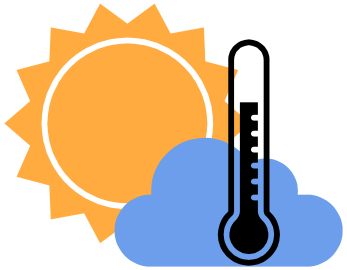
PERCONA LIVE ONLINE MAY 12 - 13th 2021

Arduino Direct Connections to Percona Server

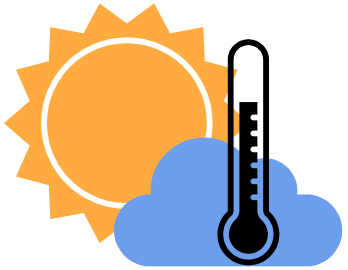


Howdy!

Wayne Leutwyler

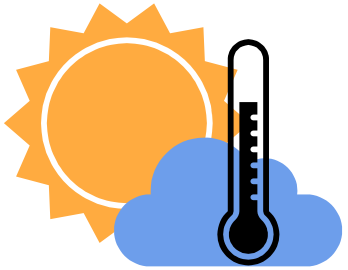
“Courage is being scared to death, but saddling up anyway.” -John Wayne

Agenda



- The Goal - Direct connections from Arduino to Percona Server
- Hardware
- Software
- Database DDL
- See it in Action

The Goal:



To improve my home grown weather station.

The first weather station I built is running on a Raspberry Pi 3B. The station has been running for almost six years. It does a good job, but…….

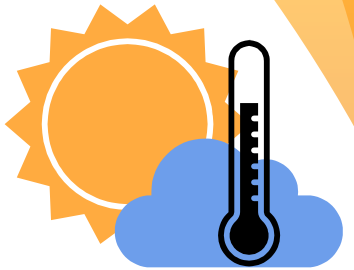
The current station is just too complex, since you need to maintain OS patching, python libraries and the treaded SD card going bad.

So I started looking if I could replicate what I'm doing on the Raspberry with an Arduino.

The initial solutions I found always called for a middleware technology. Arduino sends data to the middleware technology that handles the inserts to MySQL.

With a bit more research I found Arduino Libraries that allow Arduino to directly connect to MySQL.

Data being collected.



For this presentation, I’m gathering data from these sensors:

- Temperature
- Humidity
- Dew Point
- Heat Index

You could add more sensors to the project to collect:

- Wind Speed
- Rain Fall amount
- Barometric Pressure
- UV Levels

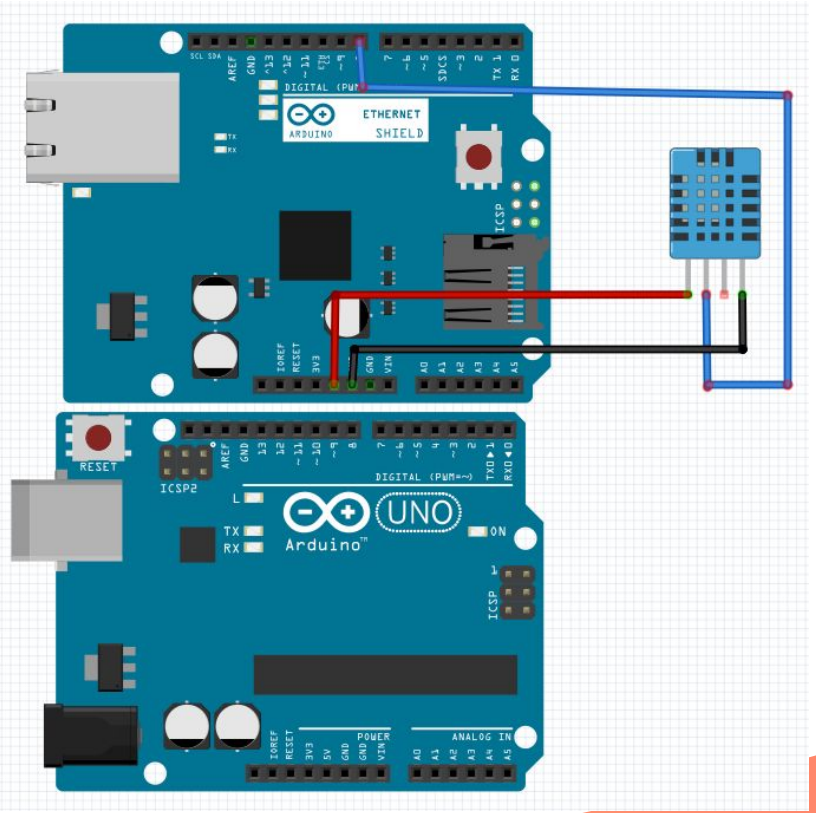
Hardware:

Let's look at the hardware we needed for this project. It’s a short list!

- Arduino Uno
- Ethernet Shield W5100
- DHT11 Sensor
- Jumper wires x 3

Approximate cost: $32.00

Wireless Arduino UNO can be used.



Wiring:

Let's do the wiring of the sensor to the Arduino.

*** Caution ***

Don’t have the Arduino connected to your PC while you do these setup. You could fry the Arduino or damage your PC.

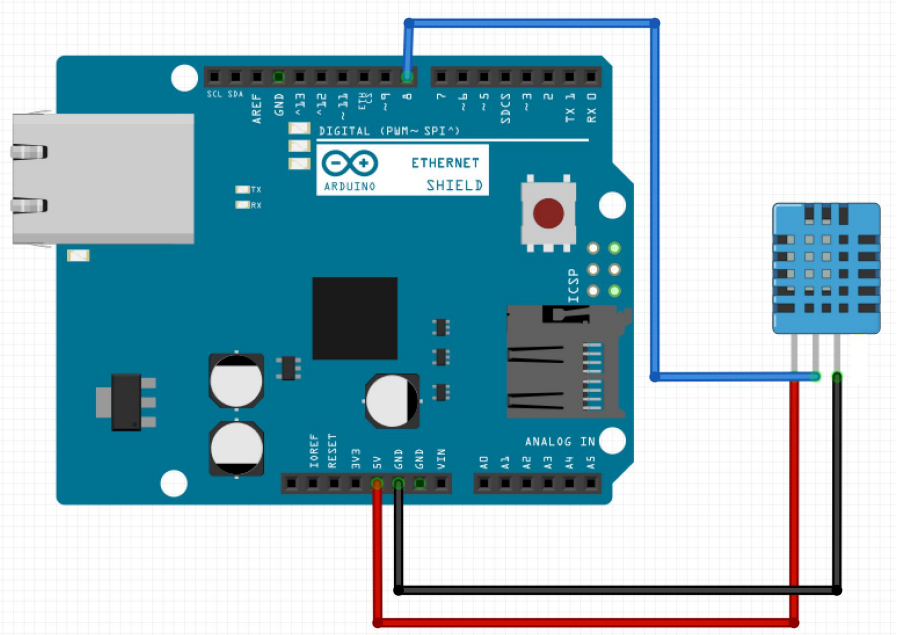
Start off by connecting the Ethernet shield to your Arduino. The Ethernet shield should come with instructions. If by chance you did not get Instruction. To Add the shield. Just align the male pins on the shield to the female connectors on the Arduino. Gently push them together.

- Connect the 5V from the Arduino to the 5V VIN pin on the DHT11.
- Connect the ground from the Arduino to the Ground on the DHT11.
- Connect Pin 8 on the Arduino will go to the Signal pin on the DHT11.

*** Check and Double Check ***

Verify that the 5V and Ground on the Arduino, are connected the the DHT11.
If 5V and ground are reversed you will fry the DHT11.

That’s it you're all ready for the code. Go ahead and connect your Arduino to your PC.



Software:

Developer Tools:

- Arduino IDE V1.18.3.
- Arduino Web Based IDE.

Libraries:

- Adafruit DHT Library
- MySQL Connection Library

The Code:

- WAM version 1.0.5

Links:

https://github.com/ChuckBell/MySQL_Connector_Arduino
https://github.com/adafruit/DHT-sensor-library
https://www.arduino.cc/en/software
https://github.com/cetanhota/wam

Arduino Code:

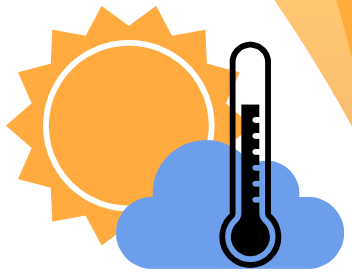
```
/* 2/14/2021
 * Wayne Leutwyler
 */
#include "DHT.h"
#include <MySQL_Connection.h>
#include <MySQL_Cursor.h>

#define DHTTYPE DHT11   // DHT 11
#define DHTPIN 2
DHT dht(DHTPIN, DHTTYPE);

byte mac_addr[] = { 0xDE, 0xAD, 0xBE, 0xEF,
0xFE, 0xED };

IPAddress server_addr(000,000,0,00);
char user[] = "DrNo";
char password[] = “Spector";

EthernetClient client;
MySQL_Connection conn((Client *)&client);

//define delay into hours
const unsigned long SECOND = 1000;
const unsigned long HOUR =
3600*SECOND;

void setup() {
  Serial.begin(9600);
  Ethernet.begin(mac_addr);
  Serial.println(F("DHTxx test!”));
 dht.begin();
}
```

```
void loop() {
  float tf = dht.readTemperature(true);
  float h = dht.readHumidity();
  float dew = (tf-(100-h)/5.0);
  float hif = dht.computeHeatIndex(tf, h);

 //connect to database
 Serial.println("Connecting...");
 if (conn.connect(server_addr, 3306, user,
password)) {
    delay(1000);

 // asign values for inserting
 char INSERT_DATA[] = "INSERT INTO
weather.percona (tmp,hum,dew,hif) VALUES
(%s,%s,%s,%s)";
 char query[128];
 char temperature[10];
 char humidity[10];
 char dewpoint[10];
 char heatindex[10];
 int str_temperature = (tf);
 int str_humidity = (h);
 int str_dewpoint = (dew);
 int str_heatindex = (hif);

 //prepare data for inserting
 dtostrf(str_temperature, 4, 2, temperature);
 dtostrf(str_humidity, 4, 2, humidity);
 dtostrf(str_dewpoint, 4, 2, dewpoint);
 dtostrf(str_heatindex, 4, 2, heatindex);
```

```
//send data to mysql
 sprintf(query, INSERT_DATA, temperature, \
humidity, dewpoint, heatindex);
 MySQL_Cursor *cur_mem = \
new MySQL_Cursor(&conn);

 //send data to serial output for debugging.
 Serial.println((query));
 Serial.print("Temperature: ");
 Serial.print(tf); Serial.println("ºF");
 Serial.print("Humidity: ");
 Serial.print(h); Serial.println("%");
 Serial.print("DewPoint: ");
 Serial.print(dew); Serial.println("ºF");
 Serial.print("Heat Index: ");
 Serial.print(hif); Serial.println("ºF");

 //excute query and delete cursor
 cur_mem->execute(query);
 delete cur_mem;
 Serial.println("Data recorded.”);
 }
  else
    Serial.println("Connection failed.");
  conn.close();
  delay (SECOND*300);
}
```

MySQL DDL

Here is the layout of the database:



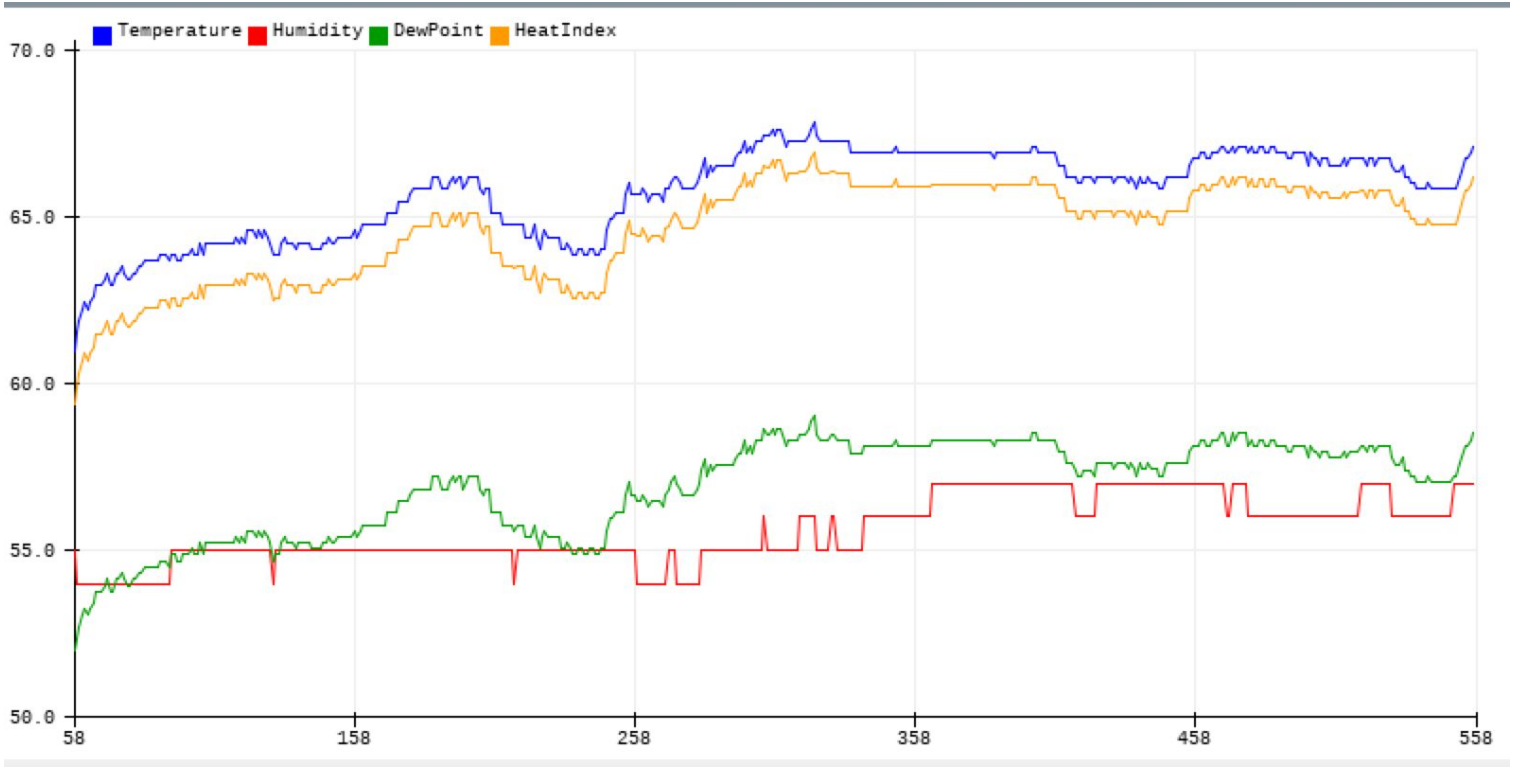
```
CREATE DATABASE WEATHER;

CREATE TABLE `weather` (
  `id` int(11) NOT NULL AUTO_INCREMENT,
  `tmp` int(11) NOT NULL,
  `hum` int(11) NOT NULL,
  `dew` int(11) NOT NULL DEFAULT '0',
  `hif` int(11) NOT NULL DEFAULT '0',
  `ts` timestamp NOT NULL DEFAULT CURRENT_TIMESTAMP,
  PRIMARY KEY (`id`)
);
```

Result Grid Filter Rows: Search

id	tmp	hum	dew	hif	ts
385	63	58	54	61	2021-04-15 14:26:24
384	63	59	54	61	2021-04-15 14:11:22
383	63	59	54	61	2021-04-15 13:56:20
382	63	59	55	62	2021-04-15 13:41:18
381	63	59	55	62	2021-04-15 13:26:16
380	63	59	55	62	2021-04-15 13:11:13
379	63	59	55	62	2021-04-15 12:56:11
378	63	59	55	62	2021-04-15 12:41:09

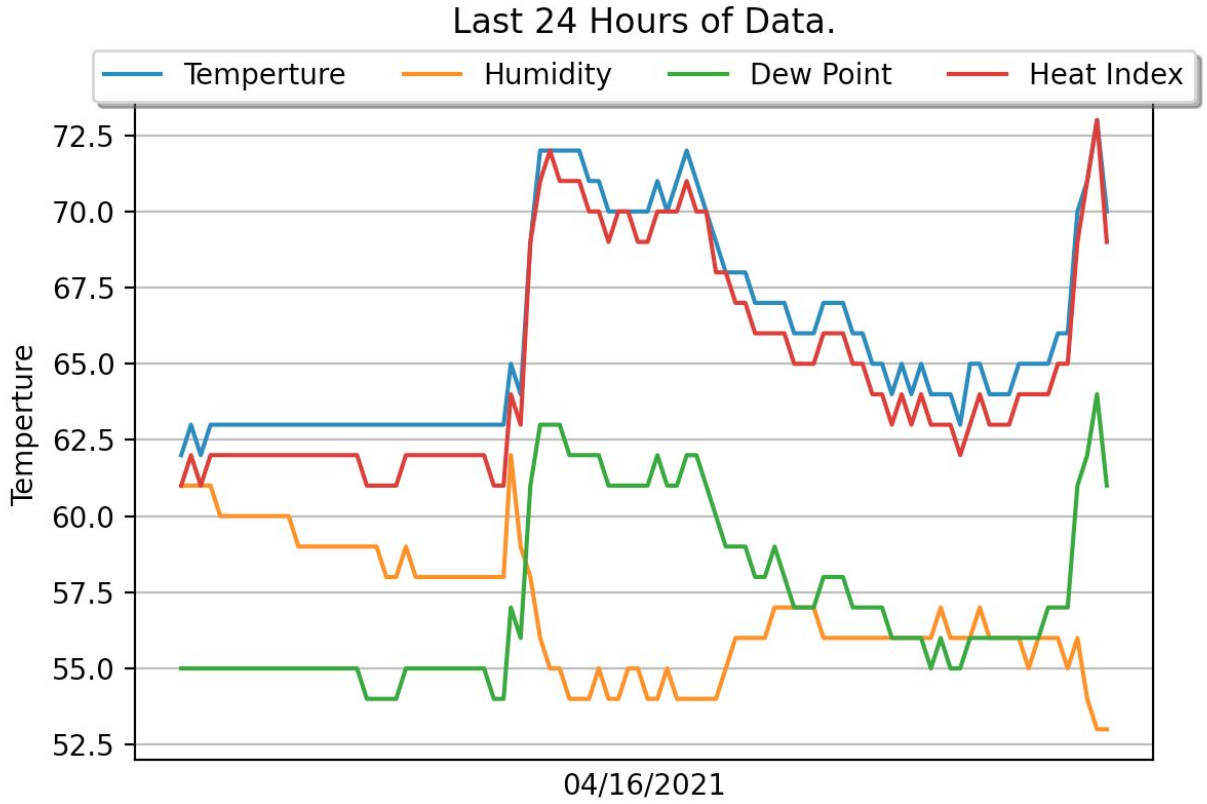
Live View!

Using the Arduino Serial Plotter Tool we can watch our data while it's being collected.



Historic View:

Using a bit of python code we can pull data from MySQL and display it in a Graph. The python code can be found on my GitHub repo.



Final Thoughts

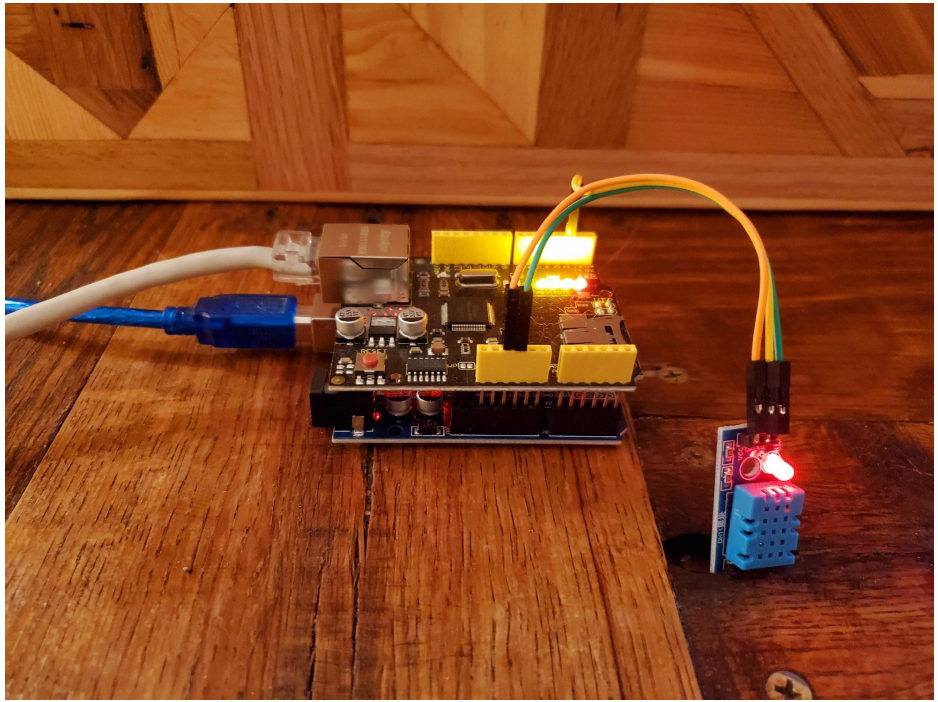
This project started about the time COVID19 hit the world. My original Idea was to give this to the STEM learning centers in my area. I really want to encourage young people to get involved with technology.

This was and is a labor of love. I really think this project would be great for anyone looking to explore new technologies or just get started with the Arduino and MySQL.

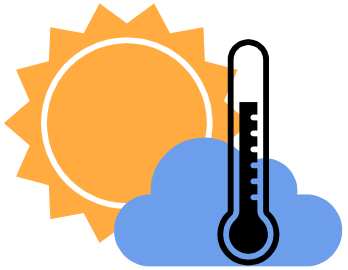
I love the fact that we get to look at 4 different technologies in this project.

- MySQL.
- Arduino Hardware.
- Arduino Programing.
- Python Programing.

I hope you enjoyed this presentation. Please share it was family and friends. Let's motivate the young minds of today. This is a starting block to a future filled with new and wondrous things.



Thank you!



Wayne Leutwyler

Github Project: https://github.com/cetanhota/wam

Remember too have fun!

THANK YOU !

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