# Set up and configure I40 test server development environment

Ubuntu server install

**Oracle virtual box**

Ubuntu18.04.4 Desktop – 40Gig dynamic disk , 4Gig RAM – image on Sdrive in linux distros

Storage > controller > Optical drive image - C:\Users\sgale\Downloads\ubuntu-18.04.4-desktop-amd64.iso

Note can use nat networking to start with

Install

$sudo apt-get update

$sudo apt-get upgrade

18.04 guest additions - <https://www.tecmint.com/install-virtualbox-guest-additions-in-ubuntu/>

$ sudo apt install build-essential dkms linux-headers-$(uname -r)

$reboot

Install guest additions

**Guest additions installed ok**

$ sudo apt install git

$ip a      # check ip address

$sudo apt-get update

$sudo apt-get upgrade

**Set up Git repo**

$git clone <https://github.com/SteveGaleComputingStudies/2020i40.git>

$cd 2020i40

$ls

$git config --list

Use your name and email

$git config --global user.name "Steve Gale"

$git config --global user.email steve.gale@computingstudies.net

$git config --list

$cd ..

Install VSCODE

Debian and Ubuntu based distributions

The easiest way to install Visual Studio Code for Debian/Ubuntu based distributions is to download and install the [.deb package (64-bit)](https://go.microsoft.com/fwlink/?LinkID=760868), either through the graphical software center if it's available, or through the command line with:

sudo apt install ./<file>.deb   
   
# If you're on an older Linux distribution, you will need to run this instead:   
# sudo dpkg -i <file>.deb   
# sudo apt-get install -f # Install dependencies

Note navigate to the link above in firefox and download the latest .deb file it will be placed in the Downloads folder ie cd $HOME/Downloads

$cd Downloads

$ls

$sudo apt install ./<file>.deb

$cd ../2020i40

$code .

Install Apache / php / mysql / phpmyadmin

Follow this for 18.04 - <http://www.computingstudies.net/tutorials/apache2/>

$sudo apt-get install apache2

$sudo gedit /etc/apache2/apache2.conf

ServerName  sgI40.local  # use a unique server name eg billi40.local added to the end of the file

$service apache2 restart

[http://localhost](http://localhost/)

#for 18.04

$sudo apt-get install php7.2 php-mbstring php7.2-mbstring mysql-server phpmyadmin libapache2-mod-php 

Choose apache2 (space to select – tab to OK)

$sudo service apache2 restart

$sudo mysql\_secure\_installation

#privelige tables - no, yes for the rest

#below in red is not needed

$sudo nano /etc/apache2/apache2.conf

Include /etc/phpmyadmin/apache.conf

$sudo apt-get update

$sudo apt-get upgrade

## Configure database user for phpmyadmin

<http://localhost/phpmyadmin/>

**Need to create a user for phpmyadmin**

$sudo mysql -u root -p

>CREATE USER 'sg'@'localhost' IDENTIFIED BY 'Password1';

>GRANT ALL PRIVILEGES ON \*.\* TO 'sg'@'localhost' WITH GRANT OPTION;

>FLUSH PRIVILEGES;

>quit

$

<http://localhost/phpmyadmin/>

username: sg

password: Password1

## First deploy – deploy test prototype code to web server

$cd 2020i40

$cd sh

$ls –sail

$chmod +x \*.sh

$cat deploy.sh #first deployment script (creates folders)

$cat deployChanges.sh #subsequent deployments

$./deploy.sh

$cd /var/www/html

$ls

**Test deployment**

<http://localhost/i40Test/>

<http://localhost/i40Test/admin/createDatabase.php>

#Note mysql needs user I40

## Add new user to database

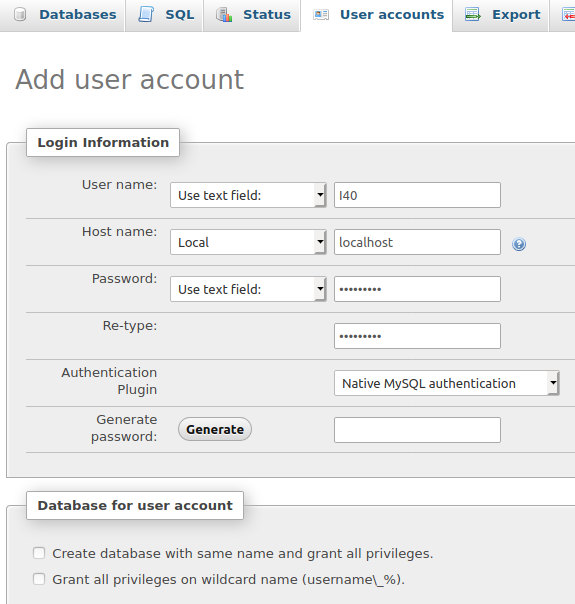
<http://localhost/phpmyadmin/>

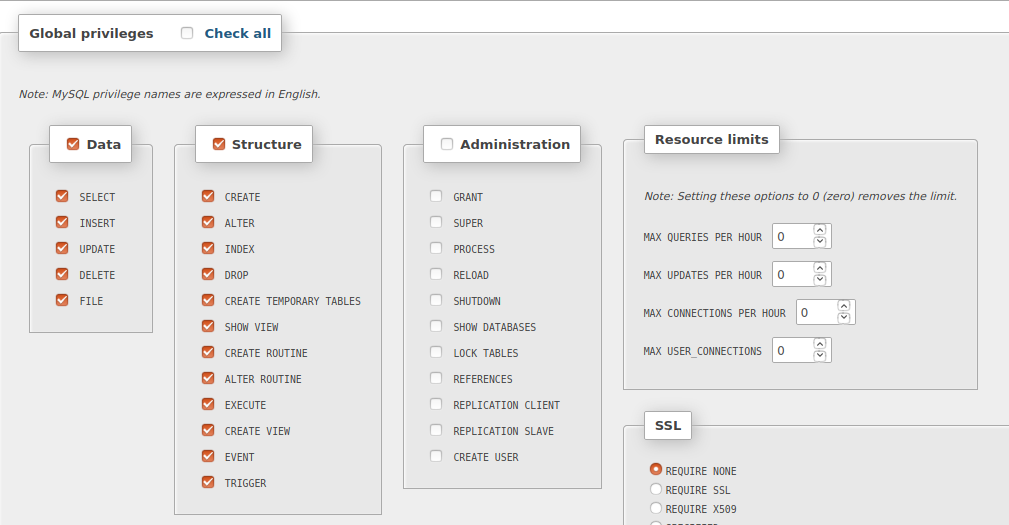
User accounts > new - **add user account**

$servername = "localhost";

$username = "I40";

$password = "Password1";





<http://localhost/i40Test/admin/createDatabase.php>

<http://localhost/i40Test/admin/createTableRoomData.php>

<http://localhost/i40Test/admin/displayRoomTabledata.php>

0 Results

Server IP address – 192.168.223.(100+computer number in E223 lab)

ref - <https://help.ubuntu.com/lts/serverguide/network-configuration.html#ip-addressing>

**Note – this can be changed if you are running at home to match your home settings**

$sudo nano /etc/netplan/99\_config.yaml

network:

version: 2

renderer: networkd

ethernets:

enp0s3:

addresses:

- 192.168.223.1XX/24

gateway4: 192.168.223.1

nameservers:

search: [mydomain, otherdomain]

addresses: [192.168.210.2, 8.8.8.8]

$shutdown now

## Oracle Virtual box - settings

Machine > Settings > network

Adapter 1 (Attached to) Bridged Adapter

Reboot

Run Pycom test code from windows PC connected to Pycom device

 Note: Change host address to match your test server address at home or if in E223: (192.168.223.(100+computer number)

# IP address of PHP / MySQL server

#2020 IP address of Steves server in VM

host = '10.0.0.49'   # VM DHCP Lease in SG HOME PC - 30/03/20

#host = '192.168.223.240'   # VM DHCP Lease in E223 (OR 241)

#host = '192.168.208.240'   # VM DHCP Lease in E208

#host = '192.168.217.9'      # VM DHCP Lease in E216

port = 80

# construct json string with measured values insetred

contentStr='{ "RoomName" : "E223", "Humidity" : "%.2f", "Temperature": "%.2f" }'%(humidityValue,tempValue)

postStr = 'POST /i40Test/admin/InsertJsonRESTData.php HTTP/1.1\r\n'

hostStr = 'Host: %s:%s\r\n'%(str(host),str(port))

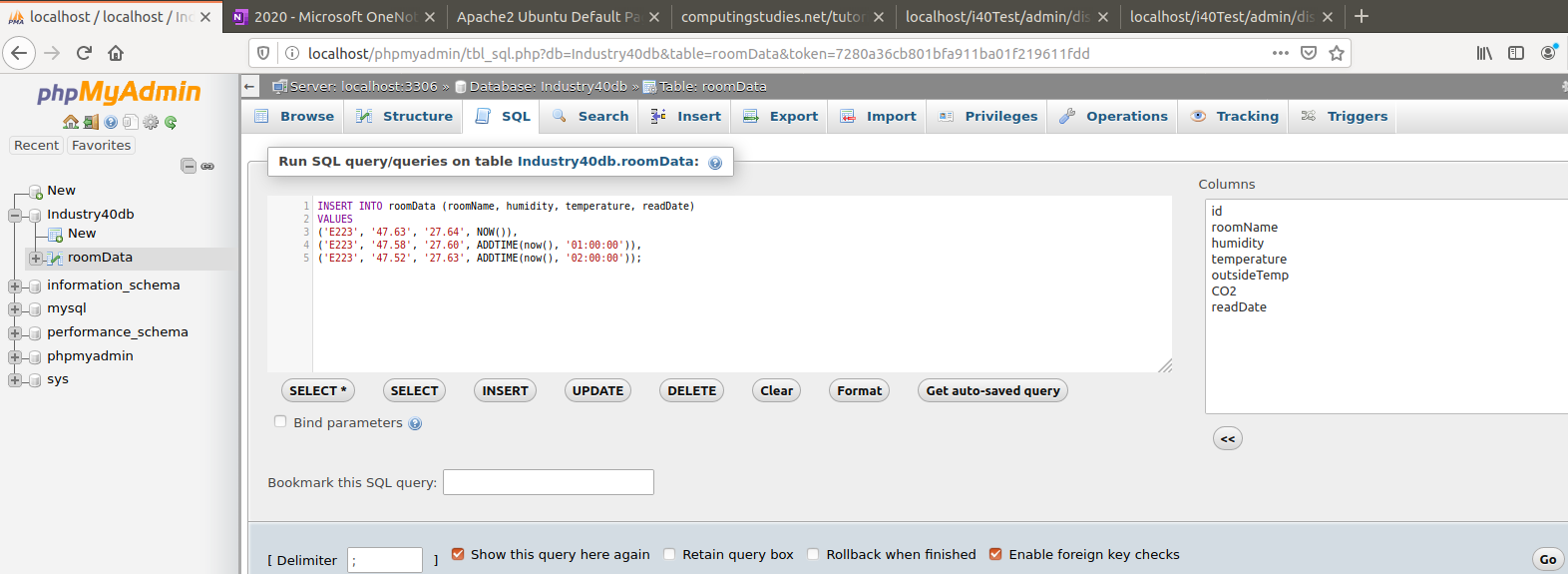
contentTypeStr = 'Content-Type: application/json\r\n'

contentLengthStr = 'Content-Length: %s\r\n\r\n'%str(len(contentStr))

# format HTTP post payload string for sending to the PHP / mySQL server

payload = postStr + hostStr+ contentTypeStr + contentLengthStr + contentStr

Insert test data if no pycom IOT device is available



\2020i40\SQL\insertRoomDataTableSampleData-150420.sql

This sql can be inserted multiple times to get more datapoints

Ref - <https://stackoverflow.com/questions/589652/add-2-hours-to-current-time-in-mysql>

Check inserted data

<http://localhost/i40Test/admin/displayRoomTabledata.php>

id: 1 - DeviceName: E223 - Temperature 27.64 - Humidity 47.63

id: 2 - DeviceName: E223 - Temperature 27.60 - Humidity 47.58

id: 3 - DeviceName: E223 - Temperature 27.63 - Humidity 47.52

Setup Python data analytics environment

#2019 data analytics instructions

$cd $HOME

$sudo apt update

$sudo apt upgrade

$sudo apt install python3-pip python3-dev

$python3 -m pip install --upgrade pip

$sudo python3 -m pip install jupyter

$sudo python3 -m pip install pandas

$sudo python3 -m pip install matplotlib

$sudo python3 -m pip install folium

$sudo apt-get update

$sudo apt-get -y install sqlite3

$sudo python3 -m pip install csvkit

#SG added 16/03/20

$sudo python3 -m pip install mysql-connector

$jupyter notebook

<https://www.w3schools.com/python/python_mysql_getstarted.asp>

<https://dev.mysql.com/doc/connector-python/en/connector-python-api-mysqlconnection-close.html>

<https://pandas.pydata.org/pandas-docs/stable/user_guide/visualization.html>

<https://pandas.pydata.org/pandas-docs/stable/user_guide/visualization.html#suppressing-tick-resolution-adjustment>

Remote data analytics

#need to set up remote connections in phpmyadmin

i40db = mysql.connector.connect(

  host="10.0.0.49",

  user="**I40Remote**",

  passwd="Password1",

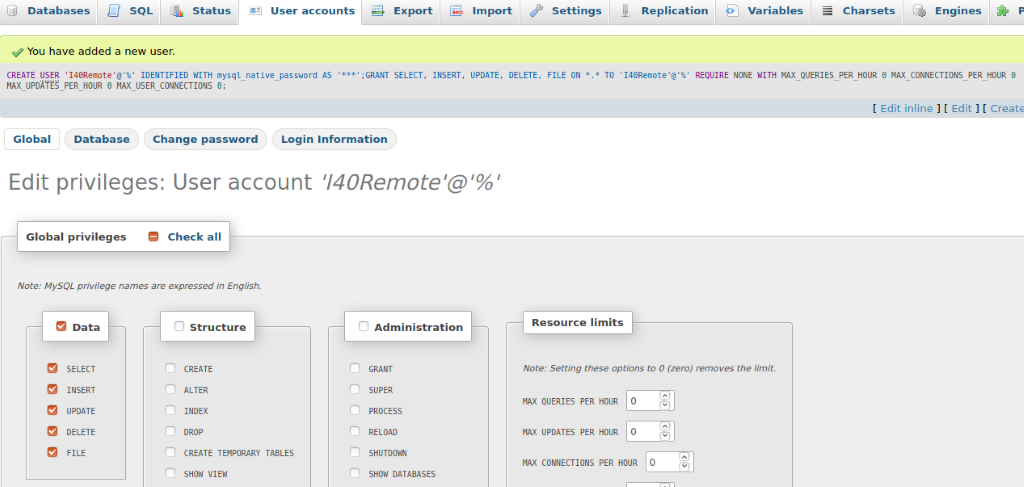
  database="Industry40db"

)

Create MySQL remote user account

<http://localhost/phpmyadmin>

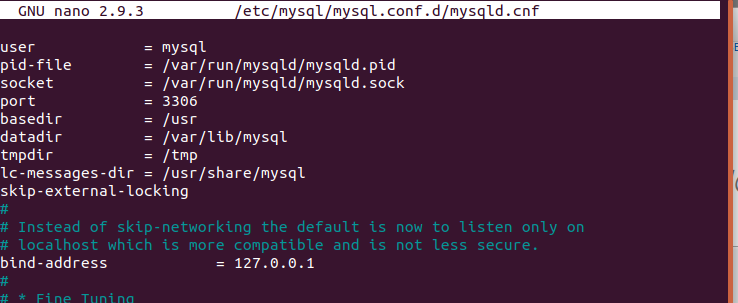
New > User accounts



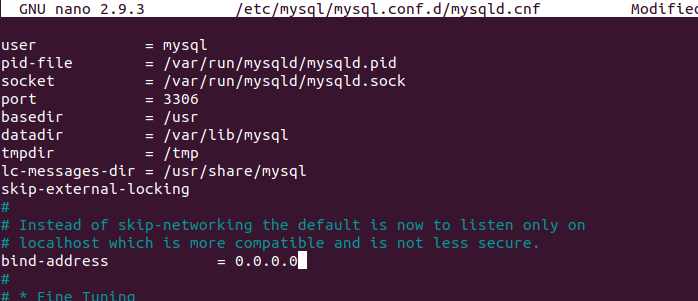
Config MySQL and firewall rules for remote connections on port 3306

<https://www.digitalocean.com/community/tutorials/how-to-allow-remote-access-to-mysql>

$**sudo nano /etc/mysql/mysql.conf.d/mysqld.cnf**



**Change the bind address – note security issues – this should be a static IP in production**



Allow connectivity from the remote windows host that will be analyzing data (10.0.0.59 windows VM host in my case)

$sudo ufw allow from remote\_IP\_address to any port 3306

$sudo ufw allow from **10.0.0.59** to any port 3306

$reboot

On windows 10 pc add mysql connector

Anaconda-prompt>**python -m pip install mysql-connector**

Graphing temperature using Tkinter and Matplotlib

Setup – install required libraries for matplotlib, pandas and Mysql connector

# <https://datatofish.com/matplotlib-charts-tkinter-gui/>

#from vscode terminal prompt >

#> python -m pip install pandas

#> python -m pip install matplotlib

#> python -m pip install mysql

#> python -m pip install mysql-connector

If this doesn’t find python in terminal prompt (python path is not set) find the path to the below by mousing over the **Python 3.6.6. 64-bit**

C:\Users\sgale.SGALE-LT\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\25B1633E.tmp

Ie - C:\Program Files (x86)\Microsoft Visual Studio\Shared\Python36\_64\python.exe

C:> cd C:\Program Files (x86)\Microsoft Visual Studio\Shared\Python36\_64

C:\Program Files (x86)\Microsoft Visual Studio\Shared\Python36\_64>**python –m pip install pandas**

C:\Program Files (x86)\Microsoft Visual Studio\Shared\Python36\_64>**python –m pip install matplotlib**

C:\Program Files (x86)\Microsoft Visual Studio\Shared\Python36\_64>**python -m pip install mysql**

C:\Program Files (x86)\Microsoft Visual Studio\Shared\Python36\_64>**python -m pip install mysql-connector**

**Refer to code - tkinter\tkplotSQLData-150420.py**

References for Matplotlib

<https://towardsdatascience.com/matplotlib-tutorial-learn-basics-of-pythons-powerful-plotting-library-b5d1b8f67596>

<https://datatofish.com/line-chart-python-matplotlib/>

<https://datatofish.com/python-tutorials/>

References for Tkinter

<https://pythonprogramming.net/how-to-embed-matplotlib-graph-tkinter-gui/>

<https://pythonprogramming.net/embedding-live-matplotlib-graph-tkinter-gui/?completed=/how-to-embed-matplotlib-graph-tkinter-gui/>

Run jupyter notebook on windows 10 pc

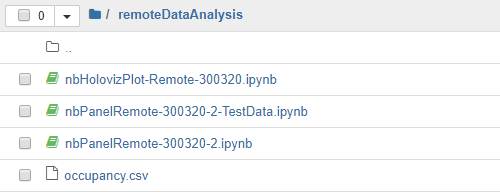
Anaconda prompt>cd C:\Users\sgale.SGALE-LT\OneDrive\2020-Teaching\2020industry40repo\2020i40\dataAnalysis\notebooks

Anaconda prompt>jupyter notebook

<http://localhost:8889/notebooks/remoteDataAnalysis/nbHolovizPlot-Remote-300320.ipynb>

Reference  - <https://panel.holoviz.org/getting_started/index.html>

test Datset - <http://archive.ics.uci.edu/ml/machine-learning-databases/00357/>



Other references

<https://stackoverflow.com/questions/28277137/how-to-convert-datatypeobject-to-float64-in-python>