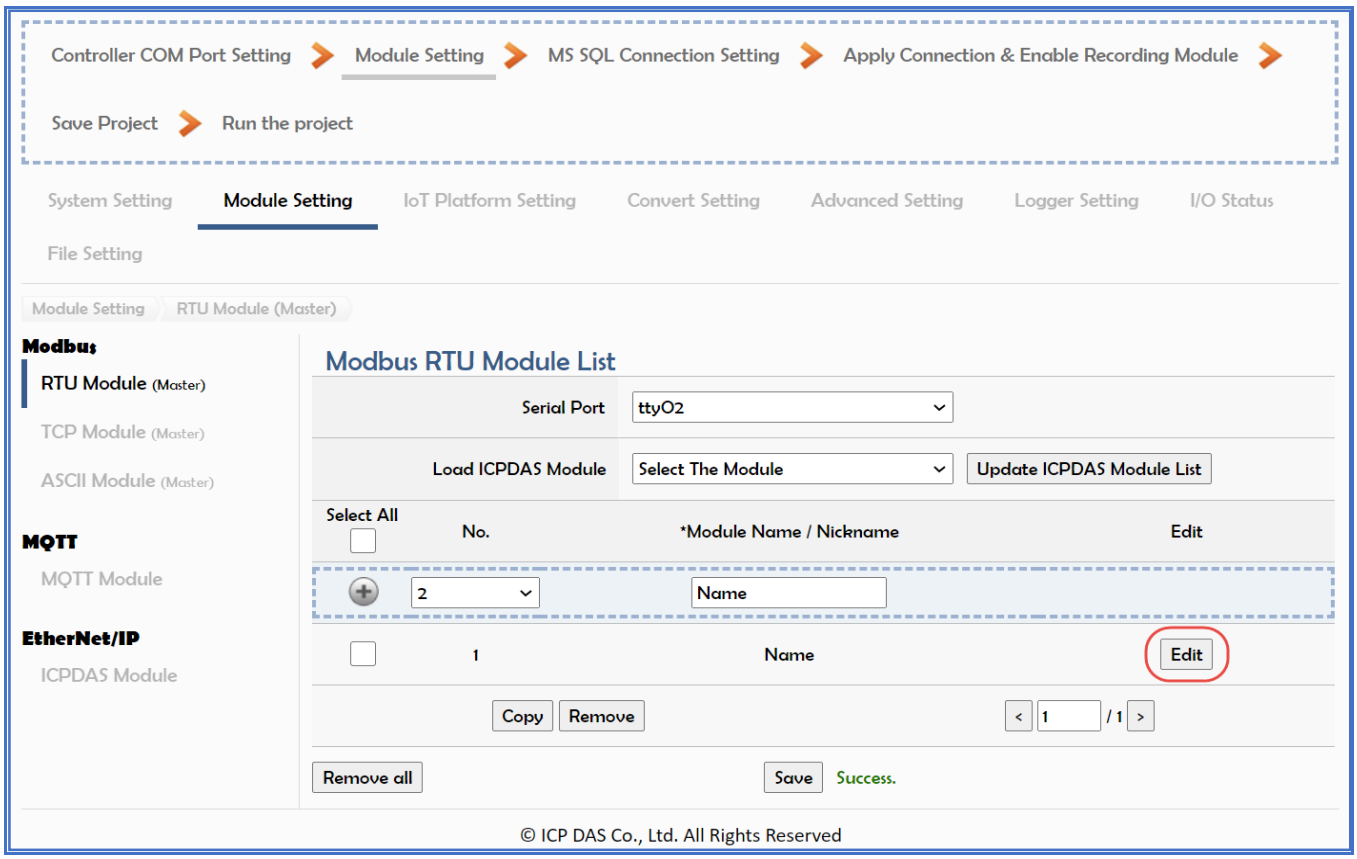


Address: Sets the address for a module.
Default: 1 Range: 0 ~ 255
Protocol: Sets the communication protocol.
- ModbusRTU (default) - DCON - DCONChkSum: uses DCON protocol and enables checksum validation feature
Baud Rate
Default: 9600 Support Baud Rate: 1200/ 2400/ 4800/ 9600/ 19200/ 38400/ 57600/ 115200 (unit: bps)
Parity
Default: N,8,1 Support format: N81, N82, E81, O81
Response Delay (ms): Sets the delay time between receiving the command and sending the data.
Default: 0 ms Range: 0 ~ 30 (unit: ms)
Save: Saves the modification and returns to the Settings menu. All the changes take effect immediately after saving changes.
Skip: Returns to the Settings menu without saving any changes.

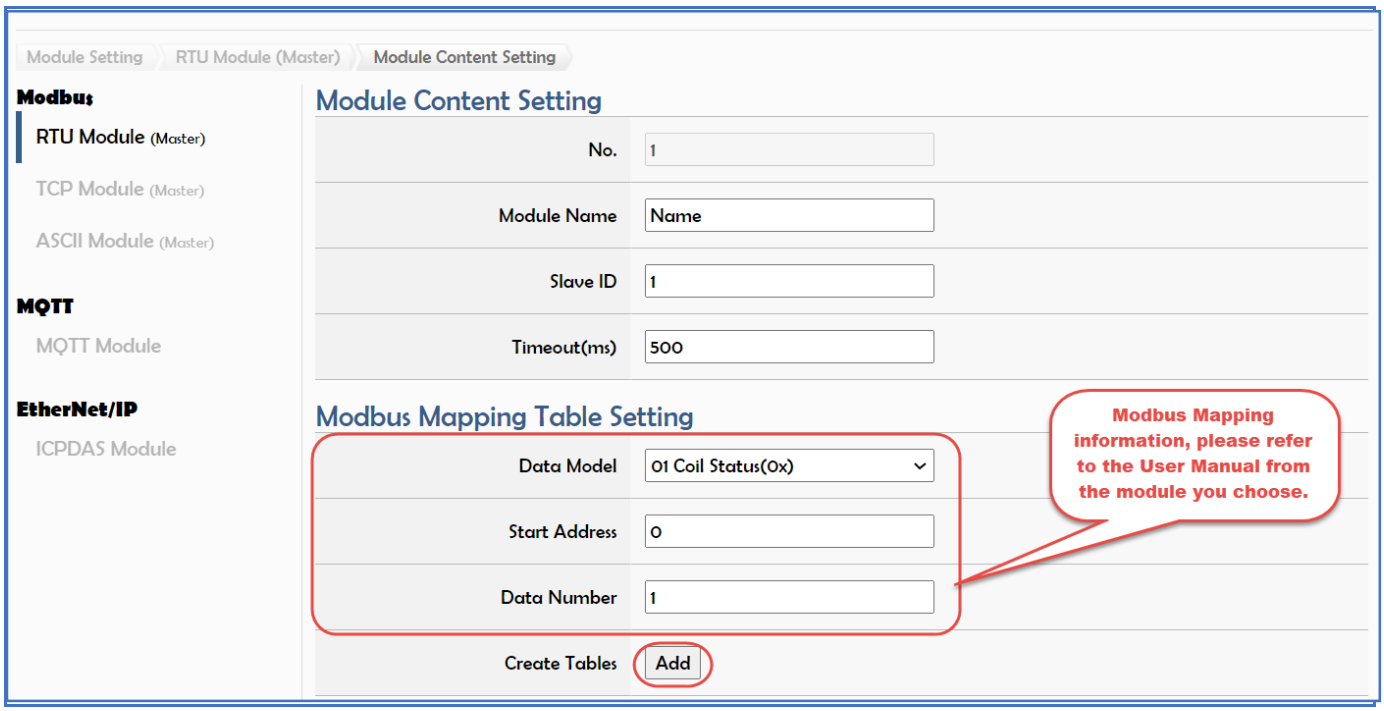
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2.2. Step 2: Module Setting





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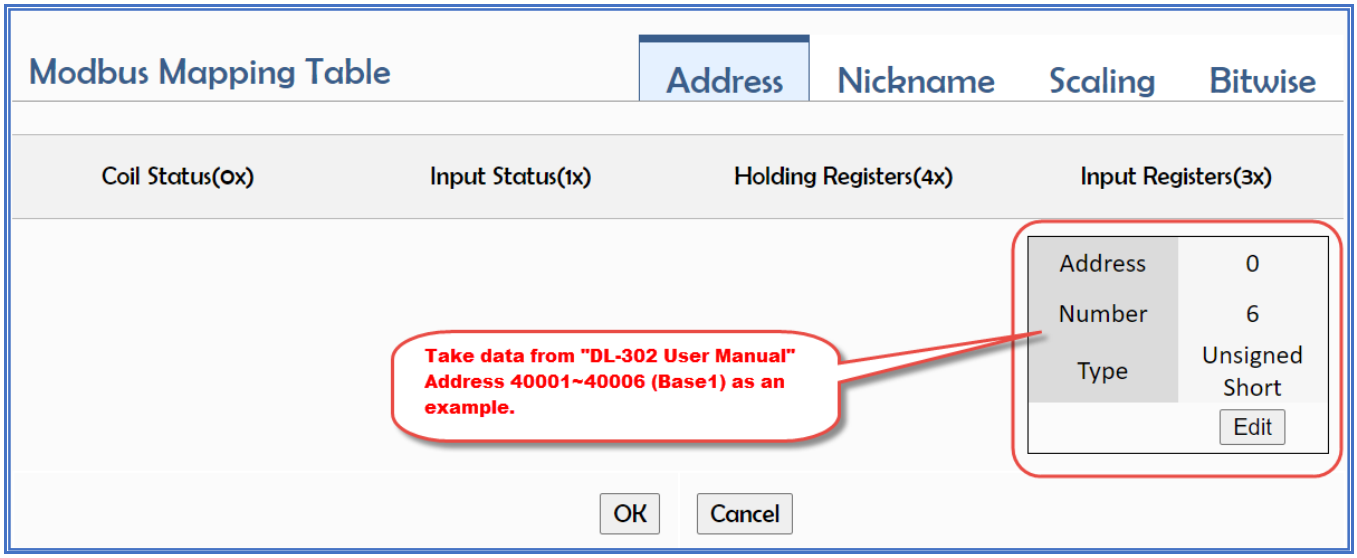
Module Content Setting	
No.	The module number in the module list (Not editable here)
Module Name	Give a name, e.g. model number or name. Default: Name.
Slave ID	Set the module Slave ID of the UA. (Range: 1 ~ 247)
Timeout	Set the timeout value for the module. Default: 500 ms
Modbus Mapping Table Setting	
Data Model	System provides 4 Modbus data models "01" ~ "04" for mapping to address of DO, DI, AO and AI. (ex. 01: DO channels, 02: DI, 03: AO, 04: AI) 01 Coil Status(0x) 02 Input Status(1x) 03 Holding Registers(4x) 04 Input Registers(3x)
Start Address	The start address of the Modbus command. **Note:** the Start Address of UA is bass on 0, even if some modules are bass on 1, here it needs to follow UA to set bass on 0.
Data Number	The number of the Modbus address. Need to give enough number for the DO, DI, AO, AI channels of the module. Default: 1.
Type	This item only when the data model is 03 or 04. Choose the suitable data type: 16-bit Short, 16-bit Unsigned Short, 32-bit Long, 32-bit Unsigned Long, 32-bit Float, 64-bit Double.
Create Tables	Click [Add] button, it will add a table in the Modbus mapping table.

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DL-302 Modbus Address Mappings (Base 1)

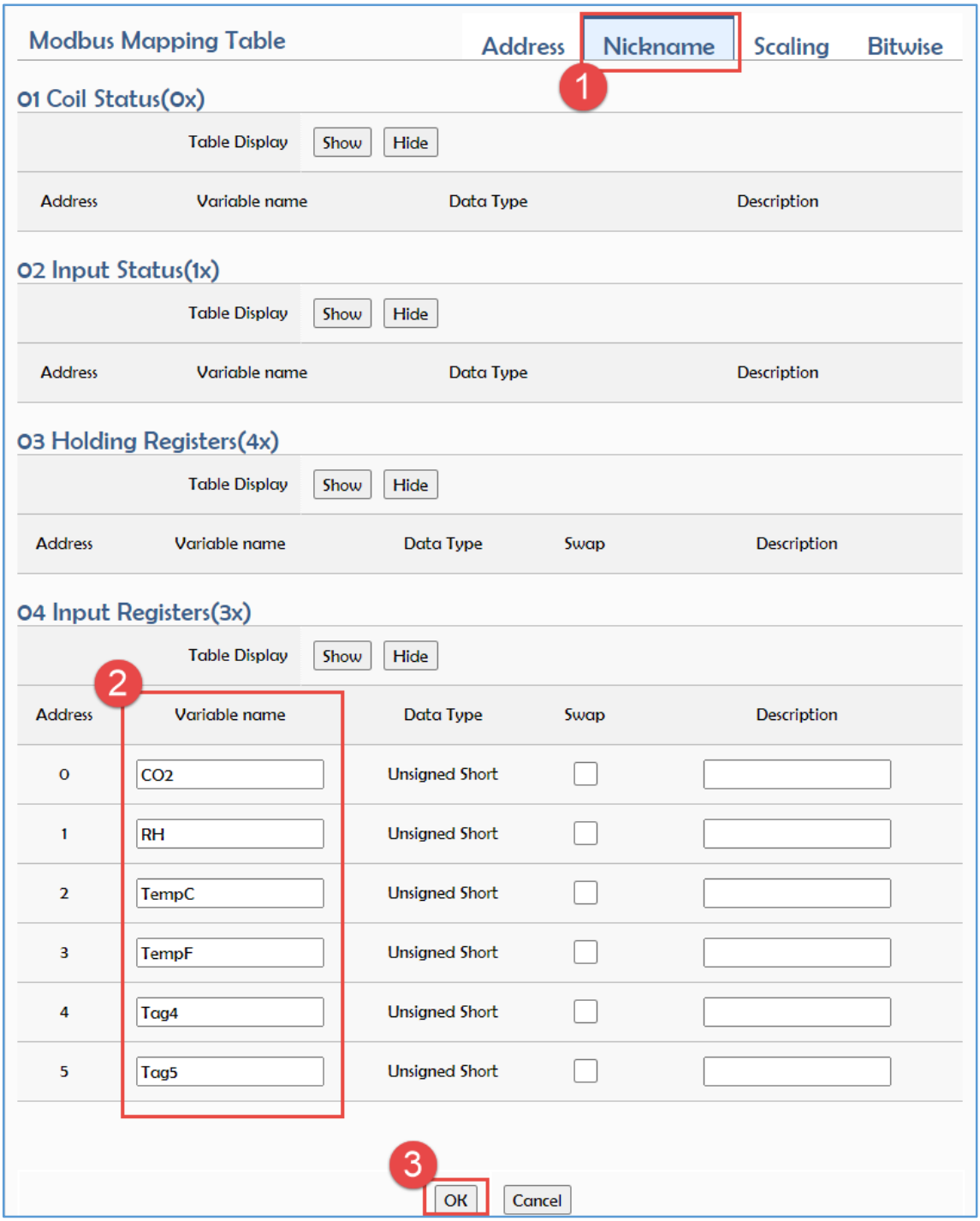
Address	Description	Attribute
30001 ~ 30006 40001 ~ 40006	Analog input value of channel 0 to 5. channel 0: CO_2 in 1ppm, channel 1: relative humidity in 0.01%, channel 2: temperature in 0.01°C, channel 3:temperature in 0.01°F, channel 4: dew point temperature in 0.01°C, channel 5: dew point temperature in 0.01°F	R

Modbus Mapping Table Setting: Modbus Mapping Table Display and Edit.



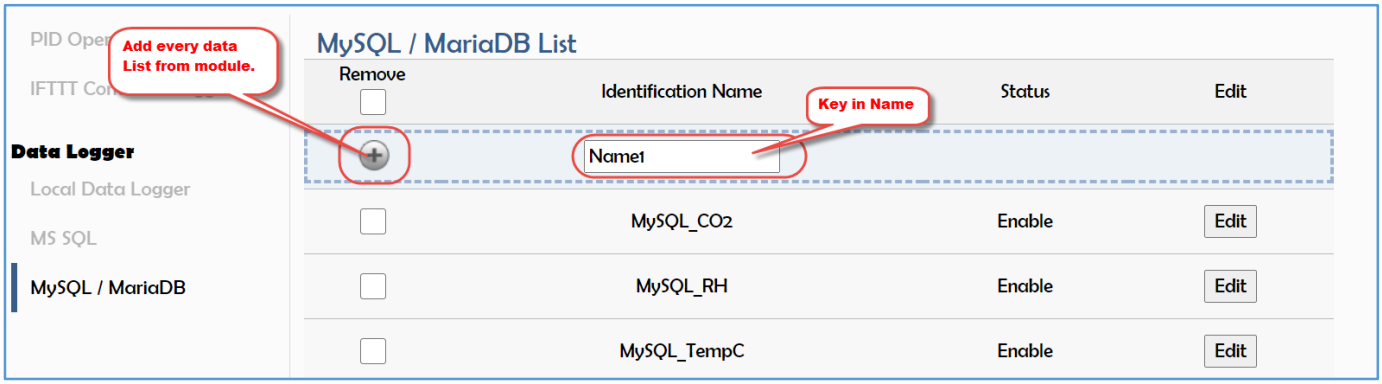
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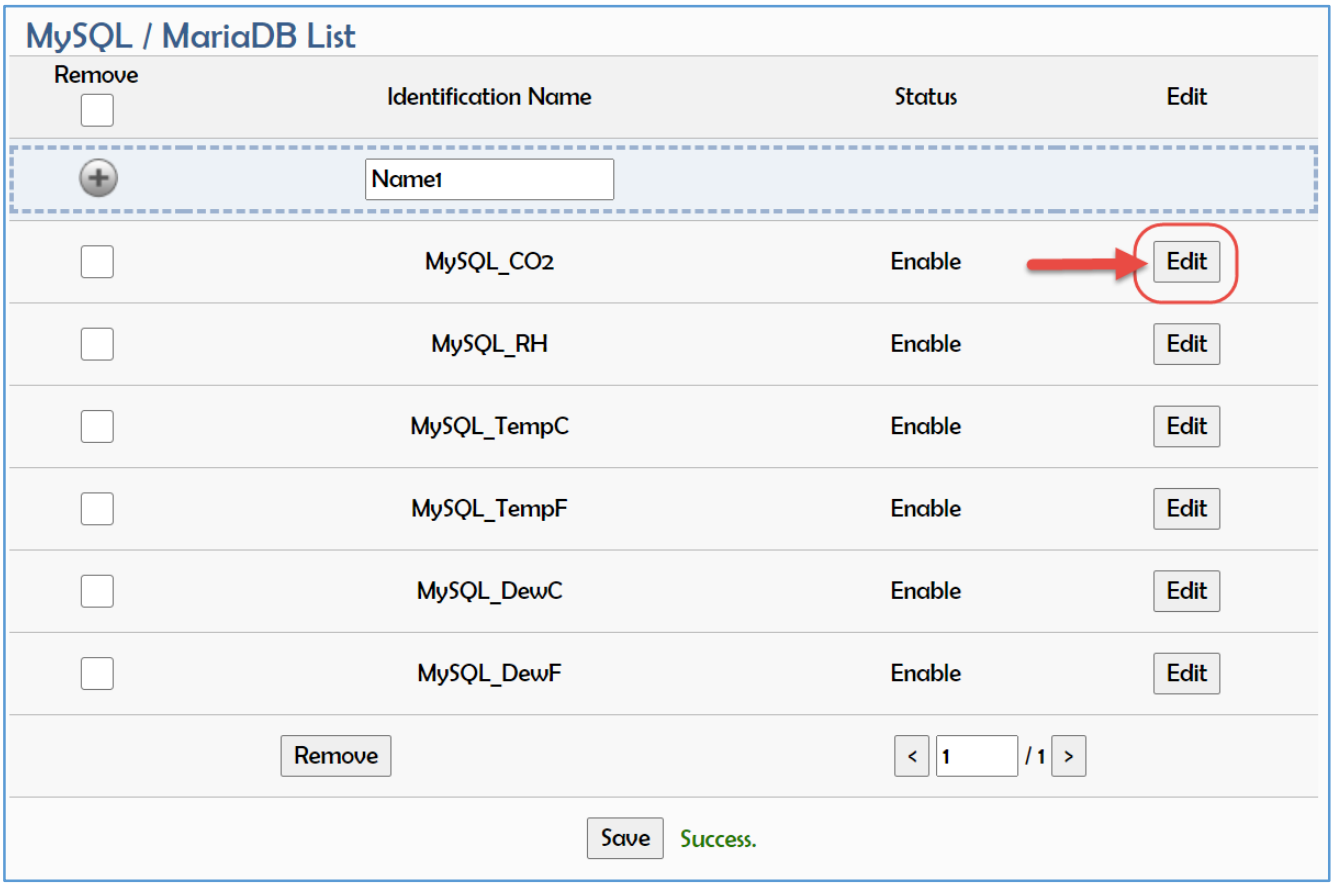
Nickname: To set the variable name and the description, please click the “Nickname” to add the information.



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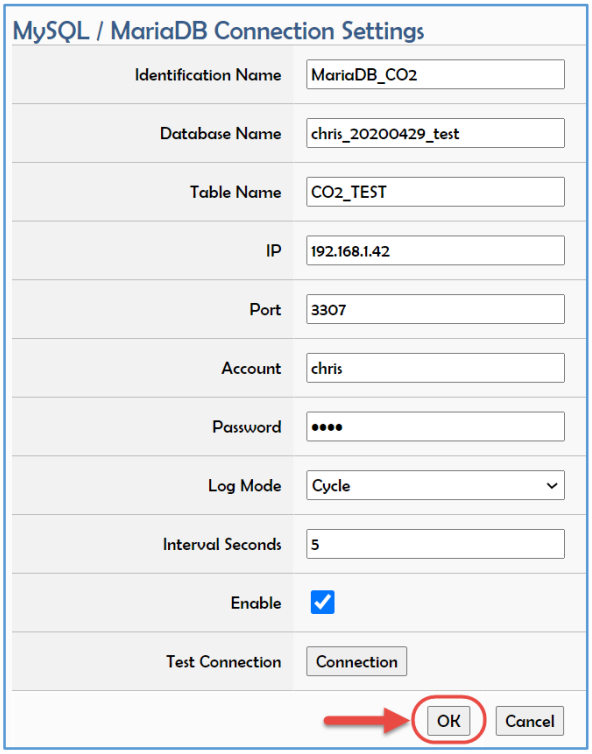
2.3. Step 3: MySQL /MariaDB Connection Setting





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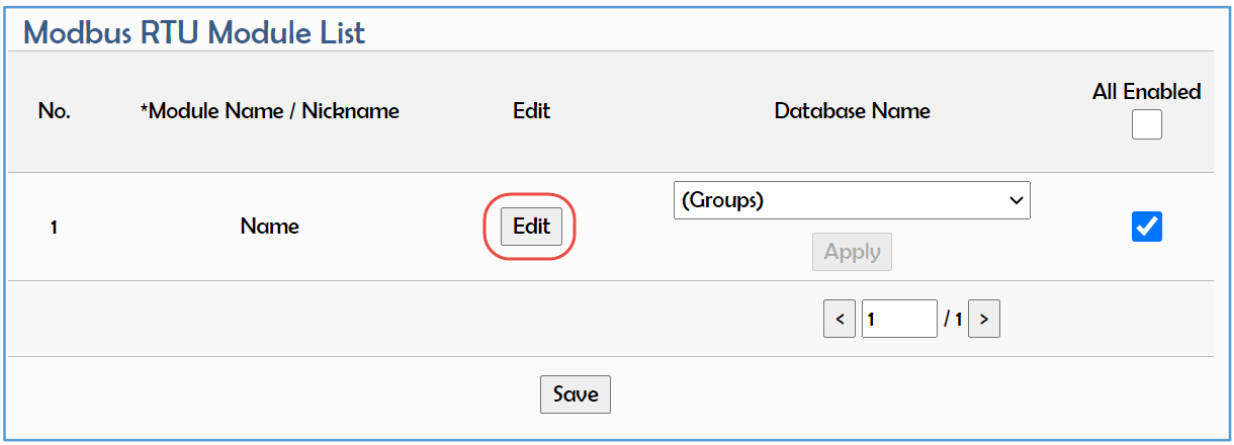
Key in all information that needs to write into Database and set the MySQL content.

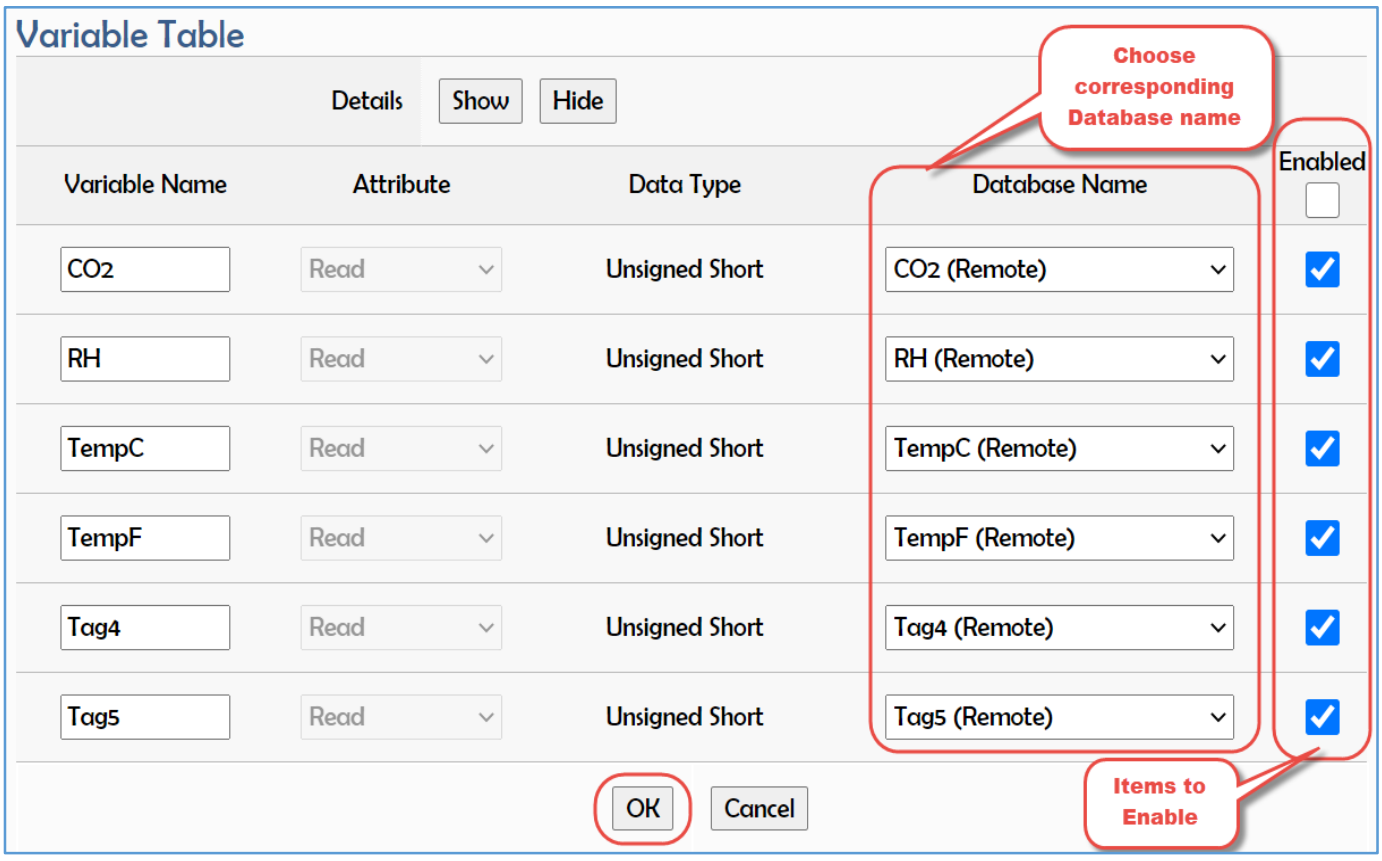


Advanced Setting > Data Logger > MySQL/MariaDB – Content Setting	
Identification Name	User defined name to identify the database.
Database Name	The name of the remote database. If the DB name not exist, it will create one DB.
Table Name	The IP address of the remote database. If the table name not exist, it will create one table.
IP	The Server IP and name of the remote database.
Port	The port to link with database. Default: 3306 (for MySQL), user defined.
Account	The login name of the remote database.
Password	The login password of the remote database.
Interval Seconds	Set up the interval time to save the I/O data to the remote database. Unit: Second.
Enable	Check to enable the data logger to the remote database. Default: check.
Test Connection	Click to test the connection to the remote database. Result: Success or Failure.
OK / Cancel	Click “OK” to save the settings of this page. Click “Cancel” to exit the setting page without saving.

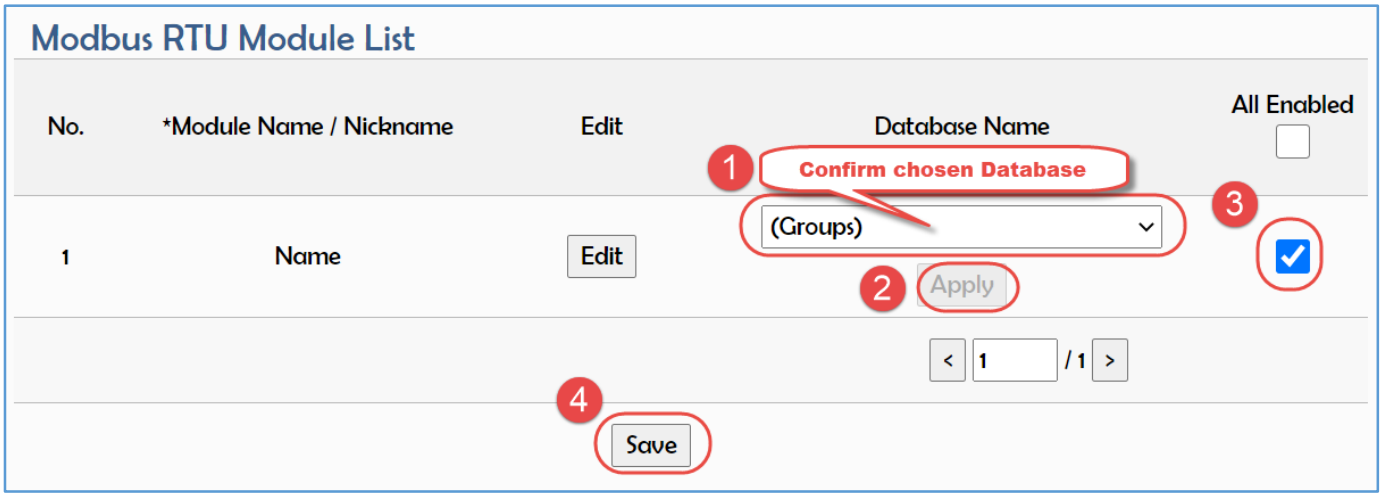
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2.4. Step 4: Apply Connection & Enable Recording Module



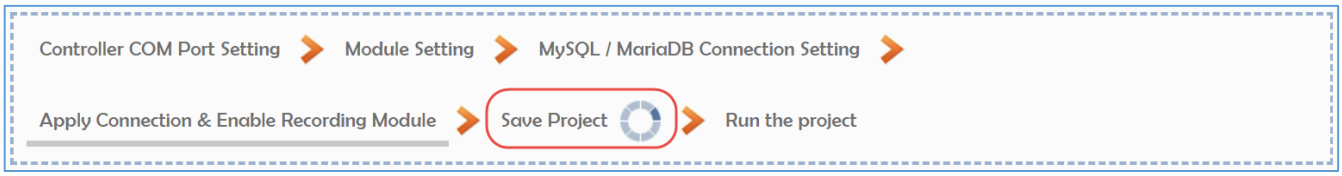


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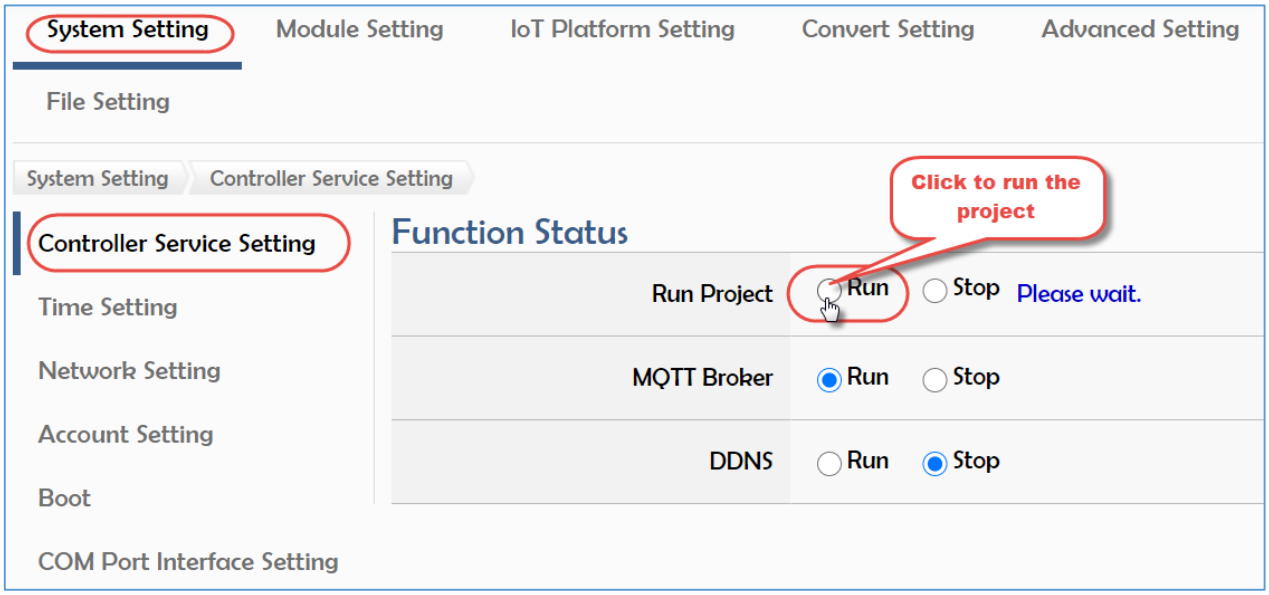


2.5. Step 5~6: Save/ Run the Project

Click the next step [Save Project], the Step Box will show an animation as below picture that means the project is saving. When the animation vanished, the project saved completely.

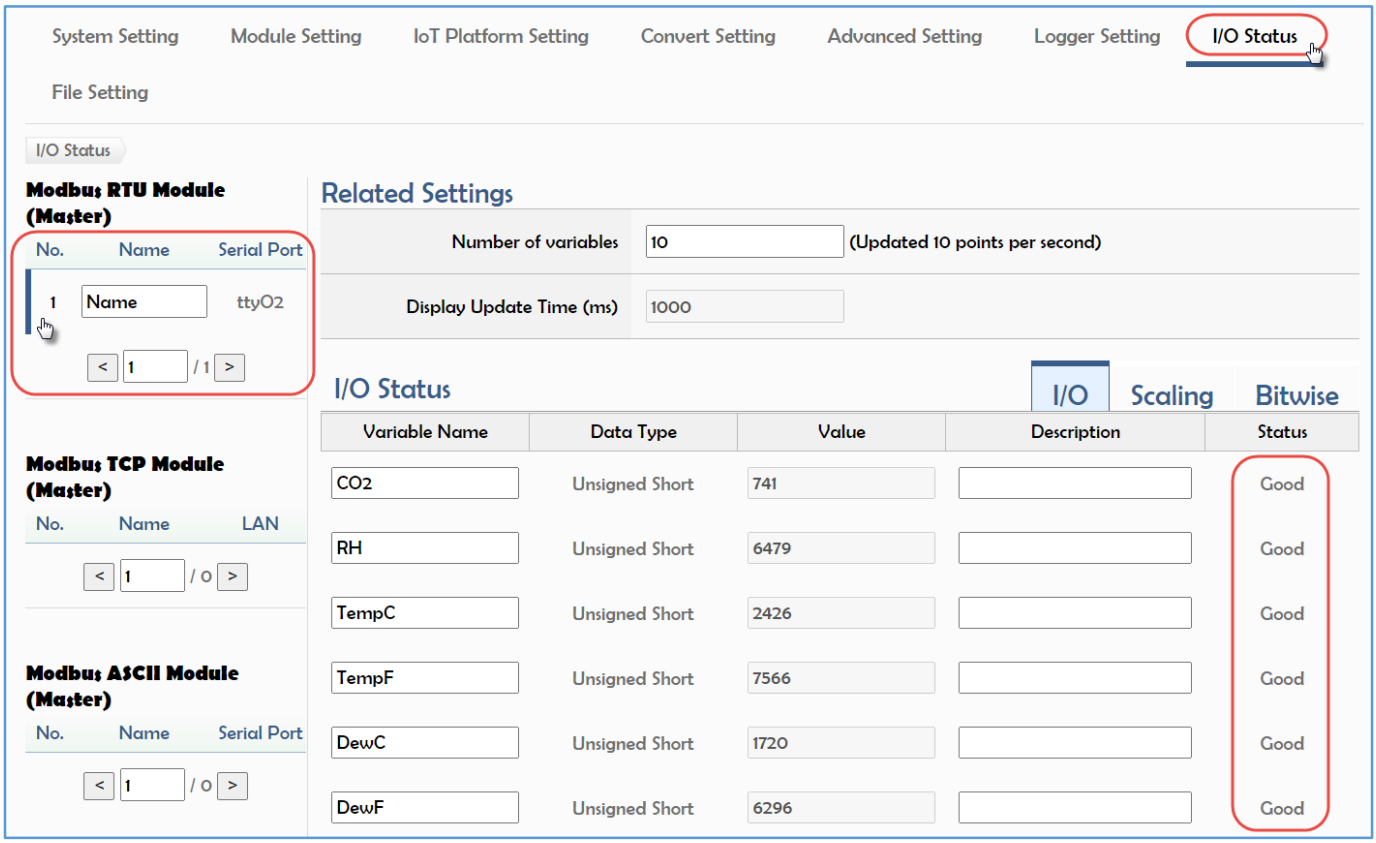


After saving, the project needs to execute. Click the next step [Run the Project].
This step can also via the [System Setting > Controller Service Setting > Run Project] to Stop and Run the project.



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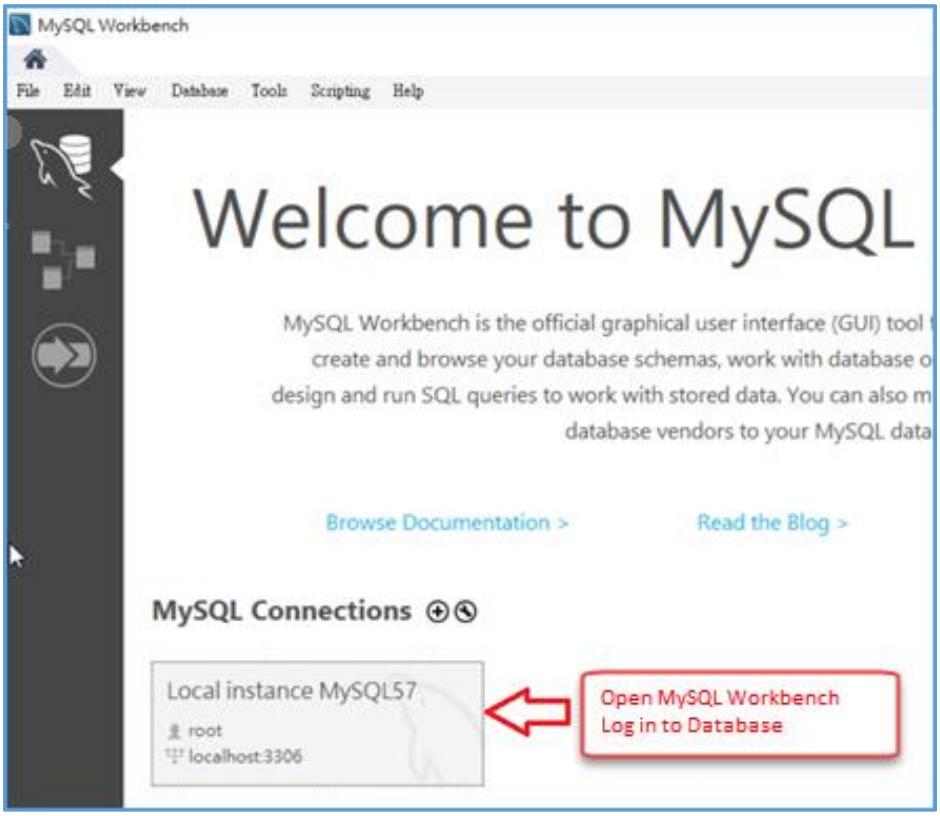
To check the I/O Status, click the "I/O status" and choose from the left-hand list. Confirm the connection value and status.

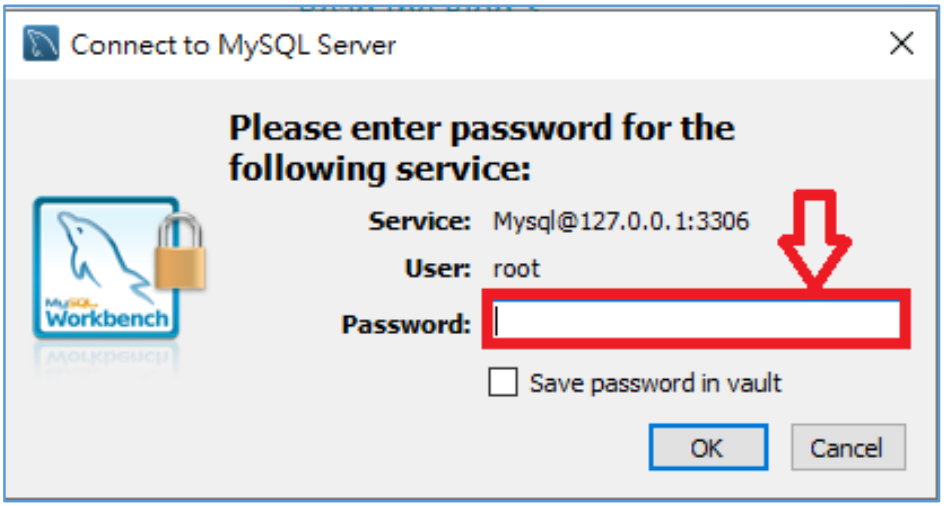


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3. After transferring UA data into MySQL, how to combine Date and Time column in the MySQL Server?

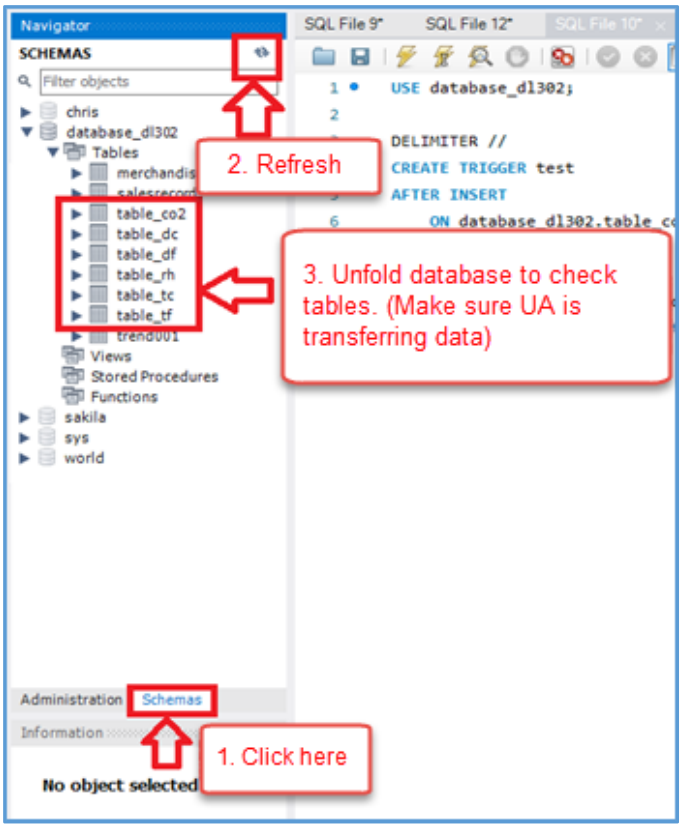
1. Open MySQL Workbench and log in to Database.

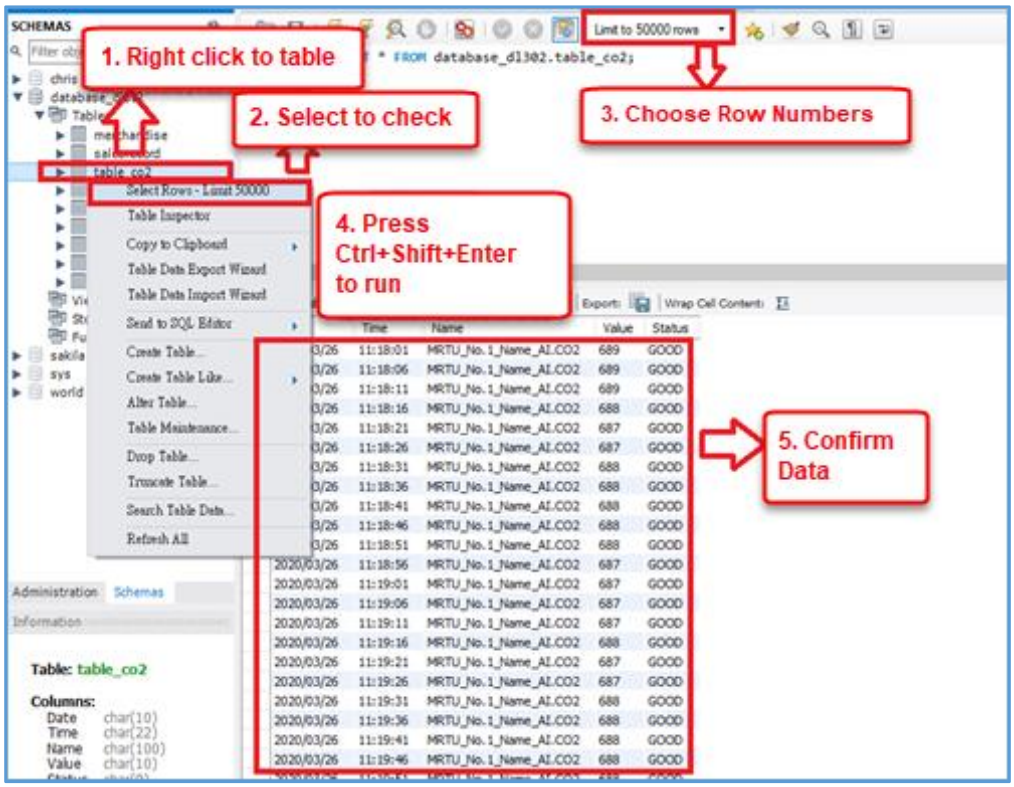




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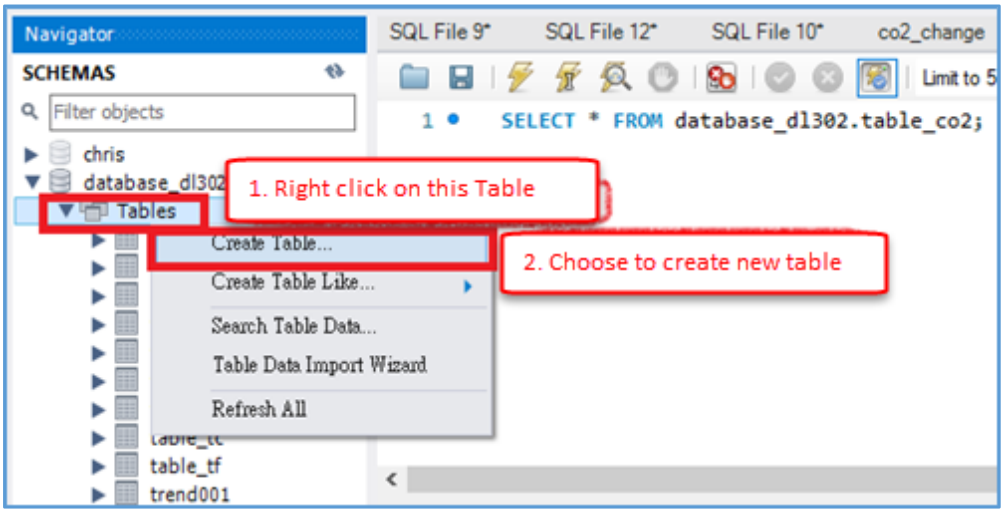
2. After log into Database, confirm if data from DL-302 is successfully show in the Schemas.

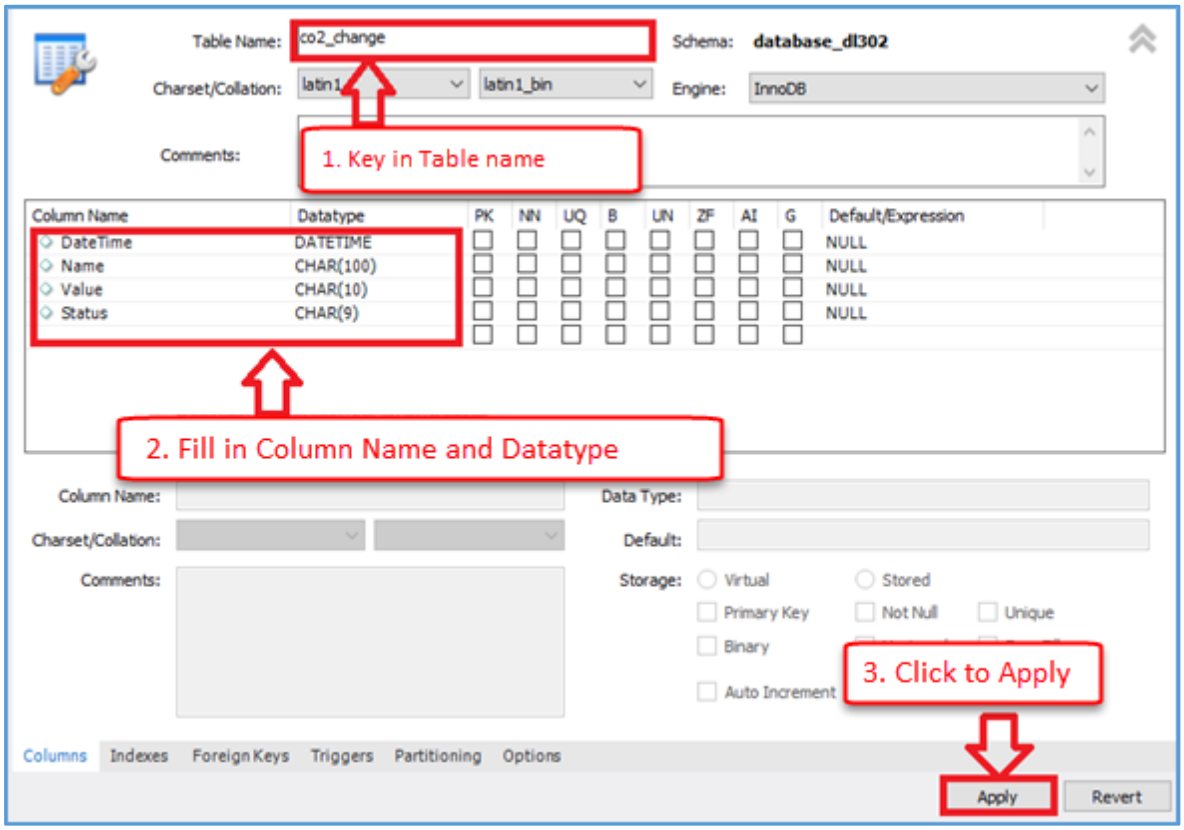




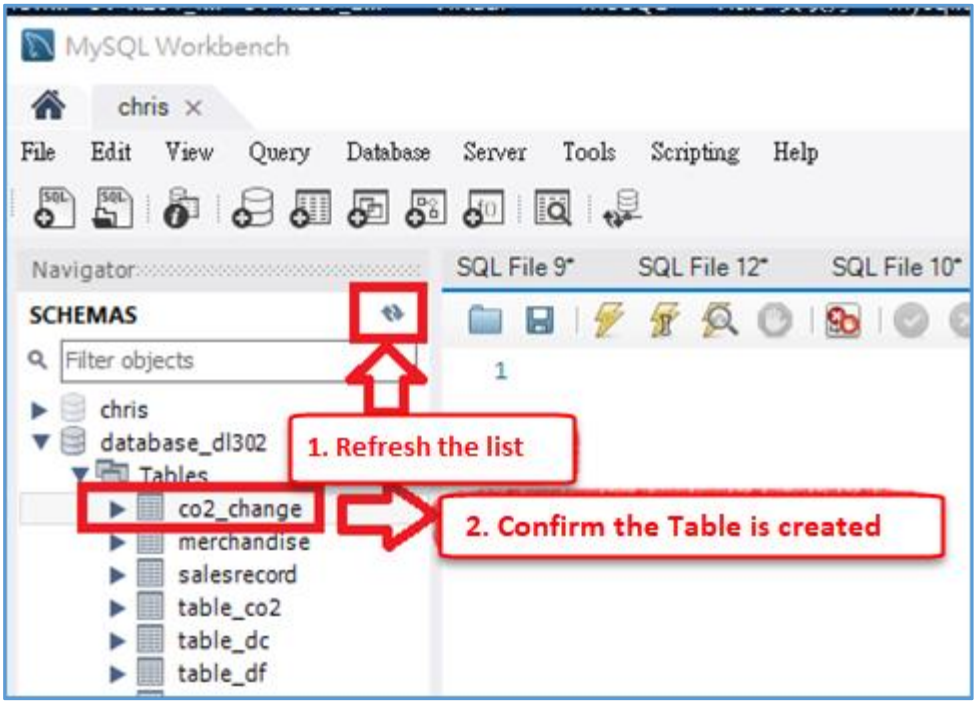
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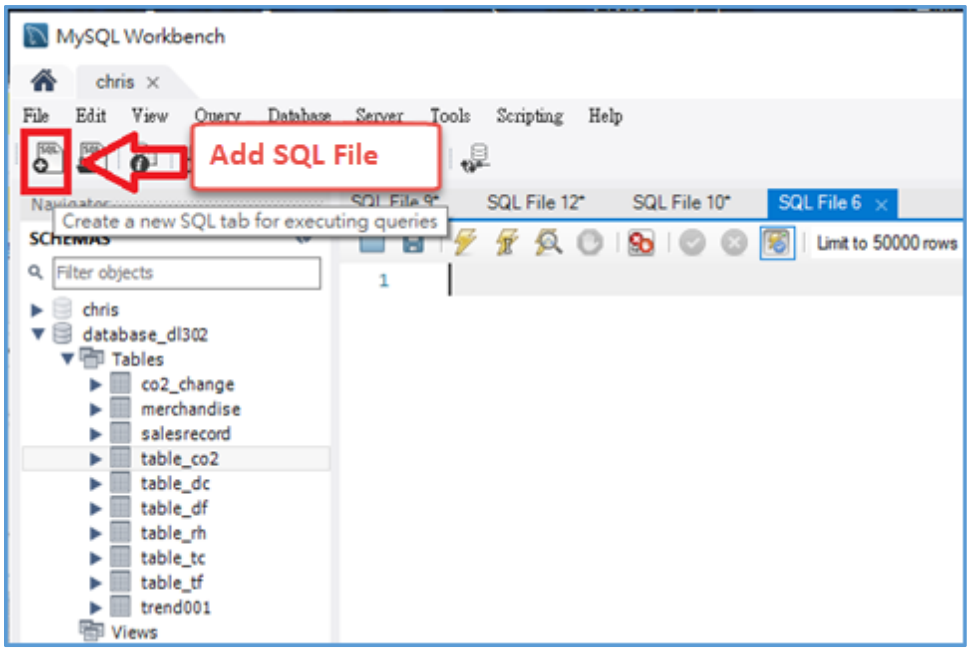
3. Right click to database table that UA transfer data; choose "Create Table" to add a new table. Later we will combine the column in this new Table.





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4. Copy & Paste following code into SQL File. Press Ctrl+Shift+Enter to run this code.

```
USE database_dl302;

DELIMITER //
CREATE TRIGGER test
AFTER INSERT
    ON database_dl302.table_co2
    FOR EACH ROW
    BEGIN
        INSERT INTO database_dl302.co2_change (DateTime , Name ,Value ,Status)
        VALUES (concat(new.Date,' ',new.Time) ,new.Name ,new.Value ,new.Status);
    END //
```

Descriptions (Adjustable regarding to different cases)

USE database_dl302; => Name of Database

CREATE TRIGGER test => Trigger name created

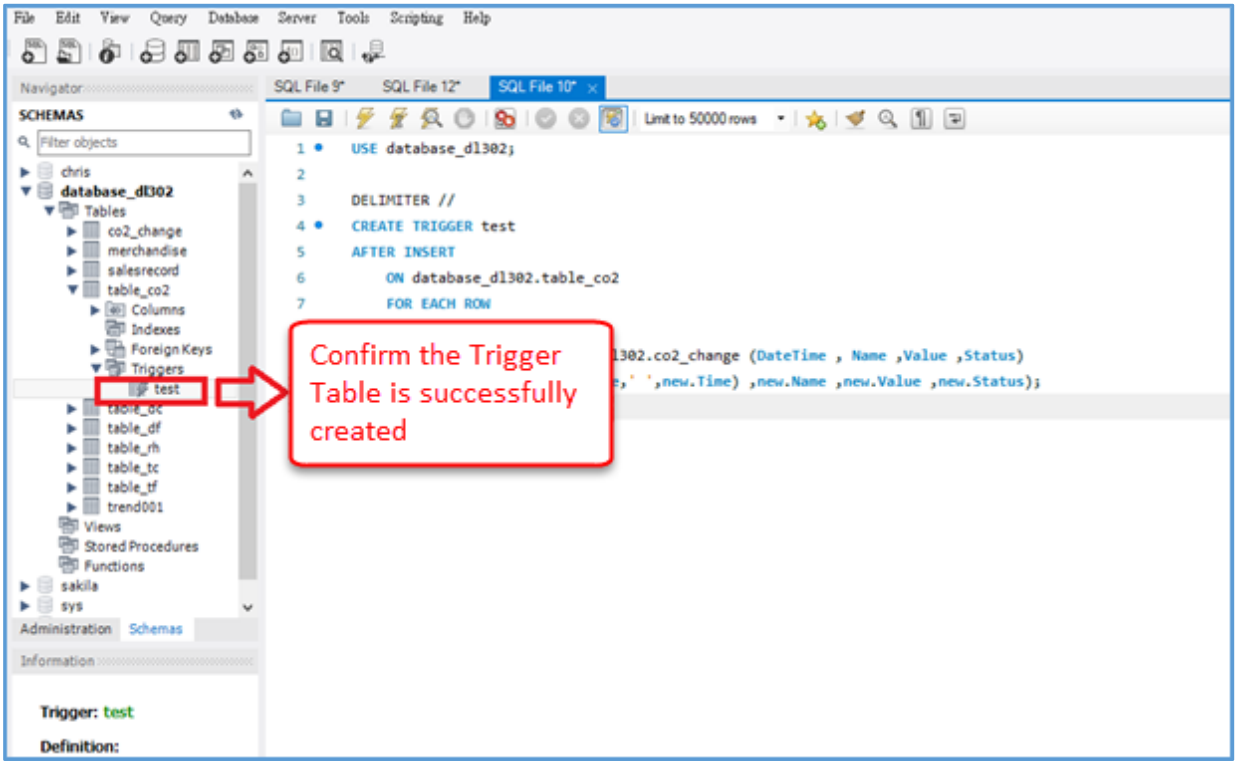
ON database_dl302.table_co2 => Table of trigger

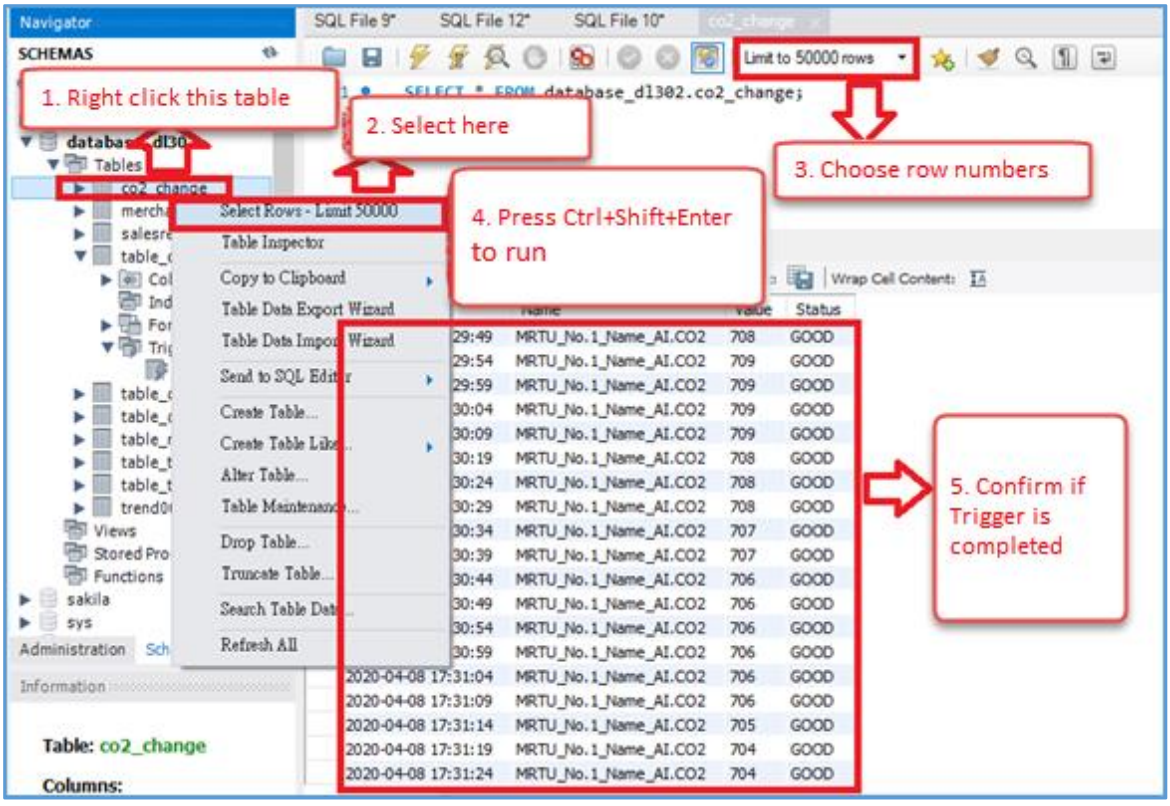
INSERT INTO database_dl302.co2_change (DateTime , Name ,Value ,Status) => datatable and column written into

VALUES (concat(new.Date,' ',new.Time) ,new.Name ,new.Value ,new.Status); While triggered, temporary table transfer data in

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5. Unfold Table to confirm the TRIGGER successfully created.





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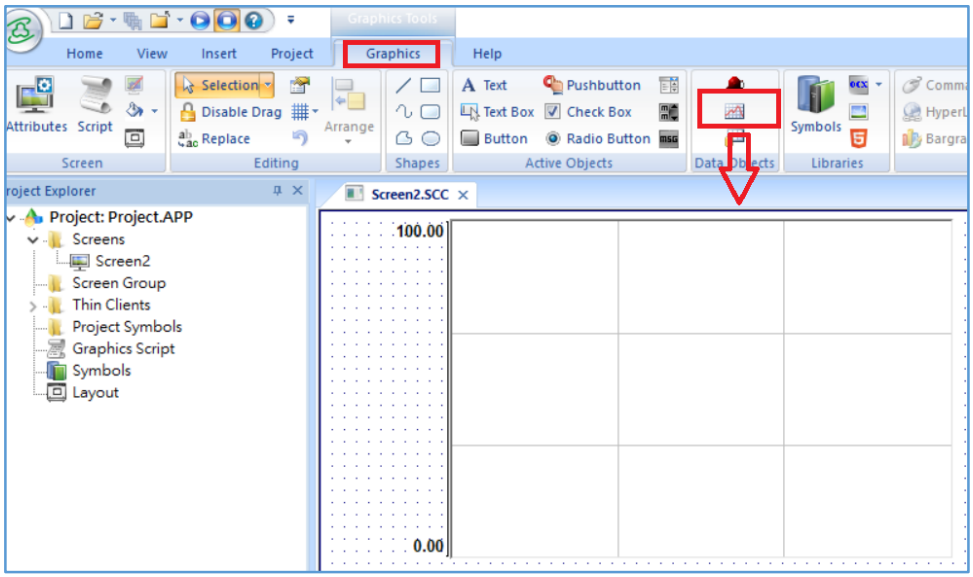
4. How InduSoft read data in SQL?

Before setting InduSoft to read SQL in this section, please make sure that the remote MySQL database access function of InduSoft (IWS) has configured. If it has not configured, please complete it first. You can refer to the appendix in the end of this FAQ to configure.

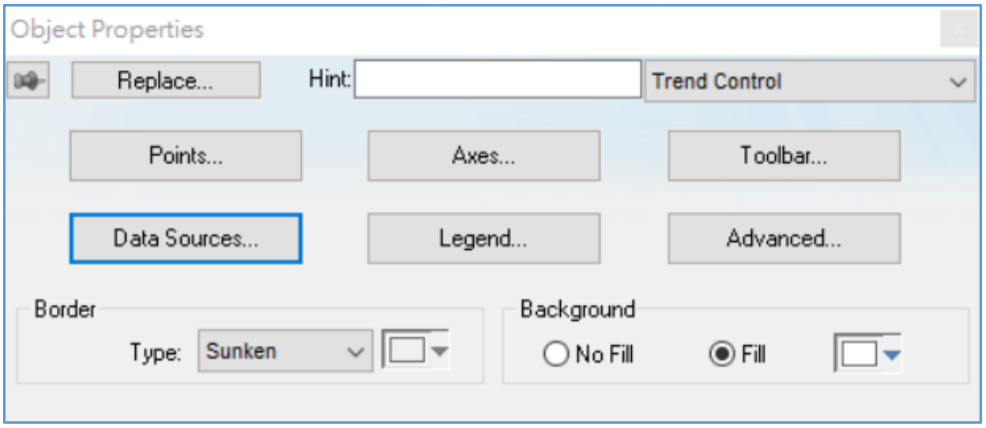
4.1 Appendix: How IWS access remote MySQL database through ODBC

Steps InduSoft to read SQL:

1. After completing the ODBC settings, enter InduSoft and click on the image of the trend graph in Graphics

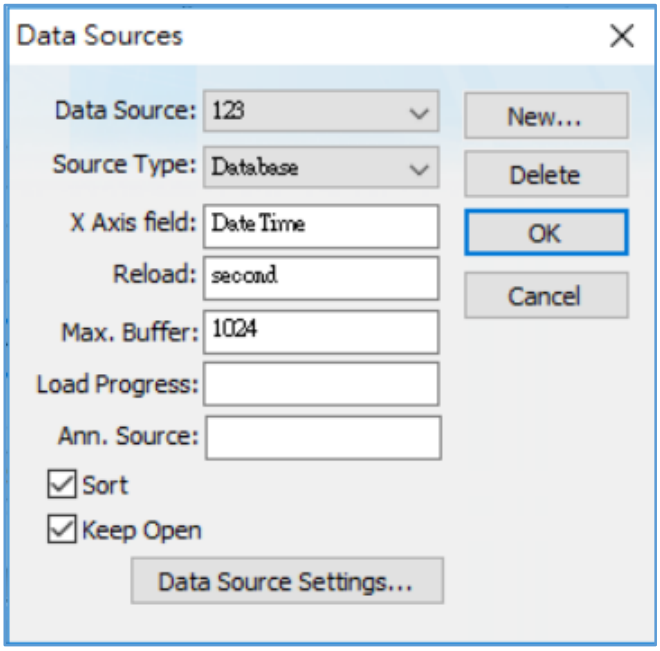


2. Double-click the trend chart to open the object properties window
3. Press [Data Sources], click [New], enter the name, and then press the [Create] button

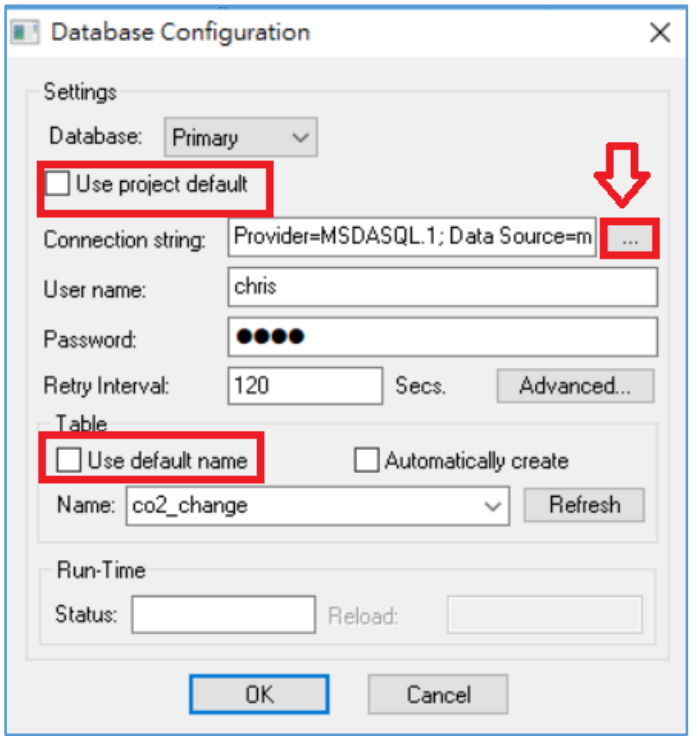


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4. Fill the name of the time record in SQL into the blank of X Axis field

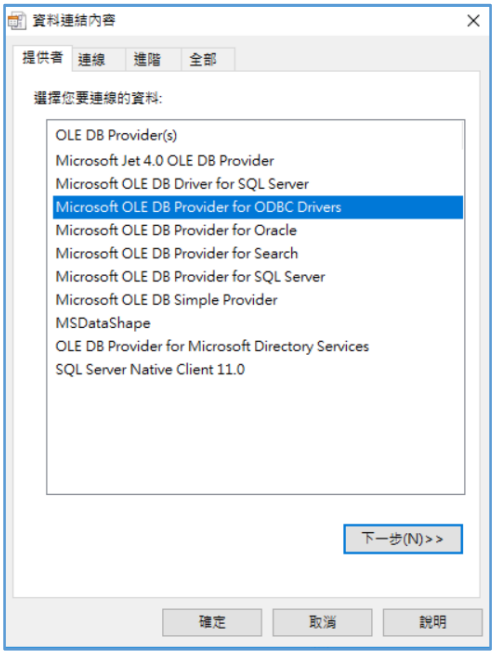


5. Click [Data Source Settings], cancel the checkbox of [Use project default] and [Use default name], and click the ... button

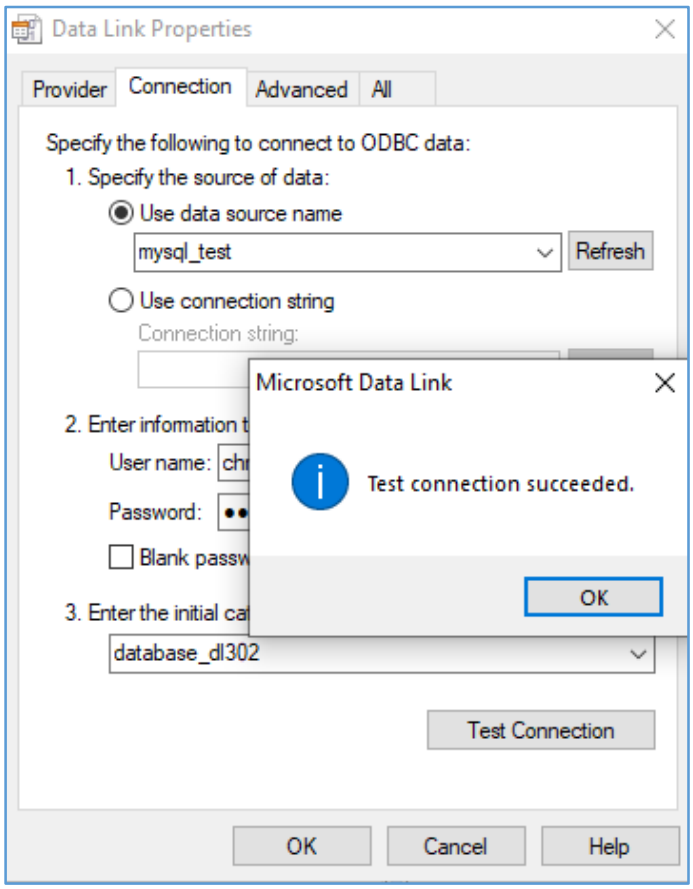


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6. After clicking [Microsoft OLE DB Provider for ODBC Drivers], click Next

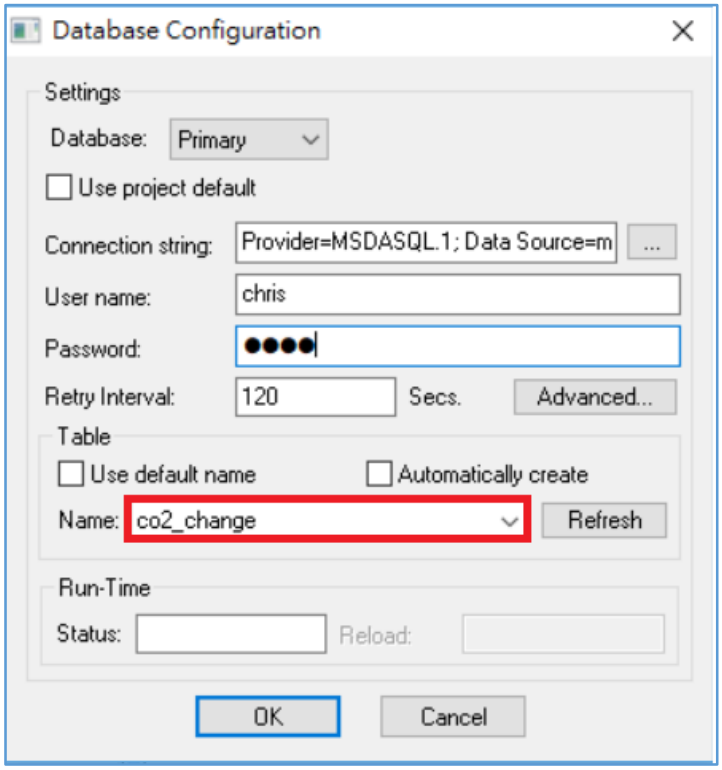


7. Fill in the content of [Connect], after the test connection is successful, click [OK]

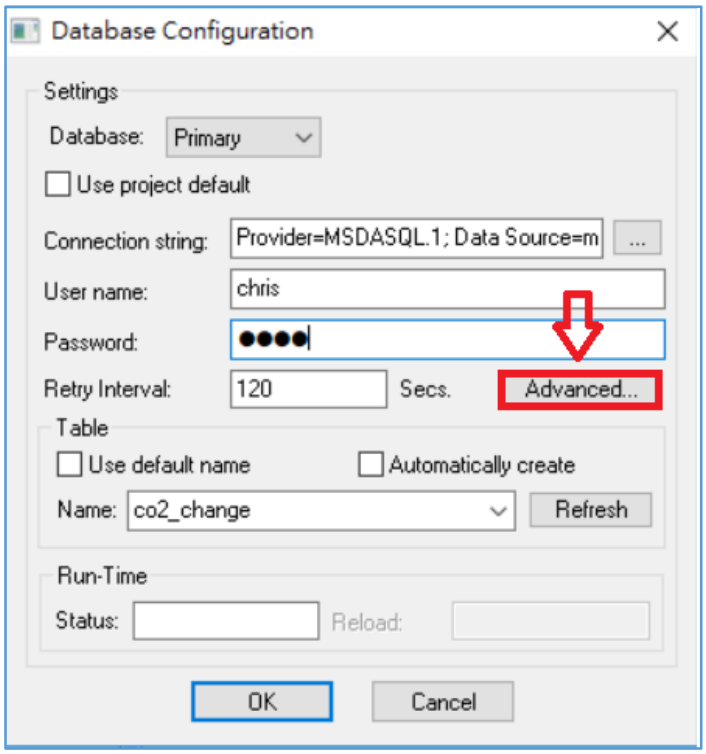


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8. After selecting the data table to be read, press [OK]

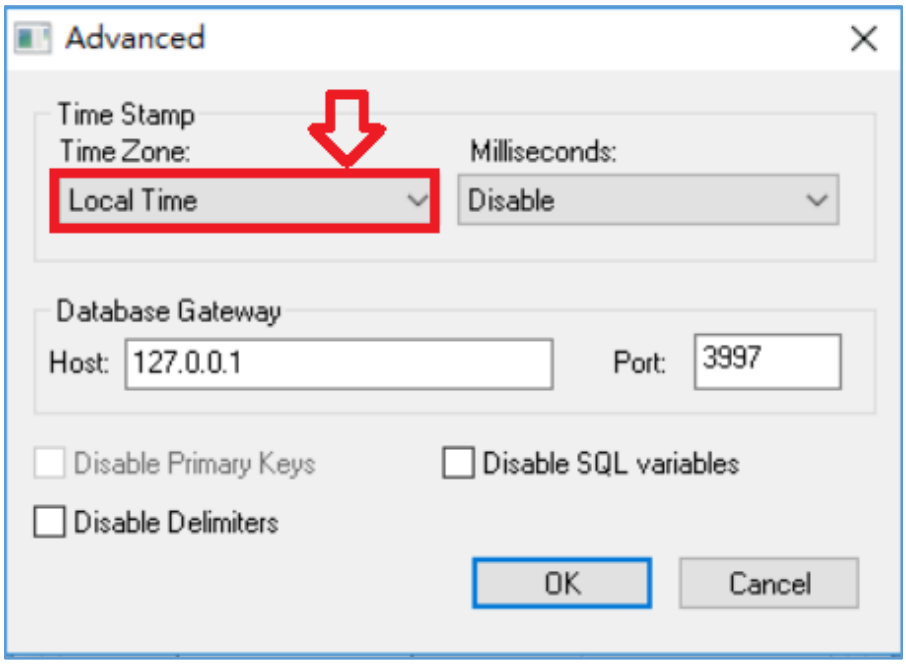


9. Click [Advanced]

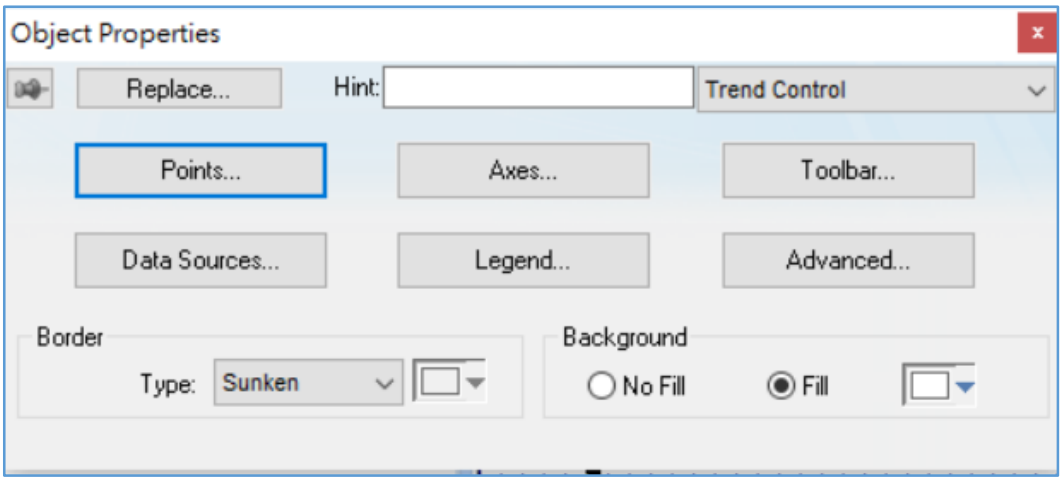


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10. Select [Time Zone] option as [Local Time] (choose according to personal situation)

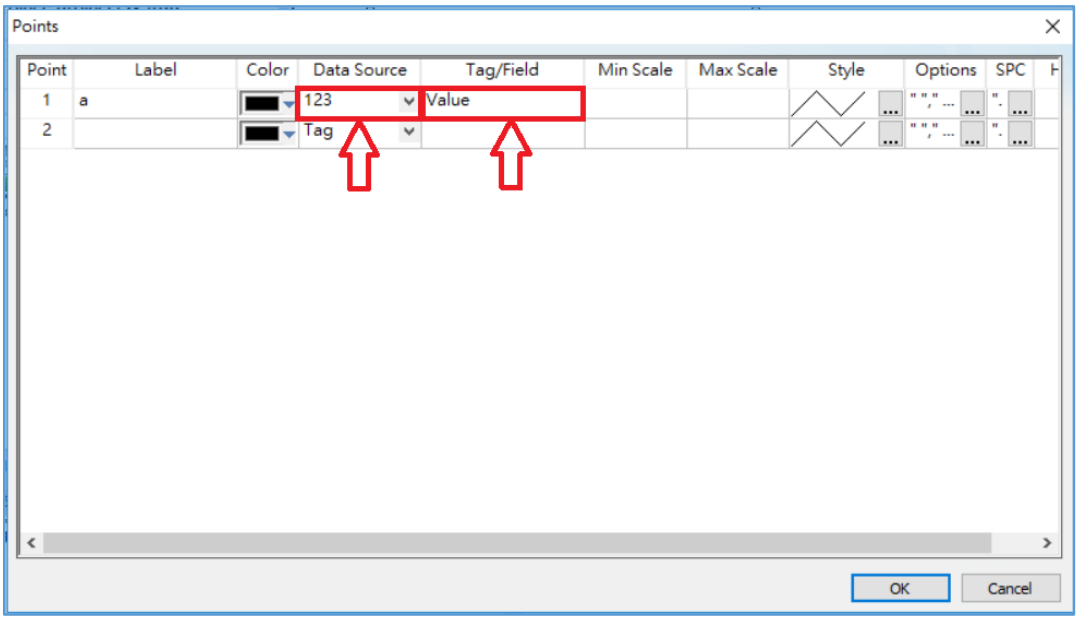


11. Double-click the trend chart to open the object properties window and click [Points]

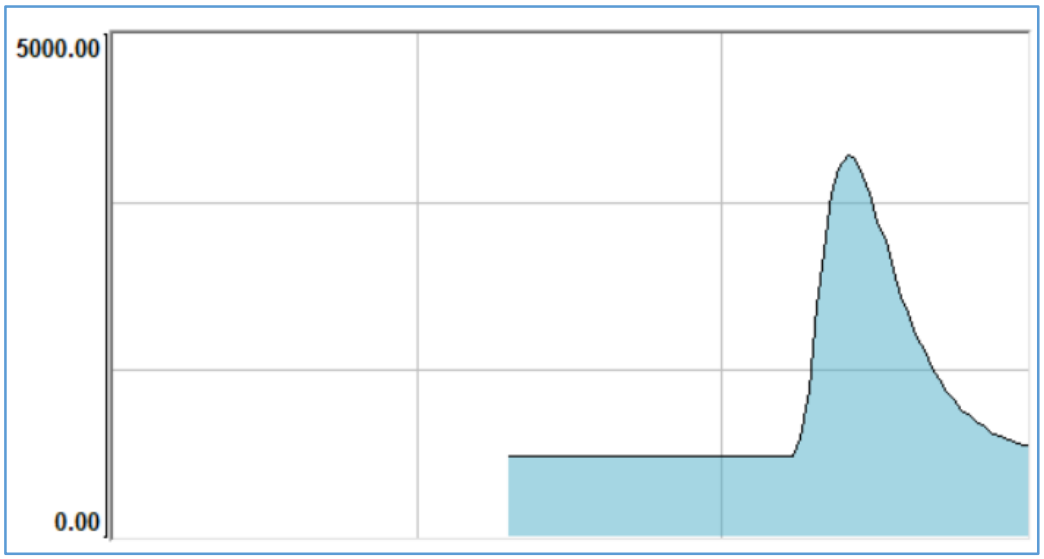


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12. After selecting and filling in the Data Source and Tag/Field to be used, click [OK]



13. Finished!



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4.1. Appendix: How IWS access remote MySQL database through ODBC

Step 1：Installation Environment (This example uses following PC Environment)

(1) Server: Install MySQL Workbench

(2) Client: Install ODBC for MySQL

	Server Side	Client Side
OS Version	Windows 8.1 Professional	Windows 7 Professional
MySQL Workbench Version	v6.3.9 (MySQL Installer 5.7.18, x86 32bit) https://dev.mysql.com/downloads/file/?id=470091	N/A
InduSoft Version	N/A	v8.0.2.0
ODBC for MySQL	N/A	V5.3.8 (win32) https://dev.mysql.com/downloads/file/?id=470365

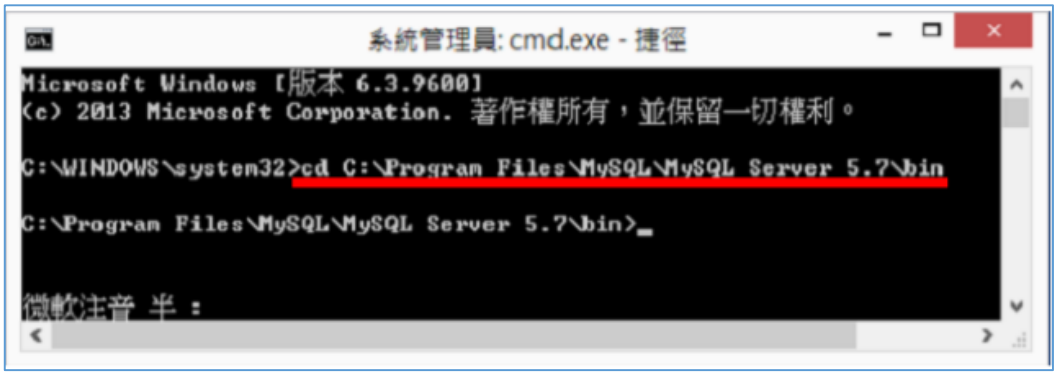
Step 2：Open MySQL Server Remote connection Permission (Server Side)

(1) Execute as Administrator: C:\Windows\system32\cmd.exe

(2) Switch the document to where “MySQL.exe” located

>cd C:\Program Files\MySQL\MySQL Server version\bin

Note: version is the installed version. This example is 5.7

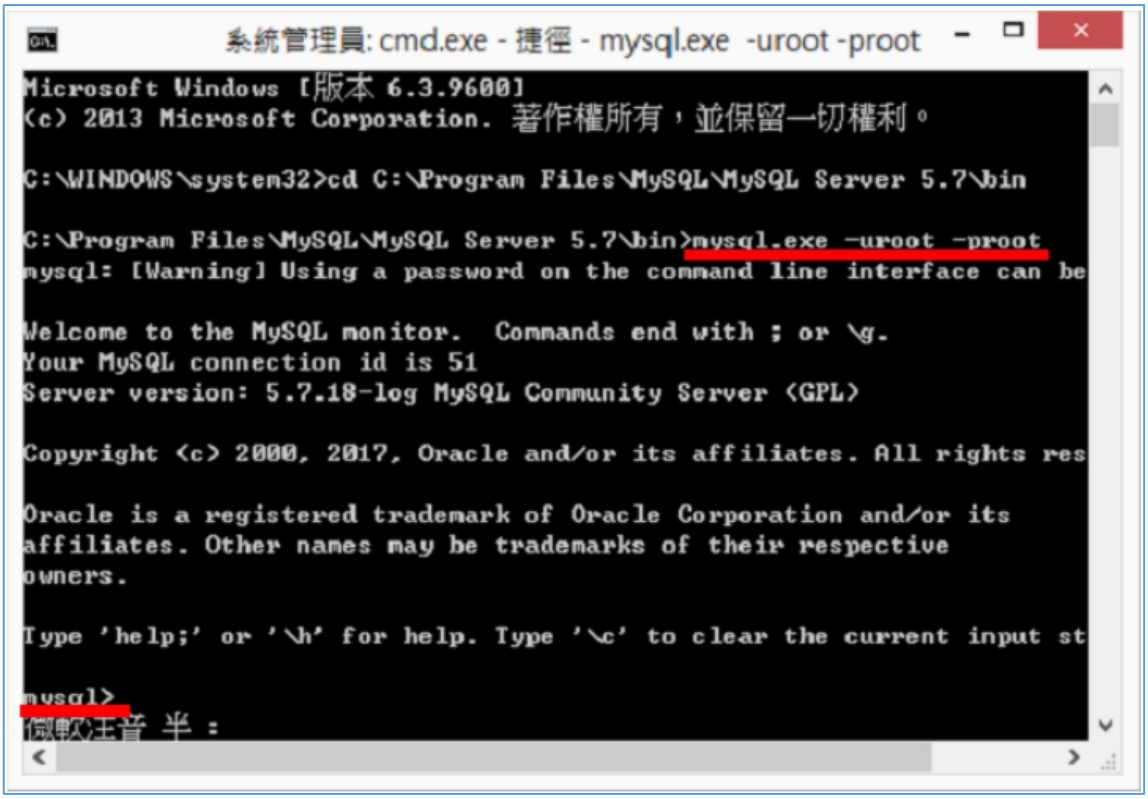


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(3) Login MySQL server (The account / password is set during installation)

>mysql -uroot –proot

Remarks: -u account -p password (-u -p followed by account password directly without spaces). After successful login, you will see mysql>



(4) Enter the command to set permissions

> GRANT ALL PRIVILEGES ON *.* TO USERNAME@IP IDENTIFIED BY PASSWORD;

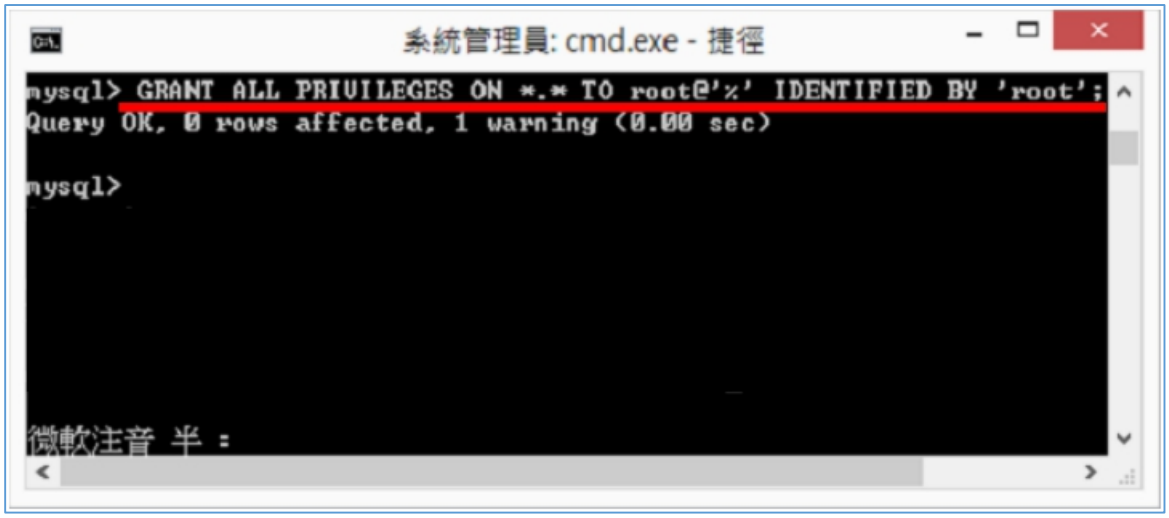
Remarks: USERNAME is generally the default root; if the IP set to '%', all computers can connect; PASSWORD is the connection password

Example:

mysql>GRANT ALL PRIVILEGES ON *.* TO root@172.17.20.176 IDENTIFIED BY root;
Allow 172.17.20.176 to log in using account root and password root

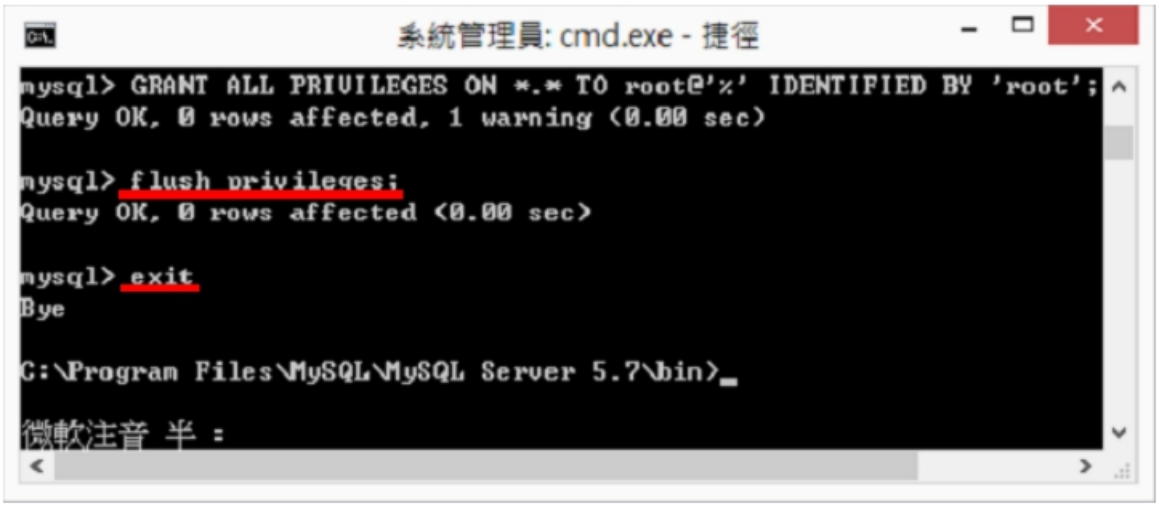
mysql>GRANT ALL PRIVILEGES ON *.* TO root@'%' IDENTIFIED BY root;
Allow all computers to log in with account root and password root

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(5) Update permission settings and leave MySQL

```
mysql>FLUSH PRIVILEGES;
mysql>quit;
```

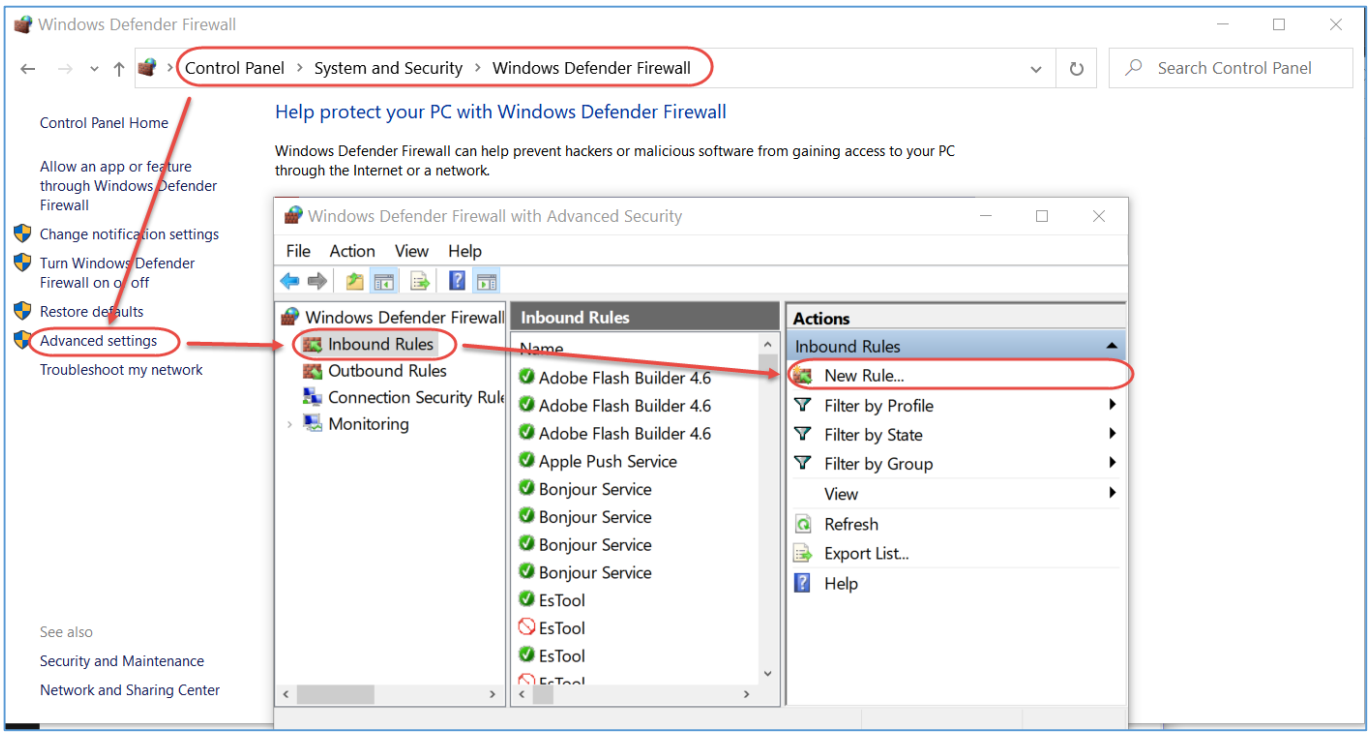


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Step 3：Add 〃Inbound Rules〃 in the Windows Defender Firewall (Server)

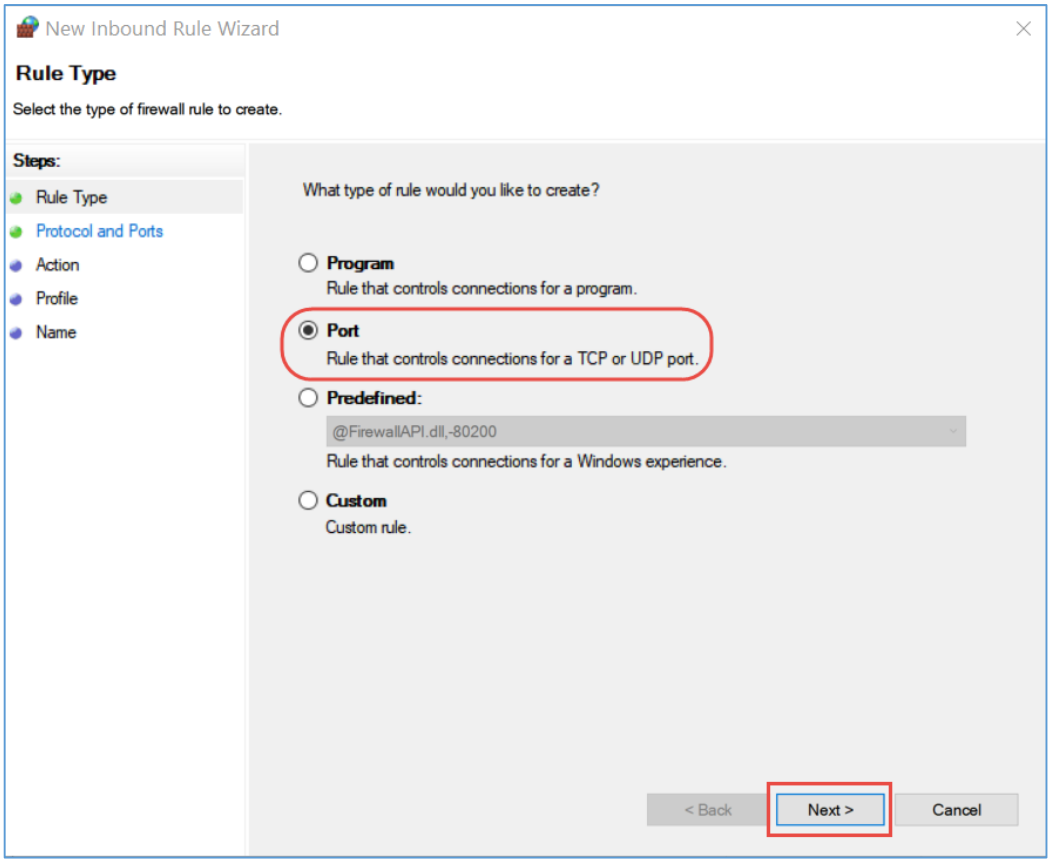
Allow MySQL pass through the firewall Port 3306, so that the remote device can access the MySQL services

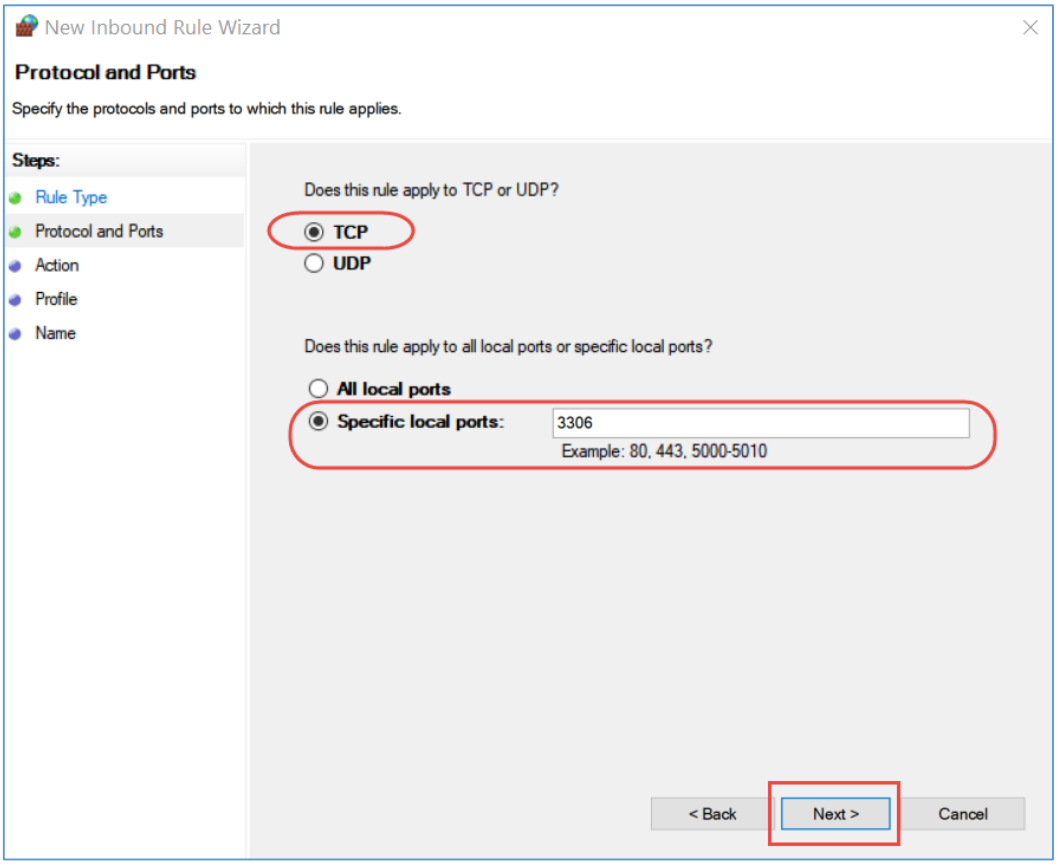
(1) Open 〃Control Panel〃→ Windows Defender Firewall→ Advanced Settings→ Inbound Rules→ New Rule



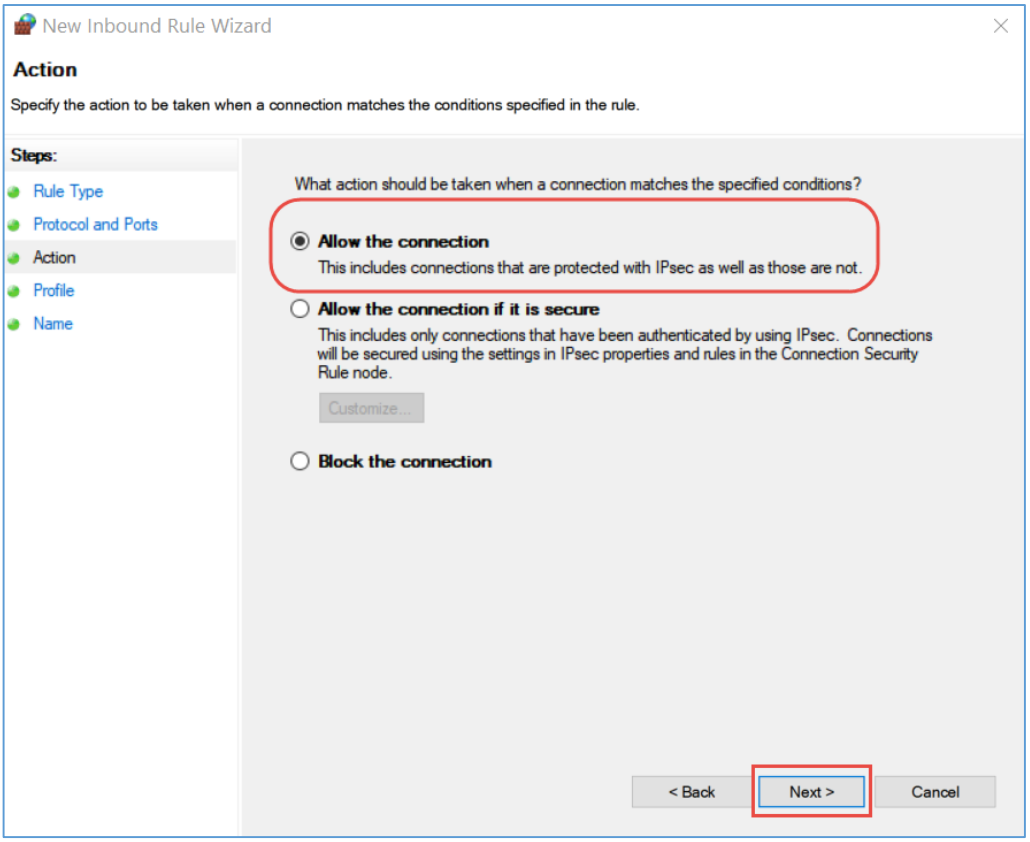
(2) Refer to following settings (Captures)

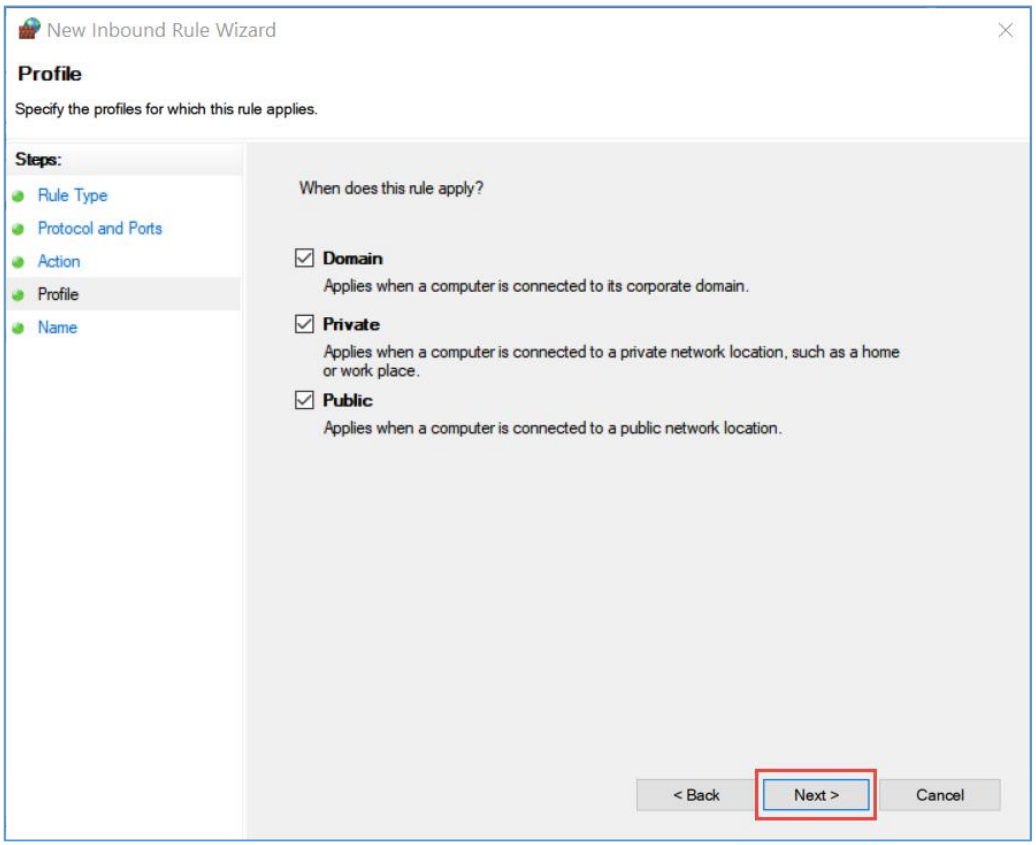
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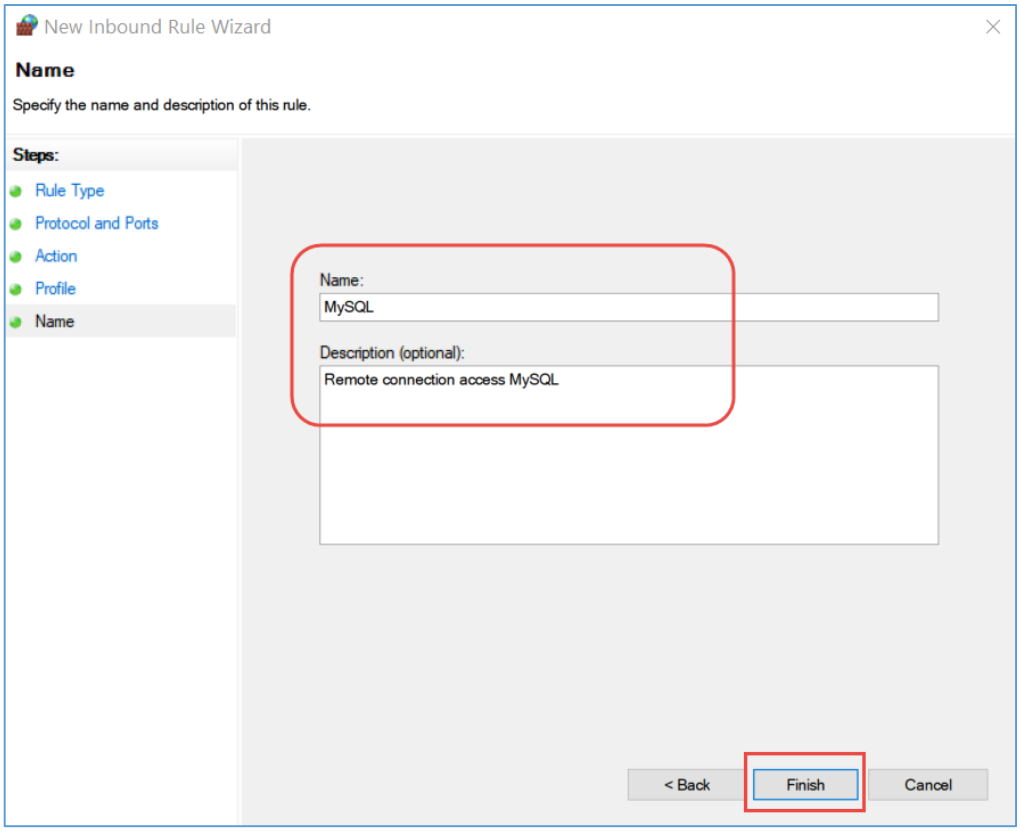


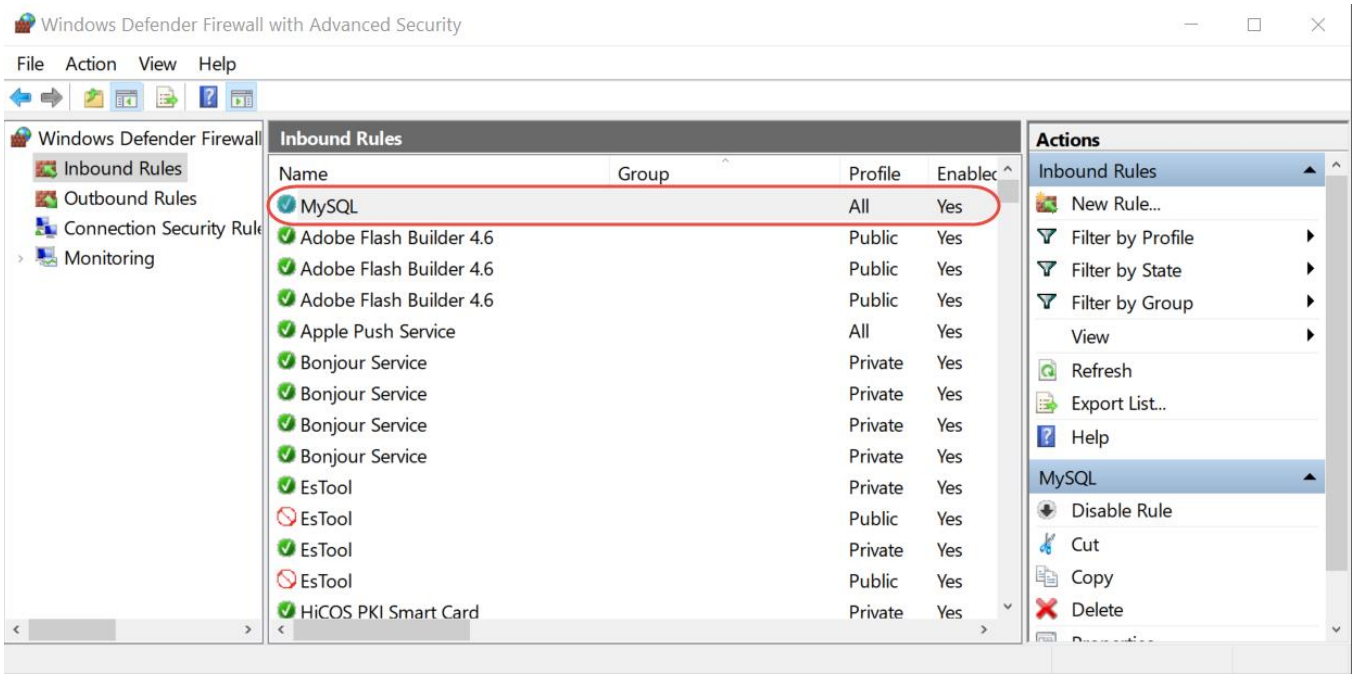
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Step 4：Set up ODBC Connections (Client)

(1) Execute as Administrator: C:\Windows\SysWOW64\odbcad32.exe➔ Add



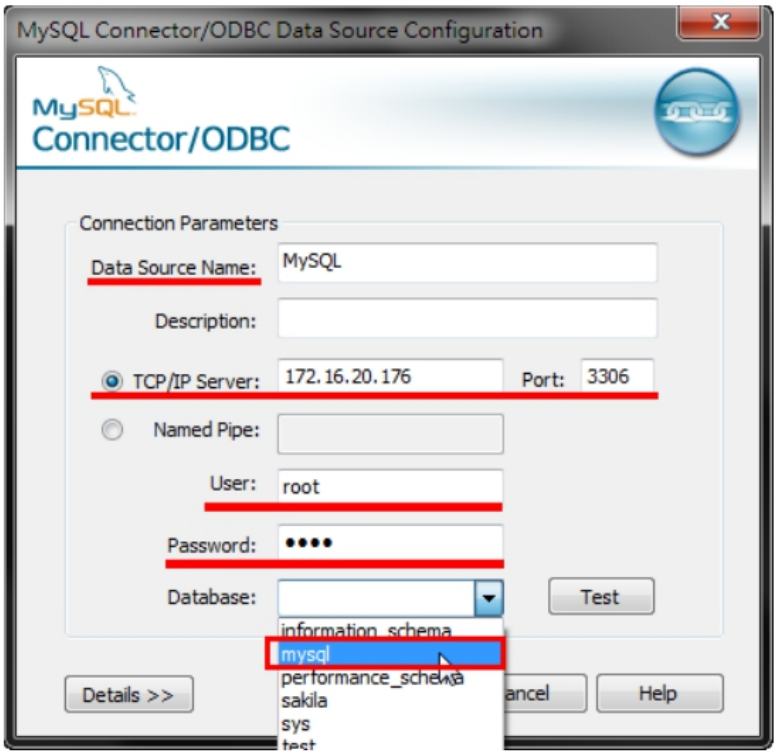
Select File resource:



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(2) Set the connection name (used by IWS) / server IP, Port / login account password / database. Press OK to close when finished

Note: The database (Schema) have to create in advance and can add using the MySQL Workbench management tool.



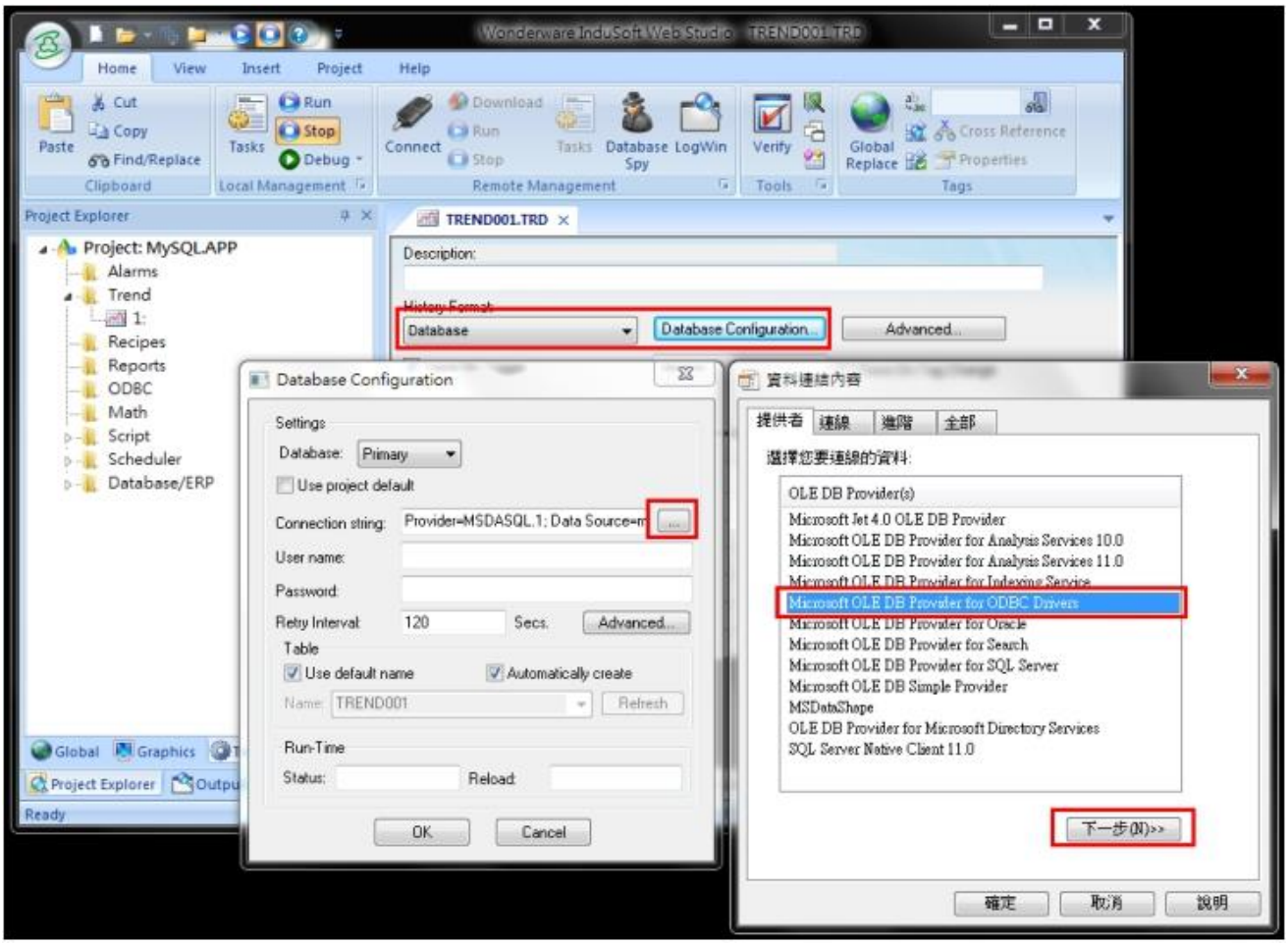
(3) Make sure the ODBC connection established successfully



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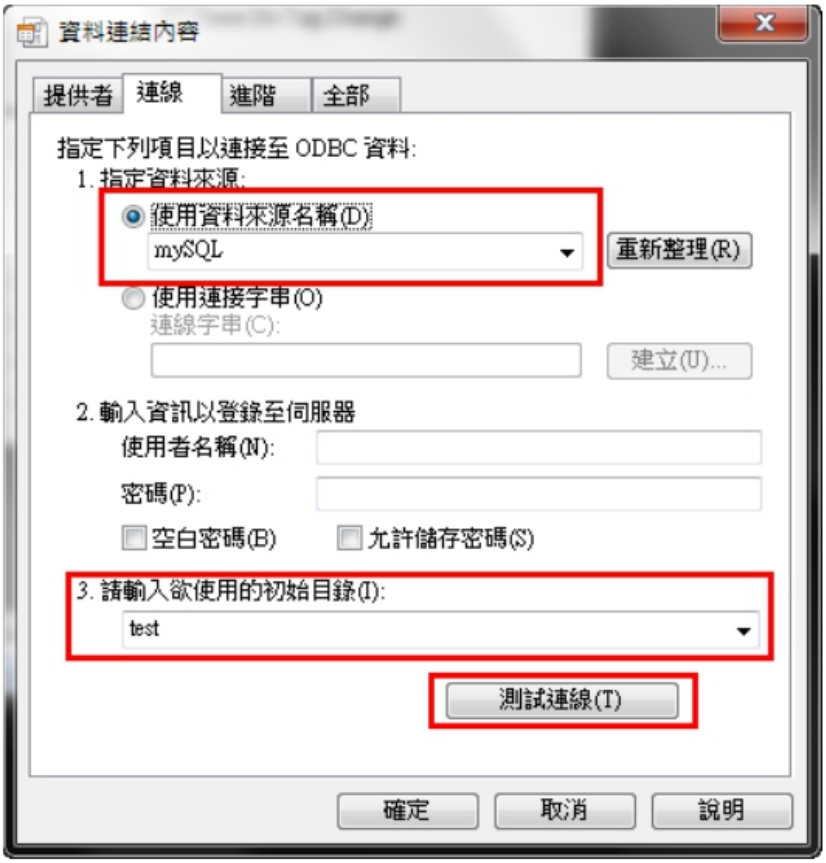
Step 5：Set up InduSoft database connection (Client)

(1) Take the trend chart form as an example. Under "Provide" Tag, chooses Microsoft OLE DB Provider for ODBC Drivers



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(2) Set the data source name (mySQL) → the database to be used (test) →test connection



(3) Successfully connected means to complete the setting.

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