Tutorial on Mosquitto and Paho

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In this tutorial we will discuss about how to install and run Mosquitto, an MQTT broker written in C, as well as Paho, an MQTT client library written in different programming languages. For the office lighting system practical assignment, an MQTT broker should be running on the broker (area controller) of the system (the blue part). The broker (area controller) can be deployed and run on a laptop or a Raspberry Pi. Therefore, we provide installation and execution information of Mosquitto on Windows, Raspberry Pi and Linux.

MQTT client is used for the lighting behavior implementation which is deployed on the end devices (Light device and Sensor device) for distributed behavior deployment and on the broker (area controller) for centralized behavior deployment.

For introduction on the MQTT protocol, you can watch the following YouTube videos:

1. https://www.youtube.com/watch?v=1GbYkCrbChw (Getting started with MQTT: Everything you need to know about the lightweight IoT protocol)
2. https://www.youtube.com/watch?v=-KNPXPmx88E (Getting started with MQTT)

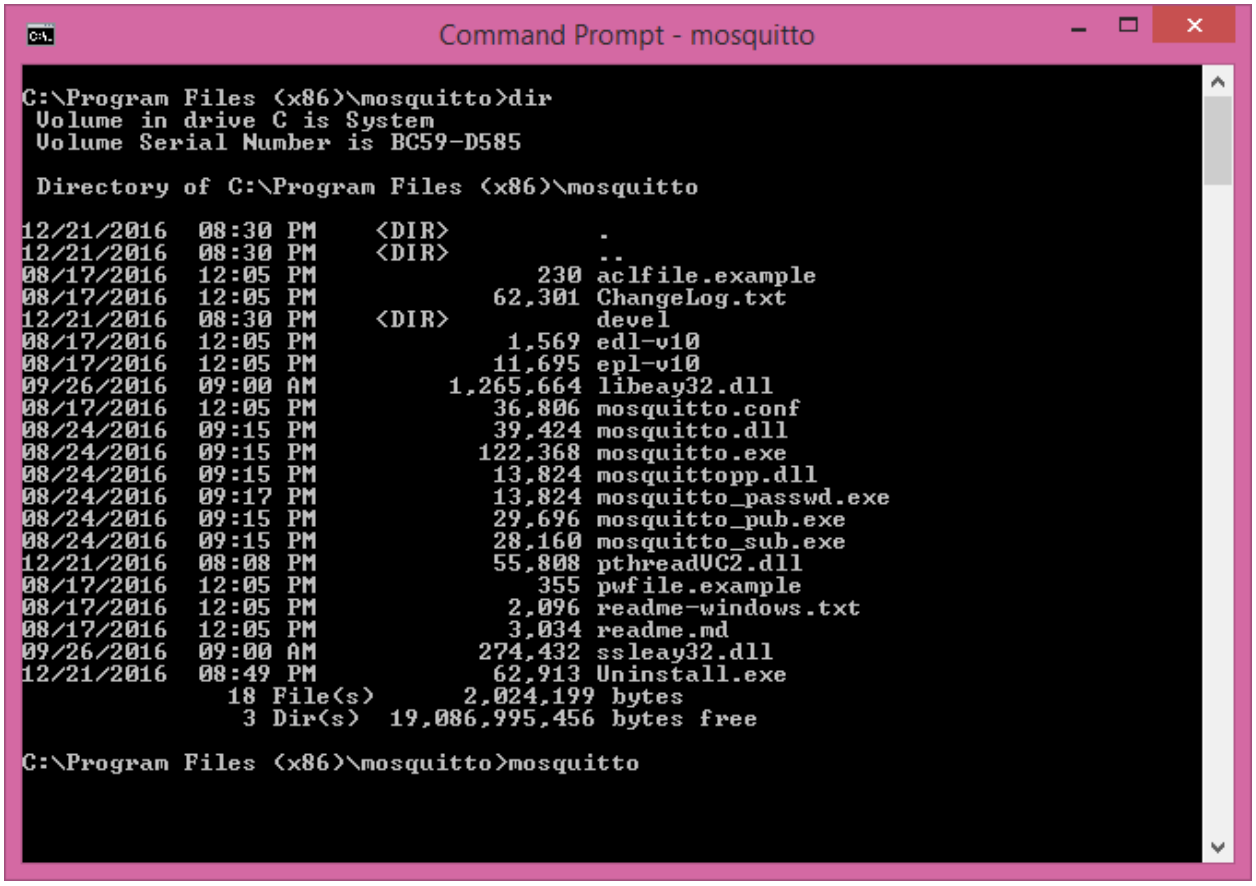
1 ECLIPSE MOSQUITTO

According to its website at https://mosquitto.org/ , "Eclipse Mosquitto™ is an open source (EPL/EDL licensed) message broker that implements the MQTT protocol versions 3.1 and 3.1.1. MQTT provides a lightweight method of carrying out messaging using a publish/subscribe model." On the following, we will discuss about how to install and test Mosquitto on Windows, Raspberry Pi and Linux System.

1.1 ECLIPSE MOSQUITTO ON WINDOWS

The following steps describe how to install and run Mosquitto on Windows:

1. Download Mosquitto broker for Windows from http://www.eclipse.org/downloads/download.php?file=/mosquitto/binary/win32/mosquitto-1.4.10-install-win32.exe
2. Install Mosquitto on Windows by following the steps specified in https://sivatechworld.wordpress.com/2015/06/11/step-by-step-installing-and-configuring-mosquitto-with-windows-7/
3. To start the Mosquitto service, open up Windows command line by clicking "Start" on the Taskbar, typing in "cmd" and pressing Enter. Navigate to where you installed Mosquitto. By default it will be located in "C:\Program Files (x86)\mosquitto" as shown on the picture below.



4. You can test your broker with the following commands on two new terminals:
   - Use `mosquitto_sub` to subscribe to a topic on terminal 1:

     ```
     mosquitto_sub -t 'test/topic' -v
     ```

   - And to publish a message on terminal 2:

     ```
     mosquitto_pub -t 'test/topic' -m “hello world”
     ```

1.2 ECLIPSE MOSQUITTO ON RASPBERRY PI

Mosquitto has been installed on the Raspberry Pis. You can simply stop and start the service with the following command:

- Stop the service

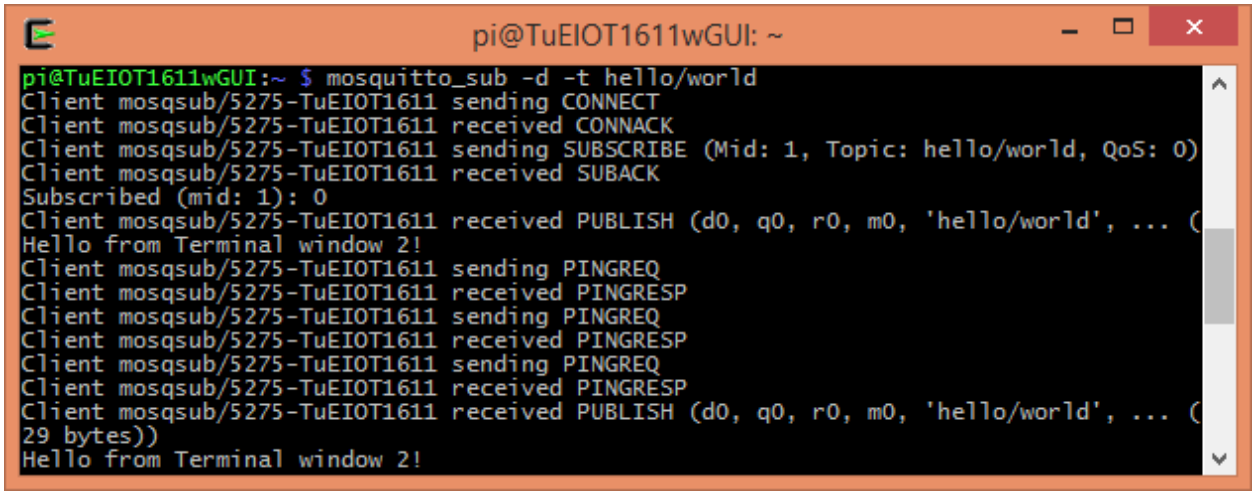
  ```
  sudo /etc/init.d/mosquitto stop
  ```

- Start the service

  ```
  sudo /etc/init.d/mosquitto start
  ```

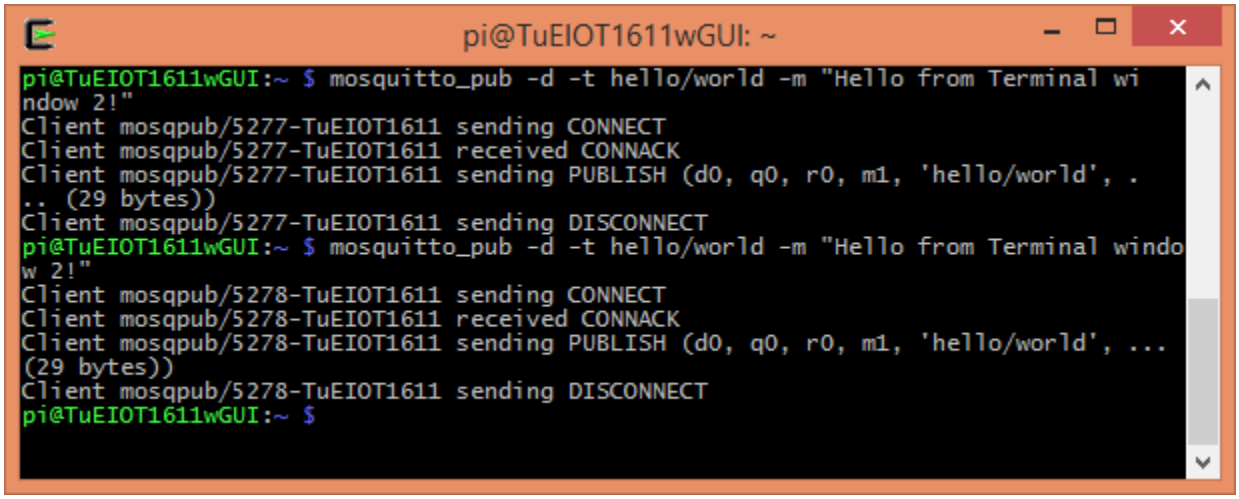
5. You can test your broker with the following commands on two terminals:
   - Use `mosquitto_sub` to subscribe to a topic on terminal 1 (see picture below):

     ```
     mosquitto_sub -d -t hello/world
     ```



   - And to publish a message on terminal 2 (see picture below):

     ```
     mosquitto_pub -d -t hello/world -m "Hello from Terminal window 2!"
     ```



1.3 ECLIPSE MOSQUITTO ON LINUX SYSTEM

For installation and testing of Mosquitto on Linux System, follow the tutorial on:

http://rundebugrepeat.com/2016/03/19/mosquitto-broker-install/

2 ECLIPSE PAHO

As stated in its website (https://eclipse.org/paho/) , Eclipse Paho is an open-source implementation of MQTT client, available in various programming languages. You can you Paho to send subscribe and publish messages to the Mosquitto broker. Paho should be deployed on the end devices and the broker (area controller) for implementing the lighting behavior. In distributed behavior deployment, the Sensor devices publish their state to the MQTT broker, and the Light Devices subscribe to the state of all sensors in the room. In centralized behavior deployment, the MQTT client deployed on the broker (area controller) subscribes to the local MQTT broker (Mosquitto) for observing the states of the Sensor devices.

For documentation on downloading, installing and using the Paho codes, please refer to https://eclipse.org/paho/downloads.php . Click on the programming language of your choice on the page for more information.