WEB CONNECTION WITH SQLs

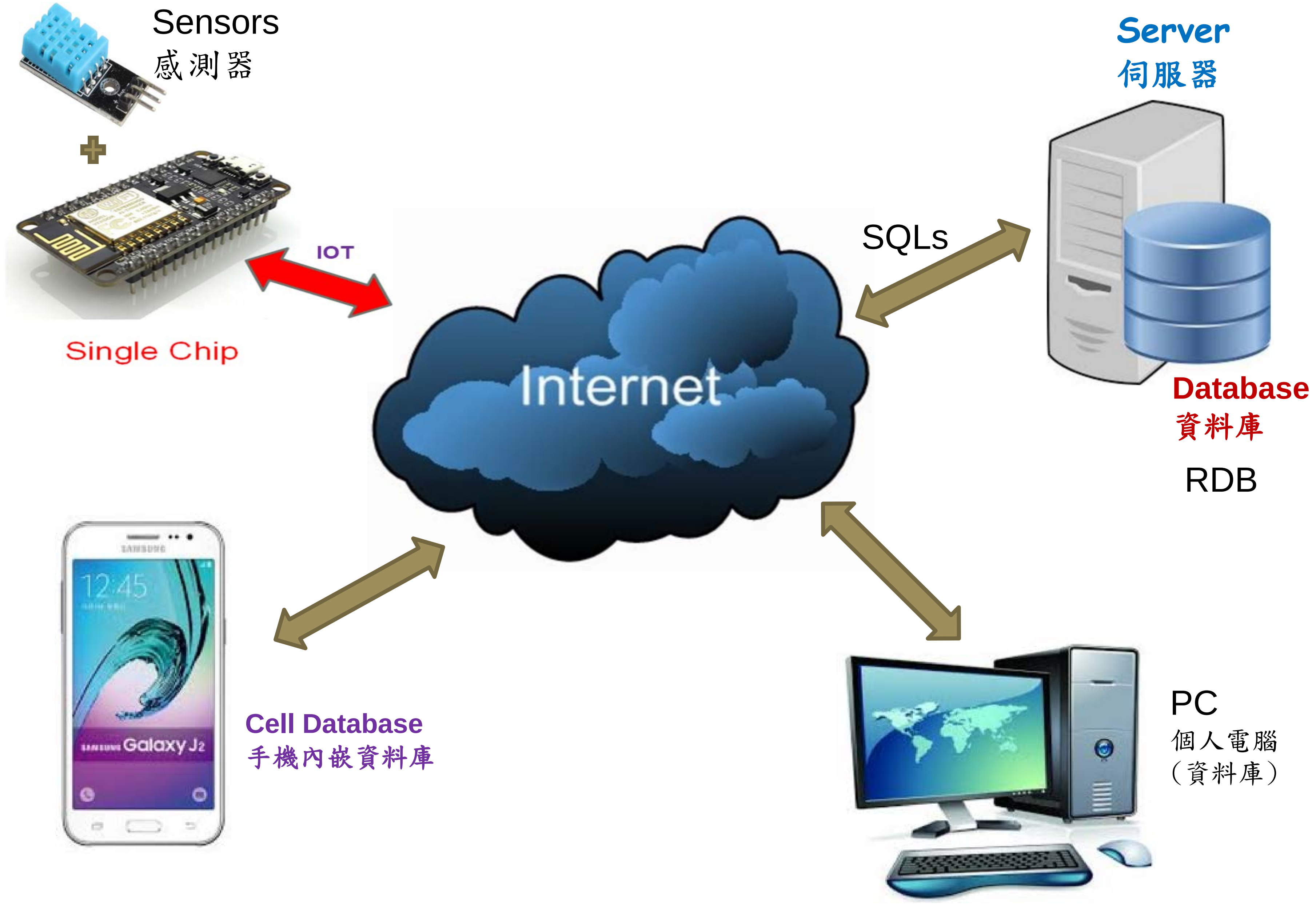
Contents

Purpose

- This Chapter is intended to teach you how to use SQLs inside high-level programs that will access relational database and get responses from it for user.

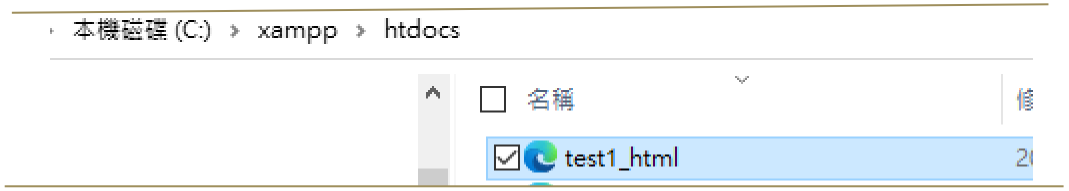
A html in Apache Server

The Data Flow for Server + Database



Start-up

- Place the test1.html on C:\xampp\htdocs

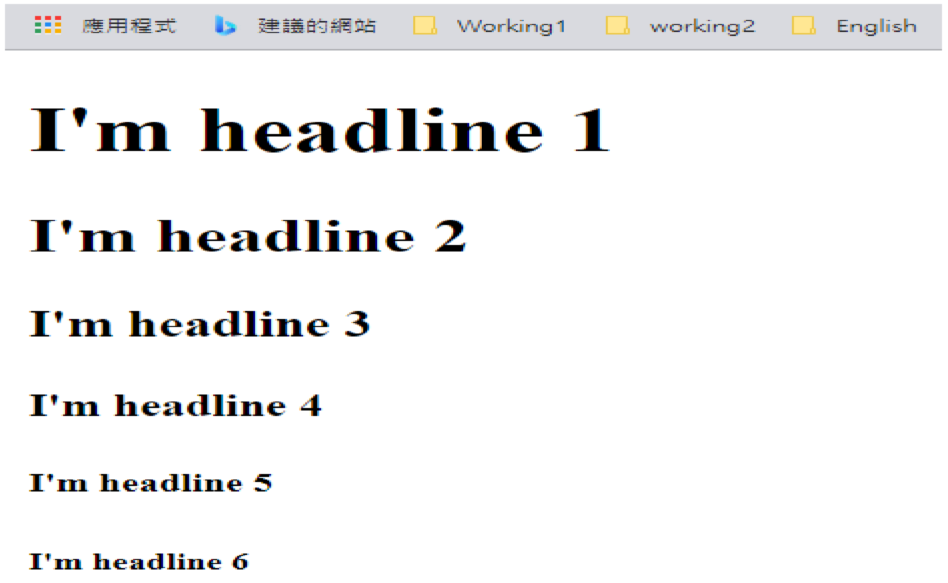


本機磁碟 (C:) › xampp › htdocs

名稱

test1_html

- Invoke the html on the browser under Apache server by typing http://localhost/test1.html



應用程式 建議的網站 Working1 working2 English

I'm headline 1

I'm headline 2

I'm headline 3

I'm headline 4

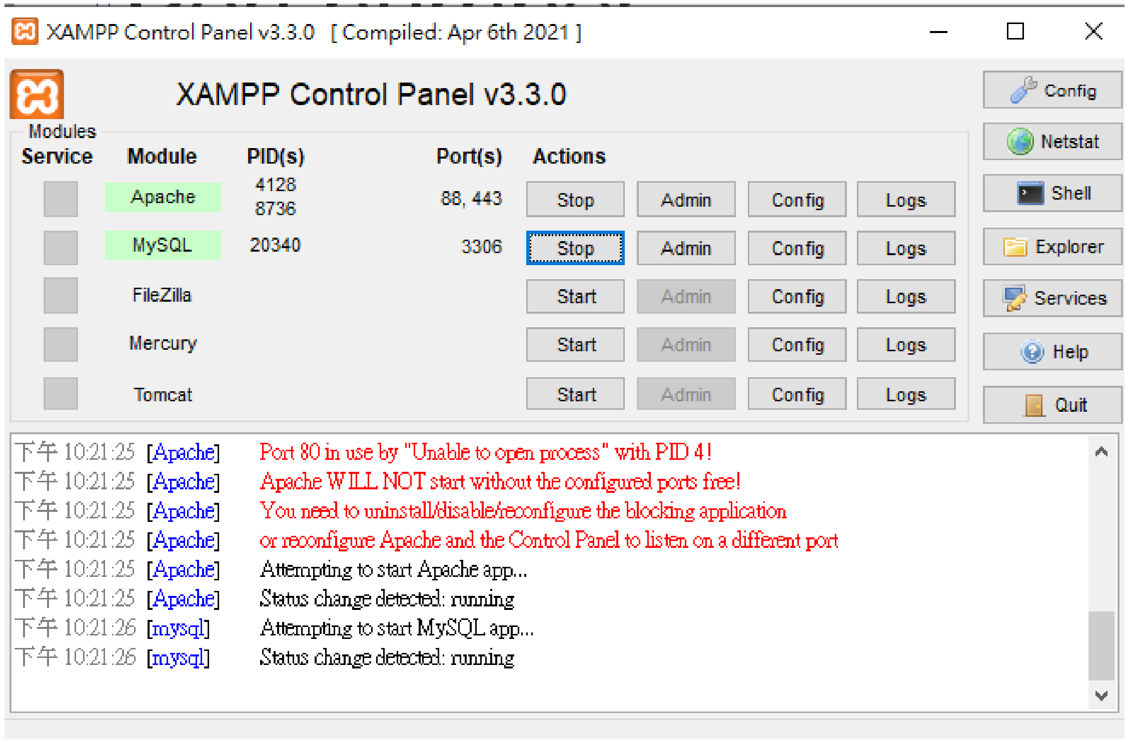
I'm headline 5

I'm headline 6

test1.html

Port number

- A port number is **the logical address of each application or process that uses a network or the Internet to communicate**. A port number uniquely identifies a network-based application on a computer.


XAMPP Control Panel v3.3.0 [Compiled: Apr 6th 2021]
XAMPP Control Panel v3.3.0
Config
Netstat
Shell
Explorer
Services
Help
Quit

Modules

Service	Module	PID(s)	Port(s)	Actions			
	Apache	4128 8736	88, 443	Stop	Admin	Config	Logs
	MySQL	20340	3306	Stop	Admin	Config	Logs
	FileZilla			Start	Admin	Config	Logs
	Mercury			Start	Admin	Config	Logs
	Tomcat			Start	Admin	Config	Logs

```
下午 10:21:25  [Apache]   Port 80 in use by "Unable to open process" with PID 4!
下午 10:21:25  [Apache]   Apache WILL NOT start without the configured ports free!
下午 10:21:25  [Apache]   You need to uninstall/disable/reconfigure the blocking application
下午 10:21:25  [Apache]   or reconfigure Apache and the Control Panel to listen on a different port
下午 10:21:25  [Apache]   Attempting to start Apache app...
下午 10:21:25  [Apache]   Status change detected: running
下午 10:21:26  [mysql]    Attempting to start MySQL app...
下午 10:21:26  [mysql]    Status change detected: running
```

Connect to the Internet

- What happen based on the current Apache and MySQL environment? Can we connecting to the Internet?

- If you were Bill Gates, what kind of network skills you will use to design *Messanger*?

Connect to DB by using php and SQL

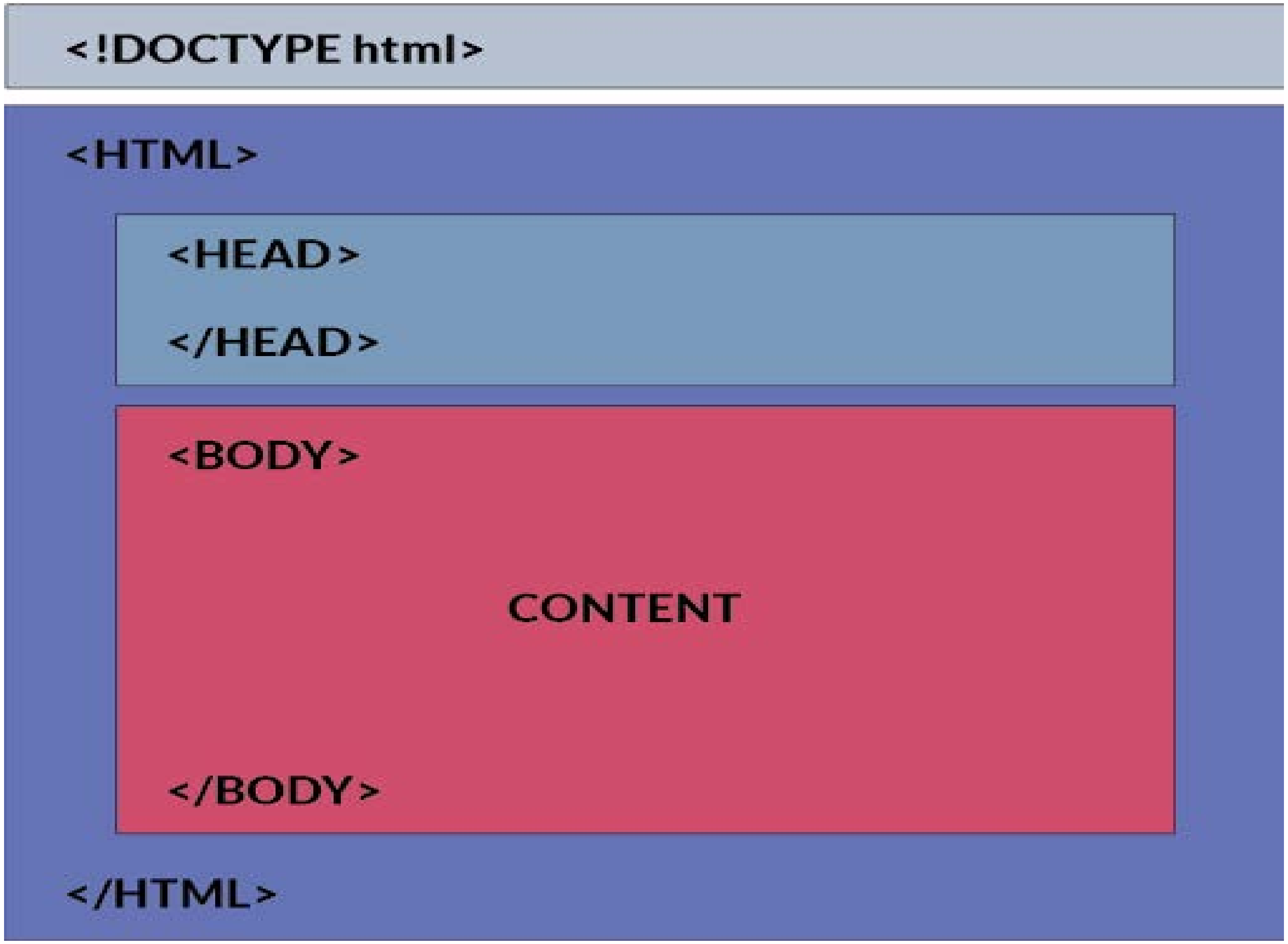
php

- php web framework
  - Laravel : MVC
  - CodeIgniter: MVC
    - **MVC** is a software approach that separates application logic from presentation.
- Traditional way

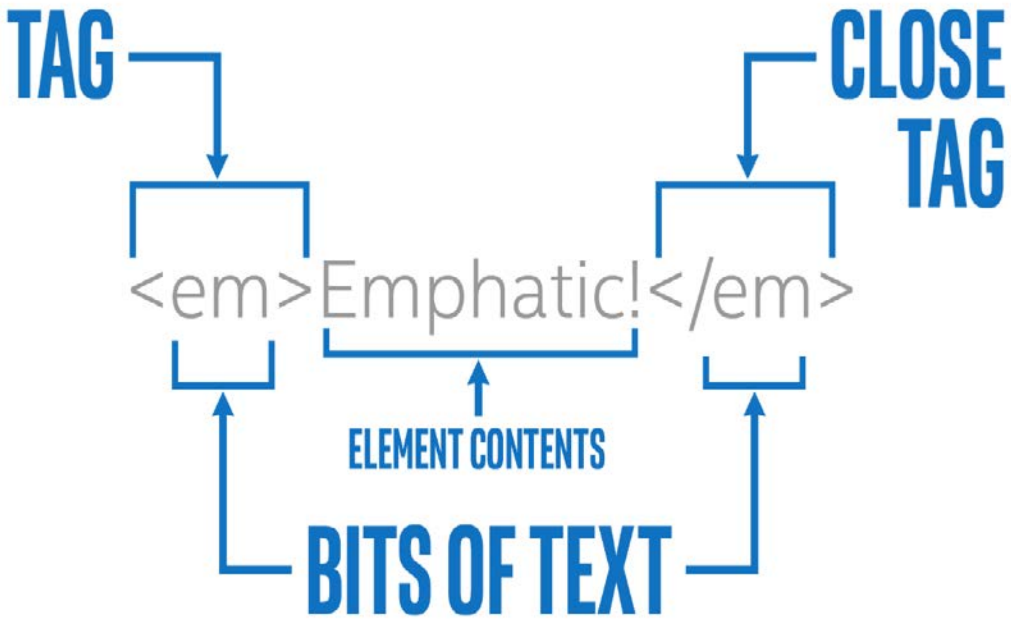
Connection

- Put *html* code and *php* code together in a file
- Separate *html* code and *php* code 🡐 This handout uses this way.
- html: front-end code (前端程式)
- php: back-end code (後端程式)

html code (.*html*)

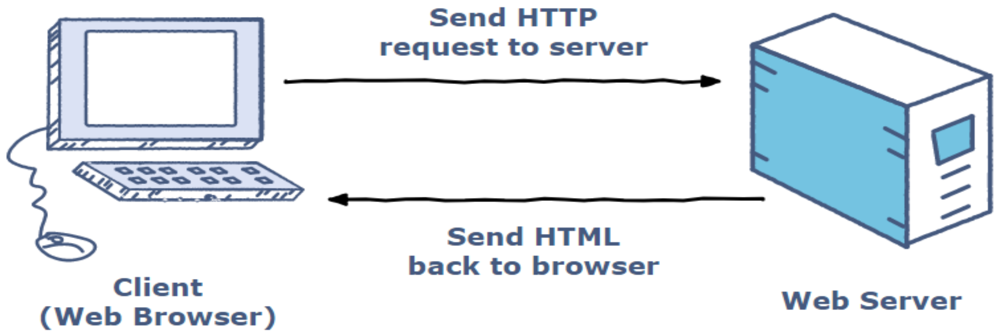


Html Tag (標籤)v.s. Element(元素)

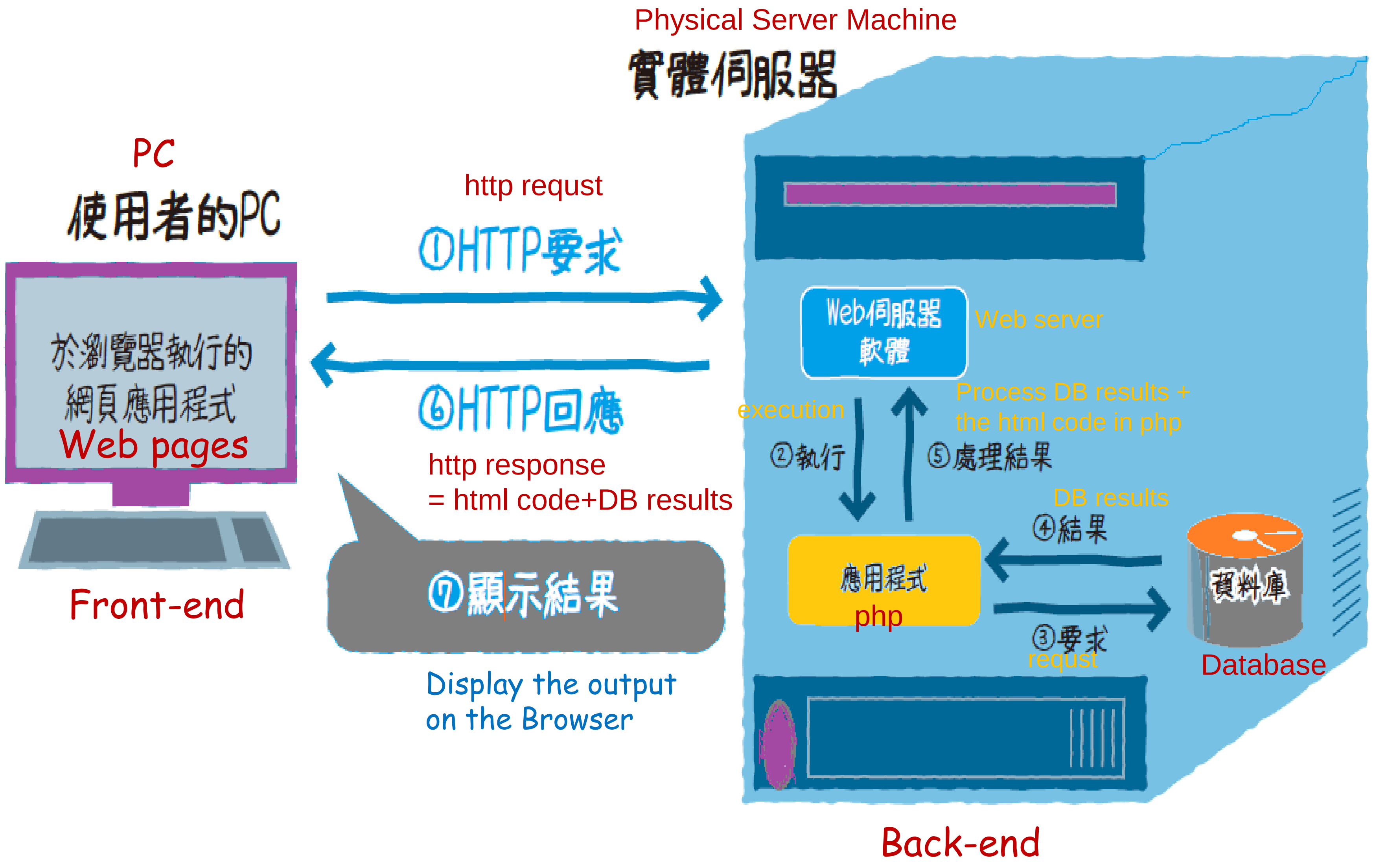


Structure of php code

- PHP is an embedded scripting language; this means that it is possible to write PHP code into an HTML file. Since web browsers can only process HTML files, the web-server converts and embeds the PHP code into one HTML file before sending it to the browser.



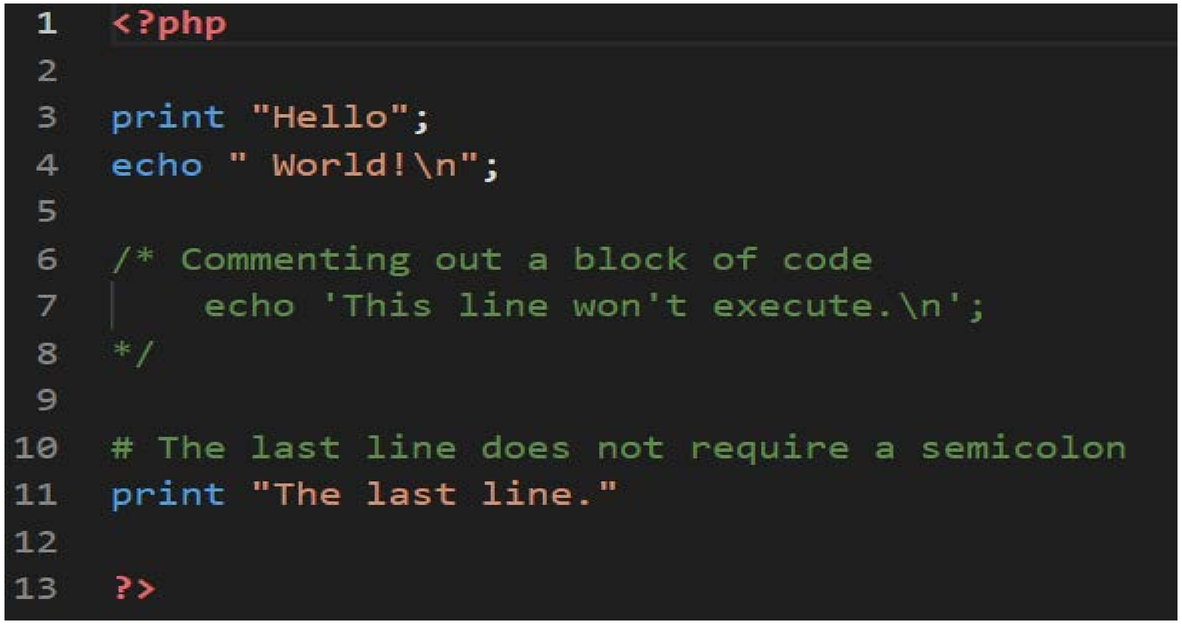
- Or, write HTML code into PHP file for response messanges. In this handout with *.html* and *.php*, *.html* is the front-end code. *.php* is the back-end code.
- Web browser process HTML files (the front-end), then send it to the server. The server invoke the corresponding *php* (the back-end) which is linked and set up in the html file. The *php* code requests data to DB. Then, get the DB results and embedded html code returned from the server


Physical Server Machine
實體伺服器
PC
使用者的PC
於瀏覽器執行的
網頁應用程式
Web pages
Front-end
http requst
①HTTP要求
⑥HTTP回應
http response
= html code+DB results
⑦顯示結果
Display the output
on the Browser
Web伺服器
軟體
Web server
execution
②執行
Process DB results +
the html code in php
⑤處理結果
DB results
④結果
應用程式
php
③要求
requst
資料庫
Database
Back-end

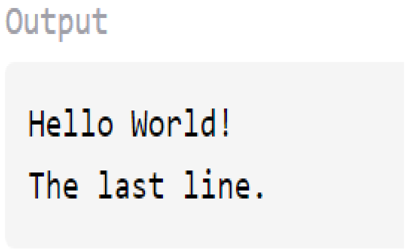
- There are HTML tags for PHP code to indicate the start and end of PHP code in an HTML file or PHP file, such as

  `<?php` php-code-here `?>`

- The start tag and end tag for PHP code are the ones most recommended and widely used.
- **Commenting for PHP:** # and // are used to comment out a single line of code, while /* and */ indicate the start and end of a commented block of code.
- Place “;” on the end of PHP statement



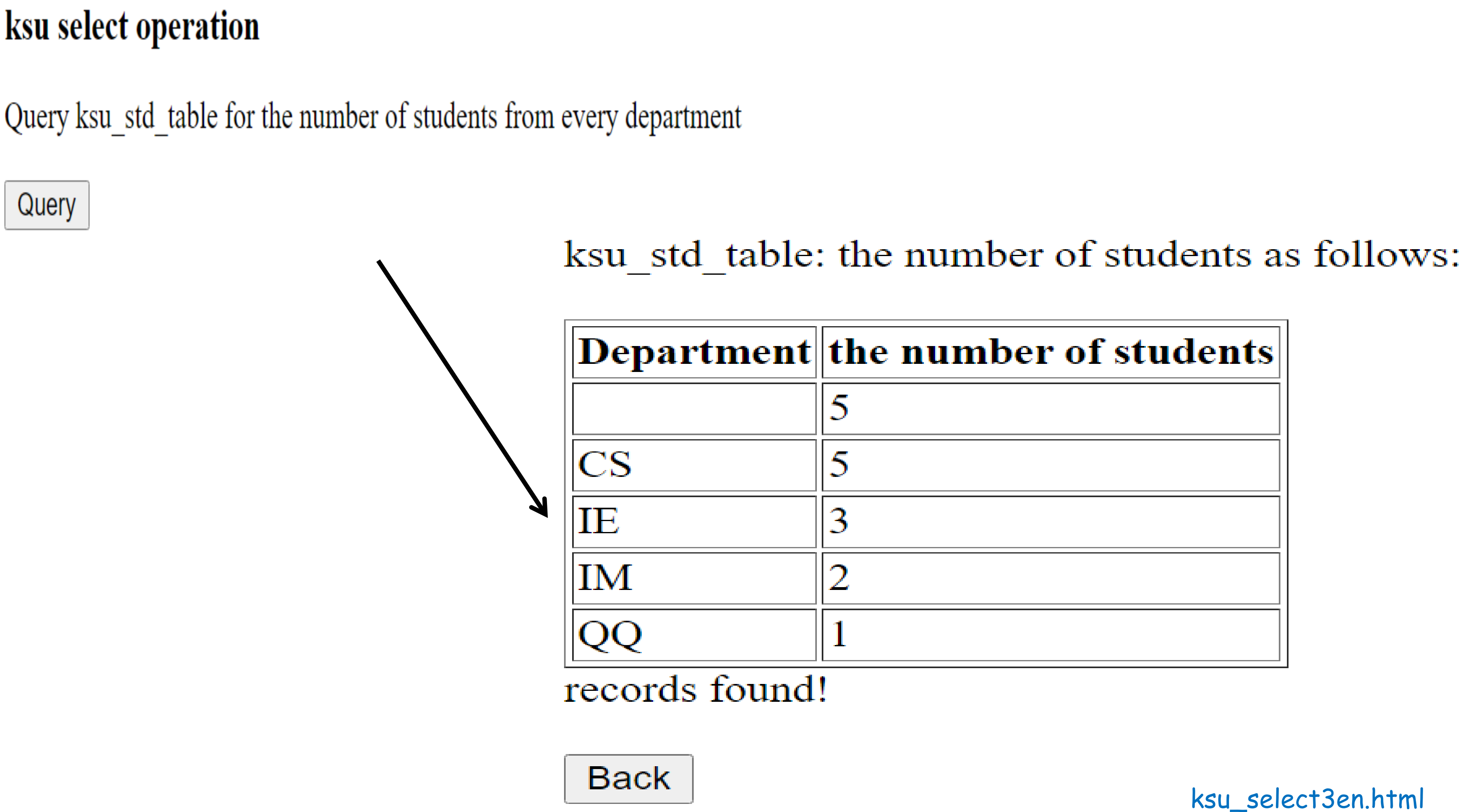
```php
<?php

print "Hello";
echo " World!\n";

/* Commenting out a block of code
    echo 'This line won't execute.\n';
*/

# The last line does not require a semicolon
print "The last line."

?>
```



Output

```
Hello World!
The last line.
```

Example



ksu select operation

Query ksu_std_table for the number of students from every department

Query

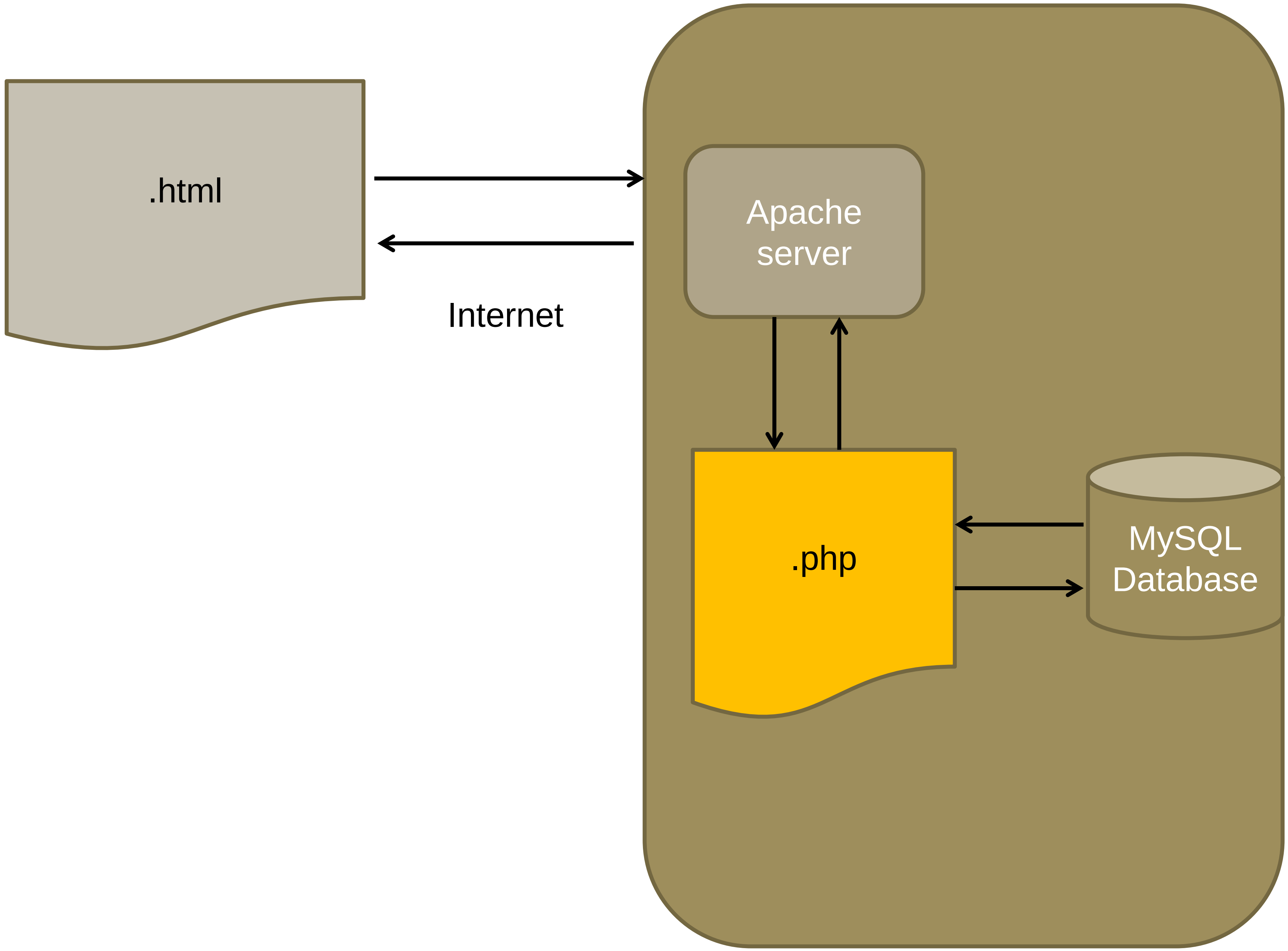
ksu_std_table: the number of students as follows:

Department	the number of students
	5
CS	5
IE	3
IM	2
QQ	1

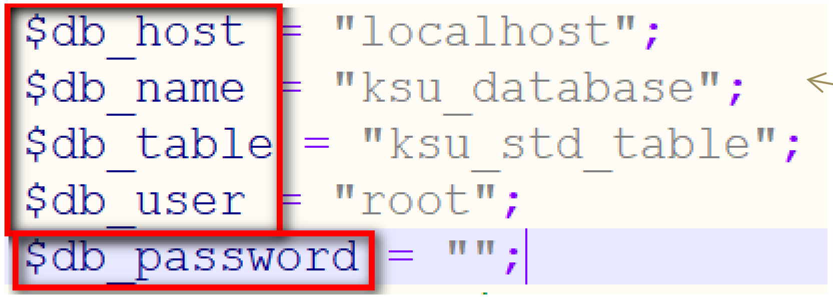
records found!

Back

ksu_select3en.html
ksu_select3en.php


.html
Internet
Apache server
.php
MySQL Database

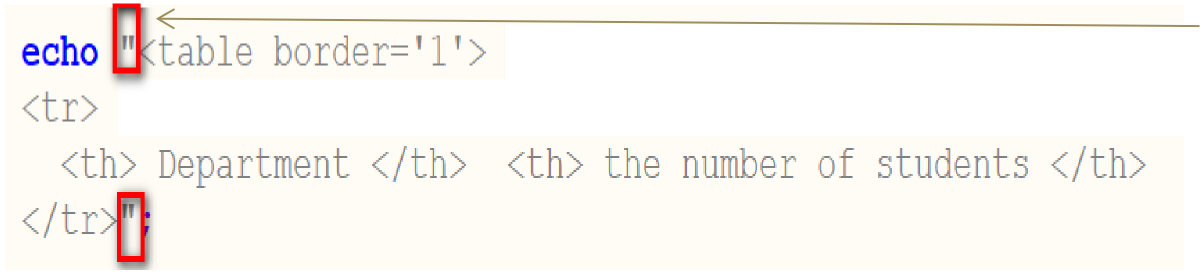
Key Points



```
$db_host = "localhost";
$db_name = "ksu_database";
$db_table = "ksu_std_table";
$db_user = "root";
$db_password = "";
```

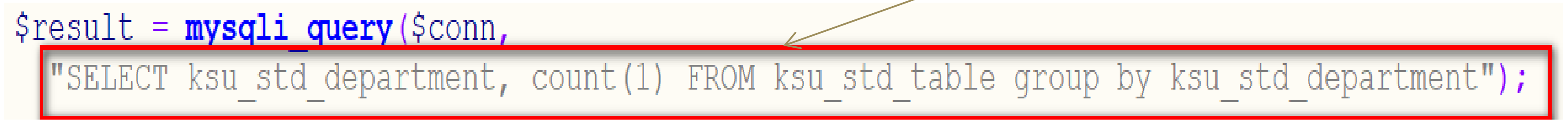
PHP variables

HTML code is embedded
In PHP code.

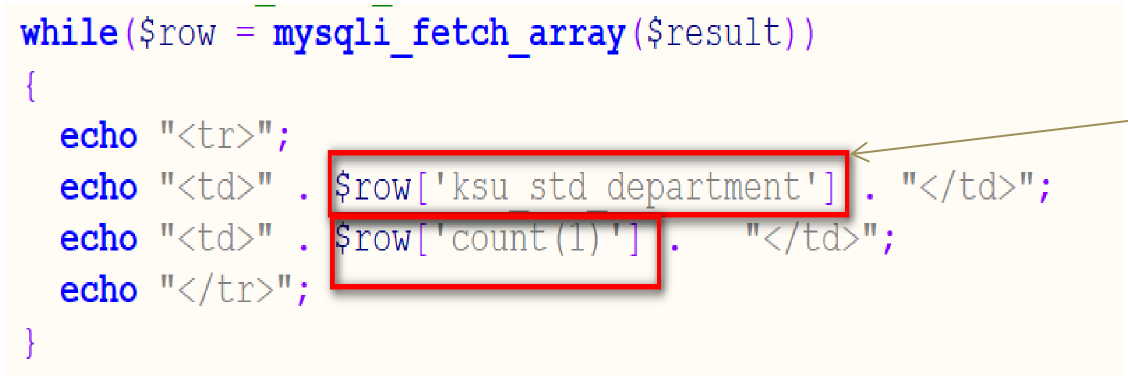


```
echo "<table border='1'>
<tr>
  <th> Department </th>  <th> the number of students </th>
</tr>";
```

SQL statement is embedded
In PHP code.



```
$result = mysqli_query($conn,
  "SELECT ksu_std_department, count(1) FROM ksu_std_table group by ksu_std_department");
```

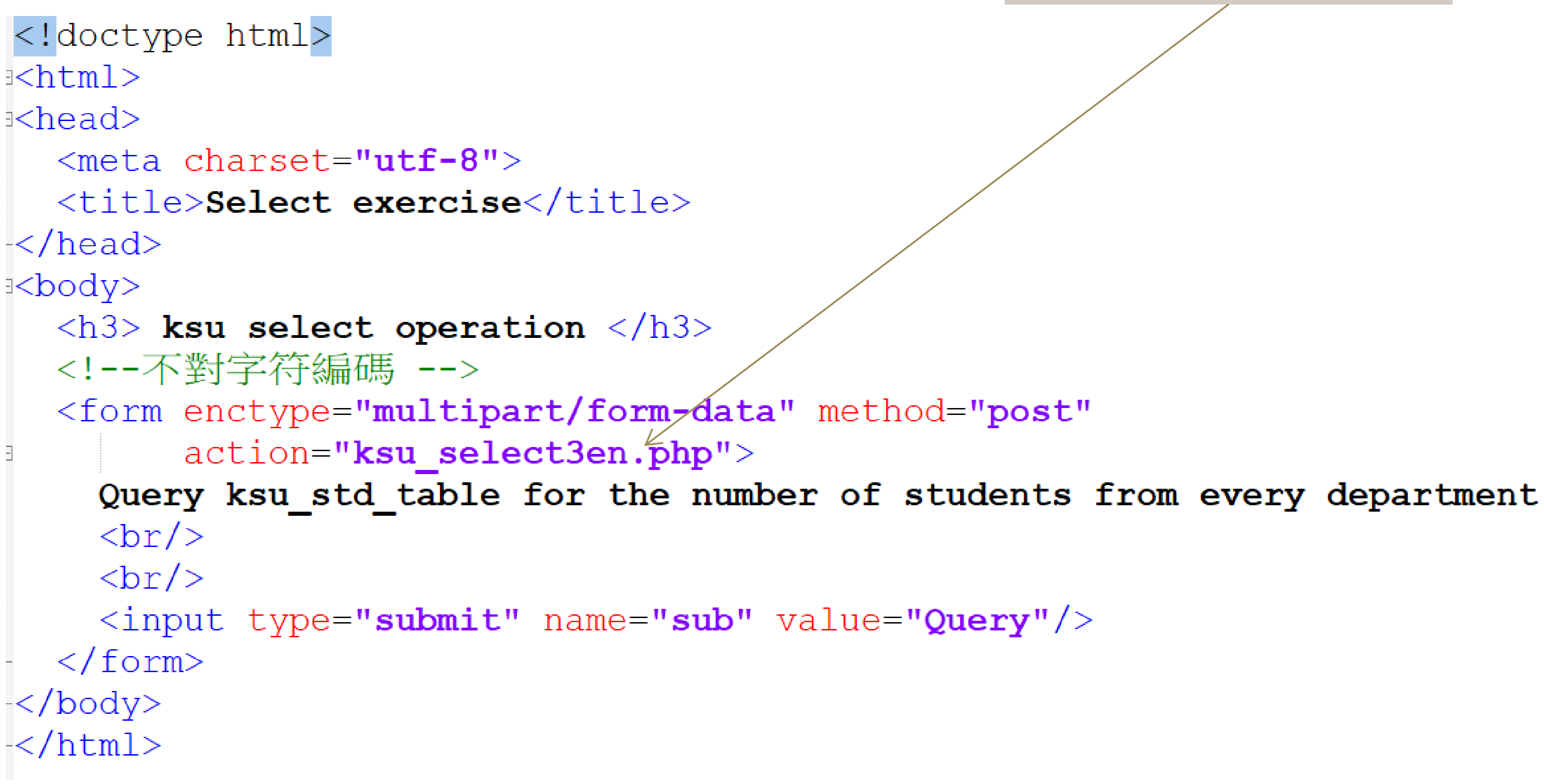


```
while($row = mysqli_fetch_array($result))
{
   echo "<tr>";
   echo "<td>" . $row['ksu_std_department'] . "</td>";
   echo "<td>" . $row['count(1)'] .   "</td>";
   echo "</tr>";
}
```

Database column name is
embedded in PHP code.

ksu_select3en.html

Link to php program



```
<!doctype html>
<html>
<head>
  <meta charset="utf-8">
  <title>Select exercise</title>
</head>
<body>
  <h3> ksu select operation </h3>
  <!--不對字符編碼 -->
  <form enctype="multipart/form-data" method="post"
        action="ksu_select3en.php">
    Query ksu_std_table for the number of students from every department
    <br/>
    <br/>
    <input type="submit" name="sub" value="Query"/>
  </form>
</body>
</html>
```

ksu_select3en.php

```
<?php
 $db_host = "localhost";
 $db_name = "ksu_database";
 $db_table = "ksu_std_table";
 $db_user = "root";
 $db_password = "";
 // check connection
 $conn = mysqli_connect($db_host, $db_user, $db_password);
 if(empty($conn)){
    print  mysqli_error ($conn);
    die ("Unable to connect to DB ! " );
    exit;
 }
 if(!mysqli_select_db( $conn, $db_name)){
    die("DB is not existed");
    exit;
 }
 //main scope
 mysqli_set_charset($conn,'utf8');

 echo "ksu_std_table: the number of students as follows:". "<br/><br/>";
 $result = mysqli_query($conn,
   "SELECT ksu_std_department, count(1) FROM ksu_std_table group by ksu_std_department");
 echo "<table border='1'>
 <tr>
   <th> Department </th>  <th> the number of students </th>
 </tr>";

 //use mysqli_fetch_array() takes the data from DB
 while($row = mysqli_fetch_array($result))
 {
   echo "<tr>";
   echo "<td>" . $row['ksu_std_department'] . "</td>";
   echo "<td>" . $row['count(1)'] .   "</td>";
   echo "</tr>";
 }
 echo "</table>";
 echo "records found!"."<br/><br/>";
?>
<form enctype="multipart/form-data"  method="post" action="ksu_select3en.html">
<input type="submit" name="sub" value="Back"/>
</form>
```

SQL

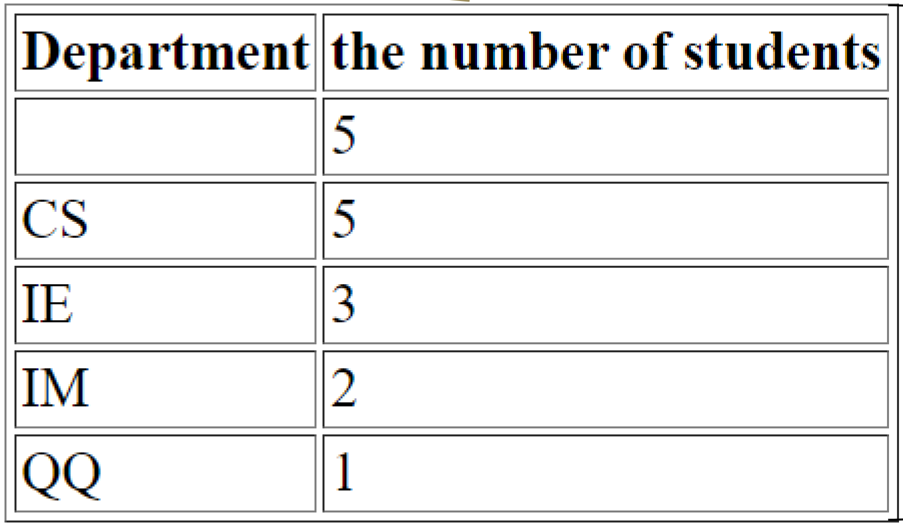
Link to html program

ksu_select3en.php

	5
CS	5
IE	3
IM	2
QQ	1

$result in memory

`$row = mysqli_fetch_array($result)`

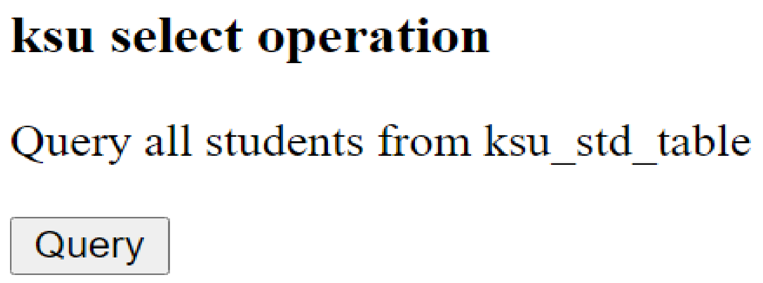


Department	the number of students
	5
CS	5
IE	3
IM	2
QQ	1

While loop

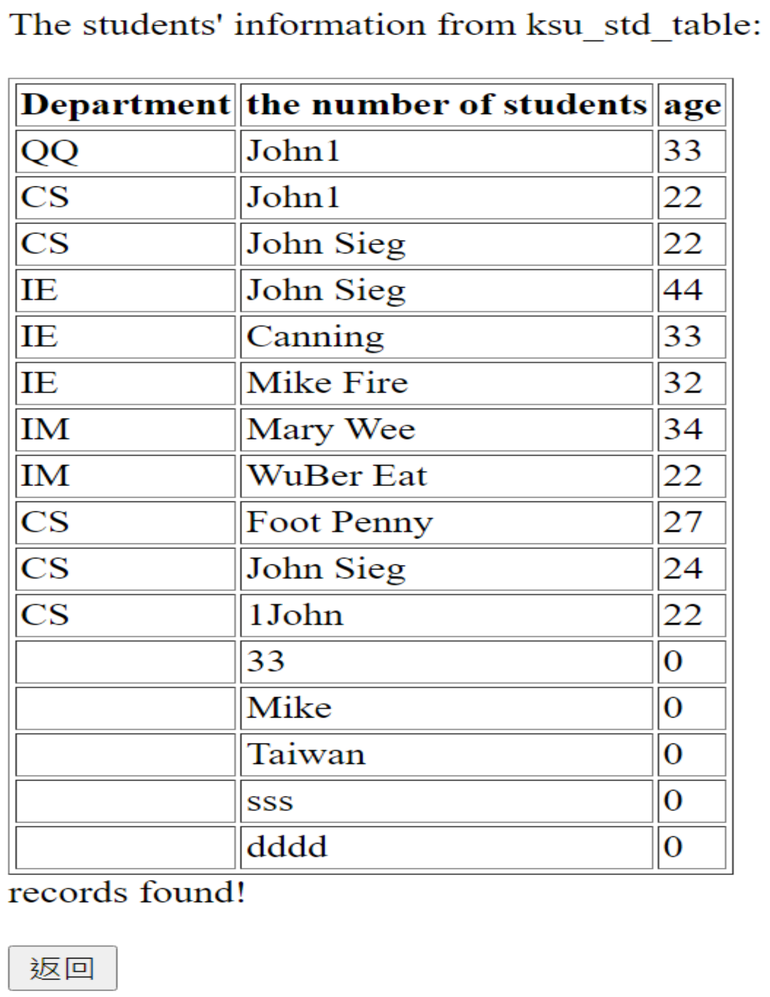
Example – Warming up

- Make a minor change in your php program



ksu select operation

Query all students from ksu_std_table



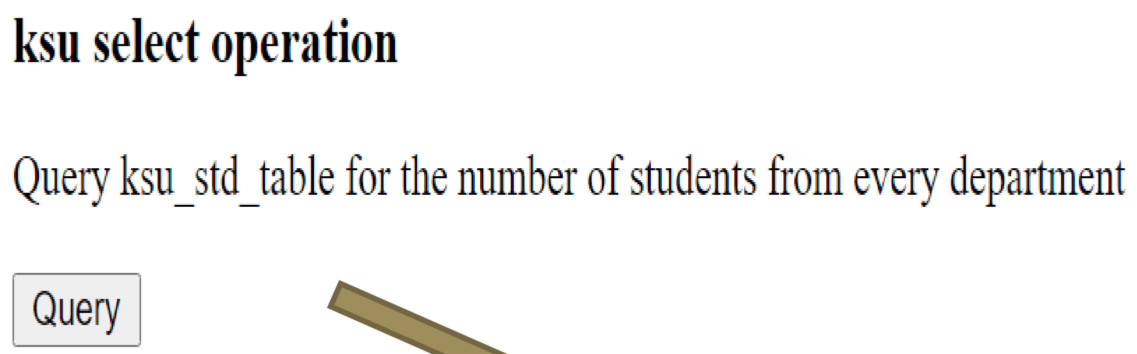
The students' information from ksu_std_table:

Department	the number of students	age
QQ	John1	33
CS	John1	22
CS	John Sieg	22
IE	John Sieg	44
IE	Canning	33
IE	Mike Fire	32
IM	Mary Wee	34
IM	WuBer Eat	22
CS	Foot Penny	27
CS	John Sieg	24
CS	1John	22
	33	0
	Mike	0
	Taiwan	0
	sss	0
	dddd	0

records found!

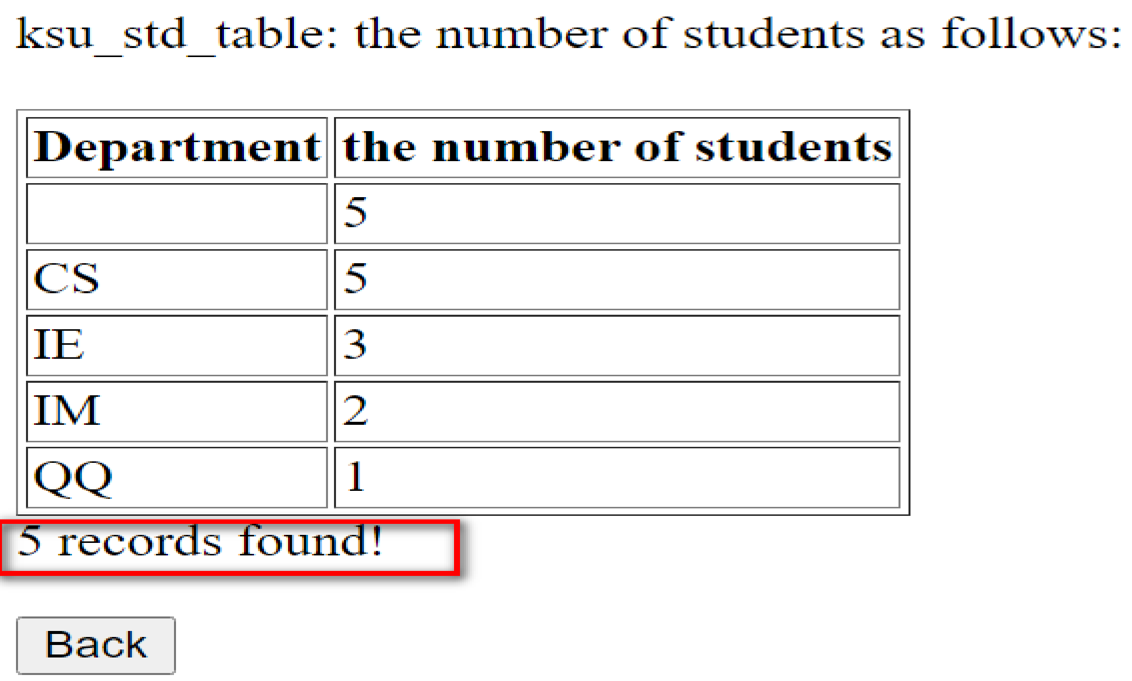
ksu_select3aen.html
ksu_select3aen.php

Example



ksu select operation

Query ksu_std_table for the number of students from every department



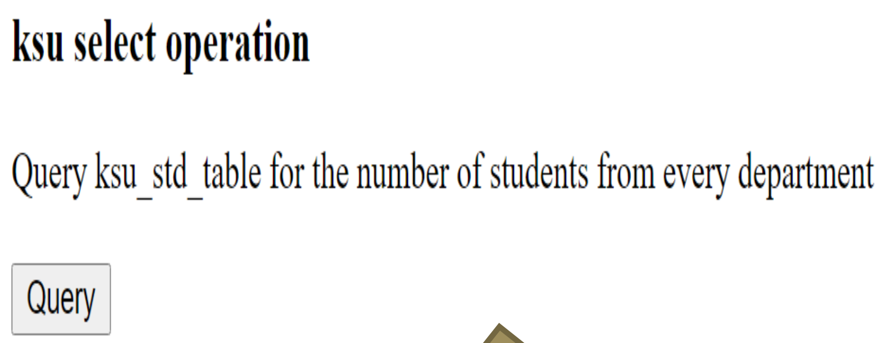
ksu_std_table: the number of students as follows:

Department	the number of students
	5
CS	5
IE	3
IM	2
QQ	1

5 records found!

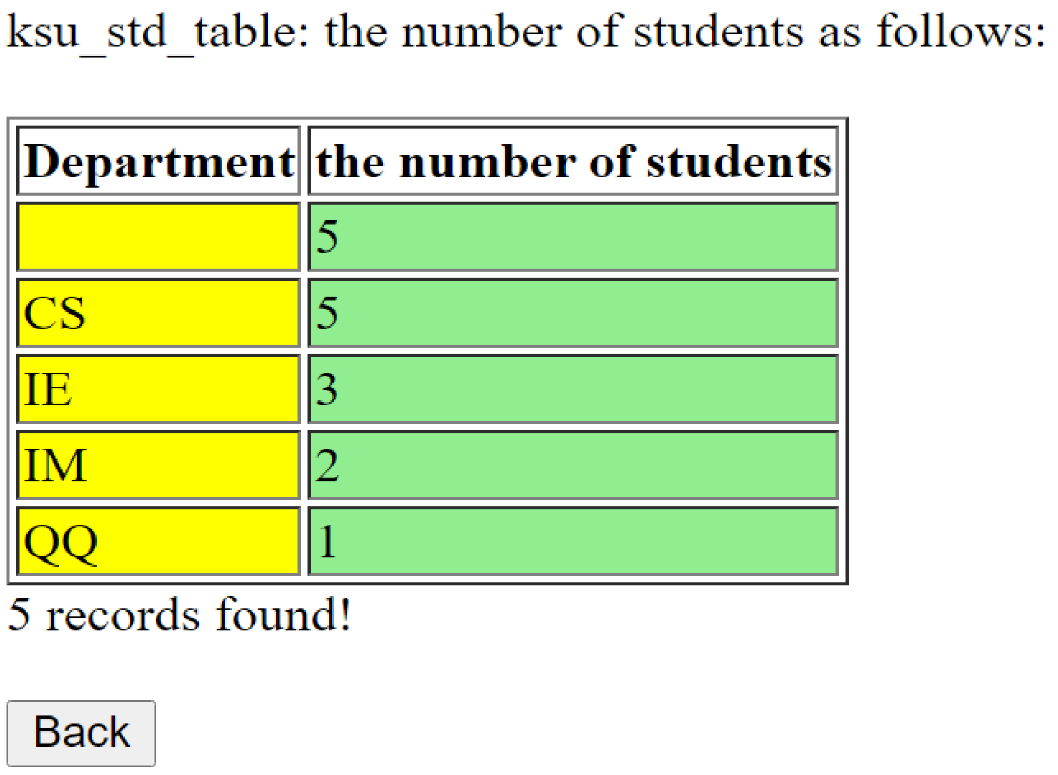
ksu_select4en.html
ksu_select4en.php

Example



ksu select operation

Query ksu_std_table for the number of students from every department



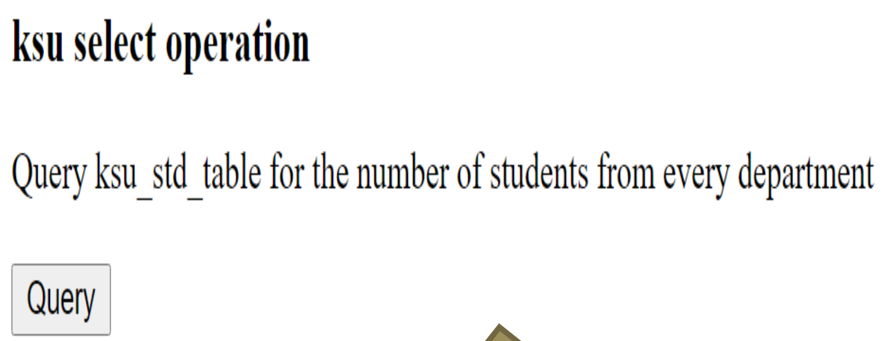
ksu_std_table: the number of students as follows:

Department	the number of students
	5
CS	5
IE	3
IM	2
QQ	1

5 records found!

ksu_select4aen.html
ksu_select4aen.php

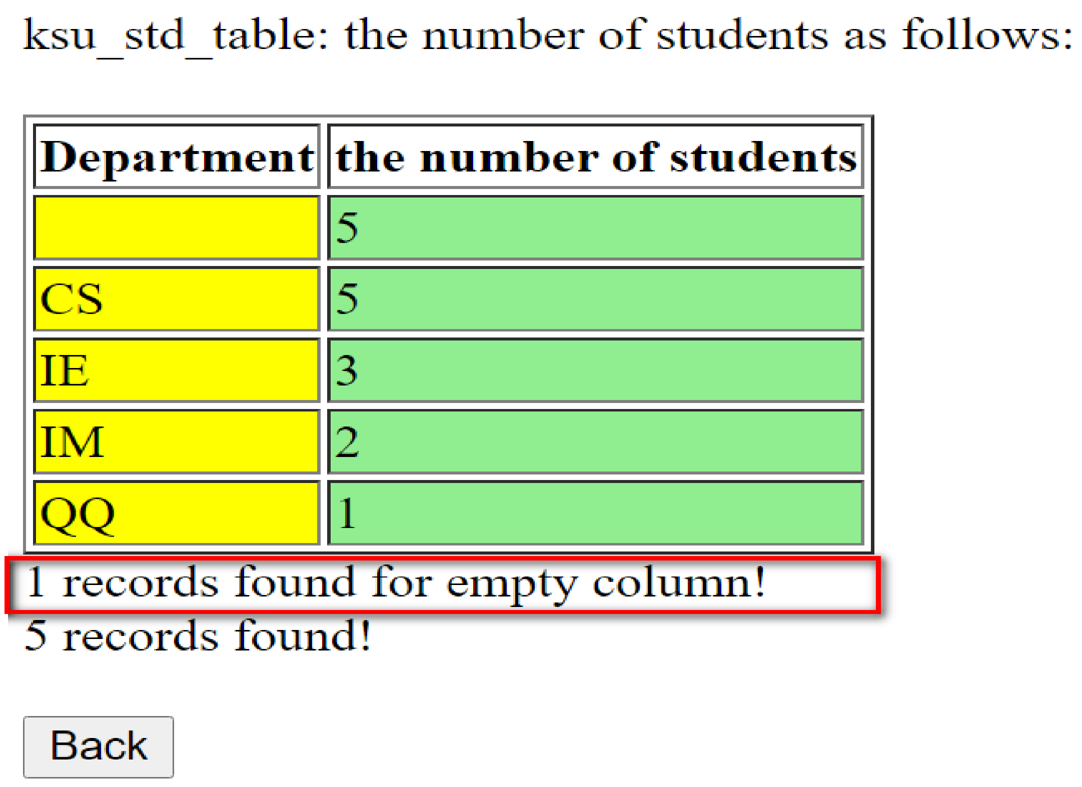
Example



ksu select operation

Query ksu_std_table for the number of students from every department

Query



ksu_std_table: the number of students as follows:

Department	the number of students
	5
CS	5
IE	3
IM	2
QQ	1

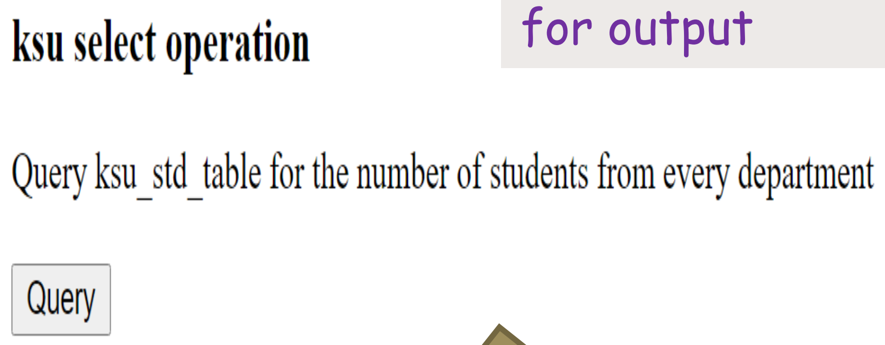
1 records found for empty column!
5 records found!

Back

ksu_select4ben.html
ksu_select4ben.php

Example

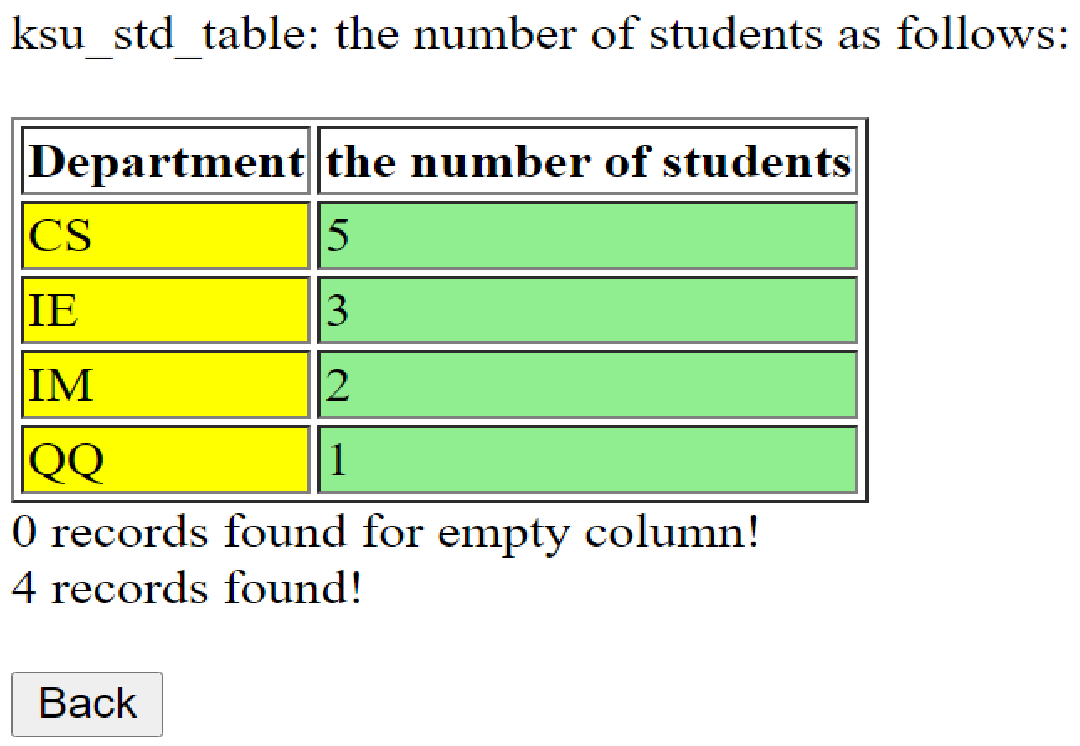
Select those data from ksu_std_table based on distinct department ID. Also check the number of records or empty records founds for output



ksu select operation

Query ksu_std_table for the number of students from every department

Query



ksu_std_table: the number of students as follows:

Department	the number of students
CS	5
IE	3
IM	2
QQ	1

0 records found for empty column!
4 records found!

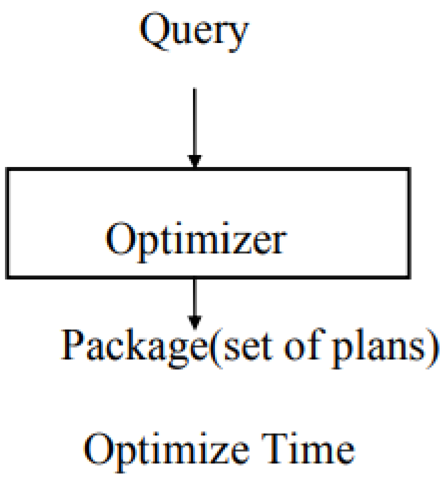
Back

ksu_select4cen.html
ksu_select4cen.php

Query Execution Plan

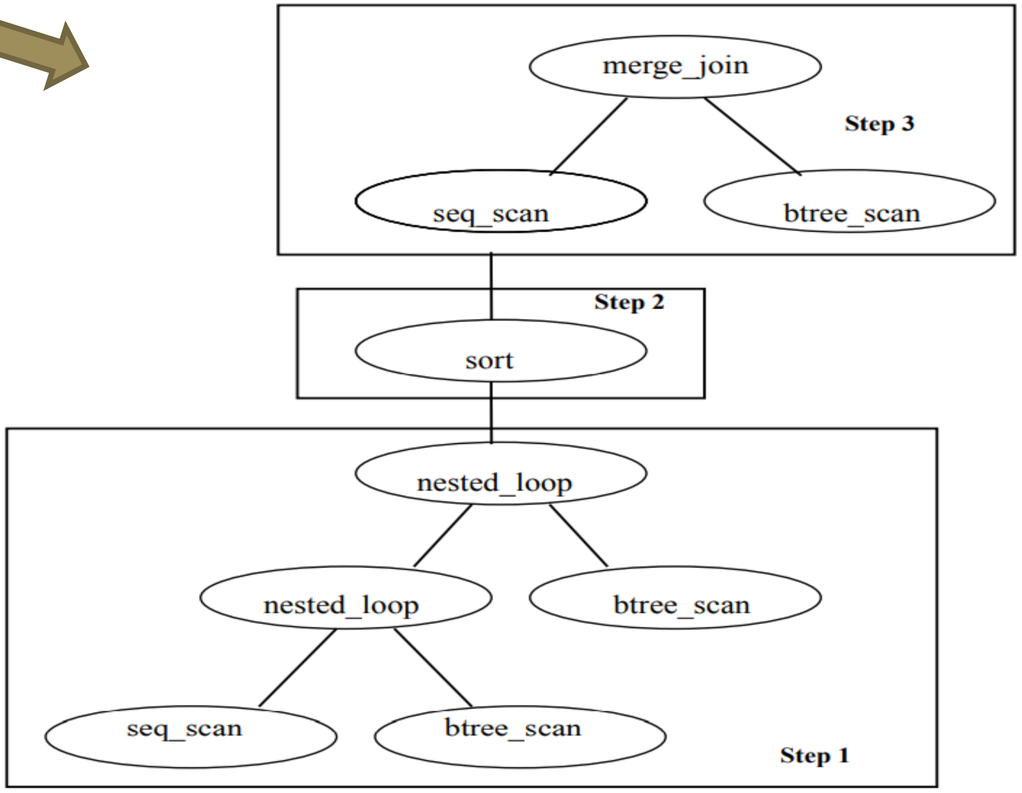
What is it?

- An SQL *query execution plan* is the set of steps for how the results are obtained. For a given SQL statement, there may be multiple ways to obtain the results. Namely, A query plan (or query execution plan) is a sequence of steps used to access data in a SQL relational database management system.
- The query optimizer evaluates different execution plans and chooses the one it considers to be most efficient based on different optimization polices.



What does it look like?

```
SELECT   SNAME
FROM     STUDENT  S,  ENR  E,  COURSE C
WHERE    S.SID=E.SID  and  S.SESSION=C.SESSION  and
         (E.GRADE= "A"  or  S.SEX = "M")
```



Performance issues

- The best query execution plan is produce and chosen by optimizer based optimization police, such as rule-based, cost-based, and so on.
- Since an query must be transformed into query execution plan that is existed in memory. So, you can work out by using one query, not to use more than one queries.
- How To Speed Up SQL Queries
  - Use column names instead of SELECT *
  - Avoid Nested Queries & Views
  - Use temp tables for big table's join
  - Avoid using OR in JOINS - JOINS are time consuming as your database has to examine each row for a match. If you also use OR condition in a JOIN, your database will take double the time to match records.
  - …

Why is query performance important?

- The query optimizer attempts to determine the most efficient way to execute a given query by considering the possible query plans. Importance: The goal of query optimization is **to reduce the system resources required to fulfill a query**, and ultimately provide the user with the correct result set faster.

What are the phases of query processing?

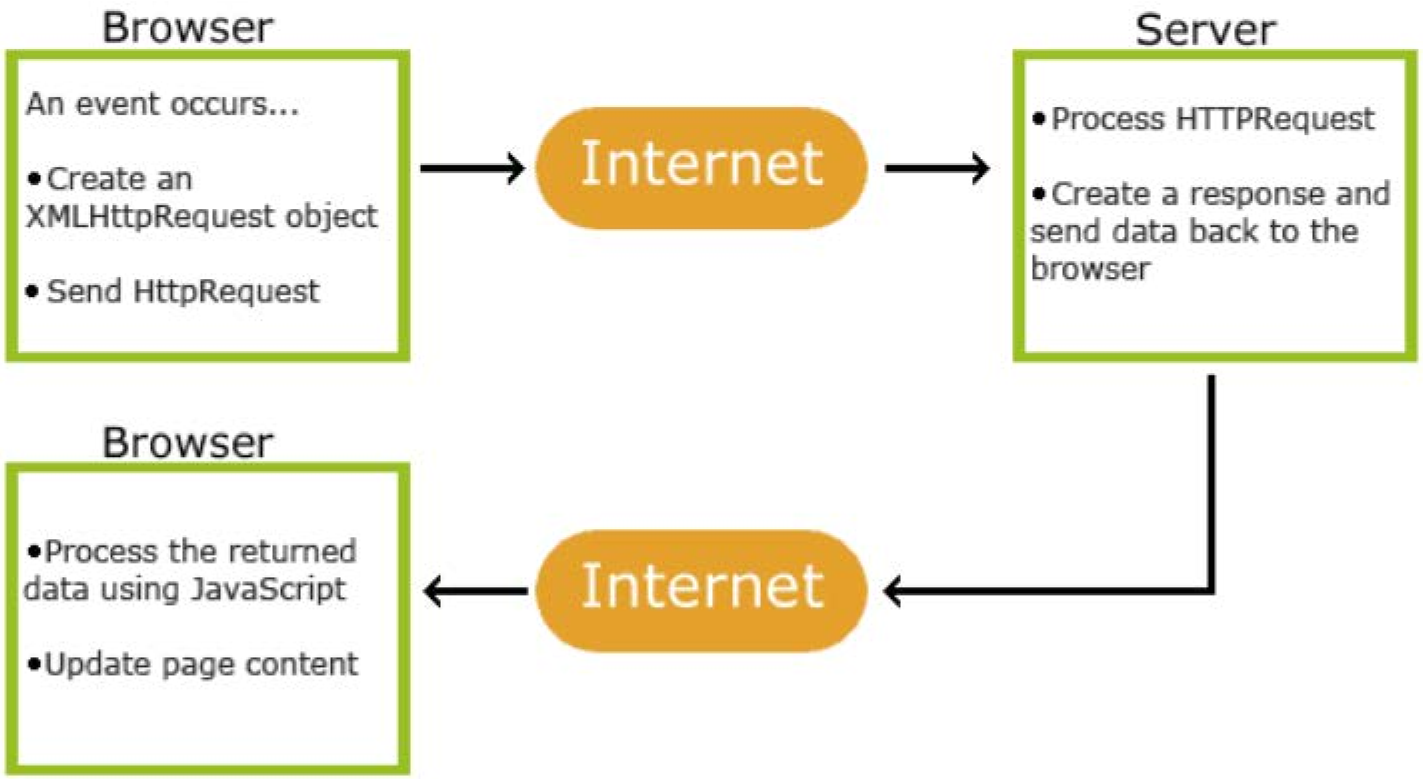
- Four main Phases: **decomposition, optimization, code generation and execution**.

AJAX

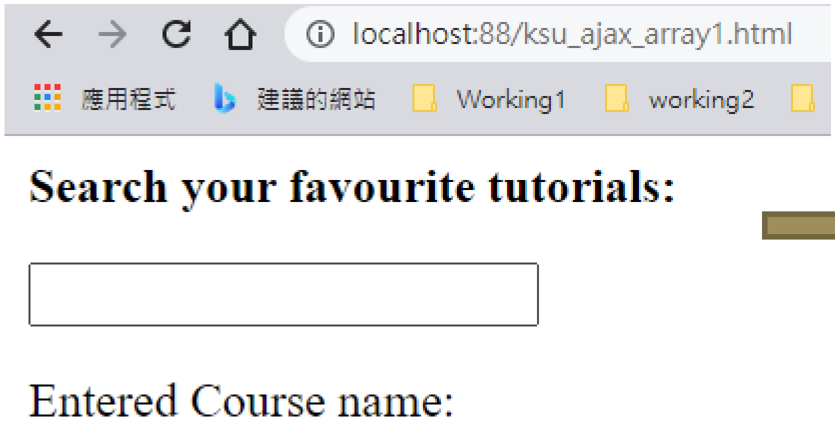
AJAX

- AJAX is about updating parts of a web page, without reloading the whole page.
- AJAX = Asynchronous JavaScript and XML.
- AJAX allows web pages to be updated asynchronously by exchanging small amounts of data with the server behind the scenes. This means that it is possible to update parts of a web page, without reloading the whole page.
- Examples of applications using AJAX: Google Maps, Gmail, Youtube, and Facebook’s tabs.

How AJAX Works

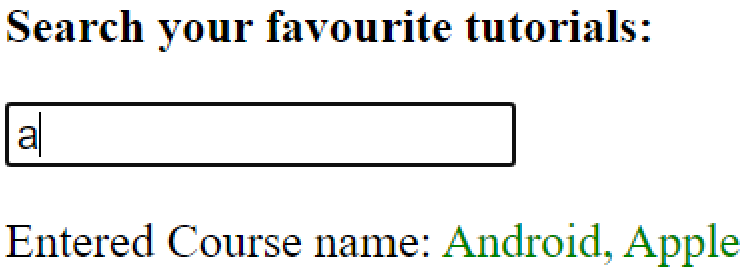

Browser
An event occurs...
•Create an XMLHttpRequest object
•Send HttpRequest
Internet
Server
•Process HTTPRequest
•Create a response and send data back to the browser
Internet
Browser
•Process the returned data using JavaScript
•Update page content

Example


localhost:88/ksu_ajax_array1.html

Search your favourite tutorials:

Entered Course name:


Search your favourite tutorials:

a

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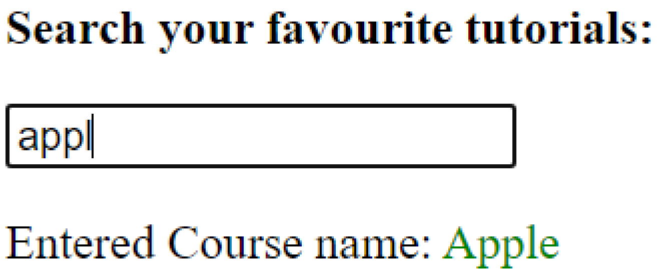
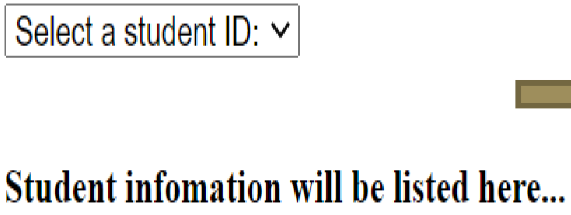

Search your favourite tutorials:

appl

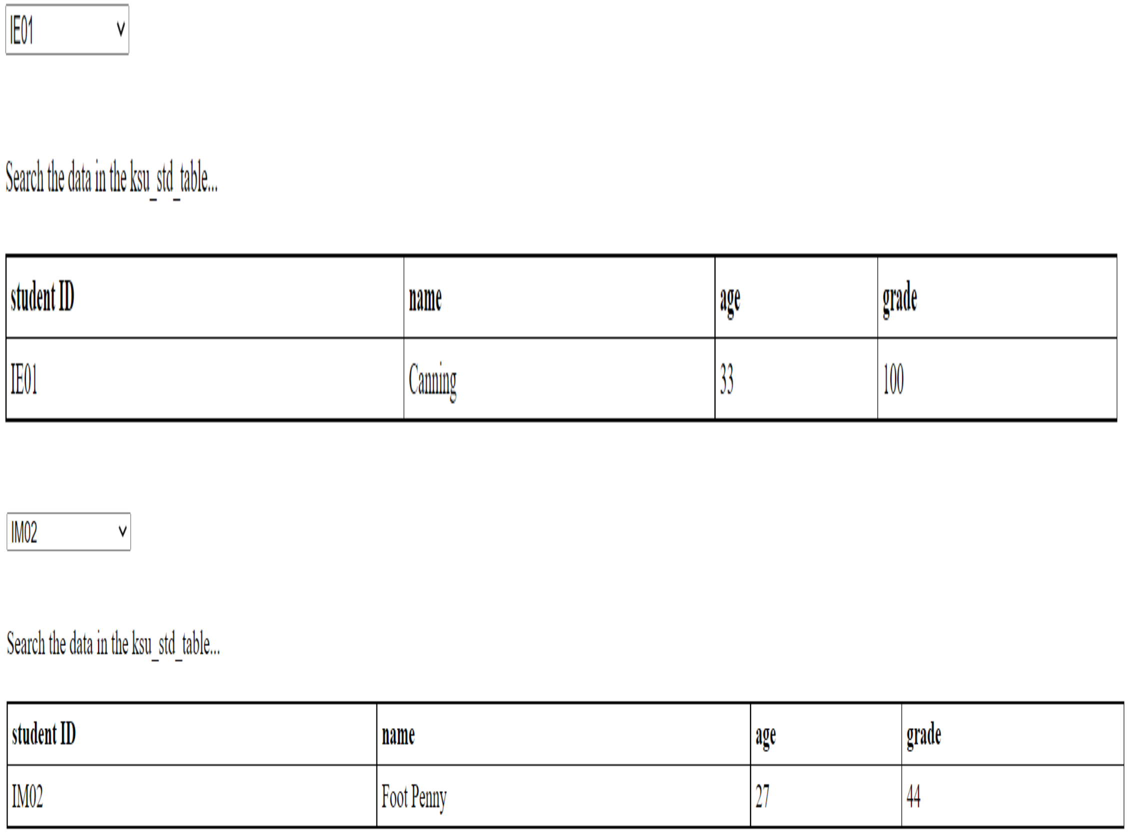
Entered Course name: Apple

ksu_ajax_array1.html
ksu_ajax_array1.php

Example



Student infomation will be listed here...



Search the data in the ksu_std_table...

student ID	name	age	grade
IE01	Canning	33	100

Search the data in the ksu_std_table...

student ID	name	age	grade
IM02	Foot Penny	27	44

ksu_ajax_db1.html
ksu_ajax_db1.php