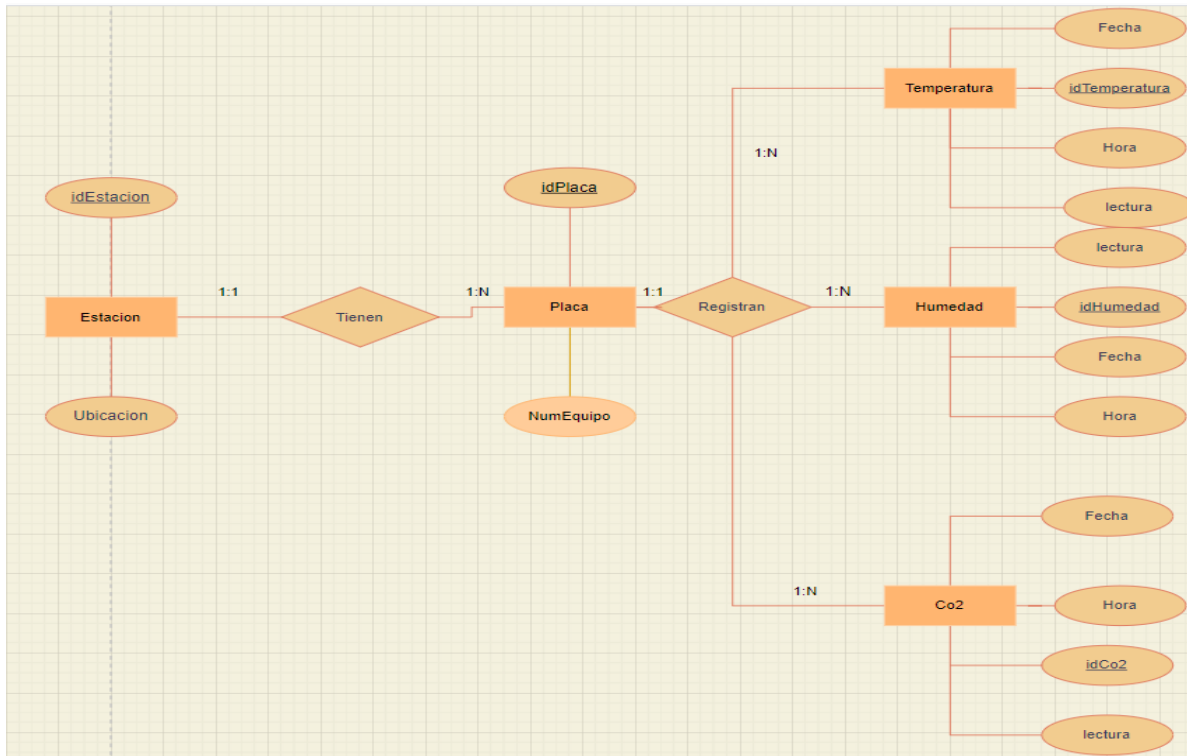


Arduino, SQL, PHP Sensor monitoring station for IoT

Authors: José Luis Madrigal Sánchez and Jorge Isidro Blanco Martínez

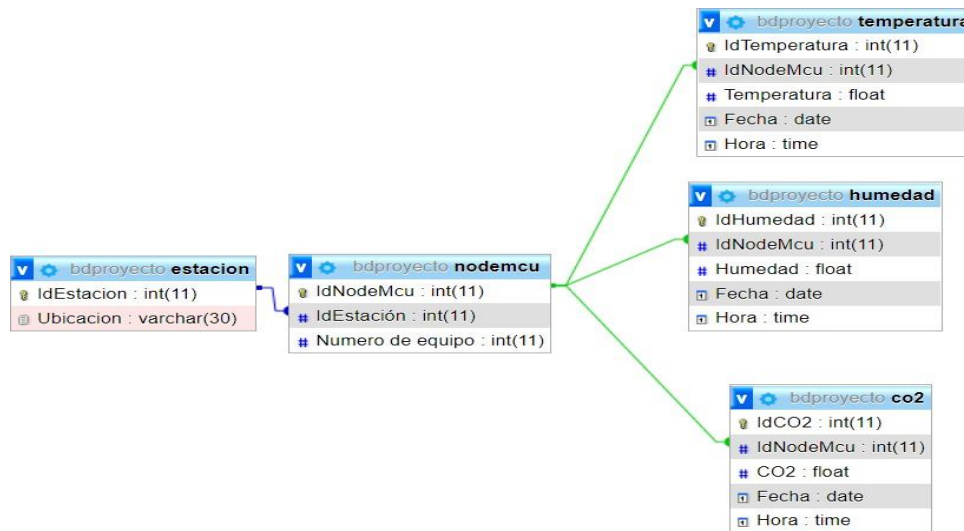
Here we can see the Entity-Relation diagram for the database, where we have station, board, temperature, humidity and co2.



This is the database in phpMyAdmin.

Tabla	Acción	Filas	Tipo	Cotejamiento	Tamaño	Residuo a depurar
co2	Examinar Estructura Buscar Insertar Vaciar Eliminar	1,486	InnoDB	latin1_swedish_ci	144.0 KB	-
estacion	Examinar Estructura Buscar Insertar Vaciar Eliminar	5	InnoDB	latin1_swedish_ci	16.0 KB	-
humedad	Examinar Estructura Buscar Insertar Vaciar Eliminar	1,486	InnoDB	latin1_swedish_ci	144.0 KB	-
nodemcu	Examinar Estructura Buscar Insertar Vaciar Eliminar	5	InnoDB	latin1_swedish_ci	32.0 KB	-
temperatura	Examinar Estructura Buscar Insertar Vaciar Eliminar	1,486	InnoDB	latin1_swedish_ci	144.0 KB	-
5 tablas	Número de filas	4,468	InnoDB	latin1_swedish_ci	480.0 KB	0 B

The DBMS shows us the tables with their relationships too.



With a NodeMCU, we put some sensors to get readings from specific places in our college, then we use an Arduino code to see in the serial monitor the values and check if they were sent successfully to a PHP script, where the connection to the database is established, so each reading can be entered in its correct table and variable.

In the image, there is an initial message that assures that the Wi-Fi connection worked, then we can see the value of each sensor and the URL generated with that data that leads to the PHP and at the end, we have the code and message from the server, which rectifies that those values were entered in the database.














```

....
Conectado

Temperatura = 19.00°C
Humedad = 47.00%
Co2 = 572 ppm
http://10.48.88.161/monitor/grabar.php?temperatura=19.00&humedad=47.00&co2=572&IdNodeMcu=4
Código: 200

Temperatura 19.00, guardada correctamente en la BD Humedad 47.00, guardada correctamente en la BD CO2 5
  
```

We had to present this information in a web page, in our case we use PHP too, but considering that these topics were only introductory, we made it local.

localhost/paginaweb/pagina.php?    C++VS Code          

Proyecto IoT Jose Luis Madrigal y Jorge Isidro Blanco

Elige lugar y equipo:

☐ Aulas 5-6 (13) ☐ Plaza Borregos (14) ☐ Alberca (15) ☐ Cafeteria Profesional (16) ☐ Preparatoria (17)

Elige sensor:

☐ Todas las medidas ☐ Temperatura ☐ Humedad ☐ CO2

Elige fecha:

☐ Todas las fechas ☐ 26/11/2021 ☐ 29/11/2021 ☐ 30/11/2021

Fecha	Hora	IdNodeMcu	IdSensor	Temperatura	Humedad	CO2	Ubicacion	Numero de Equipo
2021-11-26	10:01:15	1	1	15.5	65	186	Aulas 5-6	13
2021-11-26	10:01:20	2	2	17.2	52	629	Aulas 5-6	13
2021-11-26	10:02:15	1	3	15.5	65	326	Aulas 5-6	13
2021-11-26	10:02:20	2	4	17.3	52	609	Aulas 5-6	13
2021-11-26	10:03:15	1	5	16	64	306	Aulas 5-6	13
2021-11-26	10:03:20	2	6	17	52	600	Aulas 5-6	13

Besides from showing all the records, we put some options for filtering.

In this case, we can see the following choice, Place: Pool (team 15), Sensor: Humidity, Date: All.

Elige lugar y equipo:

☐ Aulas 5-6 (13) ☐ Plaza Borregos (14) ☒ Alberca (15) ☐ Cafeteria Profesional (16) ☐ Preparatoria (17)

Elige sensor:

☐ Todas las medidas ☐ Temperatura ☒ Humedad ☐ CO2

Elige fecha:

☒ Todas las fechas ☐ 26/11/2021 ☐ 29/11/2021 ☐ 30/11/2021

Resultado de filtrados

Tabla de datos:

Id Lectura	Id NodeMcu	Ubicacion	Equipo	Humedad	Fecha	Hora
731	5	Alberca	17	81	2021-11-30	11:23:28
736	5	Alberca	17	76	2021-11-30	11:24:29
741	5	Alberca	17	76	2021-11-30	11:25:29
746	5	Alberca	17	76	2021-11-30	11:26:30
751	5	Alberca	17	77	2021-11-30	11:27:35
758	5	Alberca	17	78	2021-11-30	11:28:45
763	5	Alberca	17	79	2021-11-30	11:29:41
767	5	Alberca	17	79	2021-11-30	11:30:41
772	5	Alberca	17	79	2021-11-30	11:31:41