



DATABASE INTRODUCTION

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 - Associate Professor
- Experiences
 - Trend Micro (Cupertino,CA,USA) - R&D Engineer
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 - Spectrum Telecorp (Merrimack,NH,USA) - Software Engineer
- Research Areas & Academia and Industry Collaboration (AIC)
 - Data Mining
 - Data Analysis
 - Internet Computing
 - Database Computing

Do a survey

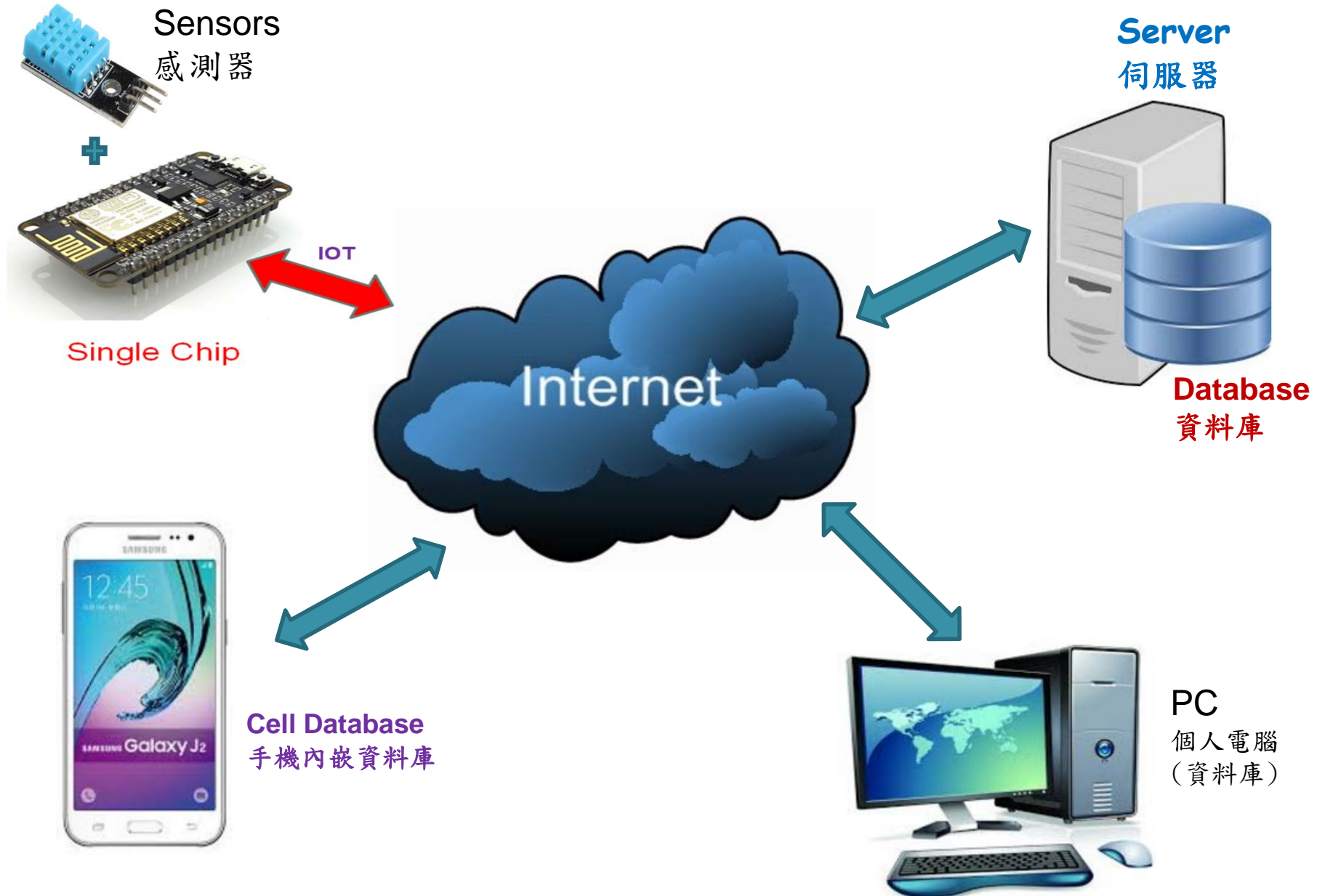
- What computer languages you have learned?
- used html ?
- Are you familiar with computer operation?
- What kind of computers you used? Ex. Windows, Mac, Linux...

Contents

- Database Implementation
- Software Installation and Warming up

Database Implementation

The Data Flow for Server Database



Terminologies

1. Database?
2. Database Management System?
3. Database System?

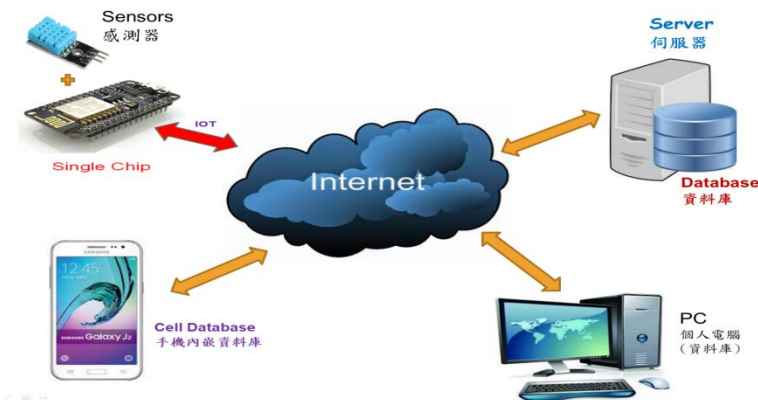
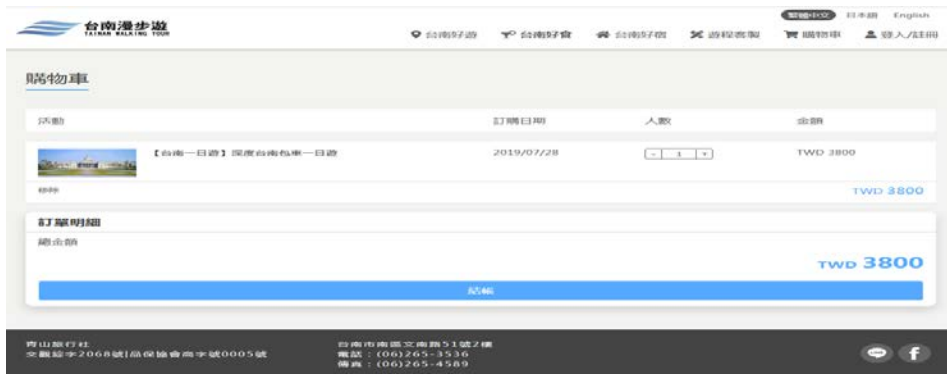
Google it and find their relationship!

Database System

- Database system contains 3 components: Database 、 Database Management System, DBMS , and application
- Database System = DBMS + Database
- http Server contains:
 - Server (including Database System)
 - Application (= `php + html + CSS + JavaScript`)

Database System

- The Database System is a data storage system in which users can access the data through various applications. For a company or enterprise, the benefits of using a database system are as follows:
 - It can **reduce the waste of space** through computerized data storage and management.
 - It can provide **valuable information** to users quickly.
 - Can centrally manage all company data, and by **setting user authorities**
 - It can **reduce duplicate data**, and relatively **strengthen the data consistency**

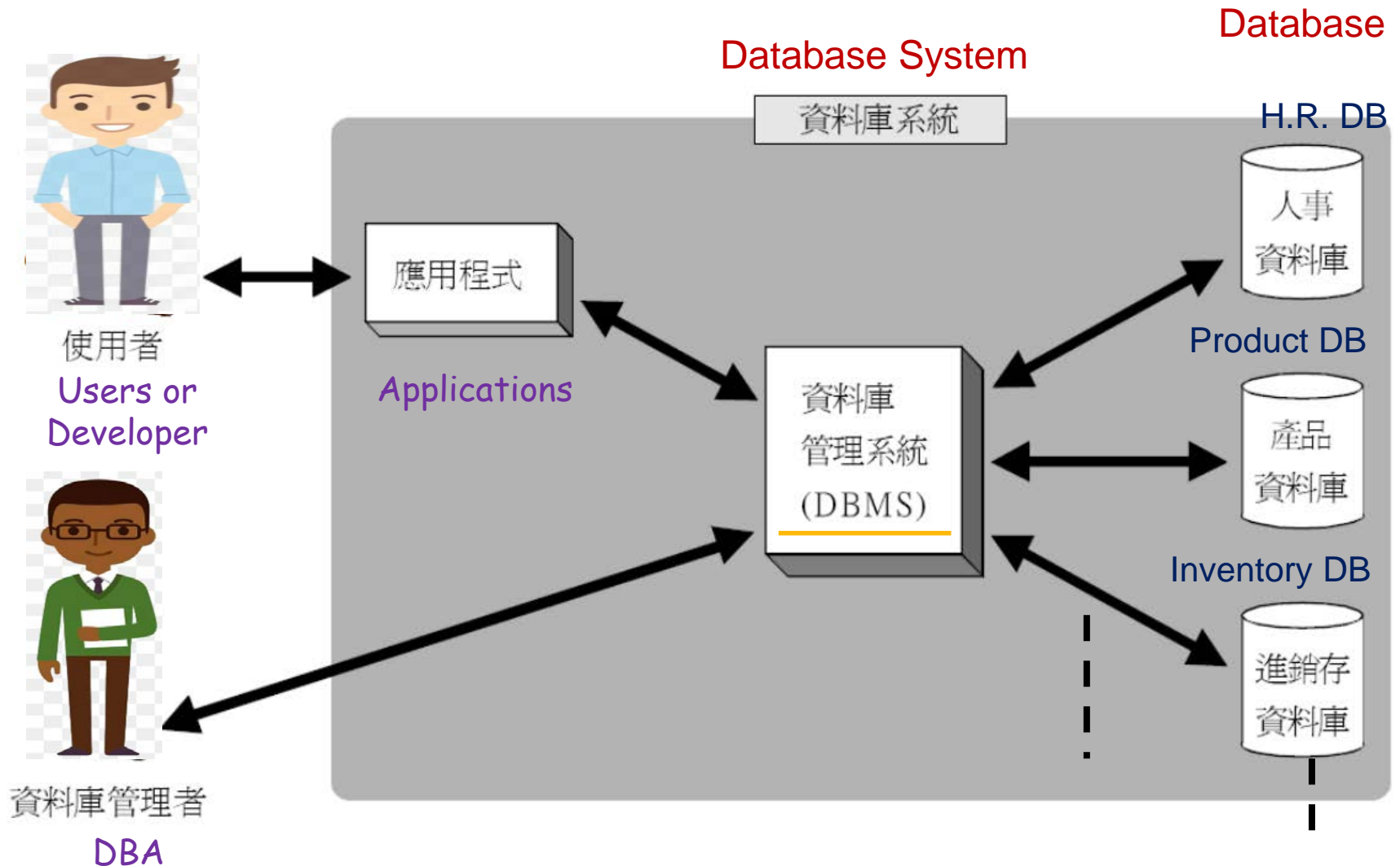


DataBase Management System(DBMS) ?

1. Access
2. MySQL
3. Oracle
4. Sysbase
5. DB2
6. MongoDB
7. SQLServer

Choose it or them! Take a guess!

Database System = DBMS + Database



Four roles for Database System

There are different participants for Database system. We can roughly distinguish four types

- Database Designer ☐
- Database Administrator (DBA)
- Application Designer
- End user

Who get the highest authority to access databases?

Database Designer

- The database designer is responsible for **the design of the entire database system**, designing an appropriate format to store the data according to the user's needs; at the same time, planning the user access rights for the entire database.
- After the design is completed, it can be **handed over to the database manager** to manage and maintain the work.
- In general small and medium-sized enterprises, the designer and manager of the database may be the same person; if it is a large enterprise, **the designer** may be one group of people, and **the manager** is another group of people
- Sometimes, also call Database Analyzer to work out performance issues

DBA

- Therefore, the DBA must set the method and timing of **database backup**, and **restore** the database as soon as possible when the database is damaged.
- In addition, the DBA is also responsible for **the account management** of the database, **deciding who has the right** to log in to the database and who has the right to perform which actions. For example, the most basic user may only have the right to query, and the user who needs to enter data has the right to write data... and so on.

Application Designer

- Application programmers are responsible for writing **client applications** that access the database, allowing users to use the database through **a friendly interface**.□
- There are many languages that can be used to develop applications, and early programmers may use C 、 php+html 、 C++ or Java....
- Nowadays programmers mostly use 、 php+html 、 JAVA 、 C# 、 C++ 、 Python...

End user

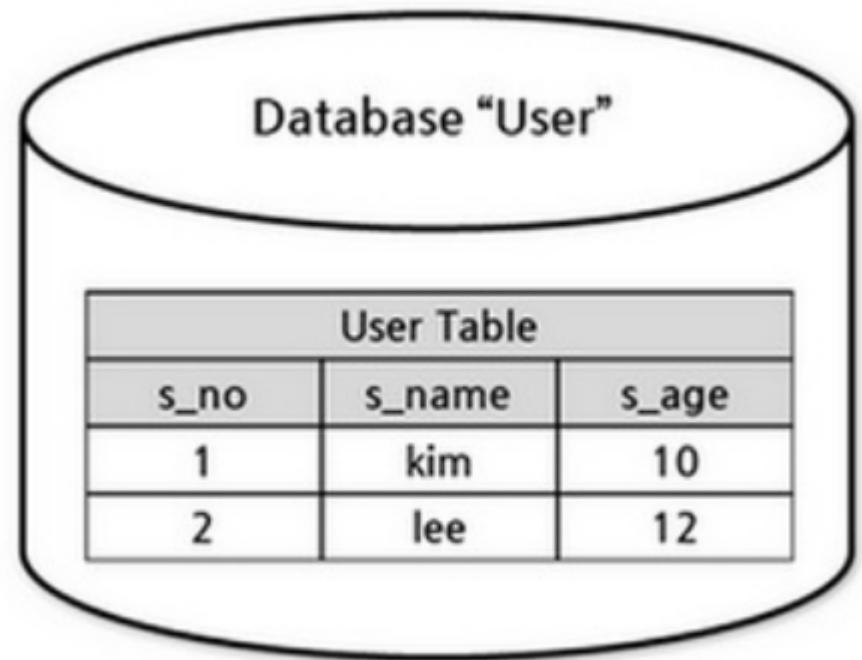
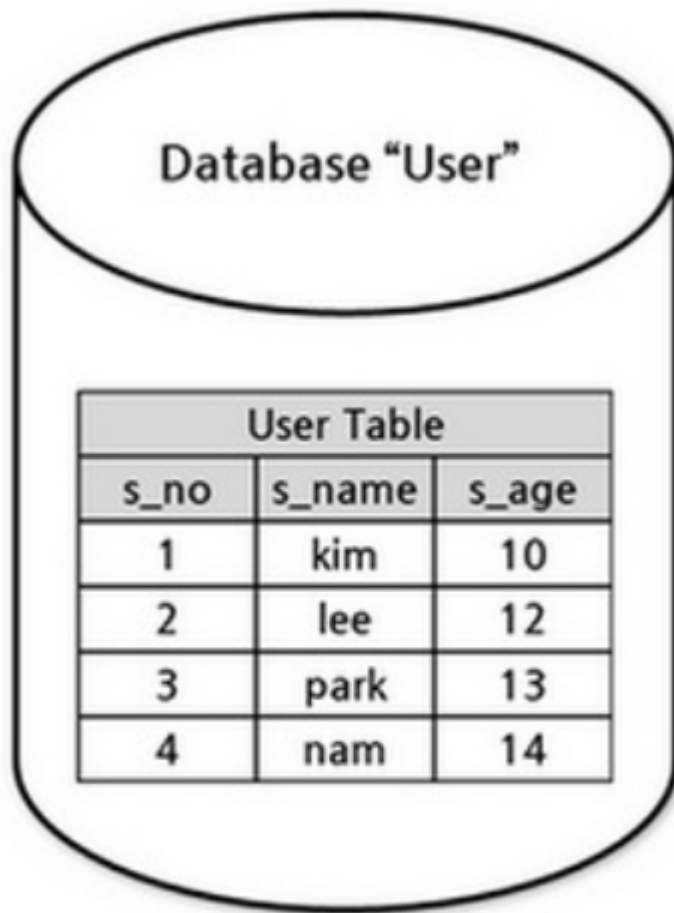
- End users are those users who really often access the database by user interfaces. They only need to learn the interface operations and do not need to worry about any problems in the maintenance or management of the database.
- If a end user encounters a problem, just ask the DBA or Engineer to deal with it.

Database

- Database is a place to store data
- A Database system may contain more than one database in which is a set of data in a same category
- Generally, we think of a database as a container for storing data, but its real form is actually an electronic file
- The database can have multiple tables. Each table can have multiple columns. Each table can have multiple data records

What are the difference between database and MSword?

Examples

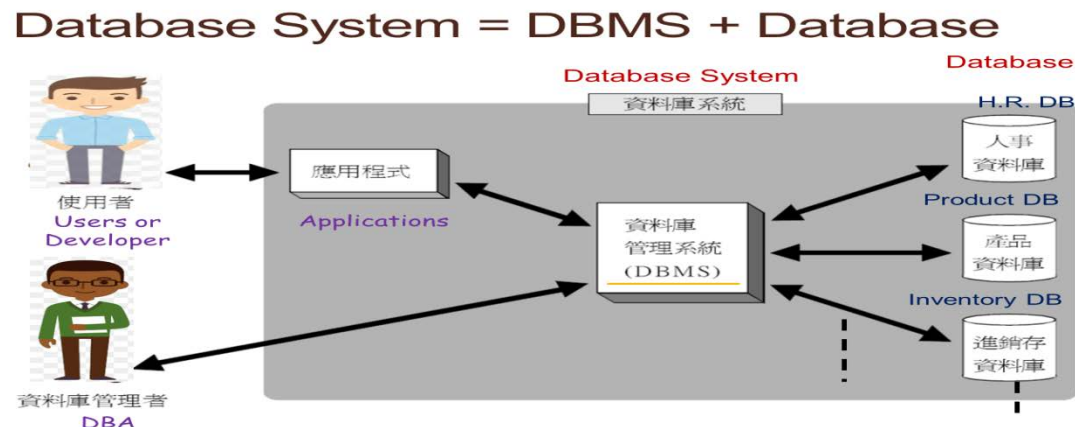


DBMS

- The database management system (DBMS) refers to the software that manages the database, and is responsible for the communication between the user and the database, such as accessing the data in the database and managing various affairs for database.
- Access, SQL Server 、 Oracle 、 SyBase 、 Informix 、 MySQL 、 Maria 、 PostgreSQL

Application

- Application programs provide a self-developed user interface. Because not every user can operate a complex database, it is necessary to provide a simpler and user-friendly operation interface through programs.
- For example, we may use JavaScript、html+php、Java、Python...to develop H.R and inventory applications。
- These applications must use the database management system to access and manage the data in the database



Air Ticket Booking System



English List your property Support Trips Sign in

Stays Flights Cars Packages Things to do More travel ▾

Roundtrip ▾ 1 traveler ▾ Economy ▾ Any airline ▾ More options ▾

Flying from
Taipei (TPE-Taoyuan Intl.)



Flying to
San Francisco, CA (SFO-San ...)



Departing
Sep 30



Returning
Oct 1

Search

Filter by

Flexible change policies

☐ No change fee

Choose departing flight > Choose returning flight > Review your trip

Flexible dates

Compare cheapest prices for nearby days

Stops

☐ Nonstop (1)

☐ 1 Stop (12)

☐ 2+ Stops (18)

From

\$1,608

\$1,671

\$1,651

Airlines

☐ American Airlines (10)

☐ Air Canada (8)

☐ China Airlines (8)

From

\$1,671

\$1,651

\$3,069

Prices displayed include taxes and may change based on availability. You can review any additional fees before check out. Prices are not final until you complete your purchase.

9:50am - 6:35am

Taipei (TPE) - San Fr... (SFO)

United

4 cleaning and safety practices

Negative COVID-19 test required

11h 45m (Nonstop)

\$1,608

Roundtrip per traveler

1:10pm - 3:55pm

Taipei (TPE) - San Fr... (SFO)

17h 45m (2 stops)

1h 10m in Seoul (ICN) • 2h 5m in Vancouver (YVR)

4 left at

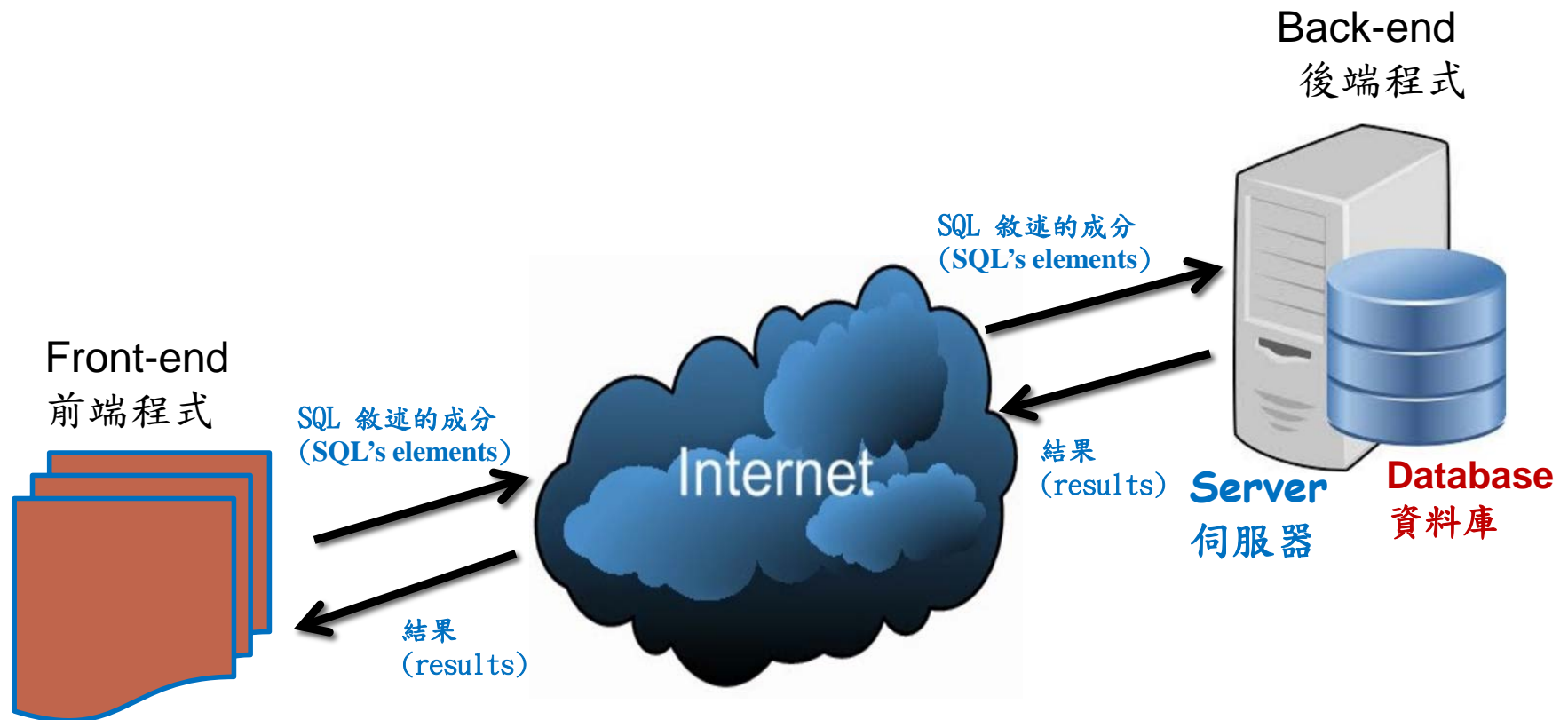
\$1,651

Sort by

Price (Lowest)



The link for the frontend and backend programs



ex. Air ticket booking system

Software Installation and Warming up

Software Installation

- XAMPP



XAMPP for **Windows** 7.3.30, 7.4.23 & 8.0.10

Version		Checksum			Size
7.3.30 / PHP 7.3.30	What's Included?	md5	sha1	Download (64 bit)	158 Mb
7.4.23 / PHP 7.4.23	What's Included?	md5	sha1	Download (64 bit)	160 Mb
8.0.10 / PHP 8.0.10	What's Included?	md5	sha1	Download (64 bit)	161 Mb

Choose one that fit in your operating system!

Startup your XAMPP

XAMPP Control Panel v3.3.0 [Compiled: Apr 6th 2021]

XAMPP Control Panel v3.3.0

Service	Module	PID(s)	Port(s)	Actions
<input type="checkbox"/>	Apache	9820 12756	80, 443	<input type="button" value="Stop"/> <input type="button" value="Admin"/> <input type="button" value="Config"/> <input type="button" value="Logs"/>
<input type="checkbox"/>	MySQL	11412	3306	<input type="button" value="Stop"/> <input type="button" value="Admin"/> <input type="button" value="Config"/> <input type="button" value="Logs"/>
<input type="checkbox"/>	FileZilla			<input type="button" value="Start"/> <input type="button" value="Admin"/> <input type="button" value="Config"/> <input type="button" value="Logs"/>
<input type="checkbox"/>	Mercury			<input type="button" value="Start"/> <input type="button" value="Admin"/> <input type="button" value="Config"/> <input type="button" value="Logs"/>
<input type="checkbox"/>	Tomcat			<input type="button" value="Start"/> <input type="button" value="Admin"/> <input type="button" value="Config"/> <input type="button" value="Logs"/>

Config Netstat Shell Explorer Services Help Quit

下午 12:07:00 [main] All prerequisites found
下午 12:07:00 [main] Initializing Modules
下午 12:07:00 [main] Starting Check-Timer
下午 12:07:00 [main] Control Panel Ready
下午 12:07:04 [Apache] Attempting to start Apache app...
下午 12:07:04 [Apache] Status change detected: running
下午 12:07:06 [mysql] Attempting to start MySQL app...
下午 12:07:06 [mysql] Status change detected: running

A test for your startup

- Please type “[localhost](#)” as the url of your Chrome

localhost/dashboard/

Apache Friends

Applications

FAQs

HOW-TO Guides

PHPInfo

phpMyAdmin



XAMPP Apache + MariaDB + PHP + Perl

Welcome to XAMPP for Windows 7.4.19

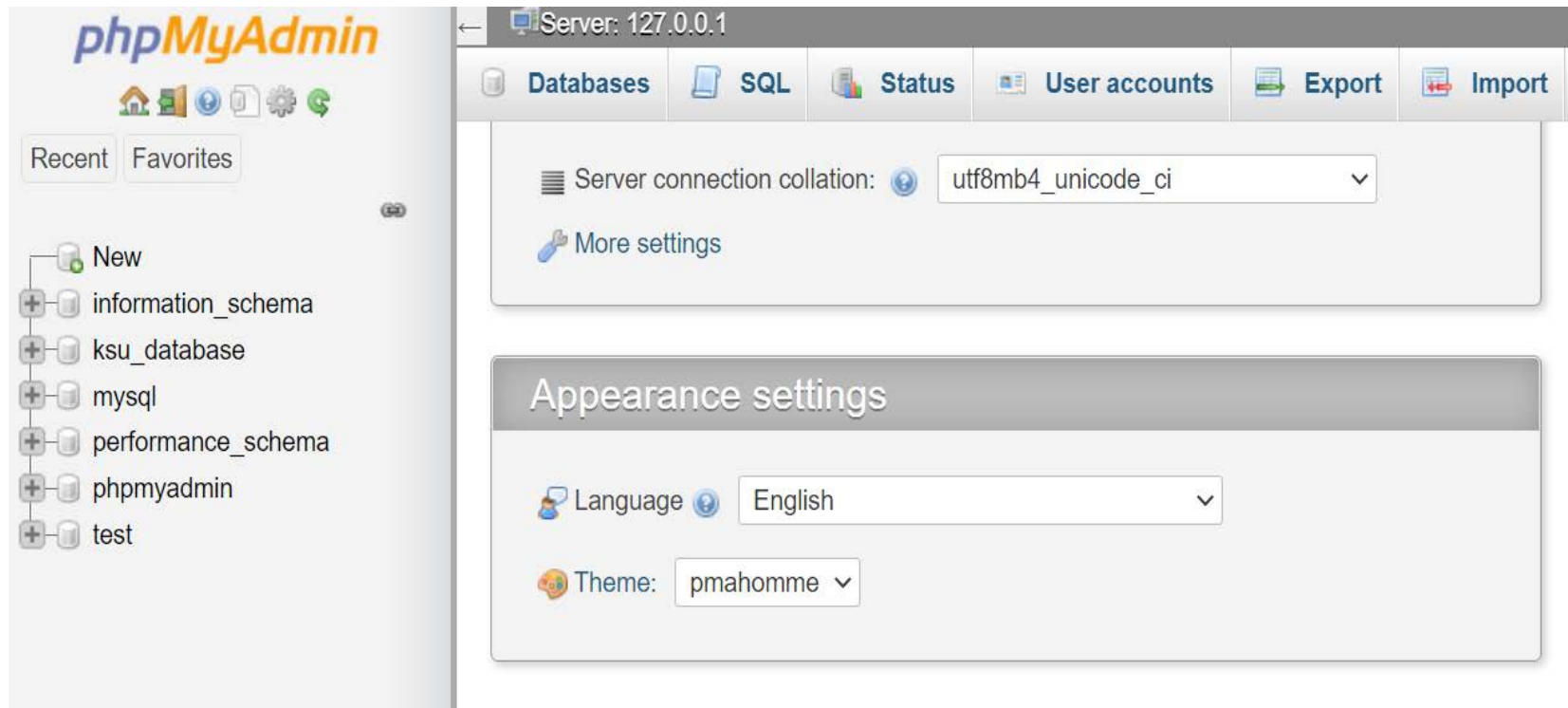
You have successfully installed XAMPP on this system! Now you can start using Apache, MariaDB, PHP and other components. You can find more info in the [FAQs](#) section or check the [HOW-TO Guides](#) for getting started with PHP applications.

XAMPP is meant only for development purposes. It has certain configuration settings that make it easy to develop locally but that are insecure if you want to have your installation accessible to others. If you want have your XAMPP accessible from the internet, make sure you understand the implications and you checked the [FAQs](#) to learn how to protect your site. Alternatively you can use [WAMP](#), [MAMP](#) or [LAMP](#) which are similar packages which are more suitable for production.

Start the XAMPP Control Panel to check the server status.

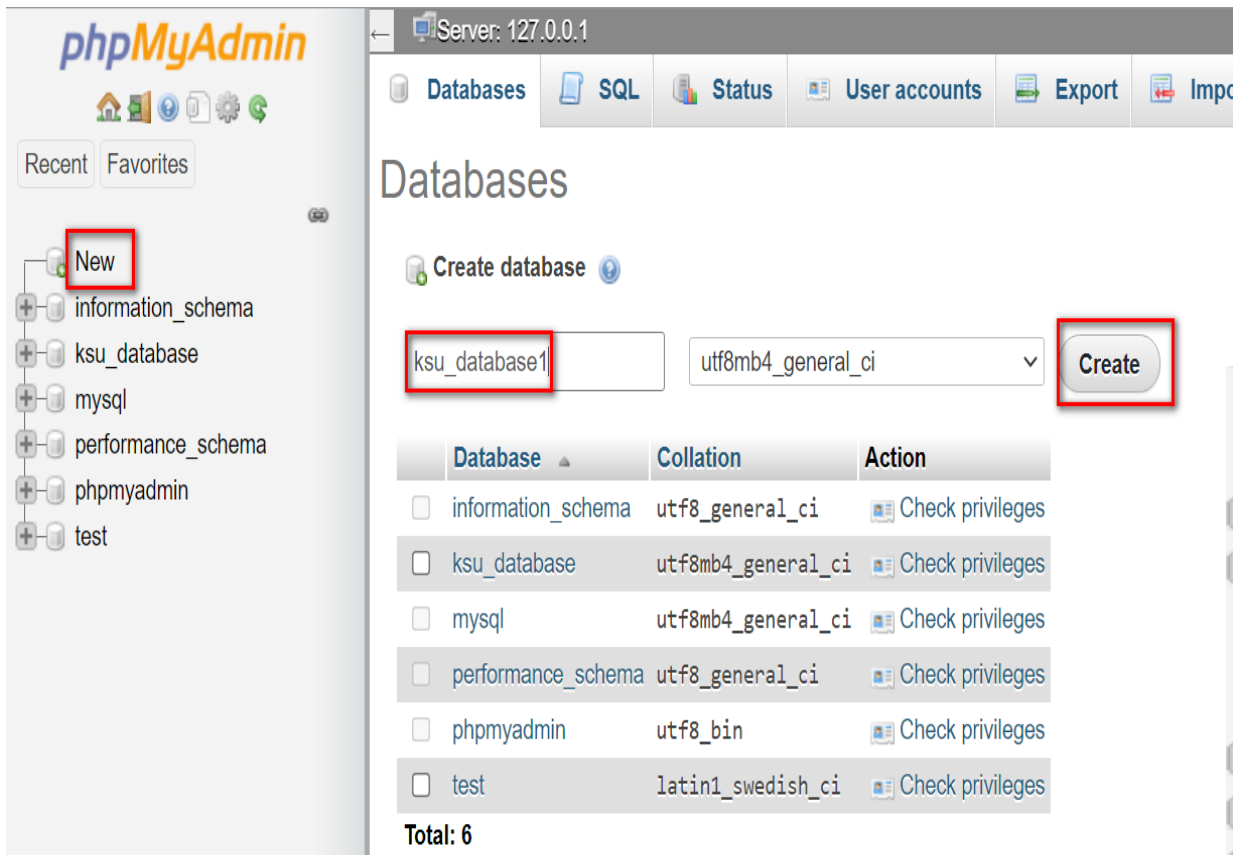
Get in phpMyAdmin

- Please type “localhost/phpmyadmin” as the url of your Chrome
- The “phpmyadmin” is a software embedded in the DBMS, “Maria”.



Create a Database

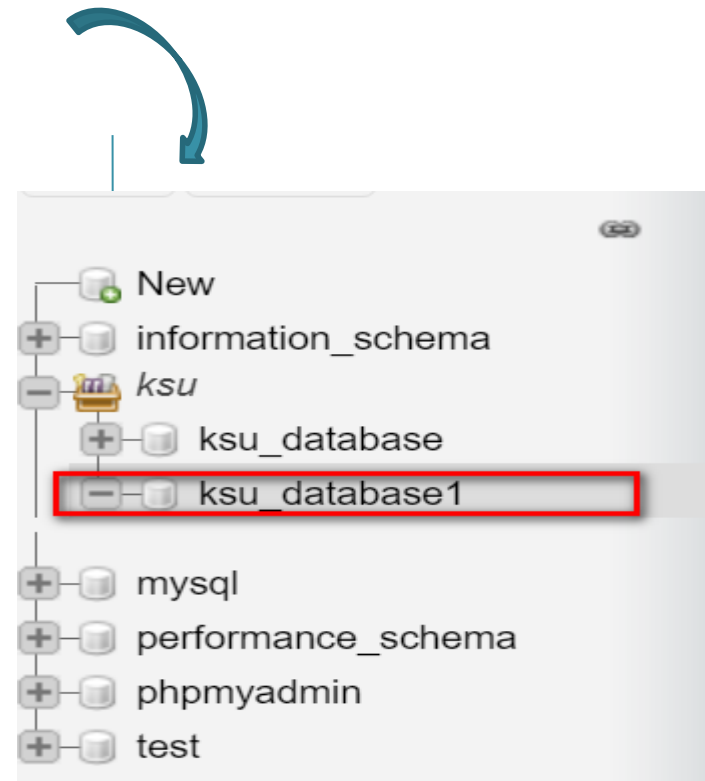
- Create a database named as “ksu_database”



The screenshot shows the phpMyAdmin interface for a MySQL server at 127.0.0.1. The 'Databases' tab is selected. In the left sidebar, the 'New' button is highlighted with a red box. The main area shows the 'Create database' form with 'ksu_database1' entered in the database name field and 'utf8mb4_general_ci' selected for the collation. The 'Create' button is also highlighted with a red box. Below the form is a table listing existing databases.

Database	Collation	Action
<input type="checkbox"/> information_schema	utf8_general_ci	Check privileges
<input type="checkbox"/> ksu_database	utf8mb4_general_ci	Check privileges
<input type="checkbox"/> mysql	utf8mb4_general_ci	Check privileges
<input type="checkbox"/> performance_schema	utf8_general_ci	Check privileges
<input type="checkbox"/> phpmyadmin	utf8_bin	Check privileges
<input type="checkbox"/> test	latin1_swedish_ci	Check privileges

Total: 6



A diagram illustrating the database structure after the creation of 'ksu_database1'. A curved arrow points from the 'Create' button in the previous screenshot to this diagram. The diagram shows a tree view of the database structure. The 'ksu' database is expanded, showing 'ksu_database' and 'ksu_database1'. The 'ksu_database1' entry is highlighted with a red box.

Create a Table

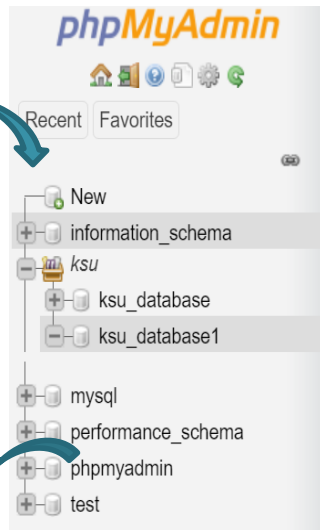
- Create a table with 2 columns as follows

資料庫沒有資料表。

建立資料表

名稱: test_table01 欄位數: 2

執行



Server: 127.0.0.1 » Database: ksu_database1

No tables found in database.

Create table

Name: ksu_table1 Number of columns: 2

Go

phpMyAdmin

Recent Favorites

New

- information_schema
- ksu
 - ksu_database
 - ksu_database1
- mysql
- performance_schema
- phpmyadmin
- test

Server: 127.0.0.1 » Database: ksu_database1 » Table: ksu_table1

Browse Structure SQL Search Insert Export Import Privileges Operations Triggers

Table name: ksu_table1 Add 2 column(s) Go

Name	Type	Length/Values	Default	Collation	Attributes	Null	Index
student_no	VARCHAR	10	None			<input type="checkbox"/>	---
student_name	VARCHAR	20	None			<input type="checkbox"/>	---

Structure

Table comments: Collation: Storage Engine: InnoDB

PARTITION definition:

Partition by: (Expression or column list)

Partitions:

Preview SQL Save



Recent Favorites

- New
- information_schema
- ksu
 - ksu_database
 - ksu_database1
 - New
 - ksu_table1

Server: 127.0.0.1 » Database: ksu_database1 » Table: ksu_table1

[Browse](#)
[Structure](#)
[SQL](#)
[Search](#)
[Insert](#)
[Export](#)
[Import](#)
[Privileges](#)
[Operations](#)

[Table structure](#)
[Relation view](#)

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
<input type="checkbox"/> 1	student_no	varchar(10)	utf8mb4_general_ci		No	None			Change Drop More
<input type="checkbox"/> 2	student_name	varchar(20)	utf8mb4_general_ci		No	None			Change Drop More

☐ Check all
 With selected:
 [Browse](#)
[Change](#)
[Drop](#)
[Primary](#)
[Unique](#)
[Index](#)
[Spatial](#)

[Print](#)
[Propose table structure](#)
[Move columns](#)
[Normalize](#)

Insert Data

phpMyAdmin

Server: 127.0.0.1 » Database: ksu_database1 » Table: ksu_table1

Browse Structure SQL Search Insert Export Import Privileges Operations Triggers

Recent Favorites

New

- information_schema
- ksu
 - ksu_database
 - ksu_database1
 - New
 - ksu_table1
- mysql
- performance_schema
- phpmyadmin
- test

Column	Type	Function	Null	Value
student_no	varchar(10)			A001
student_name	varchar(20)			John Sieg

Go

☐ Ignore

Column	Type	Function	Null	Value
student_no				A002
student_name				Mike John

Go

Current selection does not correspond to the table structure.

Showing rows 0 - 1 (2 total, 2 displayed)

```
SELECT * FROM `ksu_table1`
```

☐ Profiling [Edit inline] [Edit] []

☐ Show all | Number of rows: 2

+ Options

student_no	student_name
A001	John Sieg
A002	Mike John

Exercise – try it out!

- Insert 4 rows as follows in your **phpMyadmin** interface

+ Options

student_no	student_name
A001	John Sieg
A002	Mike John
A003	Kathy Lu
A004	Derk Water

Add one more column to your table

The screenshot shows the phpMyAdmin interface for a database named 'ksu_database1' and a table named 'ksu_table1'. The 'Structure' tab is selected, showing the current table structure with two columns: 'student_no' and 'student_name'. Below the table structure, the 'Add' button is used to add a new column. The 'Add' button is highlighted with a red box, and the 'Go' button is also highlighted with a red box. A large black arrow points from the 'Go' button to the 'Save' button in the bottom section of the interface.

Server: 127.0.0.1 » Database: ksu_database1 » Table: ksu_table1

Browse Structure SQL Search Insert Export Import Privileges Operations

Table structure Relation view

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	student_no	varchar(10)	utf8mb4_general_ci		No	None			Change Drop More
2	student_name	varchar(20)	utf8mb4_general_ci		No	None			Change Drop More

Check all With selected: Browse Change Drop Primary Unique Index

Print Propose table structure Move columns Normalize

Add 1 column(s) after student_name Go

Structure










Name	Type	Length/Values	Default	Collation	Attributes
student_cell	VARCHAR	15	None		

Online transaction Preview SQL Save

 Browse  Structure  SQL  Search  Insert  Export  Import  Privileges  Operations
















 Table structure

 Relation view

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
<input type="checkbox"/> 1	student_no	varchar(10)	utf8mb4_general_ci		No	None			 Change  Drop  More
<input type="checkbox"/> 2	student_name	varchar(20)	utf8mb4_general_ci		No	None			 Change  Drop  More
<input type="checkbox"/> 3	student_cell	varchar(15)	utf8mb4_general_ci		No	None			 Change  Drop  More

Exercise-try it out!

- Add two more columns

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	student_no	varchar(10)	utf8mb4_general_ci		No	None			 Change  Drop  More
2	student_name	varchar(20)	utf8mb4_general_ci		No	None			 Change  Drop  More
3	student_cell	varchar(15)	utf8mb4_general_ci		No	None			 Change  Drop  More
4	student_grade	int(11)			No	60			 Change  Drop  More
5	student_birthday	datetime			Yes	NULL			 Change  Drop  More

Exercise-try it out!

- Add one more record

+ Options

student_no	student_name	student_cell	student_grade	student_birthday
A001	John Sieg		60	NULL
A002	Mike John		60	NULL
A003	Kathy Lu		60	NULL
A004	Derk Water		60	NULL
B001	Mice Moore	0911980765	70	2021-09-16 16:58:31

The End