ĐẠI HỌC BÁCH KHOA HÀ NỘI
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IT4552 – Web programming

Chapter 6.1. Using MySQL with PHP

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Objectives

- To understand the advantages of using databases to store Web data
- To learn how to prepare a MySQL database for use with PHP
- To learn how to store, retrieve, and update data in a MySQL database

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Content

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What is a database?

- A set of data organized into one or more computer files.
- Using files for product inventory is a type of database
- Generally the term is reserved for more formal database systems like access, Oracle or MySQL.

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Advantages of Databases Over Files

- Faster access
- Better concurrent access
- Easier changes to data and scripts
- Increased security

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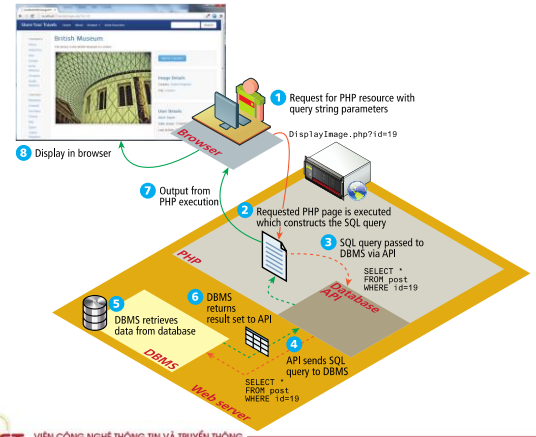
How websites use databases?



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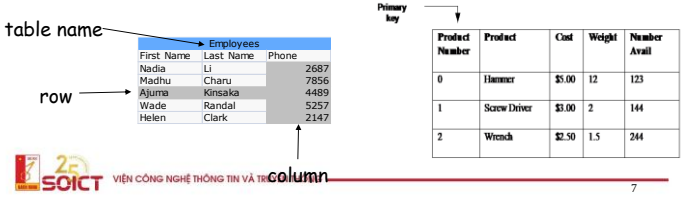
Relational Database?

- A database is a collection of tables with defined relationships between them
- Columns define attributes of the data
  - All data in a column must have the same data type
- A record is stored in a row



Primary key

Product Number	Product	Cost	Weight	Number Avail
0	Hammer	$5.00	12	123
1	Screw Driver	$3.00	2	144
2	Wrench	$2.50	1.5	244

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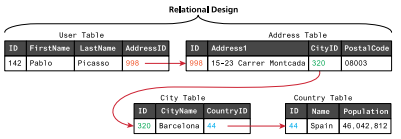
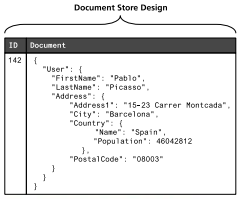
NoSQL

A different way of thinking





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NoSQL
Document Stores

Document Stores associate keys with values, but unlike key-value stores, they call that value a **document**.

ID	Document
142	{ "User": { "FirstName": "Pablo", "LastName": "Picasso", "Address": { "Address1": "15-23 Carrer Montcada", "City": "Barcelona", "Country": { "Name": "Spain", "Population": 46042812 }, "PostalCode": "08003" } } }

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NoSQL
Column Stores

Row-wise storage

	ID	Title	Artist	Year
Row # 1	345	The Death of Marat	David	1793
2	400	The School of Athens	Raphael	1510
3	408	Bacchus and Ariadne	Titian	1521
4	425	Girl with a Pearl Earring	Vermeer	1665
5	438	Starry Night	Van Gogh	1889

Column-wise storage

	ID		Title		Artist		Year
1	345	1	The Death of Marat	1	David	1	1793
2	400	2	The School of Athens	2	Raphael	2	1510
3	408	3	Bacchus and Ariadne	3	Titian	3	1521
4	425	4	Girl with a Pearl Earring	4	Vermeer	4	1665
5	438	5	Starry Night	5	Van Gogh	5	1889

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Which Database System

- PHP works with a variety of databases that include:
  - Oracle
  - Access
  - Ingres
  - SQL Server
  - MySQL
- Will use MySQL since simple to use, free and very popular.

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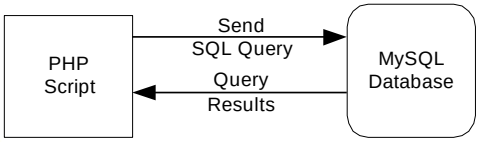
Using A Query Language

- When using a database, use a separate query language to work with database
- Within MySQL, use Structured Query Language (SQL), to access database



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1. Database and MySQL Overview
2. Basic SQL commands
3. Creating a table
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6. Updating data for a table

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2. Basic SQL commands

- Connecting to MySQL from the Command Line

```
mysql –u username -p
```

E.g.:

```
>mysql –u root
```

- To EXIT MySQL:

```
EXIT;
```


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2. Basic SQL Commands (2)

- SQL statements end with a semicolon
- View databases

```
SHOW DATABASES;
```

- Creating a database

```
CREATE DATABASE trii;
```

- Importing a database:

```
mysql -uusername -ppassword
      databasename < filename.sql
```

E.g.:

```
mysql -uroot trii < trii.sql
```


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2. Basic SQL Commands (2)

- Use database *databasename*

```
USE databasename;
```

- Display all tables in a database

```
SHOW TABLES;
```

- View column details for a table

```
DESC tablename;
```


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Creating a Database Instance

- Once you have access to a server with MySQL installed, need to get a database instance created for you.
  - Usually created by a database administrator
  - Creates a database instance, userid and password.

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PHP MySQL APIs

- **MySQL extension**. This was the original extension to PHP for working with MySQL and has been replaced with the newer mysqli extension.
- **mysqli extension**. This extension provides both a procedural and an object-oriented approach. This extension also supports most of the latest features of MySQL.
- **PHP data objects (PDOs)**. provides an abstraction layer that with the appropriate drivers can be used with any database, and not just MySQL databases. However, it is not able to make use of all the latest features of MySQL.

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Accessing MySQL in PHP

- 1. Connect to the database.
- 2. Handle connection errors.
- 3. Execute the SQL query.
- 4. Process the results.
- 5. Free resources and close connection.

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Connecting to a Database

```
// modify these variables for your
installation
$host = "localhost";
$database = "bookcrm";
$user = "testuser";
$pass = "mypassword";
$connection = mysqli_connect($host, $user,
$pass, $database);
```


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Handling Connection Errors

```
$connection = mysqli_connect(DBHOST,
DBUSER, DBPASS, DBNAME);
// mysqli_connect_errno returns the last error code
if ( mysqli_connect_errno() ) {
     die( mysqli_connect_error() );
     // die() is equivalent to exit()
}
```


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Executing the Query

```
$sql = "SELECT * FROM Categories ORDER BY
CategoryName";
// returns a mysqli_result object
$result = mysqli_query($connection, $sql);
```


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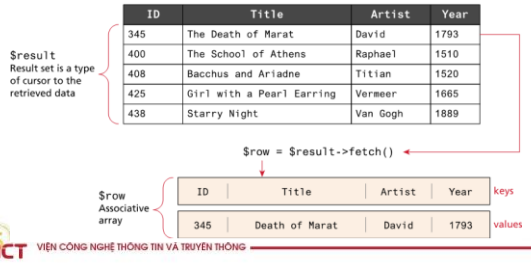
Processing the Query Results

```
// fetch a record from result set into an associative array
while ($row = $result->fetch()) {
     // the keys match the field names from the table
     echo $row['ID'] . " - " . $row['CategoryName'];
     echo "<br/>";
}
```



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Closing Connection

```
//closes the connection
mysqli_close($connection);
```


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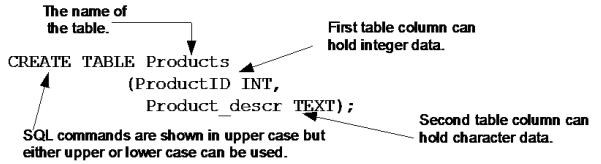
3. Creating a table

- Once database instance is created need to create your tables.
  - Use SQL CREATE TABLE command



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MySQL Data Types

- TEXT
  - hold a large amount of character data
  - Use space inefficiently since it reserves space for up to 65,535 characters.
- CHAR(N)
  - hold a fixed length string of up to N characters (N must be less than 256).
- VARCHAR(N)
  - hold a variable length string of up to N characters
  - removes any unused spaces on the end of the entry.

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MySQL Data Types (2)

- INT
  - hold an integer with a value from about –2 billion to about 2 billion.
- INT UNSIGNED
  - hold an integer with a value from 0 to about 4 billion.
- SMALLINT
  - hold an integer with a value from –32,768 to 32,767.
- SMALLINT UNSIGNED
  - hold an integer with a value from 0 to 65,535.
- DECIMAL(N,D)
  - a number that supports N total digits, of which D digits are to the right of the decimal point.

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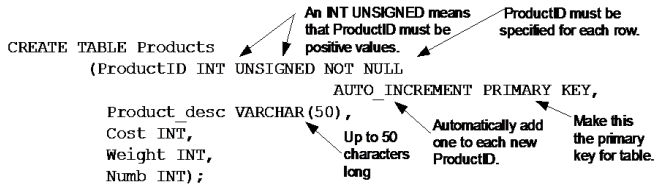
Some additional CREATE TABLE Options

- Can specify some additional options in CREATE TABLE:



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Issuing CREATE TABLE From PHP Script Segment

```
1. $connect = mysql_connect($server, $user, $pass);
2. if ( !$connect ) {
3.        die ("Cannot connect to $server using $user");
4. } else {
5.    mysql_select_db('MyDatabaseName');
6.    $SQLcmd = 'CREATE TABLE Products(
                    ProductID INT UNSIGNED NOT NULL
                              AUTO_INCREMENT PRIMARY KEY,
                    Product_desc VARCHAR(50), Cost INT,
                    Weight INT, Numb INT)';
7.    mysql_query($SQLcmd, $connect);
8.    mysql_close($connect);
9. }
```

Connect to MySQL

Issue the SQL query to the database.

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Full Script

```
1. <html><head><title>Create Table</title></head><body>
2. <?php
3. $server = 'localhost';
4. $user = 'phppgm';
5. $pass = 'mypasswd';
6. $mydb = 'mydatabase';
7. $table_name = 'Products';
8. $connect = mysql_connect($server, $user, $pass);
9. if (!$connect) {
10.       die ("Cannot connect to $server using $user");
11. } else {
12.       $SQLcmd = "CREATE TABLE $table_name (
               ProductID INT UNSIGNED NOT NULL
                         AUTO_INCREMENT PRIMARY KEY,
               Product_desc VARCHAR(50),
               Cost INT, Weight INT, Numb INT)";
```


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Full Script (2)

```
13.  mysql_select_db($mydb);
14.  if (mysql_query($SQLcmd, $connect)){
15.    print '<font size="4" color="blue" >Created Table';
16.    print "<i>$table_name</i> in database<i>$mydb</i><br></font>";
17.    print "<br>SQLcmd=$SQLcmd";
18.  } else {
19.    die ("Table Create Creation Failed SQLcmd=$SQLcmd");
20.  }
21.  mysql_close($connect);
22. }
23. ?></body></html>
```


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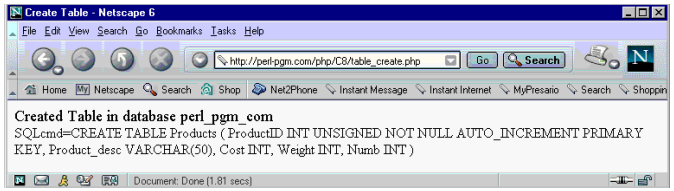
Script Browser Output



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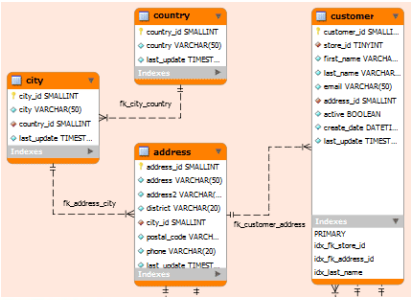
MySQL Visual Designer Tools

- phpMyAdmin (web-app)
- MySQL Workbench (Win, Linux, Mac)
- **SQLyog**
- ...



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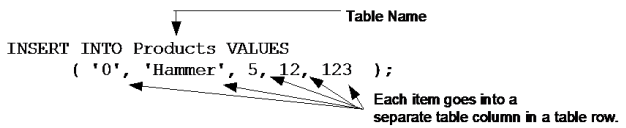
4. Inserting data to a table

- Once database is created will need to insert data
- Use the SQL INSERT command



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A Full Example

- Consider an application that allows end-user to enter inventory data:

```
Item Description: <input type="text" size="20"
                  maxlength="20" name="Item">
Weight: <input type="text" size="5"
                  maxlength="20" name="Weight">
Cost: <input type="text" size="5"
                  maxlength="20" name="Cost">
Number Available:<input type="text" size="5"
                  maxlength="20" name="Quantity">
```


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Receiving PHP Script

```
1. <html><head><title>Insert Results</title></head><body>
2. <?php
3. $host = 'localhost';
4. $user = 'phppgm';
5. $passwd = 'mypasswd';
6. $database = 'mydatabase';
7. $connect = mysql_connect($host, $user, $passwd);
8. $table_name = 'Products';
9. $query = "INSERT INTO $table_name VALUES
   ('0','$Item','$Cost','$WeightE','$Quantity')";
10. print "The Query is <i>$query</i><br>";
11. mysql_select_db($database);
12. print '<br><font size="4" color="blue">';
13. if (mysql_query($query, $connect)){
14.    print "Insert into $database was successful!</font>";
15. } else {
16.    print "Insert into $database failed!</font>";
17. } mysql_close ($connect);
18. ?></body></html>
```


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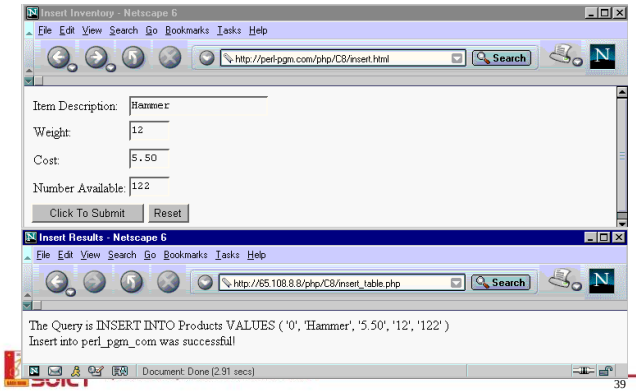
Script Output



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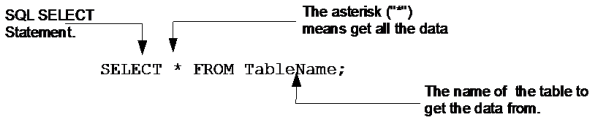
5. Retrieving data from a table

- Two major ways to retrieve data:
  - Retrieving all elements from a table
  - Searching for specific records in a table
- To retrieve all data, use following SQL command



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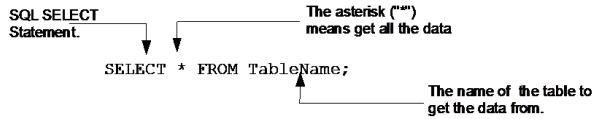
5. Retrieving Data (2)

- To retrieve all data, use following SQL command



- For example

```
1. $connect = mysql_connect('Localhost', 'phppgm',
   'mypasswd');
2. $SQLcmd = 'SELECT * FROM Products';
3. mysql_select_db('MyDatabase');
4. $results_id = mysql_query($SQLcmd, $connect);
```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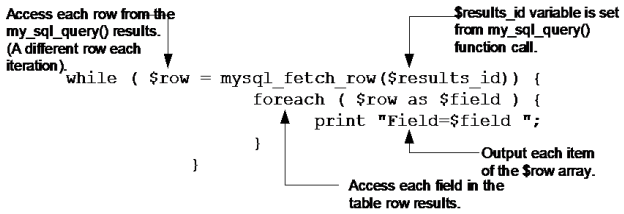
5.1. Using mysql_fetch_row()

- Use the mysql_fetch_row() function to retrieve data on row at a time



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A Script Example

```
1. <html><head><title>Table Output</title></head><body>
2. <?php
3. $host= 'localhost';
4. $user = 'phppgm';
5. $passwd = 'mypasswd';
6. $database = 'phppgm';
7. $connect = mysql_connect($host, $user, $passwd);
8. $table_name = 'Products';
9. print '<font size="5" color="blue">';
10. print "$table_name Data</font><br>";
11. $query = "SELECT * FROM $table_name";
12. print "The query is <i>$query </i><br>";
13. mysql_select_db($database);
14. $results_id = mysql_query($query, $connect);
15. if ($results_id) {
16.       print '<table border=1>';
17.       print '<th>Num<th>Product<th>Cost<th>Weight<th>Count';
```


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A Script Example (2)

```
18.      while ($row = mysql_fetch_row($results_id)){
19.         print '<tr>';
20.         foreach ($row as $field) {
21.               print "<td>$field</td> ";
22.         }
23.         print '</tr>';
24.      }
25. } else { die ("Query=$query failed!"); }
26. mysql_close($connect);
27. ?> </table></body></html>
```


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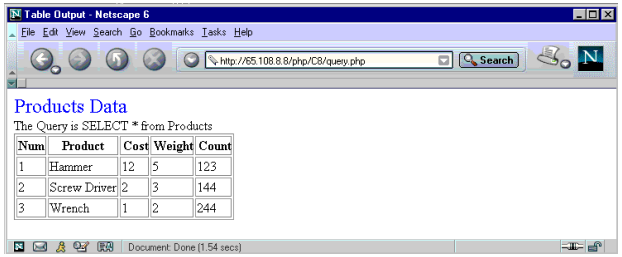
Script Output



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5.2. Searching For Specific Records

- Use the SELECT SQL statement with a WHERE clause
  - **SELECT * FROM TableName WHERE (test_expression);**

The asterisk ("*") means look at all table columns.

Specify the table name to look at.

Specify a test expression to evaluate

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Selected WHERE CLAUSE Test Operators

Operator	SQL Query Example	Meaning
=	SELECT * FROM Products WHERE (Product_desc = 'Hammer');	Retrieve those rows from the Products table that have a Product_desc column with a value **equal to** Hammer.
>	SELECT * FROM Products WHERE (Cost > '5');	Retrieve those rows from the Products table that have a Cost column with a value **greater than** 5.
<	SELECT * FROM Products WHERE (Numb < '3');	Retrieve those rows from the Products table that have a Numb column with a value **less than** 3.
<=	SELECT * FROM Products WHERE (Cost <= '3');	Retrieve those rows from the Products table that have a Cost column with a value **less than or equal to** 3.
>=	SELECT * FROM Products WHERE (Weight >= '10');	Retrieve those rows from the Products table that have a Weight column with a value **greater than or equal to** 10.

Slide 8-48

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Consider the following example …

- The following example searches a hardware inventory database for a specific part name entered by the user.
- The form uses the following key HTML form element definition.
  - `<input type="text" name="Search" size="20">`

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PHP Source

```
1. <html><head><title>Search Results</title></head><body>
2. <?php
3. $host= 'localhost';
4. $user = 'phppgm';
5. $passwd = 'mypasswd';
6. $database = 'phppgm';
7. $connect = mysql_connect($host, $user, $passwd);
8. $table_name = 'Products';
9. print '<font size="5" color="blue">';
10. print "$table_name Data</font><br>";
11. $query = "SELECT * FROM $table_name WHERE
                    (Product_desc = '$Search')";
12. print "The query is <i>$query</i> <br>";
13. mysql_select_db($database);
14. $results_id = mysql_query($query, $connect);
```


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PHP Source (2)

```
15. if ($results_id) {
16.  print '<br><table border=1>';
17.  print '<th>Num<th>Product<th>Cost<th>Weight <th>Count';
18.  while ($row = mysql_fetch_row($results_id)) {
19.   print '<tr>';
20.         foreach ($row as $field) {
21.               print "<td>$field</td> ";
22.               }
23.         print '</tr>';
24.   }
25. } else { die ("query=$Query Failed");}
26. mysql_close($connect);
27. ?> </body></html>
```


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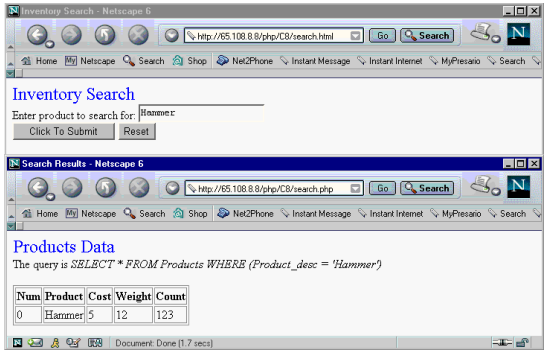
Would have the following output …



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6. Updating data for a table

- Use SQL UPDATE command when needing to update a database record:

```
UPDATE Table_name
SET col1=chng_express1,col2=chng_express2, ...
WHERE test_expression
```

Specify the name of the table to update.

Optionally specify a `WHERE` clause and test expression.

Specify one or more table column to receive the results of an expression. Optionally specify a `WHERE`

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For Example …

- The following searches the Products table for values of Product_desc equal to Hammer.

```
UPDATE Products
SET Cost=2
WHERE Product_desc = 'Hammer'
```


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For Example …

- The following looks through the Products table for values of Product_desc equal to Hammer.
- When it finds it, it decrements the Count column value by 1.

```
UPDATE Products
SET Count=Count-1
WHERE 'Product_desc=Hammer'
```


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A Full Example …

- Consider the following example
  - Displays current inventory
  - Asks end-user to decrement value for 1 item
  - Uses the following HTML

```
Hammer: <input type="radio" name="Product"
                          value="Hammer">
Screwdriver: <input type="radio"
        name="Product"
  value="Screwdriver”>
Wrench: <input type="radio" name="Product"

   value="Wrench">
```


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Full Example

```
1. <html><head><title>Product Update
   Results</title></head><body>
2. <?php
3. $host= 'localhost';
4. $user = 'phppgm';
5. $passwd = 'mypasswd';
6. $database = 'phppgm';
7. $connect = mysql_connect($host, $user, $passwd);
8. $table_name = 'Products';
9. print '<font size="5" color="blue">';
10. print "Update Results for Table
                  $table_name</font><br>\n";
11. $query = "UPDATE $table_name
              SET Numb = Numb-1
              WHERE (Product_desc = '$Product')";
12. print "The query is <i> $query </i> <br><br>\n";
13. mysql_select_db($database);
```


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A Full Example (2)

```
14. $results_id = mysql_query($query, $connect);
15. if ($results_id){
16.   Show_all($connect, $database,$table_name);
17. } else {
18.   print "Update=$query failed";
19. }
20. mysql_close($connect);
```


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A Full Example (3)

```
21. function Show_all($connect, $database, $table_name){
22.   $query = "SELECT * from $table_name";
23.   $results_id = mysql_query($query, $connect);
24.   print '<table border=1><th> Num </th>
            <th>Product</th><th>Cost</th>
            <th>Weight</th><th>Count</th>';
26.   while ($row = mysql_fetch_row($results_id)) {
27.       print '<tr>';
28.       foreach ($row as $field){
29.           print "<td>$field</td> ";
30.       }
31.       print '</tr>';
32.   }
33. }
34. ?> </body></html>
```


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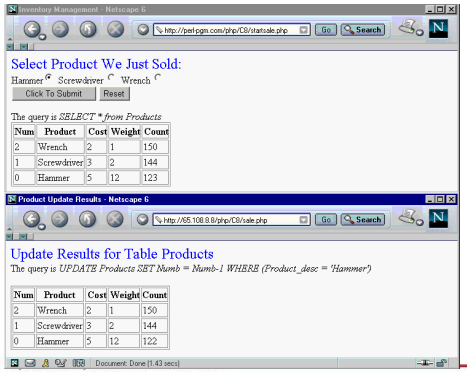
Would output the following:



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Question?

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