

Department of Electrical Engineering

City University of Hong Kong

EE4092/EE4905/EE4291 Training II
Module A2 - Microcomputer (Raspberry Pi)

Database Server

What is Database Server ?

- It uses a database application that provides database services to other computer programs or computers. It is a **client-server model**.
- **Database management systems** (DBMSs) frequently provide database-server functionality, and some database management systems (such as MySQL) rely exclusively on the client–server model for database access
- Users access a database server either through a “**front end**” running on the user's computer which displays requested data or through the “**back end**”, which runs on the server and handles tasks such as data analysis and storage.
- You will build a database server in Raspberry Pi in this workshop. Also, you will develop the front end of your database, including web page and mobile application.

What is LAMP?

- LAMP (**L**inux, **A**pache, **M**ySQL, **P**HP/**P**erl/**P**ython)
- It is a very common example of a web service stack
- It named as an acronym of the names of its original four open-source components: the **Linux operating system**, the **Apache HTTP Server**, the **MySQL** relational database management system (RDBMS), and the **PHP** programming language.
- The LAMP components are largely interchangeable and not limited to the original selection. As a solution stack, LAMP is suitable for building dynamic web sites and web applications.

What is Linux operating system?

- It is a **Unix-like** computer operating system assembled under the model of free and open-source software development and distribution.
- Most Linux distributions, as collections of software based around the Linux kernel and often around a package management system, provide complete **LAMP** setups through their packages.
- For desktop systems, the default user interface is usually graphical, although the CLI is commonly available through terminal emulator windows or on a separate virtual console.
- In this workshop, we are using **Raspberry Pi OS** which also known as Raspbian, is a Debian-based operating system for Raspberry Pi. Debian is a Linux distribution composed of free and open-source software.

What is Apache HTTP Server?

- Apache is **open-source software**.
- A wide variety of features are supported, and many of them are implemented as compiled modules which extend the core functionality of Apache.
- The role of LAMP's web server has been traditionally supplied by Apache, and has since included other web servers such as Nginx. The Apache HTTP Server has been the most popular web server on the public Internet.
- In this workshop, you will install an Apache Server in your Raspberry Pi.

What is MySQL?

- MySQL is free and **open-source software**
- In 2010, forked the open-source MySQL project to create **MariaDB**
- A database management system makes it possible for users to **create, edit and update** data in database files. Once created, the DBMS makes it possible to store and retrieve data from those database files.
- MySQL's original role as the LAMP's relational DBMS (RDBMS) has since been alternately provisioned by other RDBMSs such as MariaDB or PostgreSQL, or even NoSQL databases such as MongoDB.

What is PHP?

- PHP is a **server-side** scripting language designed for web development but also used as a general-purpose programming language.
- PHP code is interpreted by a web server via a PHP processor module, which generates the resulting web page.
- PHP's role as the LAMP's application programming language has also been performed by other languages such as **Perl** and **Python**.
- In this workshop, you will develop a web page using PHP.

Challenge 3

Try to upload temperature measured by the Sense HAT to the database you just build. The result of the database should be similar to the following:

☐ Show all

Number of rows: 25

Filter rows: Search this table

Sort by key: None

+ Options

☐

Edit

Copy

Delete

106

2020-04-11 18:44:14

38.009

☐

Edit

Copy

Delete

107

2020-04-11 18:44:19

38.028

☐

Edit

Copy

Delete

108

2020-04-11 18:44:24

38.157

☐

Edit

Copy

Delete

109

2020-04-11 18:44:29

37.991

☐

Edit

Copy

Delete

110

2020-04-11 18:44:34

38.083

☐ Check all

With selected:

Edit

Copy

Delete

Export

☐ Show all

Number of rows: 25

Filter rows: Search this table

Sort by key: None

HINT:

Use Thonny Python IDE to write this program.

Use the following library to learn about MySQL, an interface to the popular MySQL database server that provides the Python database API.

https://mysqlclient.readthedocs.io/user_guide.html

After finish your work, demonstrate your result to the technical staffs. Then, copy your code (.py) to a .txt file and zip it, then upload to Canvas, name it “**yourSID_myDB**”.

Challenge 4

- a. Try to write a .php webpage to monitor the data without login the database. The result of the webpage should be similar to the following:

Raspberry Pi Temperature Recorder

No.	Date and Time	Temperature
35	2020-04-29 23:55:53	42.269
36	2020-05-02 19:13:49	41.750
37	2020-05-02 19:13:54	41.620
38	2020-05-02 19:13:59	41.824
39	2020-05-02 19:17:57	41.806
40	2020-05-02 19:18:02	41.713
41	2020-05-02 19:18:07	41.731
42	2020-05-02 19:18:12	41.731
43	2020-05-02 19:18:17	41.824
44	2020-05-02 19:18:22	41.694
45	2020-05-02 19:18:27	41.713
46	2020-05-02 19:18:32	41.639
47	2020-05-02 19:18:37	41.787
48	2020-05-02 19:18:42	41.694
49	2020-05-02 19:18:47	41.694
50	2020-05-02 19:18:52	41.824
51	2020-05-02 19:18:57	41.917

b. Try to add more functions to your web page.

- i. Instead of go directly to the table when you enter “localhost/html” in the web browser, create a login page that require user to enter username and password.
- ii. Add an update button to refresh the web page when the database receive new data.
- iii. Add a delete button to delete selected entries. This button should also delete the data inside the database.
- iv. Add a function to sort the temperature column of the table which can sort in ascending order and descending order.

After finish your work, demonstrate your result to the technical staffs. Then, copy your code (.php) to a .txt file and zip it, then upload to Canvas, name it “**yourSID_myWP**”.