

Content

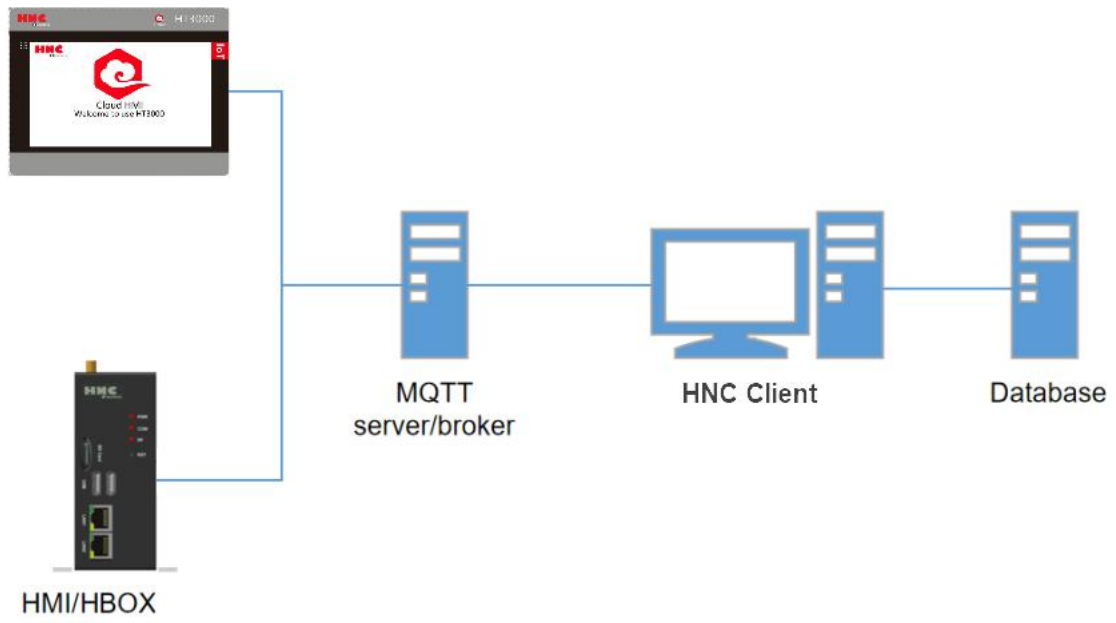
Important Statement.....	1
Network Diagram.....	3
1. Set up MQTT Server.....	4
1.1. Downloads.....	4
1.2. Installation.....	4
1.3. Start.....	5
1.4. Related Commands.....	5
1.5. Web Dashboard.....	5
2. Set up MySQL Server.....	6
2.1. Downloads.....	6
2.2. Installation.....	7
2.3. Verification.....	14
2.4. Remote Access Permission.....	14
2.5. Connect to Database Remotely.....	15
3. HTCloud Designer Programming Configuration.....	16
3.1. Create a New Project.....	16
3.2. Add a History Record Group.....	16
3.3. Data Center.....	17
3.4. Download Project.....	17
4. Configure IoTbus Data-link Tool.....	18
4.1. IoTbus Data link Tool.....	18
4.2. Configure MQTT Server.....	18
4.3. Add Task.....	18
4.4. Start.....	19
5. Verification.....	20
5.1. MQTT Server.....	20
5.2. MySQL Database.....	20

Important Statement

This article describes a simple procedure of MQTT configuration in detail. The application of MQTT apply to technicians who are proficient in database or MQTT. Hence, it is sorry that we will not answer to the questions that are not related to HMI/H-BOX/PLC. If you have any problem about database or MQTT, please refer to related documents on internet.

** Hint: Computer system is Windows 10 (64-bit) in this article. **

Network Diagram



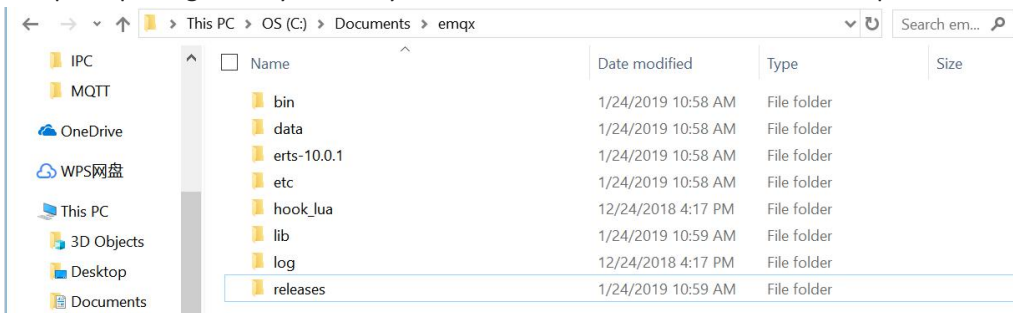
1. Set up MQTT Server

1.1. Downloads

EMQ, an open source MQTT server, is used in this case. It can be downloaded in official website <http://emqx.io/>. The relative version is Windows10(64-bit).

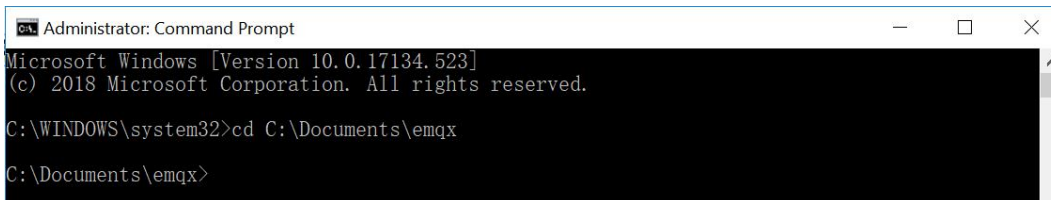


Unzip the package to any directory. The install location is C:\Documents\emqx in this example.

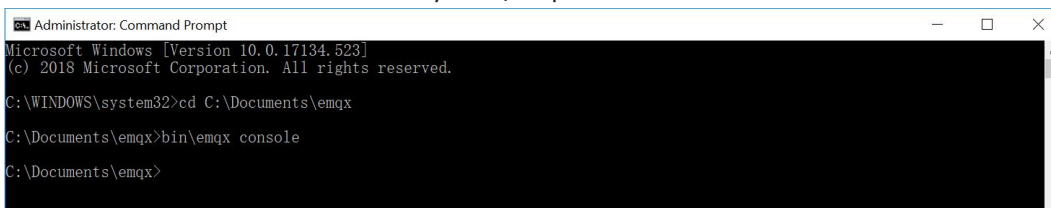


1.2. Installation

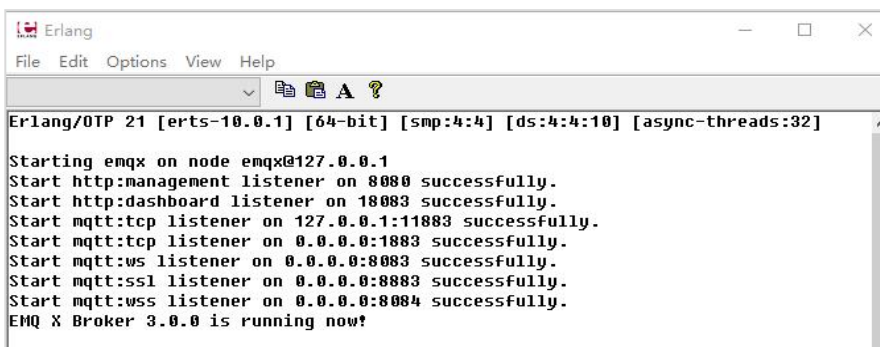
Run Command Prompt as administrator. Enter the install directory by “cd” command.



Start MQTT broker in console mode by “bin\emqx console” command.



If it is started successfully, an Erlang window will come out. Close the window and continue to register the Windows service.



Register EMQ X as Windows service by “bin\emqx install” command. If EMQ X is registered successfully, Command Prompt will print “Service emqx_3.0 added to system.”.

```
Administrator: Command Prompt
Microsoft Windows [Version 10.0.17134.523]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\WINDOWS\system32>cd C:\Documents\emqx
C:\Documents\emqx>bin\emqx console
C:\Documents\emqx>bin\emqx install
C:\Documents\emqx\erts-10.0.1\bin\erlsrv.exe: Service emqx_3.0 added to system.
C:\Documents\emqx>
```

1.3. Start

Start EMQ X service by “bin\emqx start” command.

```
Administrator: Command Prompt
Microsoft Windows [Version 10.0.17134.523]
(c) 2018 Microsoft Corporation. All rights reserved.

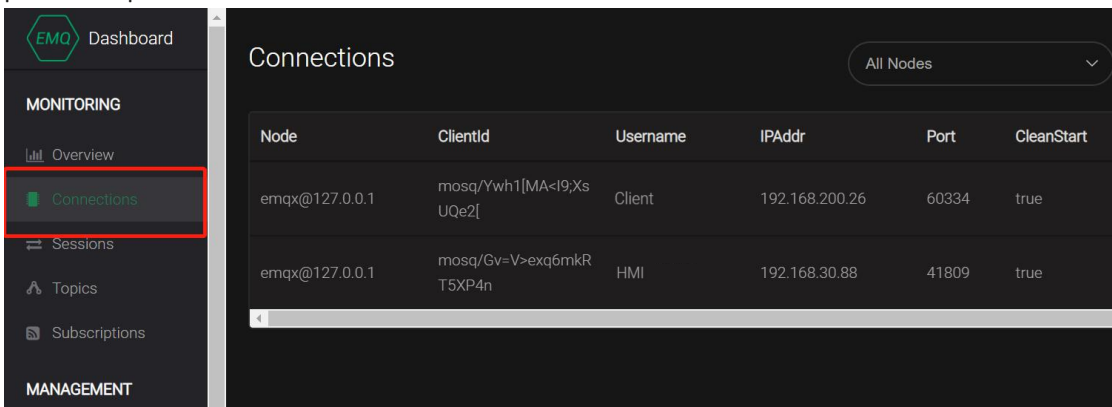
C:\WINDOWS\system32>cd C:\Documents\emqx
C:\Documents\emqx>bin\emqx console
C:\Documents\emqx>bin\emqx install
C:\Documents\emqx\erts-10.0.1\bin\erlsrv.exe: Service emqx_3.0 added to system.
C:\Documents\emqx>bin\emqx start
C:\Documents\emqx>
```

1.4. Related Commands

Stop EMQ X service by “bin\emqx stop” command. Uninstall EMQ X service by “bin\emqx uninstall” command.

1.5. Web Dashboard

Users can check and monitor the status of MQTT broker by Web Dashboard after start EMQ X service. Users can visit the default address <http://localhost:18083/> on browser to load Dashboard. Default username: admin, password: public.



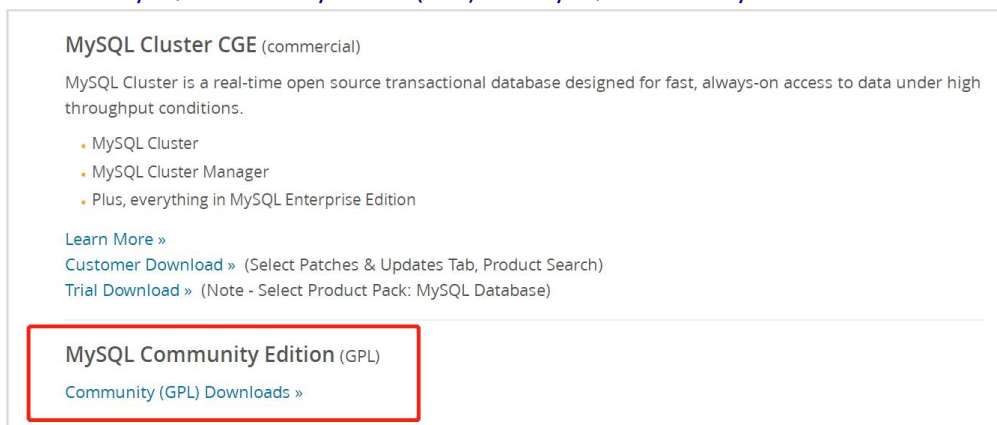
2. Set up MySQL Server

2.1. Downloads

Go to official website <https://www.mysql.com/>. Choose “DOWNLOADS” tag.



Click on “MySQL Community Edition(GPL)” -> “MySQL Community Server”.




MySQL installer is recommended for simple demonstration. In this version, we don't have to do complicated configurations.

Generally Available (GA) Releases

MySQL Community Server 8.0.13

Select Operating System:
 Microsoft Windows Looking for previous GA versions?

Recommended Download:



MySQL Installer for Windows
 All MySQL Products. For All Windows Platforms. In One Package.

Starting with MySQL 5.6 the MySQL Installer package replaces the standalone MSI packages.

Windows (x86, 32 & 64-bit), MySQL Installer MSI Go to Download Page >

Generally Available (GA) Releases

MySQL Installer 8.0.13

Select Operating System:
 Microsoft Windows Looking for previous GA versions?

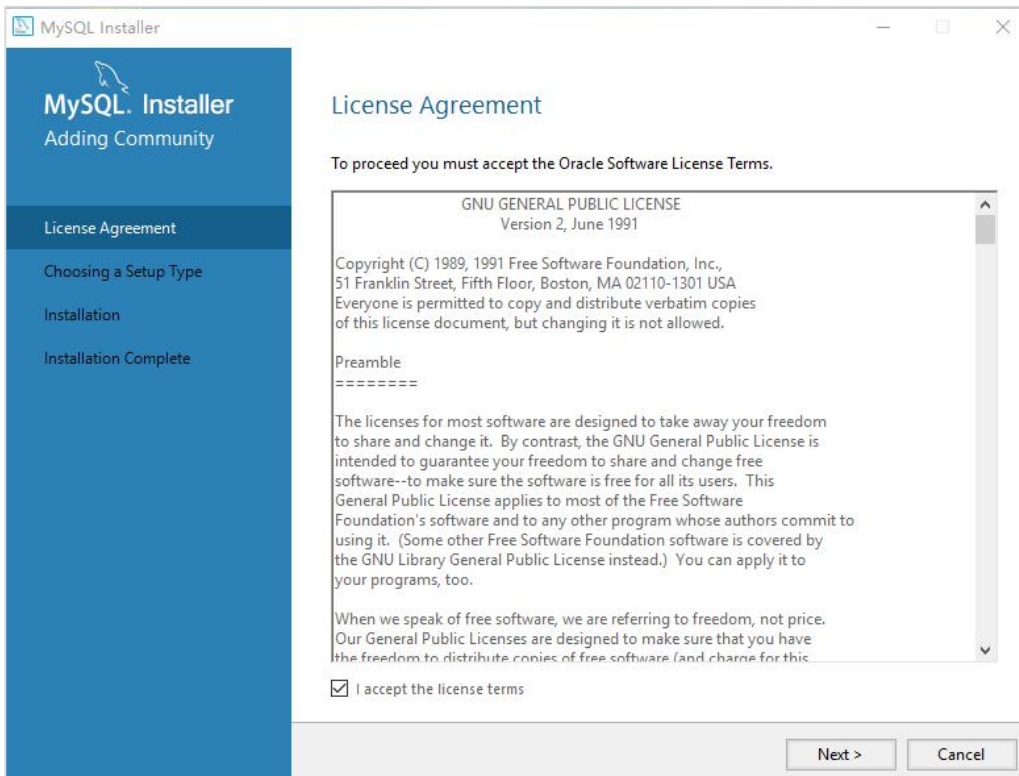
Windows (x86, 32-bit), MSI Installer <small>(mysql-installer-web-community-8.0.13.0.msi)</small>	8.0.13	16.3M	Download
Windows (x86, 32-bit), MSI Installer <small>(mysql-installer-community-8.0.13.0.msi)</small>	8.0.13	313.8M	Download

MD5: 370ab1f1ddf05b7c4c83c622f5e71b45 | Signature

MD5: 4ffa5a022d4aa3995d2a33118b2c32cc | Signature

2.2. Installation

Open MySQL Installer. Firstly, accept the license terms.



MySQL Installer
 Adding Community

License Agreement

Choosing a Setup Type

Installation

Installation Complete

License Agreement

To proceed you must accept the Oracle Software License Terms.

GNU GENERAL PUBLIC LICENSE
 Version 2, June 1991

Copyright (C) 1989, 1991 Free Software Foundation, Inc.,
 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA
 Everyone is permitted to copy and distribute verbatim copies
 of this license document, but changing it is not allowed.

Preamble
 =====

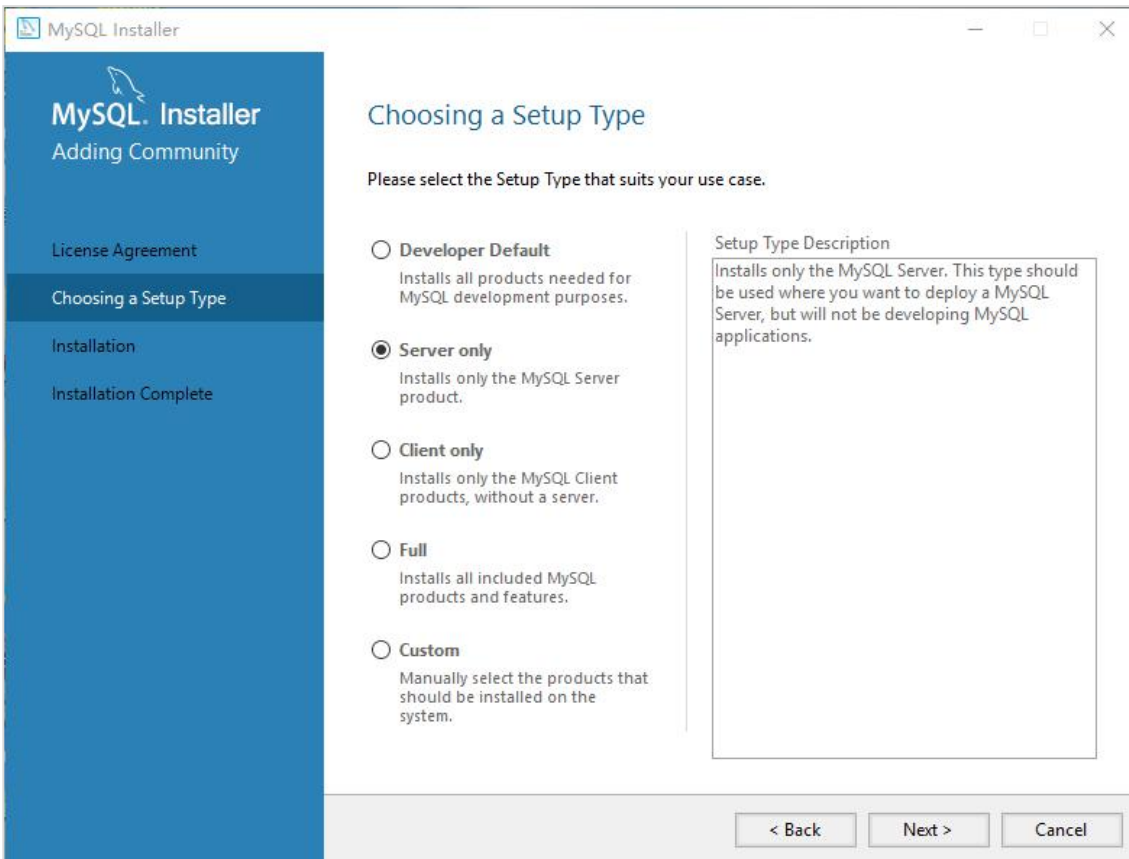
The licenses for most software are designed to take away your freedom
 to share and change it. By contrast, the GNU General Public License is
 intended to guarantee your freedom to share and change free
 software--to make sure the software is free for all its users. This
 General Public License applies to most of the Free Software
 Foundation's software and to any other program whose authors commit to
 using it. (Some other Free Software Foundation software is covered by
 the GNU Library General Public License instead.) You can apply it to
 your programs, too.

When we speak of free software, we are referring to freedom, not price.
 Our General Public Licenses are designed to make sure that you have
 the freedom to distribute copies of free software (and charge for this

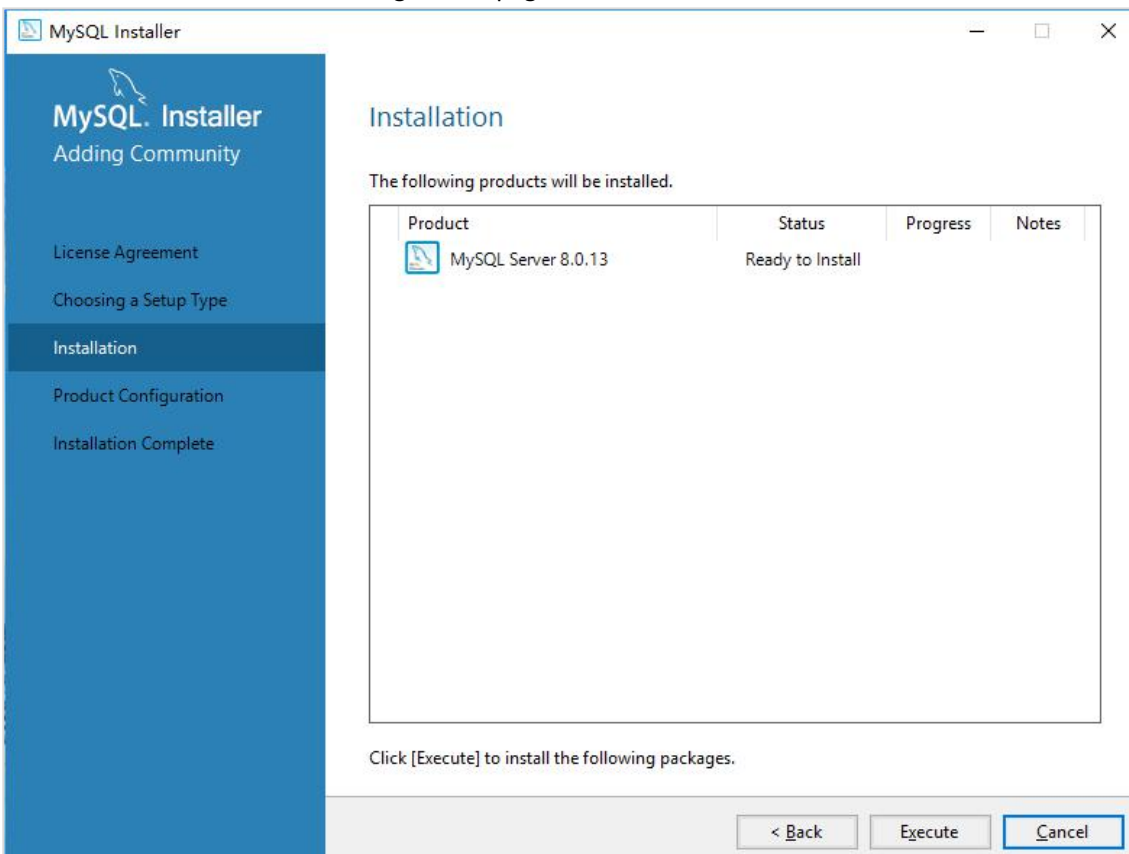
I accept the license terms

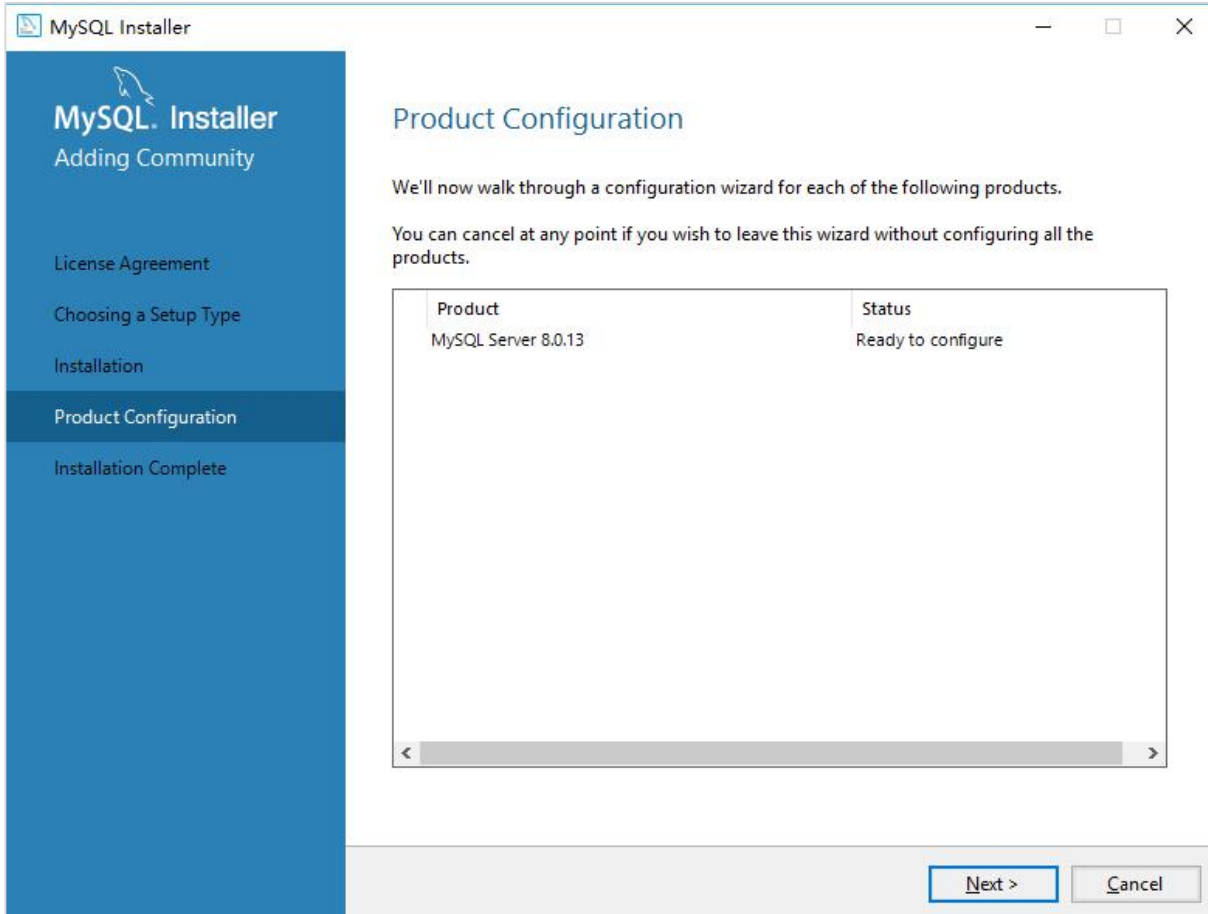
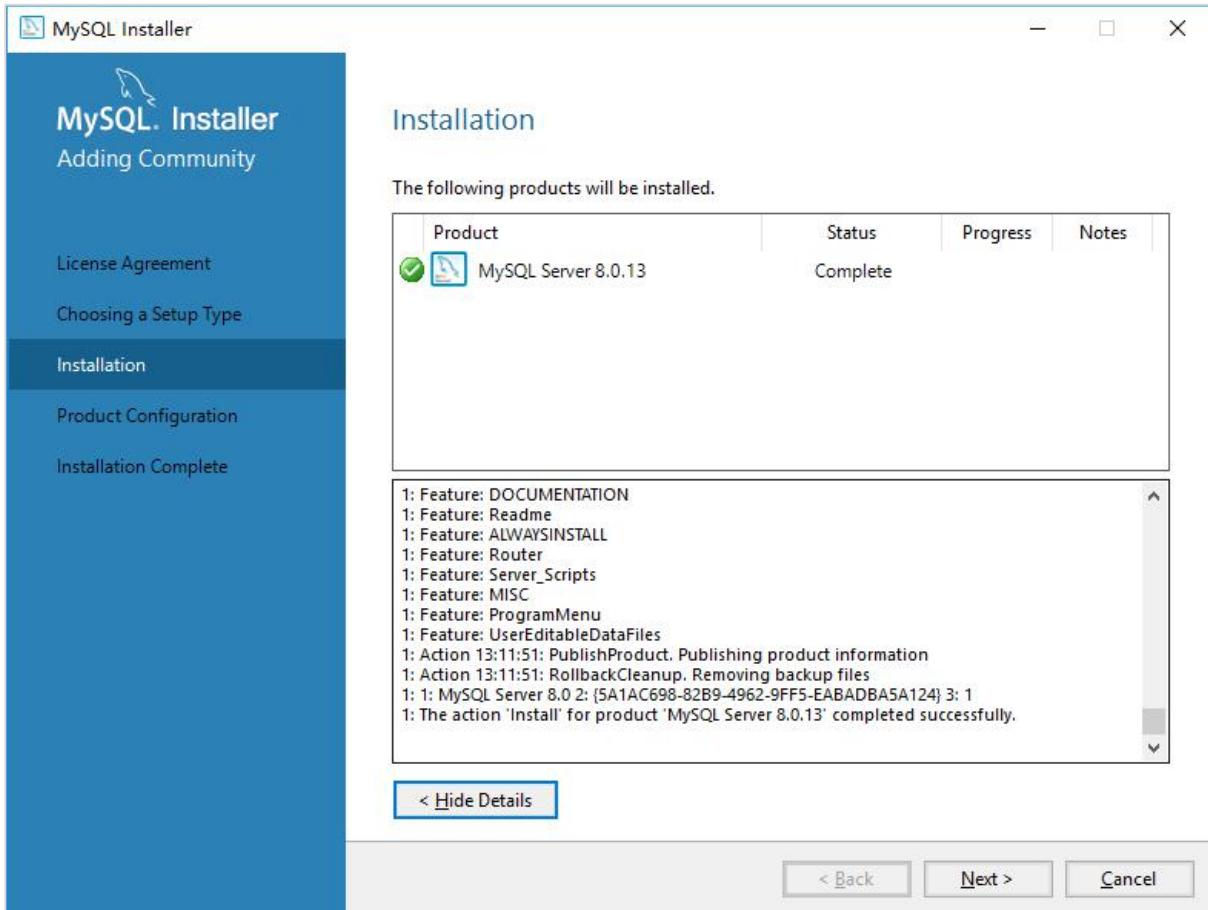
[Next >](#) [Cancel](#)

Only MySQL server is needed in this case. Hence, we choose the second option. If you have any other requirements, you can select other setup type.

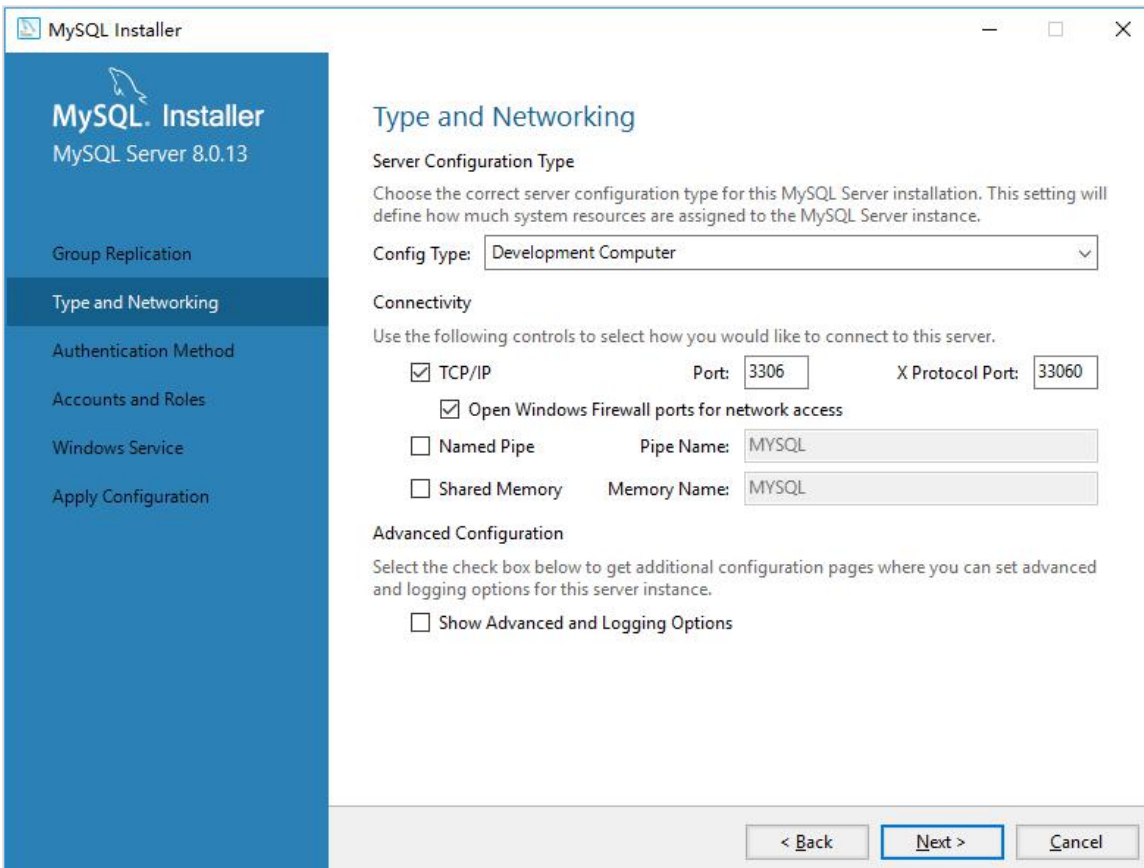
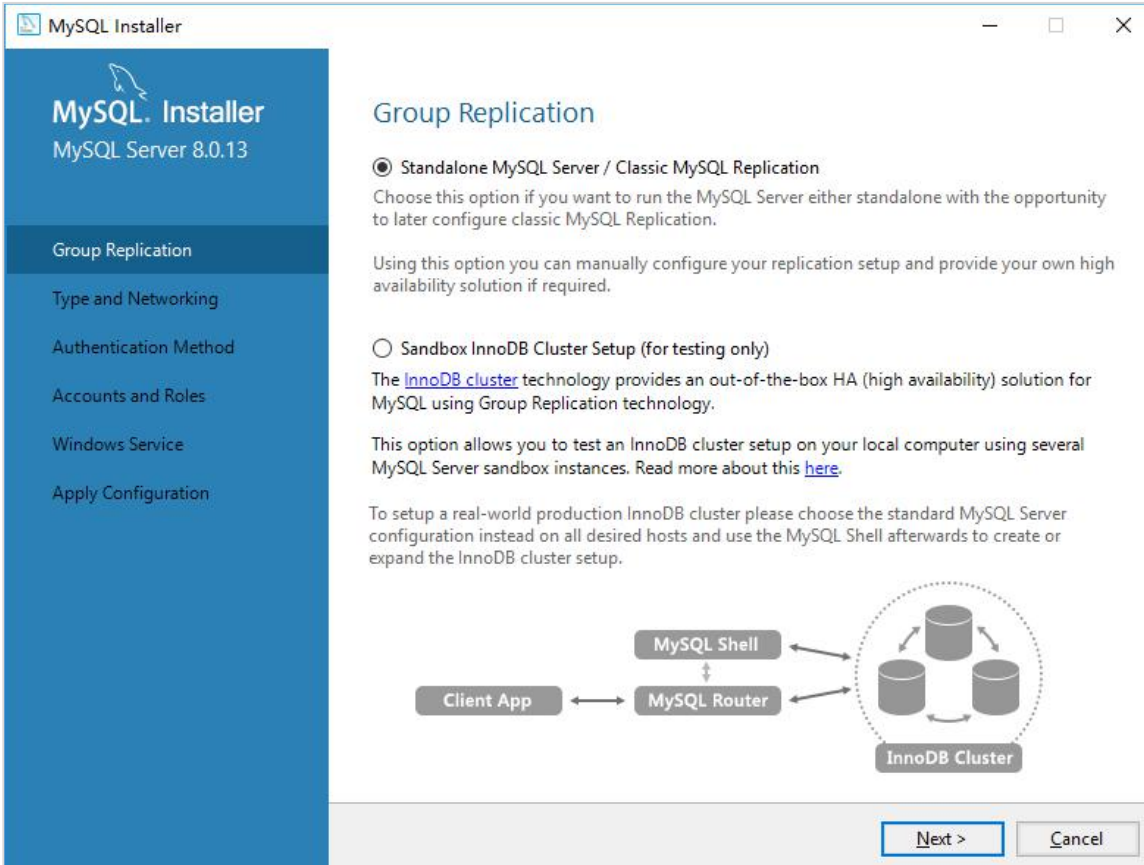


Click "Execute" and enter the configuration page.

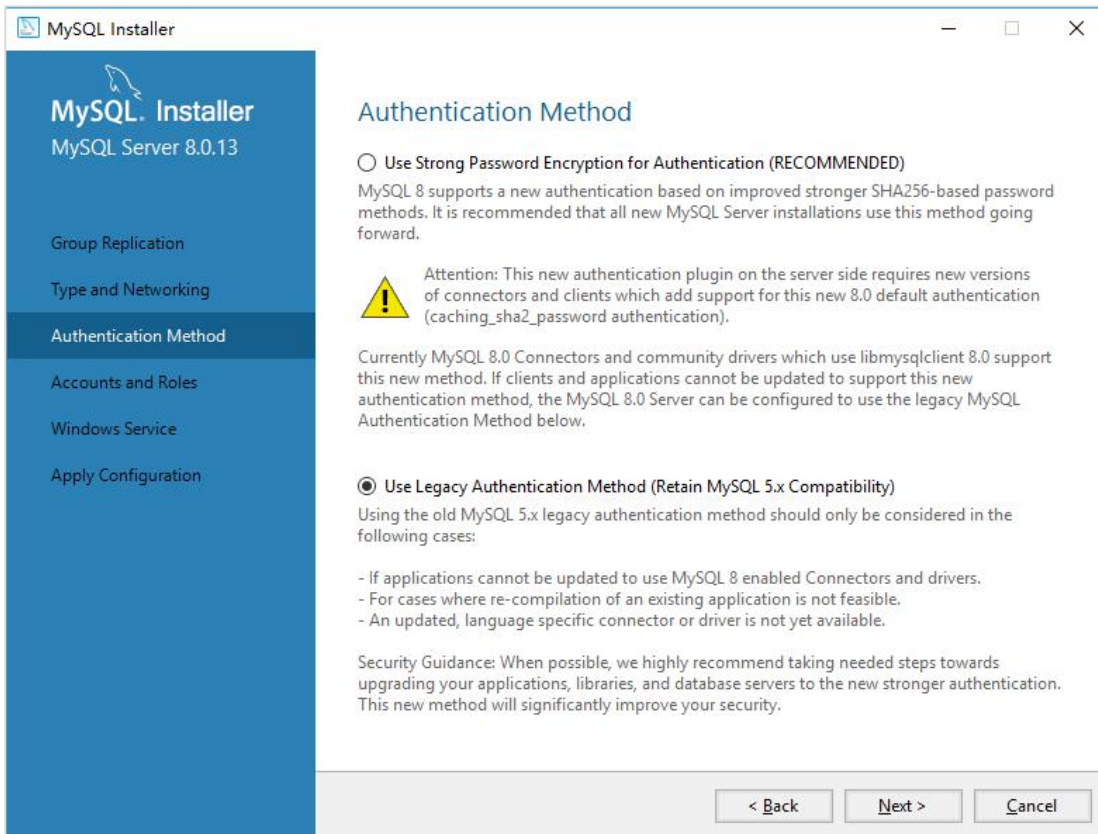




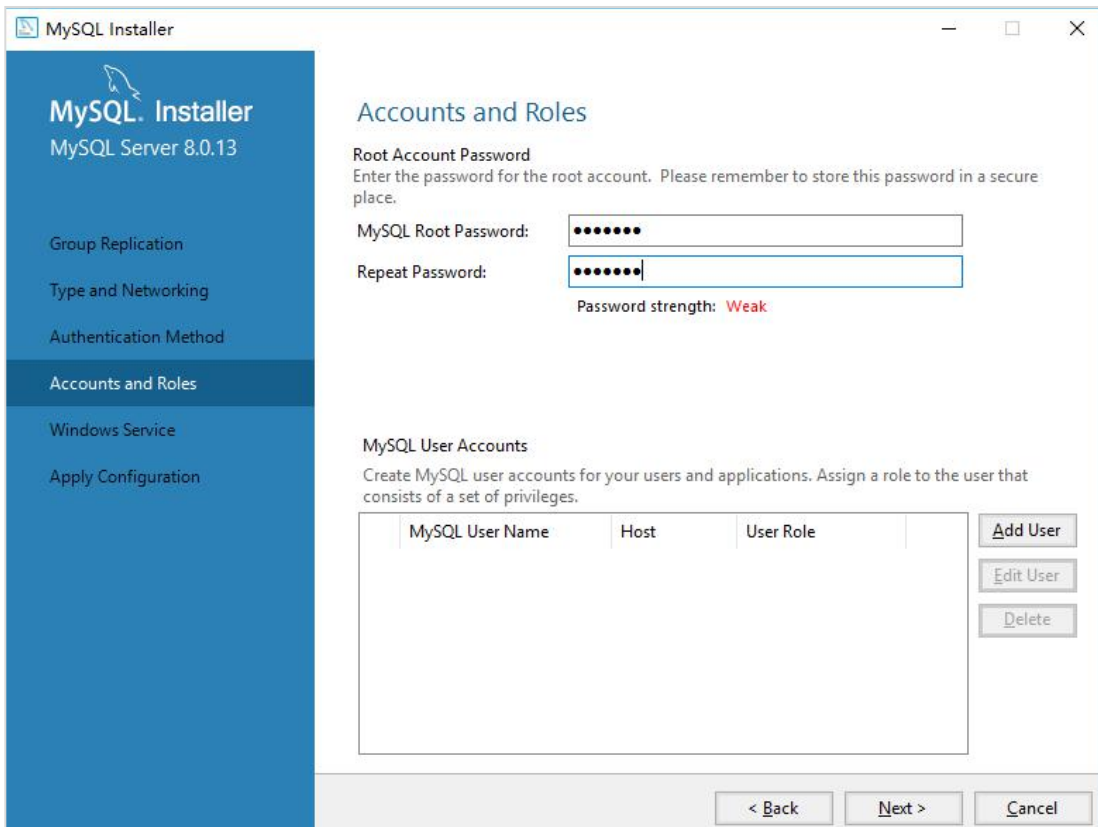
Choose default options for Group Replication and Type and Networking. Default TCP/IP port is 3306.



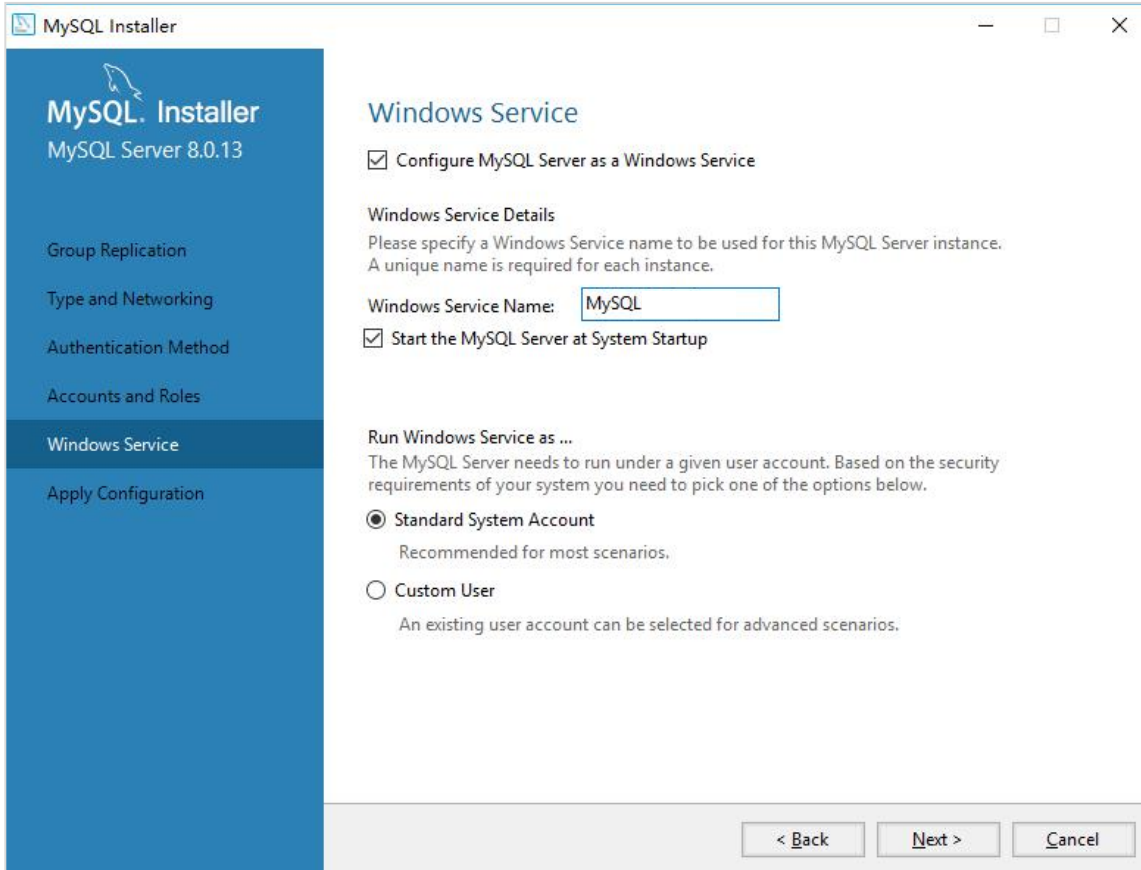
Choose Authentication method. Some of the clients or software haven't support the new authentication method. In this case, we have to choose the second method, which is "Use Legacy Authentication Method (Retain MySQL 5.x Compatibility)".



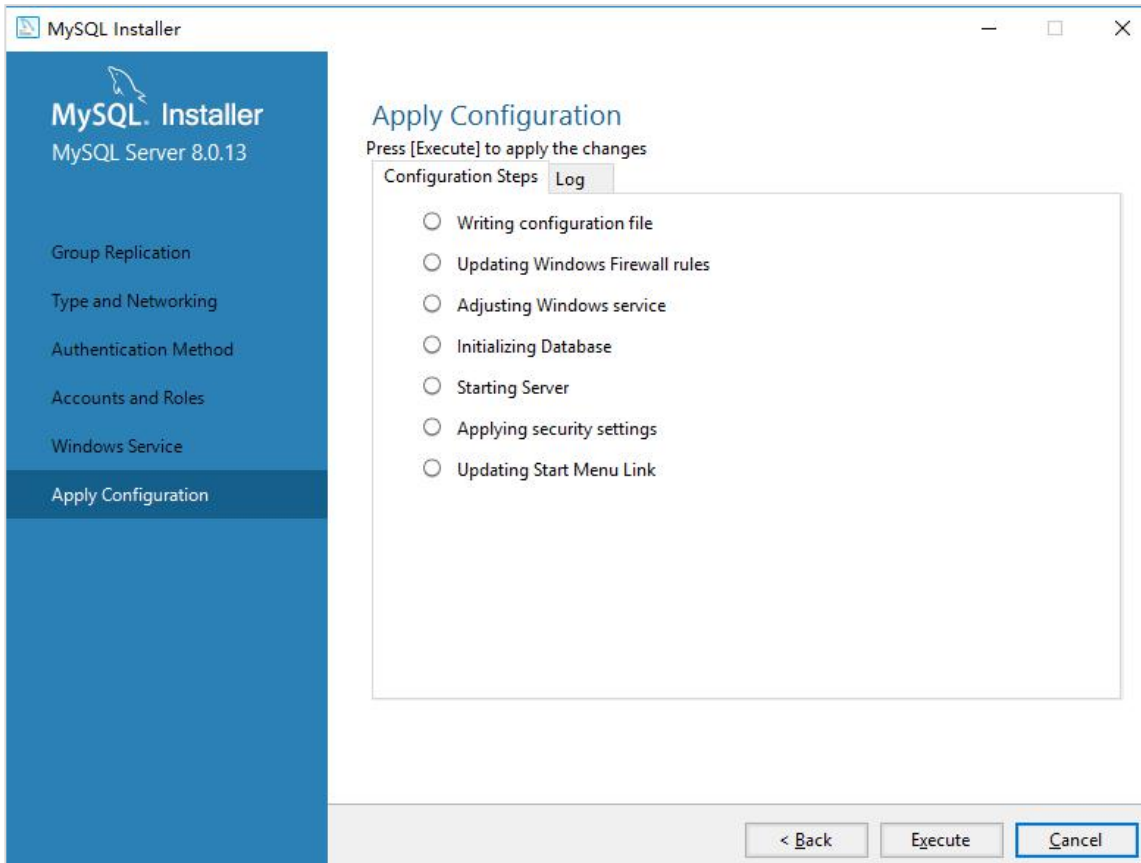
The next step is creating password for root account. You can also add other user accounts in this step. Remember the password. It is needed to create database.

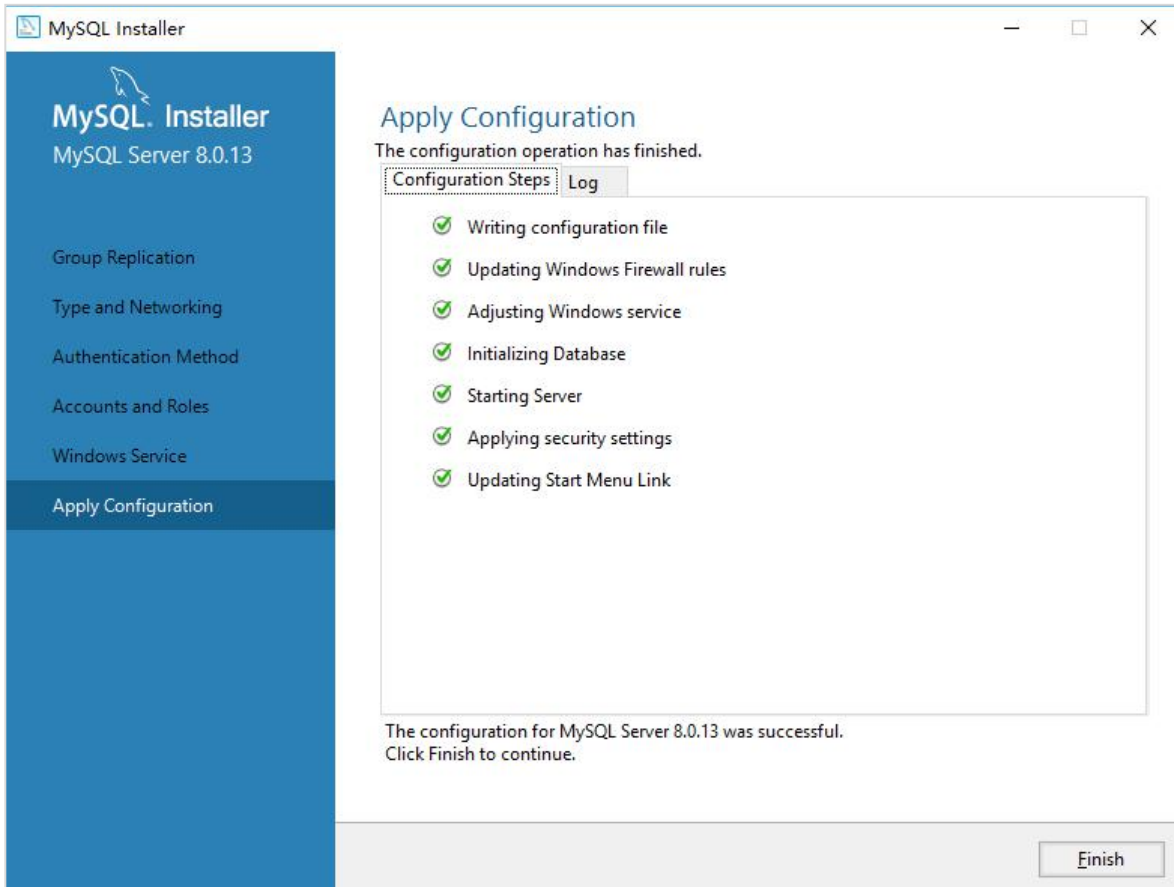


Configure MySQL Server as a Windows Service.

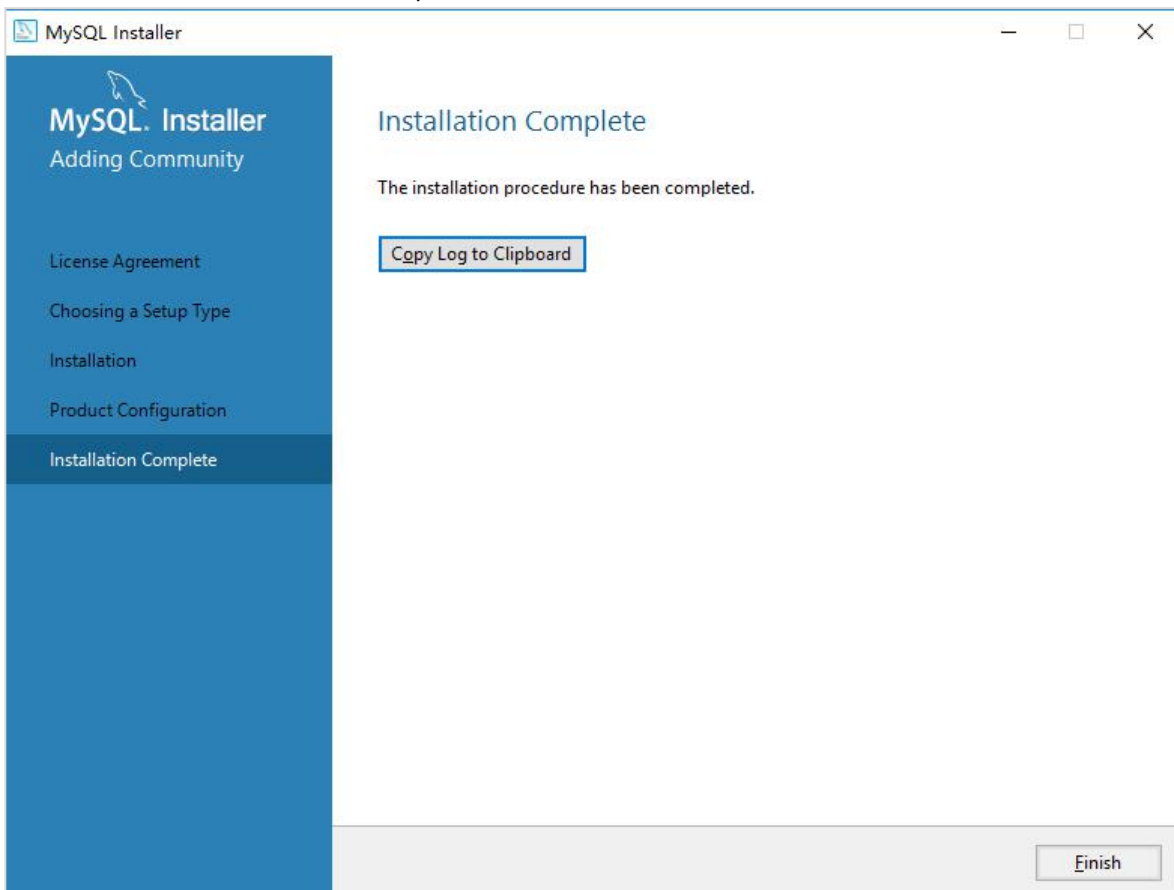


Click "Execute" to apply the configuration. After finishing the configuration, return to install page.





Click "Finish". The installation is completed.



2.3. Verification

Find MySQL Command Line Client in MySQL in start menu. Enter password created in step 2.2.

```
MySQL 8.0 Command Line Client
Enter password: *****
```

If MySQL server is installed and launched successfully, the information messages will appear.

```
MySQL 8.0 Command Line Client
Enter password: *****
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 41
Server version: 8.0.13 MySQL Community Server - GPL

Copyright (c) 2000, 2018, Oracle and/or its affiliates. All rights reserved.

Oracle is a registered trademark of Oracle Corporation and/or its
affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.
mysql>
```

2.4. Remote Access Permission

By default MySQL server is only allow connections to local server. We have to enable remote access to MySQL server. The code sample is as followed.

```
use mysql;
CREATE USER 'root'@'%' IDENTIFIED BY 'your password';
GRANT ALL ON *.* TO 'root'@'%';
FLUSH PRIVILEGES;
```

The host of root user is changed to % after executing “SELECT host, user from user;” command. It means the remote access permission is granted.

```
选择MySQL 8.0 Command Line Client

Oracle is a registered trademark of Oracle Corporation and/or its
affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> use mysql;
Database changed
mysql> CREATE USER 'root'@'%' IDENTIFIED BY 'XXXXXX';
Query OK, 0 rows affected (0.16 sec)

mysql> GRANT ALL ON *.* TO 'root'@'%';
Query OK, 0 rows affected (0.15 sec)

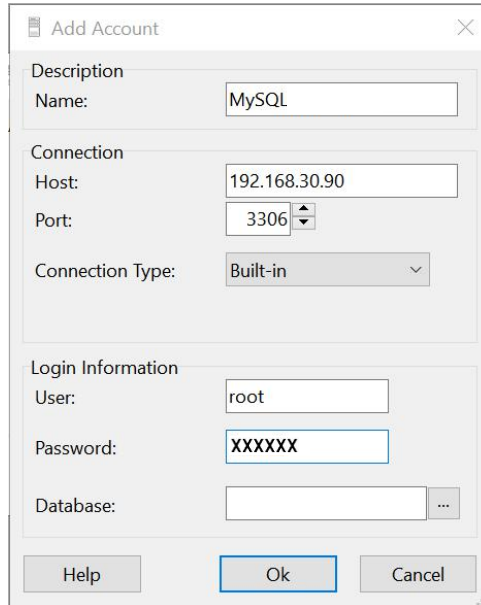
mysql> FLUSH PRIVILEGES;
Query OK, 0 rows affected (0.03 sec)

mysql> SELECT host, user from user;
+-----+-----+
| host      | user      |
+-----+-----+
| %         | root      |
| localhost | mysql.infoschema |
| localhost | mysql.session |
| localhost | mysql.sys  |
| localhost | root      |
+-----+-----+
5 rows in set (0.02 sec)
```

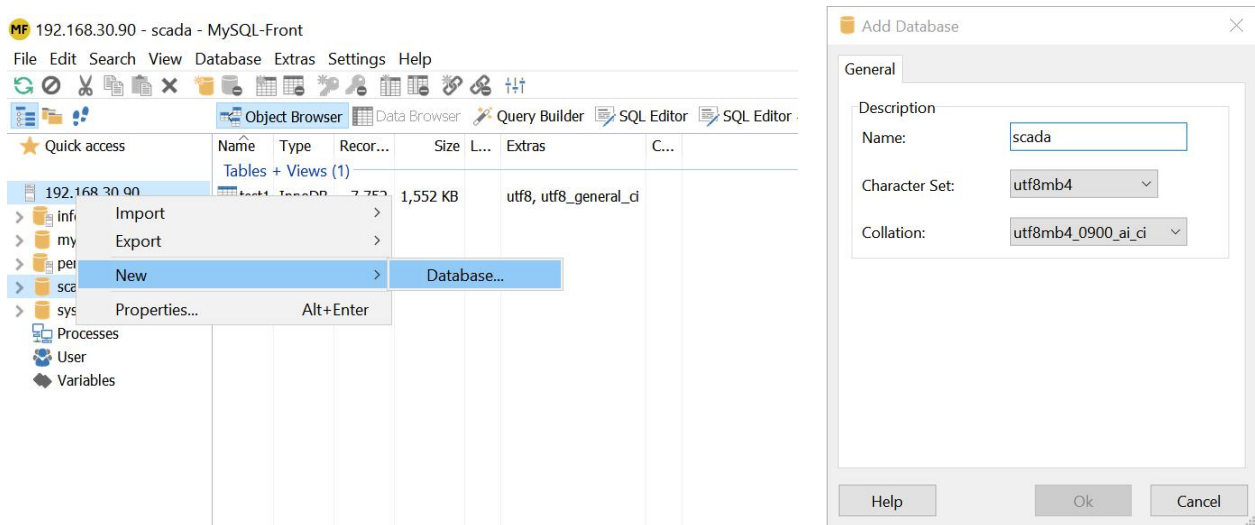
2.5. Connect to Database Remotely

There are various MySQL clients such as MySQL Workbench, Navicat, HeidiSQL and so on. In this article, we use MySQL-Front to connect to database remotely.

Click MySQL-Front -> File -> Open Connection -> New. Fill in the fields with your database information. Host is your server hostname. Port is 3306 by default. Enter user and password of root account.



We create a new database to store the historical data uploaded from HMI/H-BOX. Right click on IP address of the host and select New -> Database. We can edit the name in the pop-up window.



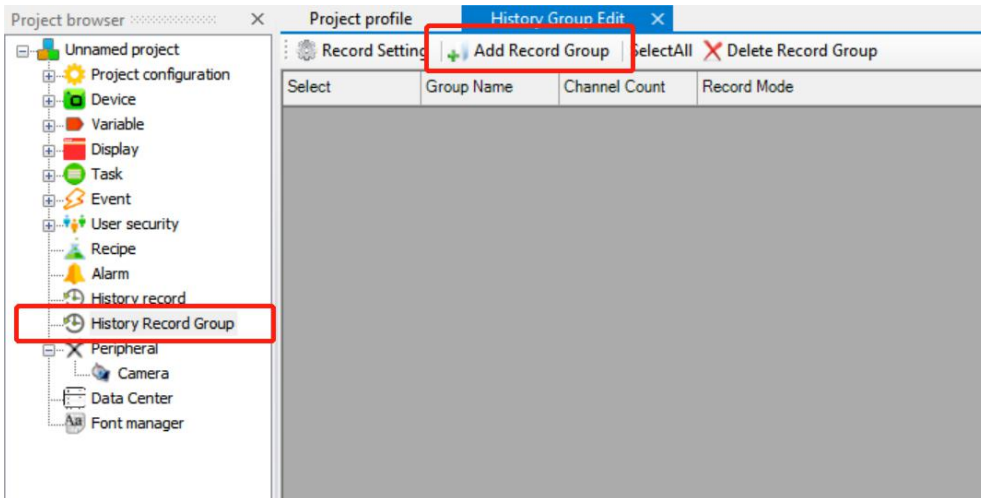
3. HTCloud Designer Programming Configuration

3.1. Create a New Project

Open HTCloud Designer. Create a new project, add a new device and new variables.

3.2. Add a History Record Group

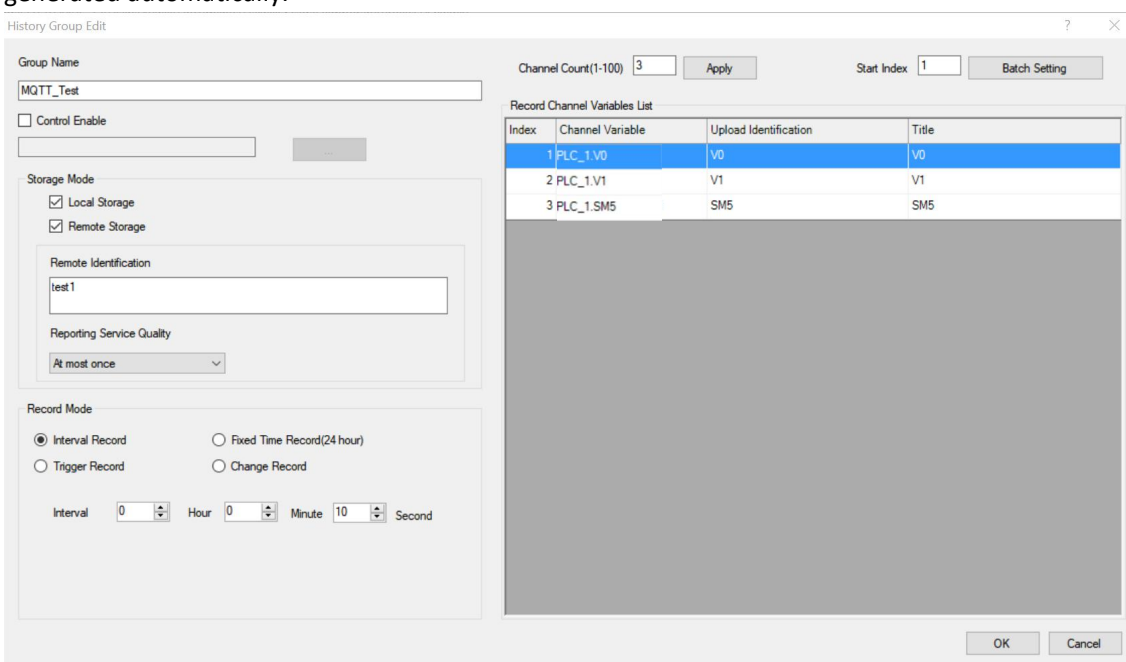
Double click History Record Group on the project browser. Add a new record group.



Add new record channel variables. Remote storage Group must be selected in storage mode. The variables added in this article are V0,V1 and SM5. There are three levels of reporting service quality(QoS):

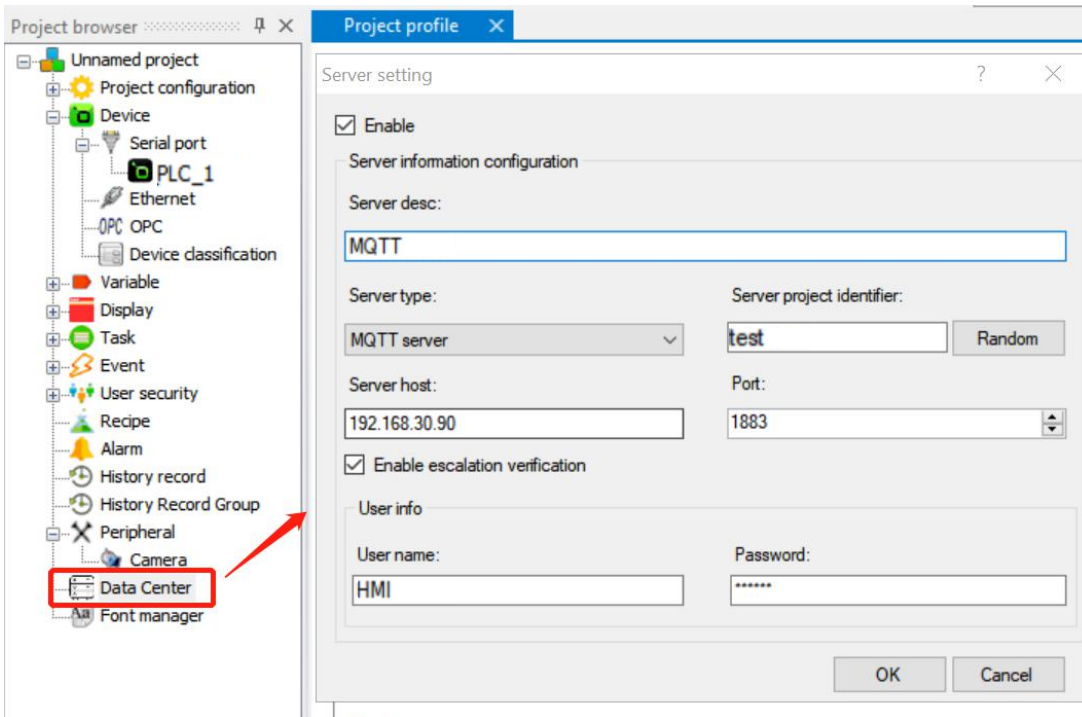
- At most once (QoS 0) - The client will deliver the message once.
- At least once (QoS 1) - The receiver will receive the message at least once. The message might be delivered multiple times.
- For once (QoS 2) - The client will deliver the message at least once.

Remote identification is corresponding to the table name in MySQL database while upload identification corresponding to field name. There is no need to create table and field in database in advance as it will be generated automatically.



3.3. Data Center

Double click data center to configure MQTT server. Tick on Enable. Enter the IP address of the EMQ X server. The port is 1883 by default. The server project identifier must be unique. We enable escalation verification in this article for verification in the final step.



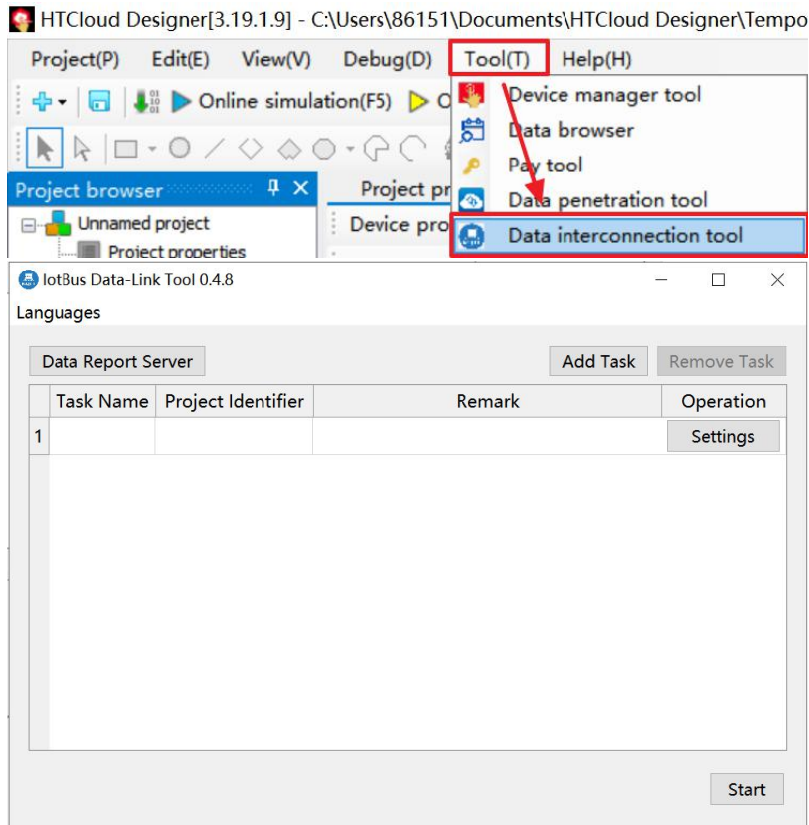
3.4. Download Project

Download your project after edit the displays.

4. Configure IoTbus Data-link Tool

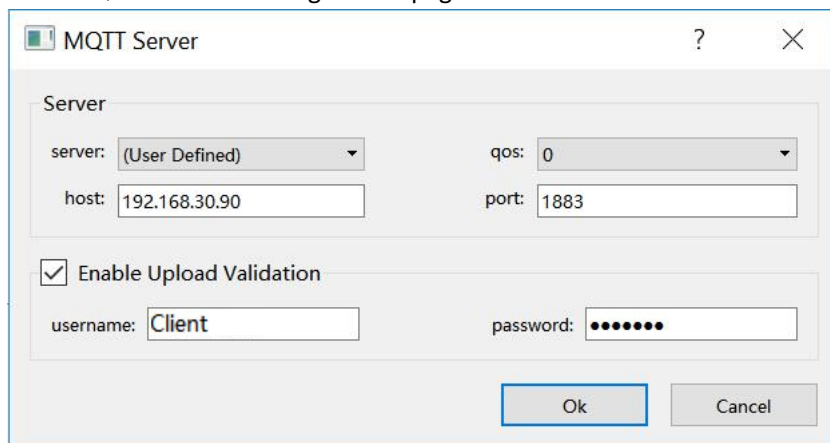
4.1. IoTbus Data link Tool

“IoTbus Data link Tool” is a database storage tool developed by HNC which built-in “HTCloud Designer”



4.2. Configure MQTT Server

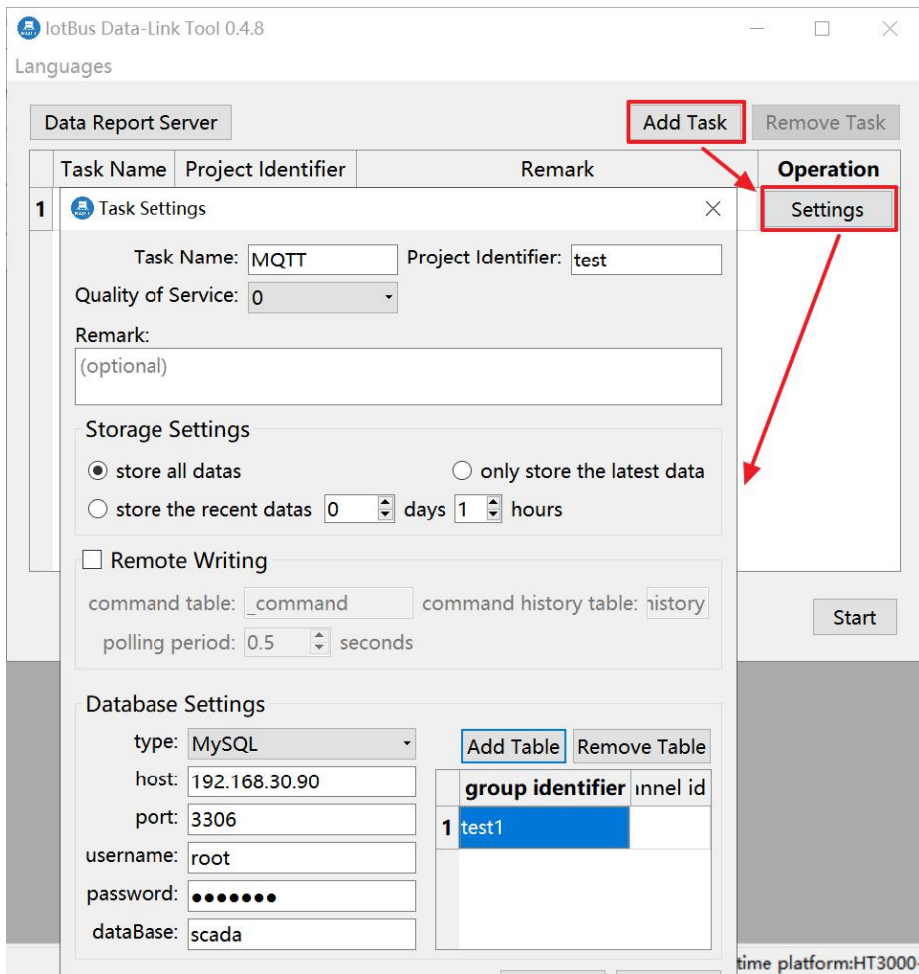
Click MQTT Server to configuration page. You can refer to 3.3. Data Center for guidance.



4.3. Add Task

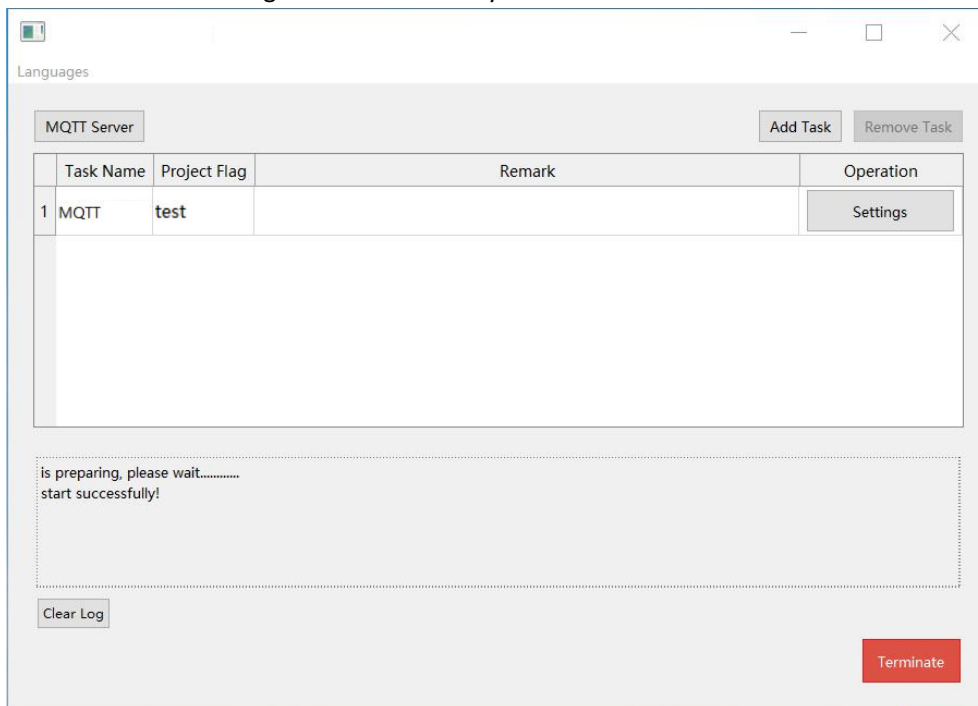
Click Add Task -> Settings to set up a new task.

Project flag is corresponding to server project identifier in data center of HTCloud Designer while table name corresponding to remote identification in history group edit. You can refer to 2.5. Connect to Database Remotely for other settings. Fill in database option with the database created in 2.5. Connect to Database Remotely, which is scada.



4.4. Start

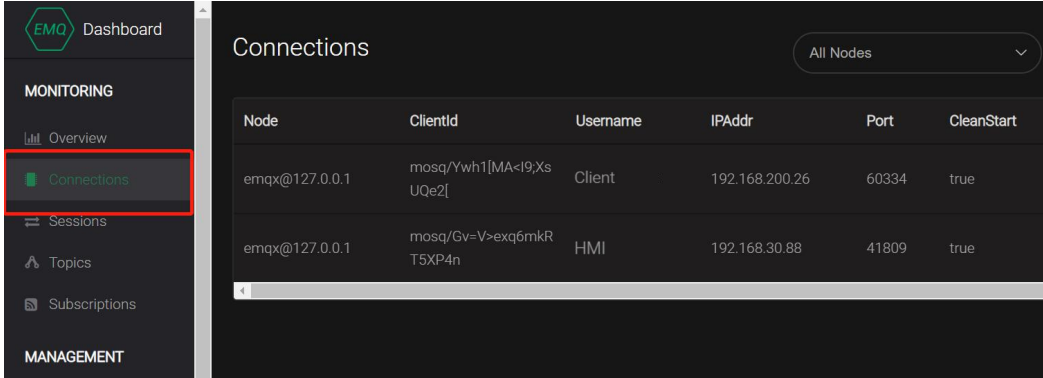
Click start to execute the task after adding a new task. If the task starts successfully, the log window will show the information message “start successfully!”.



5. Verification

5.1. MQTT Server

Enter EMQ X Web Dashboard. In the connections tag, there are two connections to EMQ X server. The usernames are Client and HMI, which are the usernames set up previously. Hence, both HMI/HBOX and IoTbus Data link Tool are connected to MQTT server.



5.2. MySQL Database

Connect to MySQL server remotely with MySQL-Front. A new table, whose name is test1, is created in scada database. Select data browser mode in test1 table. The values of V0, V1 and SM5 are uploaded and stored in MySQL database. Hence, the historical data of HMI/H-BOX are stored in MySQL server successfully.

MF 192.168.30.90 - scada.test1 - MySQL-Front

_id	_time	_pncode	V0	V1	SM5
8311	2019-01-29 09:10:	18081031100301C	14498	14498	0
8310	2019-01-29 09:10:	18081031100301C	3766	3766	1
8309	2019-01-29 09:10:	18081031100301C	-6663	-6663	1
8308	2019-01-29 09:10:	18081031100301C	-17580	-17580	1
8307	2019-01-29 09:09:	18081031100301C	-28461	-28461	0
8306	2019-01-29 09:09:	18081031100301C	26596	26596	0
8305	2019-01-29 09:09:	18081031100301C	15710	15710	0
8304	2019-01-29 09:09:	18081031100301C	5083	5083	1
8303	2019-01-29 09:09:	18081031100301C	-5619	-5619	1
8302	2019-01-29 09:09:	18081031100301C	-16252	-16252	0
8301	2019-01-29 09:08:	18081031100301C	-26983	-26983	1
8300	2019-01-29 09:08:	18081031100301C	27833	27833	0