

```
jordansun@Jordans-MBP ~ % brew install mosquito
--> Downloading https://ghcr.io/v2/homebrew/core/libuv/manifests/1.44.1
##### 100.0%
--> Downloading https://ghcr.io/v2/homebrew/core/libuv/blobs/sha256:a6abf837a4759d19e3239f297cc91eb981362c33b138a88e72a6a988428b55dc
##### 100.0%
--> Downloading from https://pkg-containers.githubusercontent.com/ghcr1/blobs/sha256:a6abf837a4759d19e3239f297cc91eb981362c33b138a88e72a6a988428b55dc?se=2022-03-17T19%3A50%3A00Z&sig=6CgKvJk2F%2BkfqJLCB1
##### 100.0%
--> Downloading https://ghcr.io/v2/homebrew/core/libwebsockets/manifests/4.3.1
##### 100.0%
--> Downloading https://ghcr.io/v2/homebrew/core/libwebsockets/blobs/sha256:83158a8bffe0742fbd6a0fa3c81eecec1cd6727ee8189bfbfcbf4d1961ec7499
##### 100.0%
--> Downloading from https://pkg-containers.githubusercontent.com/ghcr1/blobs/sha256:83158a8bffe0742fbd6a0fa3c81eecec1cd6727ee8189bfbfcbf4d1961ec7499?se=2022-03-17T19%3A50%3A00Z&sig=fLnlLIuoGYjCk2F9fcel
##### 100.0%
--> Downloading https://ghcr.io/v2/homebrew/core/mosquitto/manifests/2.0.14
##### 100.0%
--> Installing dependencies for mosquito: libuv and libwebsockets
--> Installing mosquito dependency: libuv
--> Pouring libuv--1.44.1.arm64_monterey.bottle.tar.gz
  /opt/homebrew/Cellar/libuv/1.44.1: 49 files, 3.6MB
--> Installing mosquito dependency: libwebsockets
--> Pouring libwebsockets--4.3.1.arm64_monterey.bottle.tar.gz
  /opt/homebrew/Cellar/libwebsockets/4.3.1: 115 files, 2.5MB
--> Installing mosquito
--> Pouring mosquito--2.0.14.arm64_monterey.bottle.tar.gz
--> Caveats
mosquitto has been installed with a default configuration file.
You can make changes to the configuration by editing:
  /opt/homebrew/etc/mosquitto/mosquitto.conf

To restart mosquitto after an upgrade:
  brew services restart mosquitto
Or, if you don't want/need a background service you can just run:
  /opt/homebrew/opt/mosquitto/sbin/mosquitto -c /opt/homebrew/etc/mosquitto/mosquitto.conf
--> Summary
  /opt/homebrew/Cellar/mosquitto/2.0.14: 43 files, 1.7MB
--> Running 'brew cleanup mosquitto'...
Disable this behaviour by setting HOMEBREW_NO_INSTALL_CLEANUP.
Hide these hints with HOMEBREW_NO_ENV_HINTS (see 'man brew').
--> Caveats
--> mosquitto
mosquitto has been installed with a default configuration file.
You can make changes to the configuration by editing:
  /opt/homebrew/etc/mosquitto/mosquitto.conf

To restart mosquitto after an upgrade:
  brew services restart mosquitto
Or, if you don't want/need a background service you can just run:
  /opt/homebrew/opt/mosquitto/sbin/mosquitto -c /opt/homebrew/etc/mosquitto/mosquitto.conf
jordansun@Jordans-MBP ~ % brew services start mosquitto
--> Successfully started 'mosquitto' (label: homebrew.mxcl.mosquitto)
jordansun@Jordans-MBP ~ %
```

```
lesson5 -- -zsh — 202x54
Last login: Thu Mar 17 15:04:07 on tty001
jordansun@Jordans-MBP ~ % mosquitto_pub -h localhost -t test/topic -m "Hello"
jordansun@Jordans-MBP ~ % sudo pip3 install -U paho-mqtt
Password:
WARNING: The directory '/Users/jordansun/Library/Caches/pip' or its parent directory is not owned or is not writable by the current user. The cache has been disabled. Check the permissions and owner of
that directory. If you do not own or control the directory, you should use sudo's -H flag.
DEPRECATION: Configuring installation scheme with distutils config files is deprecated and will no longer work in the near future. If you are using a Homebrew or Linuxbrew Python, please see discussion
at https://github.com/Homebrew/homebrew-core/issues/76621
Collecting paho-mqtt
  Downloading paho-mqtt-1.6.1.tar.gz (99 kB)
    |#####| 99 kB 3.0 MB/s
  Preparing metadata (setup.py) ... done
Building wheels for collected packages: paho-mqtt
  Building wheel for paho-mqtt (setup.py) ... done
  Created wheel for paho-mqtt: filename=paho_mqtt-1.6.1-py3-none-any.whl size=62133 sha256=02fac751dddd61c85ea19e4a7de1a2c538a377f147bde35be649207c127fc89
  Stored in directory: /private/tmp/pip-ephem-wheel-cache-whd8_2lq/wheels/0f/90/29/d029bb8ddc98ec5f2363b959130c9ddbfc5fcd64a00b618add
Successfully built paho-mqtt
Installing collected packages: paho-mqtt
DEPRECATION: Configuring installation scheme with distutils config files is deprecated and will no longer work in the near future. If you are using a Homebrew or Linuxbrew Python, please see discussion
at https://github.com/Homebrew/homebrew-core/issues/76621
Successfully installed paho-mqtt-1.6.1
WARNING: Running pip as the 'root' user can result in broken permissions and conflicting behaviour with the system package manager. It is recommended to use a virtual environment instead: https://pip.py
pa.io/earnings/vanv
WARNING: You are using pip version 21.3.1; however, version 22.0.4 is available.
You should consider upgrading via the '/opt/homebrew/opt/python@3.9/bin/python3.9 -m pip install --upgrade pip' command.
jordansun@Jordans-MBP ~ % cd Desktop/github
jordansun@Jordans-MBP ~ % git clone https://github.com/eclipse/paho.mqtt.python.git
Cloning into 'paho.mqtt.python'...
remote: Enumerating objects: 4491, done.
remote: Counting objects: 100% (929/929), done.
remote: Compressing objects: 100% (869/869), done.
remote: Total 4491 (delta 847), reused 826 (delta 490), pack-reused 3562
Receiving objects: 100% (4491/4491), 1.37 MiB | 2.50 MiB/s, done.
Resolving deltas: 100% (2395/2395), done.
jordansun@Jordans-MBP ~ % git hub % cd iot
jordansun@Jordans-MBP ~ % cd lesson5
jordansun@Jordans-MBP ~ % python3 client.py
Connected with result code 0
$SYS/broker/publish/messages/received 1412661
$SYS/broker/publish/messages/sent 6341138
$SYS/broker/publish/bytes/received 180565722
$SYS/broker/publish/bytes/sent 208332407
^CTraceback (most recent call last):
  File "/Users/jordansun/Desktop/github/iot/lesson5/client.py", line 24, in <module>
    client.loop_forever()
  File "/opt/homebrew/lib/python3.9/site-packages/paho/mqtt/client.py", line 1756, in loop_forever
    rc = self._loop(timeout)
  File "/opt/homebrew/lib/python3.9/site-packages/paho/mqtt/client.py", line 1150, in _loop
    socklist = select.select(rlist, wlist, [], timeout)
KeyboardInterrupt

jordansun@Jordans-MBP ~ % lesson5 %
```

lesson5 — Python sub.py — 202x54

```
jordansun@Jordans-MBP ~ % $ mosquitto_sub -h localhost -v -t test/topic &
[1] 58165
jordansun@Jordans-MBP ~ % zsh: command not found: $

[1] + exit 127 $ mosquitto_sub -h localhost -v -t test/topic
jordansun@Jordans-MBP ~ % mosquitto_sub -h localhost -v -t test/topic &
[1] 58166
jordansun@Jordans-MBP ~ % test/topic Hello

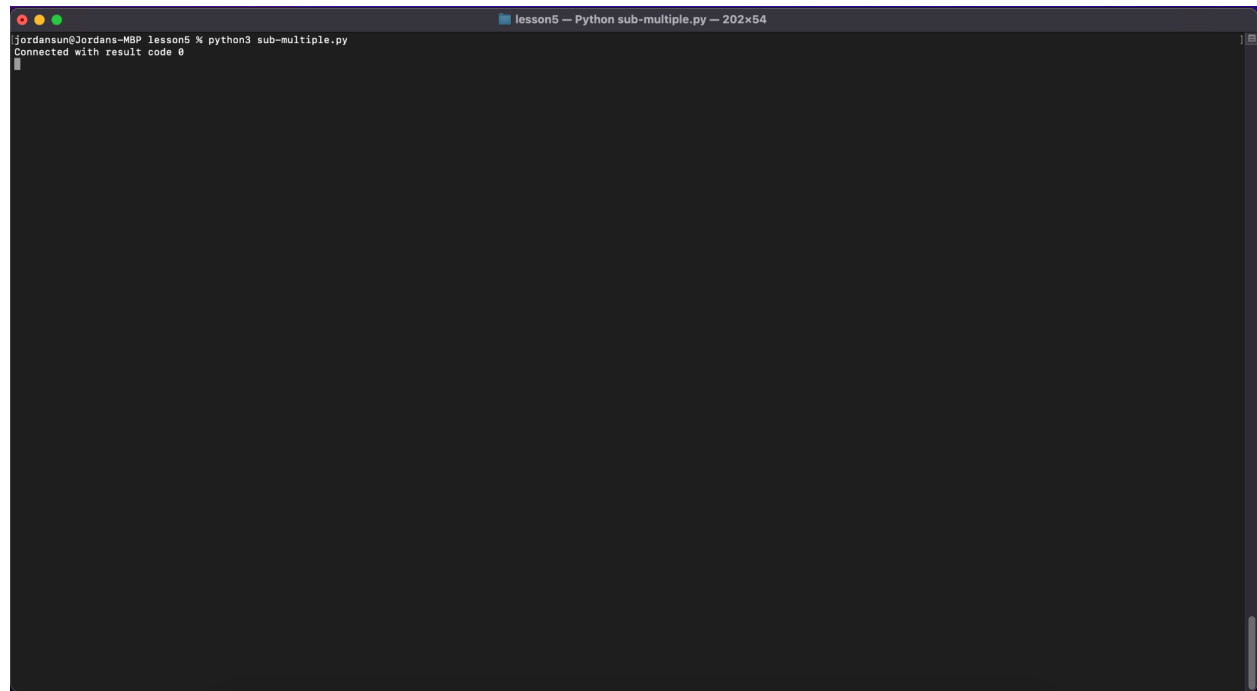
jordansun@Jordans-MBP ~ % python3 sub.py
/opt/homebrew/bin/python3: can't open file '/Users/jordansun/sub.py': [Errno 2] No such file or directory
jordansun@Jordans-MBP ~ % cd Desktop/github/iot/lesson5
jordansun@Jordans-MBP lesson5 % python3 sub.py
Connected with result code 0
```

lesson5 — Python sub.py — 202x54

```
Preparing metadata (setup.py) ... done
Building wheels for collected packages: paho-mqtt
  Building wheel for paho-mqtt (setup.py) ... done
  Created wheel for paho-mqtt: filename=paho_mqtt-1.6.1-py3-none-any.whl size=62133 sha256=02fac751ddddd1c85ea19e4a7de1a2c530a377f147bde35be649207c127fc89
  Stored in directory: /private/tmp/pip-ephem-wheel-cache-whd8_21q/wheels/0f/90/29/db29bb8ddc98ec5f2363b959130c9dbbcf5cfdb4a08b6184dd
Successfully built paho-mqtt
Installing collected packages: paho-mqtt
  DEPRECATION: Configuring installation scheme with distutils config files is deprecated and will no longer work in the near future. If you are using a Homebrew or Linuxbrew Python, please see discussion at https://github.com/Homebrew/homebrew-core/issues/76621
  Successfully installed paho-mqtt-1.6.1
WARNING: Running pip as the 'root' user can result in broken permissions and conflicting behaviour with the system package manager. It is recommended to use a virtual environment instead: https://pip.py
pa.io/warnings/venv
WARNING: You are using pip version 21.3.1; however, version 22.0.4 is available.
You should consider upgrading via the '/opt/homebrew/opt/python@3.9/bin/python3.9 -m pip install --upgrade pip' command.
jordansun@Jordans-MBP ~ % cd Desktop/github
jordansun@Jordans-MBP github % git clone https://github.com/eclipse/paho.mqtt.python.git
Cloning into 'paho.mqtt.python'...
remote: Enumerating objects: 4491, done.
remote: Counting objects: 100% (929/929), done.
remote: Compressing objects: 100% (369/369), done.
remote: Total 4491 (delta 547), reused 826 (delta 490), pack-reused 3562
Receiving objects: 100% (4491/4491), 1.37 MiB | 2.50 MiB/s, done.
Resolving deltas: 100% (2395/2395), done.
jordansun@Jordans-MBP github % cd iot
jordansun@Jordans-MBP iot % cd lesson5
jordansun@Jordans-MBP lesson5 % python3 client.py
Connected with result code 0
$SYS/broker/publish/messages/received 1412661
$SYS/broker/publish/messages/sent 6341130
$SYS/broker/publish/bytes/received 100565722
$SYS/broker/publish/bytes/sent 208332407
^CTraceback (most recent call last):
  File "/Users/jordansun/Desktop/github/iot/lesson5/client.py", line 24, in <module>
    client.loop_forever()
  File "/opt/homebrew/lib/python3.9/site-packages/paho/mqtt/client.py", line 1756, in loop_forever
    rc = self._loop(timeout)
  File "/opt/homebrew/lib/python3.9/site-packages/paho/mqtt/client.py", line 1150, in _loop
    socklist = select.select(rlist, wlist, [], timeout)
KeyboardInterrupt

jordansun@Jordans-MBP lesson5 % python3 sub.py
Connected with result code 0
^CTraceback (most recent call last):
  File "/Users/jordansun/Desktop/github/iot/lesson5/sub.py", line 11, in <module>
    client.loop_forever()
  File "/opt/homebrew/lib/python3.9/site-packages/paho/mqtt/client.py", line 1756, in loop_forever
    rc = self._loop(timeout)
  File "/opt/homebrew/lib/python3.9/site-packages/paho/mqtt/client.py", line 1150, in _loop
    socklist = select.select(rlist, wlist, [], timeout)
KeyboardInterrupt

jordansun@Jordans-MBP lesson5 % python3 sub.py
Connected with result code 0
```



A terminal window titled "lesson5 -- Python sub-multiple.py -- 202x54". The prompt is "jordansun@Jordans-MBP lesson5 %". The command "python3 sub-multiple.py" has been executed, resulting in the output "Connected with result code 0".

```
jordansun@Jordans-MBP lesson5 % python3 sub-multiple.py
Connected with result code 0
```

```
lesson5 -- zsh -- 202x54

jordan@Jordans-MBP lesson5 % python3 sub-multiple.py
Connected with result code 0
*OTraceback (most recent call last):
  File "/Users/jordan/Desktop/github/iot/lesson5/sub-multiple.py", line 11, in <module>
    client.loop_forever()
  File "/opt/homebrew/lib/python3.9/site-packages/paho/mqtt/client.py", line 1756, in loop_forever
    rc = self._loop(timeout)
  File "/opt/homebrew/lib/python3.9/site-packages/paho/mqtt/client.py", line 1150, in _loop
    socklist = select.select(rlist, wlist, [], timeout)
KeyboardInterrupt

jordan@Jordans-MBP lesson5 % python3 pub-multiple.py
jordan@Jordans-MBP lesson5 %
```

```
lesson5 -- Python sub-multiple.py -- 202x54

jordan@Jordans-MBP lesson5 % python3 sub-multiple.py
Connected with result code 0
paho/test/multiple multiple 1
paho/test/multiple multiple 2

```

```
lesson5 -- Python pubcpu.py -- 202x54

jordan@jordan-MBP lesson5 % python3 sub-multiple.py
Connected with result code 0
paho/test/multiple multiple 1
paho/test/multiple multiple 2
^CTraceback (most recent call last):
  File "/Users/jordan/Desktop/github/iot/lesson5/sub-multiple.py", line 11, in <module>
    client.loop_forever()
  File "/opt/homebrew/lib/python3.9/site-packages/paho/mqtt/client.py", line 1756, in loop_forever
    rc = self._loop(timeout)
  File "/opt/homebrew/lib/python3.9/site-packages/paho/mqtt/client.py", line 1150, in _loop
    socklist = select.select(rlist, wlist, [], timeout)
KeyboardInterrupt

jordan@jordan-MBP lesson5 % python3 subcpu.py
Connected with result code 0
^CTraceback (most recent call last):
  File "/Users/jordan/Desktop/github/iot/lesson5/subcpu.py", line 11, in <module>
    client.loop_forever()
  File "/opt/homebrew/lib/python3.9/site-packages/paho/mqtt/client.py", line 1756, in loop_forever
    rc = self._loop(timeout)
  File "/opt/homebrew/lib/python3.9/site-packages/paho/mqtt/client.py", line 1150, in _loop
    socklist = select.select(rlist, wlist, [], timeout)
KeyboardInterrupt

jordan@jordan-MBP lesson5 % python3 pubcpu.py
Traceback (most recent call last):
  File "/Users/jordan/Desktop/github/iot/lesson5/pubcpu.py", line 3, in <module>
    import psutil
ModuleNotFoundError: No module named 'psutil'

jordan@jordan-MBP lesson5 % pip3 install psutil
DEPRECATION: Configuring installation scheme with distutils config files is deprecated and will no longer work in the near future. If you are using a Homebrew or Linuxbrew Python, please see discussion at https://github.com/Homebrew/homebrew-core/issues/76621
Collecting psutil
  Using cached psutil-5.9.0.tar.gz (478 kB)
  Preparing metadata (setup.py) ... done
Building wheels for collected packages: psutil
  Building wheel for psutil (setup.py) ... done
  Created wheel for psutil: filename=psutil-5.9.0-cp39-cp39-macosx_12_0_arm64.whl size=238203 sha256=1155ed4cfb6867b2a3cf69fb5dce29d99aef3b9fbfa48ae992a68ce838654b40
  Stored in directory: /Users/jordan/Library/Caches/pip/wheels/18/df/c6/8de32e61da3868ca8a1df2a3c2cc94604b82fbd1883b245
Successfully built psutil
Installing collected packages: psutil
DEPRECATION: Configuring installation scheme with distutils config files is deprecated and will no longer work in the near future. If you are using a Homebrew or Linuxbrew Python, please see discussion at https://github.com/Homebrew/homebrew-core/issues/76621
Successfully installed psutil-5.9.0
WARNING: You are using pip version 21.3.1; however, version 22.0.4 is available.
You should consider upgrading via the '/opt/homebrew/opt/python@3.9/bin/python3.9 -m pip install --upgrade pip' command.

jordan@jordan-MBP lesson5 % python3 pubcpu.py
2022-03-17 15:56:06
CPU Usage: 8.6 %
2022-03-17 15:56:16
CPU Usage: 5.8 %
2022-03-17 15:56:26
CPU Usage: 10.7 %
```

```
lesson5 -- Python subcpu.py -- 202x54

jordan@jordan-MBP lesson5 % python3 sub-multiple.py
Connected with result code 0
^CTraceback (most recent call last):
  File "/Users/jordan/Desktop/github/iot/lesson5/sub-multiple.py", line 11, in <module>
    client.loop_forever()
  File "/opt/homebrew/lib/python3.9/site-packages/paho/mqtt/client.py", line 1756, in loop_forever
    rc = self._loop(timeout)
  File "/opt/homebrew/lib/python3.9/site-packages/paho/mqtt/client.py", line 1150, in _loop
    socklist = select.select(rlist, wlist, [], timeout)
KeyboardInterrupt

jordan@jordan-MBP lesson5 % python3 pub-multiple.py
jordan@jordan-MBP lesson5 % python3 pubcpu.py
Traceback (most recent call last):
  File "/Users/jordan/Desktop/github/iot/lesson5/pubcpu.py", line 3, in <module>
    import psutil
ModuleNotFoundError: No module named 'psutil'

jordan@jordan-MBP lesson5 % python3 subcpu.py
Connected with result code 0
MyCPU 2022-03-17 15:56:06
MyCPU CPU Usage: 8.6 %
MyCPU 2022-03-17 15:56:16
MyCPU CPU Usage: 5.8 %
MyCPU 2022-03-17 15:56:26
MyCPU CPU Usage: 10.7 %
MyCPU 2022-03-17 15:56:36
MyCPU CPU Usage: 13.1 %
```