

PHP/MySQL Tutorial

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Lesson 1:

Overview

Open source has brought a lot more than Linux to the computing world. It has also given us PHP and MySQL. According to Graeme, PHP and MySQL are the world's best combination for creating data-driven sites. In the first installment of this three-lesson tutorial, our Kiwi guide covers everything you need to know to begin developing database hubs. He gives instructions for installation on both Unix and Windows, and then goes on to show some simple scripts that will insert information into a database and display that data on a Web page.

Lesson 2 covers more PHP/MySQL goodies than you could probably imagine. Graeme starts by showing while loops, then talks about the ever-useful if-else statement. But this information alone means little if you don't continue and see how PHP can be used with HTML forms. By the time you've polished off this lesson, you'll be able to add, edit, and remove information from your database.

In Lesson 3, Graeme shows some of the secrets that will turn your simple data-driven site into a useful application. As he covers validation, he'll show how to prevent users from leaving key form fields blank and how to make sure numeric files don't contain letters. He'll also teach you how PHP handles includes and functions. Plus you'll see how these two features, when deployed together, can make the coder's life much easier. Graeme winds it all up with some tearful parting words and a bit of advice for the aspiring PHP/MySQL coder.

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Introducing PHP and MySQL

Unless you've been living on Mars for the last six to eight months, you've heard of open source software (OSS). This movement has got so much momentum that even the big boys are taking notice. Companies like Oracle, Informix, and a host of others are releasing their flagship database products for that poster child of the OSS movement, Linux.

Having a massively complex RDBMS (relational database management system) is all well and good if you know what to do with it. But perhaps you are just getting into the world of databases. You've read Jay's article and you want to put up your own data-driven Web site. But you find you don't have the resources or desire for an ASP server or some pricey database. You want something free, and you want it to work with Unix.

Enter PHP and MySQL. These two make up what must be the best combination for data-driven Web sites on the planet. You needn't take my word for it. An unofficial Netcraft survey shows that PHP usage has jumped from 7,500 hosts in June 1998 to 410,000 in March 1999. That's not bad. The combination was also awarded Database of the Year at Webcon98, where it received a lovely tiara.

MySQL is a small, compact database server ideal for small - and not so small - applications. In addition to supporting standard SQL (ANSI), it compiles on a number of platforms and has multithreading abilities on Unix servers, which make for great performance. For non-Unix people, MySQL can be run as a service on Windows NT and as a normal process in Windows 95/98 machines.

PHP is a server-side scripting language. If you've seen ASP, you'll be familiar with embedding code within an HTML page. Like ASP, PHP script is processed by the Web server. After the server plays with the PHP code, it returns plain old HTML back to the browser. This kind of interaction allows for some pretty complex operations.

In addition to being free (MySQL does have some licensing restrictions though), the PHP-MySQL combination is also cross-platform, which means you can develop in Windows and serve on a Unix platform. Also, PHP can be run as an external CGI process, a stand-alone script interpreter, or an embedded Apache module.

If you're interested, PHP also supports a massive number of databases, including Informix, Oracle, Sybase, Solid, and PostgreSQL - as well as the ubiquitous ODBC.

PHP supports a host of other features right at the technological edge of Internet development. These include authentication, XML, dynamic image creation, WDDX, shared memory support, and dynamic PDF document creation to name but a few. If that's not enough, PHP is easy to extend, so you can roll your own solution if you're programming savvy.

Finally, since both efforts are collaborative in nature, there's always plenty of support from documentation and mailing lists. Bugs are fixed rapidly, and requests for features are always heard, evaluated, and if feasible, implemented.

Enough talk! Let's go over what we're going to cover in this tutorial.

Lesson 1 is going to cover the installation of these products on both Unix and Windows systems. If you don't need to worry about that (you're working on your ISP's machine, perhaps), jump right to the first example scripts, where the magic starts.

In Lesson 2 we'll look at some more complex scripting goodies, including looping, form input, and sending data from and to the database.

Lesson 3 will cover validation and techniques for making your PHP scripts smart and clean.

Let's roll.

Installing MySQL

Let's jump straight in, grab ourselves a copy of these great packages, and get hacking! This isn't simple stuff. There are lots of options available to you for obtaining, compiling, and installing the software. Let's deal with MySQL first, as we'll need it before we get PHP going.

MySQL central is <http://www.mysql.com/>. As befits a program of its stature, there are a zillion mirrors located all over the globe, so do the Internet a favor and pick the one closest to you.

You've got plenty of choices at this point. If you're a do-it-yourselfer, then grab the source code. If you're not that brave, there are some precompiled binaries for other platforms already available for download.

In addition, there is a shareware version of MySQL for Windows users. It is an older version of MySQL. If you want the latest version, you'll have to purchase a license. There are also ODBC drivers that let your applications talk to MySQL. Various other exciting bits and pieces are lurking about on the site, too, so take a look.

The precompiled Unix versions and the Windows version are as simple as unpacking and going, and they don't require much explanation. So let's compile from the source code. Windows users, please keep in mind that you need to run `mysqld` in the `mysql/bin` directory.

Download the compressed file into your source directory and uncompress and untar it using `gzip` and `tar`. The fast way of doing this is to type:

```
gunzip < mysql-xxxx.tar.gz | tar xvf -
```

The `xxxx` is where you put the version number. This will create a directory called `mysql-xxxx`, which contains all the source files. Move to that directory by typing `cd mysql-xxxx` and check out the various `README` and `INSTALL` files. They're lifesavers in sticky situations.

MySQL comes with a handy configuration script. Simply type `./configure` and let things take care of themselves. If you need to specify what happens and where, typing `./configure --help` gives you a list of options to choose from. For example, if you're compiling on a machine with little memory, you can opt for the `--with-low-memory` flag. I like MySQL to install in one handy directory tree rather than in various locations on my machine, so I specify an install location with the `--prefix` flag.

You can also specify lots of other options, such as what to compile and what to skip. Let's assume that we want everything under `/usr/local/mysql` on our server. This means we'd type `./configure --prefix=/usr/local/mysql`.

The `configure` script will run and inspect your system and then build the necessary files to successfully compile. If it fails, you'll usually get a helpful error message saying why. Quite often, you'll find the script will fail when it's looking for threading libraries. Check that you've got MIT-pthreads installed on your machine, and if not, add them. Linux users will have to download LinuxThreads. These are critical libraries that allow MySQL to multithread (i.e., run multiple versions of itself). Recent distributions of Linux may already have these libraries installed.

If everything goes according to plan, simply type `make` and go get a coffee. MySQL is a complex program and takes some time to compile. If you get an error, check the documentation to see if there is anything specific that you've missed for your particular OS.

Next, type `make install` and all the necessary files will be installed in all the necessary spots. Now you're almost ready to roll! If you are a MySQL virgin and you've never installed MySQL before, you need to create the default permissions, so type `... scripts/mysql_install_db` to set these up.

That's it. We're ready to roll. All we need to do is add the ability to start and stop the server at boot-up and shutdown times. And yes, there's a script for that as well. Typing `mysql.server start` starts the server, and `mysql.server stop` stops the server. It's kind of obvious, really. To start the server manually (so you can play without rebooting) enter the root directory in your MySQL installation (`/usr/local/mysql`) and type `bin/safe_mysqld &`. You're halfway there. Now on to PHP.

Installing PHP

Phew! Hopefully you've got MySQL all up and running by now. That was almost fun! Now for PHP ... This process is slightly easier, but the array of options is dazzling. Don't be daunted, though. You can always go back later and recompile PHP to add or remove options as needed.

The home of PHP is <http://www.php.net/>. The PHP site is a mine of information, from project listings to bug reports. As with MySQL, you should choose a nearby mirror. Obviously you'll want the Downloads section to get PHP.

Your range of options here is a little more limited. A few precompiled binaries are available, but these are experimental. If you're on anything except a Windows platform, grab the source code and compile it yourself.

But first let's cover Windows. When using PHP, a common practice is to develop on a Windows machine and then run your site on a Unix server. It may end up that you will do this yourself, which means you need to be proficient in installing on both platforms.

Let's grab the Windows binary and uncompress it using our favorite Zip decompression tool into a directory on your C drive called php3. The supplied README file deals with the installation in some detail, but here's the Reader's Digest version: If you want to install PHP to a folder other than C:\php3, you'll need to edit the .inf file that comes with PHP.

In the php3 directory, you'll find a lot of .dll files. Take all the .dll files that don't begin with php_ and move them into your \windows\system directory. Then rename php.ini-dist to php3.ini and move it into your \windows directory. If you open up that file, you'll see there are lots of interesting things to change. For now just "uncomment" the line:

```
extension=php3_mysql.dll
```

If you're using Apache for Win32, set up Apache to recognize and parse PHP files. Depending on the version of Apache you're using, you'll need to add the following to either the httpd.conf or srm.conf file:

```
ScriptAlias /php3/"c:/path-to-php-dir/"
AddType application/x-httpd-php3 .php3
Action application/x-httpd-php3"/php3/php.exe"
```

Or if you're using IIS or PWS, right-click on php_iis_reg.inf and select 'Install'. You'll need to reboot for IIS to see this change.

OK, now that Windows is out of the way, let's get to Unix. Of course, we'll be compiling from source code. As with MySQL, download and unpack the source code. Again, PHP comes with a configure script. You can't get away with going for defaults here, though. Run ./configure -help | more to see pages and pages of new and interesting options. You have to decide between compiling as a CGI or as an Apache module. If you are using the Apache Web server and you are able to recompile it, use the module: It's faster and easier to use. Otherwise, you can go with the CGI version. We also need to compile in MySQL support.

For now we'll assume that we're running the module with MySQL support. If you want to add other options or other libraries, you can do this later. Type:

```
./configure --with-apache=/path/to/apache/dir --with-mysql=/usr/local/mysql
Skip the -with-apache option if you're creating a CGI version. The configure process will run and produce the relevant system files. Now simply type make again.
```

It's time for another coffee. If you start feeling a bit nervous and shaky at this point, don't worry about it. We all get a little anxious during our first PHP install. Have some more coffee.

If you've created a CGI version, you're now ready to roll. Simply copy the resulting executable file into your CGI file. For Apache module users, type make install to copy files to your Apache directory. From there, follow the instructions to add a module to Apache and recompile.

You'll need to tell your Web server how to process pages through the PHP program now. If you're not using Apache, you'll need to check your Web server documentation on how to get it to process documents with a .php3 extension. Apache 1.3.x users can simply add `AddType application/x-httpd-php3 .php3` to the `httpd.conf` or `srm.conf` file. If you're using the CGI version, you'll need to add the following before `AddType`:

```
ScriptAlias /php3/"path-to-php-dir/" AddType application/x-httpd-php3 .php3 Action application/x-httpd-php3"/php3/php"
```

That's it. With any luck, you've now got MySQL running and PHP functioning. Don't forget to check the FAQs and documentation if you get stuck. Also try the mailing lists.

Now that we've managed all that, lets put this stuff in motion!

Your First Script

You'll be glad to know that the really tricky stuff is behind you. Installation of software is always a black hole because so much changes from system to system. But with any luck your database is up and running, and PHP is compiled and installed with our Web server and able to recognize documents with .php3 extensions.

Let's dive right in and write our first script. Create a text file containing the following:

```
<html>
<body>
<?php
$myvar = "Hello World";
echo $myvar;
?>
</body>
</html>
```

Now call up the URL, for instance, <http://myserver/test.php3>. You should see a page containing the text "Hello World." If you get an error message, check the PHP documentation to see if you set things up properly.

That's it! That's your first PHP script. If you view the HTML source for the page, you'll see that there is only the text. Hello World

That's because the PHP engine has examined the page, processed any code blocks that it found, and returned only HTML.

The first thing you'll notice about the script above are the delimiters. These are the lines that start <?php. This indicates the start of a block of PHP code, and ?> indicates the end of the block. The power of PHP is that these can be placed anywhere - and I mean anywhere - in your code in any number of ways. Later we'll see some interesting uses for these, but for now let's keep it simple. If you wish, you can also configure PHP to use short tags, <?, and ?>, but these are not XML compliant, so be careful. If you're making the switch from ASP, you can even configure PHP to use the <% and %> delimiters.

Another thing you'll notice is the semicolon on the end of each line. These are known as separators and serve to distinguish one set of instructions from another. It is feasible to write an entire PHP script on one line and separate the portions with semicolons. But that would be a mess, so we'll add a new line after each semicolon. Just remember that each line must end in a semicolon.

Finally, you see that the word myvar begins with a dollar sign. This symbol tells PHP that this is a variable. We assigned the words "Hello World" to the variable \$myvar. A variable can also contain numbers or an array. Either way, all variables start with the dollar sign symbol.

The real power of PHP comes from its functions. These are basically processing instructions. If you add up all of the optional add-ins to PHP, there are more than 700 functions available. So there's quite a bit you can do.

Now let's add some MySQL to the picture.

Load Up a Database

So now we're ready to plug in MySQL. One handy way of knowing what options are available in PHP and what's going on in your server is to use the `phpinfo()` function. Create a script with the following:

```
<html>
<body>
<?php phpinfo(); ?>
</body>
</html>
```

Save and view this script through your Web server. You'll see a page filled with useful and interesting information like this. This info tells all about your server, internal Web server environment variables, the options that are compiled, and on and on. In the first section, Extensions, look for a line beginning with MySQL. If this is missing, then for some reason MySQL hasn't made it into PHP. Go back and review the installation steps and check the PHP documentation to see if you missed anything.

If MySQL is there, then you're ready to roll.

Before we can get data out of MySQL, we have to put data in it. There's really no easy way to do it at this stage. Most PHP scripts come with what's known as a dump file that contains all the data required to create and populate a MySQL database. The ins and outs of this process are really outside the scope of this tutorial, so I'll just do it for you.

MySQL uses its own user permissions table. At setup, a default user (`root`) is automatically created with no password. It's up to the database administrator to add other users with various permissions, but I could write a whole other article on that, so we'll stick with using the `root` user. If you set up your own server and database, it's vital that you assign a password to the `root` user.

Anyway, let's get on with the database. For Win32 users, I'm sorry, but this requires some DOS work. You'll have to use a DOS window or type everything in the Run window. Don't forget to type in the path to the location of the `MySQL/bin` directory with your commands. Unix users can work from the `MySQL bin` directory, but you may have to start each command with `./` so the programs run.

The first thing we need to do is create the actual database. From the command line, type:

```
mysqladmin -u root create mydb
```

That creates a database called "mydb." The flag tells MySQL that we're doing this as the `root` user.

Next we'll add some data using everyone's favorite example, the employees database. We're going to need that dump file I mentioned earlier. If you're interested in how it goes together, review the manual that comes with MySQL or check out <http://www.turbolift.com/mysql/>.

Copy and paste the following text to a file and save it in MySQL's bin directory. (I'll call the file `mydb.dump`.)

```
CREATE TABLE employees ( id tinyint(4) DEFAULT '0' NOT NULL AUTO_INCREMENT, first varchar(20), last
varchar(20), address varchar(255), position varchar(50), PRIMARY KEY (id), UNIQUE id (id));INSERT
INTO employees VALUES (1,'Bob','Smith','128 Here St, Cityname','Marketing Manager');
```

```
INSERT INTO employees VALUES (2,'John','Roberts','45 There St , Townville','Telephonist');
```

```
INSERT INTO employees VALUES (3,'Brad','Johnson','1/34 Nowhere Blvd, Snowston','Doorman');
```

If the lines wrap, make sure that each insert statement is on a new line. Now we'll insert it into the `mydb` database. From the command line, type:

```
mysql -u root mydb < mydb.dump
```

You shouldn't get any errors doing this. If you do, check for incorrect line wrapping.

Pull It Back Out

OK, now we've got our data in the database. Let's do something with it. Copy and paste the following into a text file and save it in your Web server document tree with a .php3 extension.

```
<html>
<body>
<?php
$db = mysql_connect("localhost", "root");
mysql_select_db("mydb",$db);
$result = mysql_query("SELECT * FROM employees",$db);
printf("First Name: %s<br>\n", mysql_result($result,0,"first"));
printf("Last Name: %s<br>\n", mysql_result($result,0,"last"));
printf("Address: %s<br>\n", mysql_result($result,0,"address"));
printf("Position: %s<br>\n", mysql_result($result,0,"position"));
?>
</body>
</html>
```

Let's explain what happens here. The `mysql_connect()` function opens a link to a MySQL server on the specified host (in this case it's localhost) along with a username (root). If you needed to specify a password, you'd add it here as well. The result of the connection is stored in the variable `$db`.

`mysql_select_db()` then tells PHP that any queries we make are against the mydb database. We could create multiple connections to databases on different servers. But for now, let's leave it to this.

Next, `mysql_query()` does all the hard work. Using the database connection identifier, it sends a line of SQL to the MySQL server to be processed. The results that are returned are stored in the variable `$result`.

Finally, `mysql_result()` is used to display the values of fields from our query. Using `$result`, we go to the first row, which is numbered 0, and display the value of the specified fields.

The syntax of the `printf` function may seem a little odd if you haven't used Perl or C before. In each of the lines above, `%s` indicates that the variable in the second half of the expression (e.g., `mysql_result($result,0,"position")`) should be treated as a string and printed. For more on `printf`, see the PHP documentation.

So there we have it. We successfully compiled, installed, and configured MySQL and PHP, and we've executed a simple script to retrieve some information. In Lesson 2, we'll do some clever stuff to display multiple records and even send data to and from the database.

Come on back, now.

Lesson 2:

Getting Loopy

In this lesson, we're going to dive right in and create some simple yet useful pages using PHP and MySQL. Let's start by displaying the database we created yesterday, but with a little more panache.

First, let's query our database using the following code.

```
<html>
<body>
<?php
$db = mysql_connect("localhost", "root");
mysql_select_db("mydb",$db);
$result = mysql_query("SELECT * FROM employees",$db);
echo "<table border=1>\n";
echo "<tr><td>Name</td><td>Position</td>\n";
while ($myrow = mysql_fetch_row($result)) {
    printf("<tr><td>%s    %s</td><td>%s</td></tr>\n",    $myrow[1],    $myrow[2],
    $myrow[3]);
}
echo "</table>\n";
?>
</body>
</html>
```

You probably noticed that we introduced a couple of new features here. Most obvious is the while() loop. The loop says that as long as there are new rows of data to be grabbed (using the mysql_fetch_row() function), assign that row to the \$myrow variable. Then execute the instructions between the curly brackets ({}). Take a look for a second, and this should make sense.

The mysql_fetch_row() function bears a closer look. One small problem with mysql_fetch_row() is that it returns an array that supports only numeric references to the individual fields. So the first field is referred to as 0, the second as 1, and so on. With complex queries this can become something of a nightmare.

Now let's examine the loop in more detail. The first few lines you'll recognize from the example in Lesson 1. Then in the while() loop we fetch a row from the result and assign it to the array \$myrow. Then we print the contents of the array on the screen with the printf function. After that it loops around again, and another row is assigned to \$myrow. It will do this until it runs out of rows to grab.

The great thing about a while() loop is that if your query returns no records, you won't get an error message. The first time through there won't be any data to assign to \$myrow, and the program will just move on.

But if the query returns no data, we have no way of letting the user know, and we should probably provide some sort of message. This is possible, so let's do it.

Stay Informed

Take a look at this script.

```
<html>
<body>
<?php
$db = mysql_connect("localhost", "root");
mysql_select_db("mydb",$db);
$result = mysql_query("SELECT * FROM employees",$db);
if ($myrow = mysql_fetch_array($result)) {
    echo "<table border=1>\n";
    echo "<tr><td>Name</td><td>Position</td></tr>\n";
    do {
        printf("<tr><td>%s      %s</td><td>%s</tr>\n",    $myrow["first"],    $myrow["last"],
$myrow["address"]);
    } while ($myrow = mysql_fetch_array($result));
    echo "</table>\n";
} else {
    echo "Sorry, no records were found!";
}
?>
</body>
</html>
```

There are a number of new features introduced here, but they're quite simple. First, there's the `mysql_fetch_array()` function. This is exactly the same as `mysql_fetch_row()` with one nice exception: Using this function, we can refer to fields by their names (such as `$myrow["first"]`) rather than their numbers. This should save us some headaches. We've also introduced a `do/while` loop and an `if-else` statement.

The `if-else` statement says that if we can assign a row to `$myrow`, then continue; otherwise skip to the `else` section and do what's in there.

The `do/while` loop is a variation of the `while()` loop we used on the last page. We need the `do/while` loop here for a very good reason: With the initial `if` statement, we assigned the first row returned by the query to the variable `$myrow`. If at this point we executed a regular `while` statement (such as `while ($myrow = mysql_fetch_row($result))`), we'd be kicking the first record out of the variable and replacing it with the second record. But the `do/while` loop lets us test the condition after the code has been run once. So there's no chance of us accidentally skipping a row.

Finally, if there are no records returned at all, the statements contained in the `else{}` portion will be executed. To see this portion in action, change the SQL statement to `SELECT * FROM employees WHERE id=6` or something else that will return no records.

Now let's extend this looping and `if-else` code to make one fancy-schmancy page. You're going to love it.

Link Intelligently

We're going to take that looping power we just learned and use it in a more practical example. But before we proceed here, you should know how to work with forms, the querystring, and the GET and POST methods. Jay covered this not long ago, so go take a look at his article if this is unfamiliar to you.

Right now I'm going to work with the querystring. As you should know, there are three ways to get information into the querystring. The first is to use the GET method in a form. The second is to type the information into the URL on your browser. And third, you can embed a querystring in a standard link. Just make the anchor tag look something like this: ``. We're going to use this technique right now.

First off, lets query our database again and list the employee names. Look at the following script. Much of this should look pretty familiar by now.

```
<html>
<body>
<?php
$db = mysql_connect("localhost", "root");
mysql_select_db("mydb",$db);
$result = mysql_query("SELECT * FROM employees",$db);
if ($myrow = mysql_fetch_array($result)) {
    do {
        printf("<a href= \"\%s?id=%s \">%s %s</a><br>\n", $PHP_SELF, $myrow["id"],
        $myrow["first"], $myrow["last"]);
    } while ($myrow = mysql_fetch_array($result));
} else {
    echo "Sorry, no records were found!";
}
?>
</body>
</html>
```

Everything's about the same except the printf function, so let's look at it in some detail.

First notice that each quotation mark is preceded by a backslash. The backslash tells PHP to display the character following it, rather than treat it as part of the code. Also note the use of the variable `$PHP_SELF`. This variable, which stores the script's name and location, is passed along with every PHP page. It's helpful here because we just want this file to call itself. Using `$PHP_SELF`, we can be sure that will happen, even if the file is moved to another directory - or even another machine.

As I just mentioned, these links will recall the page. On the second time through, however, some information will be added to the querystring.

PHP does a nifty thing when it sees a name=value pair in the querystring. It automatically creates a variable with the name and value the querystring indicated. This feature allows us to test if it's the first or second time through this page. All we have to do is ask PHP if the variable `$id` exists.

Once I know the answer to that question, I can display a different set of information the second time through. Here's how:

```
<html>
<body>
<?php
$db = mysql_connect("localhost", "root");
mysql_select_db("mydb",$db);
// display individual record
if ($id) {
    $result = mysql_query("SELECT * FROM employees WHERE id=$id",$db);
    $myrow = mysql_fetch_array($result);
```

```

printf("First name: %s\n<br>", $myrow["first"]);
printf("Last name: %s\n<br>", $myrow["last"]);
printf("Address: %s\n<br>", $myrow["address"]);
printf("Position: %s\n<br>", $myrow["position"]);
} else {
    // show employee list
    $result = mysql_query("SELECT * FROM employees", $db);
    if ($myrow = mysql_fetch_array($result)) {
        // display list if there are records to display
        do {
            printf("<a href=\"%s?id=%s\">%s %s</a><br>\n", $PHP_SELF, $myrow["id"],
$myrow["first"], $myrow["last"]);
        } while ($myrow = mysql_fetch_array($result));
    } else {
        // no records to display
        echo "Sorry, no records were found!";
    }
}
?>
</body>
</html>

```

This code is getting complex now, so I've started to use comments to keep track of what's going on. You can use // to make a single-line comment or /* and */ to start and end a large comment block.

And there we have it: your first truly useful PHP/MySQL script! Now let's take a look at how to plug forms into it and send information back into the database.

Throw in Some Forms

We've managed to get data from a database without much difficulty. But what about sending data the other way? It's not a problem with PHP.

First let's create a page with a simple form.

```
<html>
<body>
<form method="post" action="<?php echo $PHP_SELF?>">
First name:<input type="Text" name="first"><br>
Last name:<input type="Text" name="last"><br>
Address:<input type="Text" name="address"><br>
Position:<input type="Text" name="position"><br>
<input type="Submit" name="submit" value="Enter information">
</form>
</body>
</html>
```

Note the use of `$PHP_SELF` again. Like I said in Lesson 1, you can use PHP anywhere inside your HTML code. You'll also notice that each form element matches the field name in the database. This is not compulsory; it's just a good idea so you can get your head around your code later on.

Also notice that I've given the Submit button a name attribute. I've done this so I can test for the existence of a `$submit` variable. That way, when the page is called again, I'll know whether someone used this form.

I should mention that you don't have to have a page that loops back on itself. You can span two, three, or more pages, if you like. This way everything stays compact.

OK, let's add some code that will check for the form input. Just to prove that the form input does make it through, I'll dump all the variables to the screen with `$HTTP_POST_VARS`. This is a useful debugging feature. If you ever need to see all the variables on a page, use `$GLOBALS`.

```
<html>
<body>
<?php
if ($submit) {
    // process form
    while (list($name, $value) = each($HTTP_POST_VARS)) {
        echo "$name = $value<br>\n";
    }
} else{
    // display form
    ?>
<form method="post" action="<?php echo $PHP_SELF?>">
First name:<input type="Text" name="first"><br>
Last name:<input type="Text" name="last"><br>
Address:<input type="Text" name="address"><br>
Position:<input type="Text" name="position"><br>
<input type="Submit" name="submit" value="Enter information">
</form>
<?php
} // end if
?>
</body>
</html>
```

Now that this is looking good, let's take the form information and post it to the database.

```

<html>
<body>
<?php
if ($submit) {
    // process form
    $db = mysql_connect("localhost", "root");
    mysql_select_db("mydb",$db);
    $sql = "INSERT INTO employees (first,last,address,position) VALUES
('$first','$last','$address','$position')";
    $result = mysql_query($sql);
    echo "Thank you! Information entered.\n";
} else{
    // display form
    ?>
    <form method="post" action="<?php echo $PHP_SELF?>">
    First name:<input type="Text" name="first"><br>
    Last name:<input type="Text" name="last"><br>
    Address:<input type="Text" name="address"><br>
    Position:<input type="Text" name="position"><br>
    <input type="Submit" name="submit" value="Enter information">
    </form>
    <?php
} // end if
?>
</body>
</html>

```

You've now inserted data into the database. It's still far from perfect. What if someone leaves a field blank or enters text when we want a numeric entry? What if there's an error somewhere?

Don't worry. We'll get to that.

Make the Forms Smarter

Throughout this tutorial, I've been loading the SQL statement into a variable (`$sql`) before firing the query at the database with `mysql_query()`. This is useful for debugging. If something goes wrong, you can always echo the SQL to the screen to examine it for mistakes.

We already know how to get data into the database. Now let's try modifying records that are already in the database. Editing data combines two elements we've already seen: displaying data on the screen and sending data back to the database via form input. However, editing is slightly different in that we have to show the appropriate data in the form.

First, let's recycle the code from Lesson 1 to display the employee names on our page. But this time through, we're going to populate our form with employee information. It should look a little like this:

```
<html>
<body>
<?php
$db = mysql_connect("localhost", "root");
mysql_select_db("mydb",$db);
if ($id) {
    // query the DB
    $sql = "SELECT * FROM employees WHERE id=$id";
    $result = mysql_query($sql);
    $myrow = mysql_fetch_array($result);
    ?>
    <form method="post" action="<?php echo $PHP_SELF?>">
    <input type="hidden" name="id" value="<?php echo $myrow["id"] ?>">
    First name:<input type="Text" name="first" value="<?php echo $myrow["first"] ?>"><br>
    Last name:<input type="Text" name="last" value="<?php echo $myrow["last"] ?>"><br>
    Address:<input type="Text" name="address" value="<?php echo $myrow["address"] ?>"><br>
    Position:<input type="Text" name="position" value="<?php echo $myrow["position"] ?>"><br>
    <input type="Submit" name="submit" value="Enter information">
    </form>
    <?php
} else {
    // display list of employees
    $result = mysql_query("SELECT * FROM employees",$db);
    while ($myrow = mysql_fetch_array($result)) {
        printf("<a href=\"%s?id=%s\">%s %s</a><br>\n", $PHP_SELF, $myrow["id"],
    $myrow["first"], $myrow["last"]);
    }
}
?>
</body>
</html>
```

We just echoed the field information into the value attribute of the each element, which was fairly easy. Let's build on this a little more. We will add the ability to send the edited code back to the database. Again, we're going to use the Submit button to test whether we need to process the form input. Also note the slightly different SQL statement we use.

```
<html>
<body>
<?php
$db = mysql_connect("localhost", "root");
mysql_select_db("mydb",$db);
if ($id) {
    if ($submit) {
        $sql = "UPDATE employees SET first='$first',last='$last',address='$address',position='$position'
    WHERE id=$id";
```

```

$result = mysql_query($sql);
echo "Thank you! Information updated.\n";
} else {
    // query the DB
    $sql = "SELECT * FROM employees WHERE id=$id";
    $result = mysql_query($sql);
    $myrow = mysql_fetch_array($result);
    ?>
    <form method="post" action="<?php echo $PHP_SELF?>">
    <input type=hidden name="id" value="<?php echo $myrow["id"] ?>">
    First name:<input type="Text" name="first" value="<?php echo $myrow["first"] ?>"><br>
    Last name:<input type="Text" name="last" value="<?php echo $myrow["last"] ?>"><br>
    Address:<input type="Text" name="address" value="<?php echo $myrow["address"]
?>"><br>
    Position:<input type="Text" name="position" value="<?php echo $myrow["position"]
?>"><br>
    <input type="Submit" name="submit" value="Enter information">
    </form>
    <?php
    }
} else {
    // display list of employees
    $result = mysql_query("SELECT * FROM employees",$db);
    while ($myrow = mysql_fetch_array($result)) {
        printf("<a href=\">%s?id=%s\">%s %s</a><br>\n", $PHP_SELF, $myrow["id"],
    $myrow["first"], $myrow["last"]);
    }
}
?>
</body>
</html>

```

And that's that. We've managed to combine most of the features we've seen into one script. You can also see how we've used an if() statement inside another if() statement to check for multiple conditions. It's time to put it all together and make one killer script.

All Together Now

We'll finish up this lesson by putting everything into a single page that can add, edit, and remove entries from the database. It's an extension of what we've covered so far and makes for a good review. Let's take a look.

```
<html>
<body>
<?php
$db = mysql_connect("localhost", "root");
mysql_select_db("mydb",$db);
if ($submit) {
    // here if no ID then adding else we're editing
    if ($id) {
        $sql = "UPDATE employees SET first='$first',last='$last',address='$address',position='$position'
WHERE id=$id";
    } else {
        $sql = "INSERT INTO employees (first,last,address,position) VALUES
('$first','$last','$address','$position)";
    }
    // run SQL against the DB
    $result = mysql_query($sql);
    echo "Record updated/edited!<p>";
} elseif ($delete) {
    // delete a record
    $sql = "DELETE FROM employees WHERE id=$id";
    $result = mysql_query($sql);
    echo "$sql Record deleted!<p>";
} else {
    // this part happens if we don't press submit
    if (!$id) {
        // print the list if there is not editing
        $result = mysql_query("SELECT * FROM employees",$db);
        while ($myrow = mysql_fetch_array($result)) {
            printf("<a href=\"%s?id=%s\">%s %s</a> \n", $PHP_SELF, $myrow["id"], $myrow["first"],
$myrow["last"]);
            printf("<a href=\"%s?id=%s&delete=yes\">(DELETE)</a><br>", $PHP_SELF,
$myrow["id"]);
        }
    }
?>
<P>
<a href="<?php echo $PHP_SELF?>">ADD A RECORD</a>
<P>
<form method="post" action="<?php echo $PHP_SELF?>">
<?php
if ($id) {
    // editing so select a record
    $sql = "SELECT * FROM employees WHERE id=$id";
    $result = mysql_query($sql);
    $myrow = mysql_fetch_array($result);
    $id = $myrow["id"];
    $first = $myrow["first"];
    $last = $myrow["last"];
    $address = $myrow["address"];
    $position = $myrow["position"];
    // print the id for editing
    ?>
    <input type=hidden name="id" value="<?php echo $id ?>">
    <?php
```

```

}
?>
First name:<input type="Text" name="first" value="<?php echo $first ?>"><br>
Last name:<input type="Text" name="last" value="<?php echo $last ?>"><br>
Address:<input type="Text" name="address" value="<?php echo $address ?>"><br>
Position:<input type="Text" name="position" value="<?php echo $position ?>"><br>
<input type="Submit" name="submit" value="Enter information">
</form>
<?php
}
?>
</body>
</html>

```

This looks complex, but it really isn't. The script is broken up into three parts. The first `if()` statement checks to see whether the Submit button has been pressed, and if it has, it checks to see whether the variable `$id` exists. If doesn't, then we're adding a record. Otherwise, we're editing a record.

Next we check to see whether the variable `$delete` exists. If it does, we delete a record. Note that with the first `if()` statement we checked for a variable that came through as a POST, and in this one, the variable would be part of a GET.

Finally, we take the default action that displays the list of employees and the form. Again we check for the existence of the `$id` variable. If it exists, we query the database to display the relevant record. Otherwise, we display a blank form.

We've now put all we've learned into one script. We used `while()` loops and `if()` statements, and we ran the gamut of the basic SQL statements - SELECT, INSERT, UPDATE, and DELETE. Lastly, we've looked at how we can pass information from one page to another using URLs and form input.

In Lesson 3 we'll look at how to make the page more intelligent.

Lesson 3:

A Place for Everything

Welcome to the third and final lesson for this tutorial. If you've gone through Lesson 1 and Lesson 2, you already know the essentials for installing and writing useful scripts with MySQL and PHP. We're going to look at some useful PHP functions that should make your life a lot easier. First, let's look at include files.

We all know the basics of includes, right? Contents of an external file are referenced and imported into the main file. It's pretty easy: You call a file and it's included. When we do this in PHP there are two functions we need to talk about: `include()` and `require()`. The difference between these two functions is subtle but important, so let's take a closer look. The `require()` function works in a XSSI-like way; files are included as part of the original document as soon as that file is parsed, regardless of its location in the script. So if you decide to place a `require()` function inside a conditional loop, the external file will be included even if that part of the conditional loop is false.

The `include()` function imports the referenced file each time it is encountered. If it's not encountered, PHP won't bother with it. This means that you can use `include` in loops and conditional statements, and they'll work exactly as planned.

Finally, if you use `require()` and the file you're including does not exist, your script will halt and produce an error. If you use `include()`, your script will generate a warning, but carry on. You can test this yourself by trying the following script. Run the script, then replace `include()` with `require()` and compare the results.

```
<html>
<body>
<?php
include("emptyfile.inc");
echo "Hello World";
?>
</body>
</html>
```

I like to use the suffix `.inc` with my include files so I can separate them from normal PHP scripts. If you do this, make sure that you set your Web server configuration file to parse `.inc` files as PHP files. Otherwise, hackers might be able to guess the name of your include files and display them through the browser as text files. This could be bad if you've got sensitive information - such as database passwords - contained in the includes.

So what are you going to do with include files? Simple! Place information common to all pages inside them. Things like HTML headers, footers, database connection code, and user-defined functions are all good candidates. Paste this text into a file called `header.inc`.

```
<?php
$db = mysql_connect("localhost", "root");
mysql_select_db("mydb",$db);
?>
<html>
<head>
<title>
<?php echo $title ?>
</title>
</head>
<body>
<center><h2><?php echo $title ?></h2></center>
```

Then create another file called `footer.txt` that contains some appropriate closing text and tags. Now let's create a third file containing the actual PHP script. Try the following code, making sure that your MySQL server is running.

```
<?php
```

```
$title = "Hello World";
include("header.inc");
$result = mysql_query("SELECT * FROM employees",$db);
echo "<table border=1>\n";
echo "<tr><td>Name</td><td>Position</tr>\n";
while ($myrow = mysql_fetch_row($result)) {
    printf("<tr><td>%s %s</td><td>%s</tr>\n", $myrow[1], $myrow[2], $myrow[3]);
}
echo "</table>\n";
include("footer.inc");
?>
```

See what happens? The include files are tossed into the main file and then the whole thing is executed by PHP. Notice how the variable \$title was defined before header.inc is referenced. Its value is made available to the code in header.inc; hence, the title of the page is changed. You can now use header.inc across all your PHP pages, and all you'll have to do is change the value of \$title from page to page.

Using a combination of includes, HTML, conditional statements, and loops, you can create complex variations from page to page with an absolute minimum of code. Includes become especially useful when used with functions, as we'll see down the road.

On to the exciting world of data validation.

Simple Validation

Imagine for a moment that we've got our database nicely laid out and we're now requesting information from users that will be inserted into the database. Further, let's imagine that you have a field in your database waiting for some numeric input, such as a price. Finally, imagine your application falling over in a screaming heap because some smart aleck put text in that field. MySQL doesn't want to see text in that portion of your SQL statement - and it complains bitterly.

What to do? Time to validate.

Validation simply means that we'll examine a piece of data, usually from an HTML form, and check to make sure that it fits a certain model. This can range from ensuring that an element is not blank to validating that an element meets certain criteria (for example, that a numeric value is stipulated or that an email address contains an @ for an email address).

Validation can be done on the server side or on the client side. PHP is used for server-side validation, while JavaScript or another client-based scripting language can provide client-side validation. This article is about PHP, so we're going to concentrate on the server end of things. But if you're looking for some ready-made, client-side validation scripts, check out the Webmonkey code library.

Let's ignore our database for the moment and concentrate on PHP validation. If you wish, you can add additional fields to our employee database quite simply by using the MySQL ALTER statement - that is, if you want to commit to the values that we'll validate.

There are several useful PHP functions we can use to validate our data, and they range from simple to highly complex. A simple function we could use might be `strlen()`, which tells us the length of the variable.

A more complex function would be `ereg()`, which uses full regular expression handling for complex queries. I won't delve into the complexities of regex here, as entire books have been written on the subject, but I will provide some examples on the next page.

Let's start with a simple example. We'll check to see whether a variable does or does not exist.

```
<html>
<body>
<?php
if ($submit) {
    if (!$first || !$last) {
        $error = "Sorry! You didn't fill in all the fields!";
    } else {
        // process form
        echo "Thank You!";
    }
}
if (!$submit || $error) {
    echo $error;
    ?>
    <P>
    <form method="post" action="<?php echo $PHP_SELF ?>">
    FIELD 1: <input type="text" name="first" value="<?php echo $first ?>"><br>
    FIELD 2: <input type="text" name="last" value="<?php echo $last ?>"><br>
    <input type="Submit" name="submit" value="Enter Information">
    </form>
    <?php
} // end if
?>
</body>
</html>
```

The keys to this script are the nested conditional statements. The first checks to see whether the Submit button has been pressed. If it has, it goes on to check that both the variables \$first and \$last exist. The || symbol means "or" and the ! symbol means "not." We could also rewrite the statement to say, "If \$first does not exist or \$last does not exist, then set \$error to the following."

Next, let's extend things a little by checking to see whether a string is a certain length. This would be ideal for passwords, since you don't want some lazy user entering a password of only one or two letters. You'd rather it be, say, six or more characters.

The function for this is, as you already know, strlen(). It simply returns a number equal to the number of characters in the variable being tested. Here, I modified the script above to check the length of \$first and \$last.

```
<html>
<body>
<?php
if ($submit) {
    if (strlen($first) < 6 || strlen($last) < 6) {
        $error = "Sorry! You didn't fill in all the fields!";
    } else {
        // process form
        echo "Thank You!";
    }
}
if (!$submit || $error) {
    echo $error;
    ?>
    <P>
    <form method="post" action="<?php echo $PHP_SELF ?>">
    FIELD 1: <input type="text" name="first" value="<?php echo $first ?>"><br>
    FIELD 2: <input type="text" name="last" value="<?php echo $last ?>"><br>
    <input type="Submit" name="submit" value="Enter Information">
    </form>
    <?php
} // end if
?>
</body>
</html>
```

Run this script and try entering six or fewer letters to see what happens. It's simple yet quite effective.

Not-So-Simple Validation

Let's talk a bit about using regular expressions with the `ereg()` and `eregi()` functions. As I said earlier, these can be either quite complex or very simple, depending on what you need.

Using regular expressions, you can examine a string and intelligently search for patterns and variations to see whether they match the criteria you set. The most common of these involves checking whether an email address is valid (although, of course, there's no fail-safe way of doing this).

Rather than delve into the mysteries of regular expressions, I'll provide some examples. You can use the same form we created on the previous page - just paste in the lines below to see how they work.

First, let's make sure that text only has been entered into a form element. This regular expression tests true if the user has entered one or more lowercase characters, from a to z. No numbers are allowed:

```
if (!ereg("[a-Z]", $first) || !ereg("[a-Z]", $last)) {
```

Now, let's extend this expression to check whether the string is four to six characters in length. Using `[:alpha:]` is an easy way to check for valid alphabetic characters. The numbers in the braces check for the number of occurrences. And note that the `^` and `$` indicate the beginning and end of the string.

```
if (!ereg("^[[:alpha:]]{4,6}$", $first) || !ereg("^[[:alpha:]]{4,6}$", $last)) {
```

Finally, let's build a regular expression that will check an email address' validity. There's been plenty of discussion about the effectiveness of checking for email addresses in this way. Nothing's completely foolproof, but what I have below works pretty well.

I took this gem from the PHP mailing list. It's a great resource - use it. And yes, this is as scary as it looks.

```
f (!ereg('[-!#$%&\'*\+\.\|/0-9=?A-Z^_`a-z{|}~]+'.  
'@'.  
'[-!#$%&\'*\+\.\|/0-9=?A-Z^_`a-z{|}~]+\.'.  
'[-!#$%&\'*\+\.\|/0-9=?A-Z^_`a-z{|}~]+'.$', $last)) {
```

Don't spend too much time looking at this. Just move on to the next page.

Functions

Enjoy that last regex expression? Fun, wasn't it? Wouldn't it be even more fun to enter that chunk on a dozen different pages that need to process email addresses?! Think about the joy of finding a typo in that mess - and doing it a dozen times no less. But of course, there's a better way.

Remember when we talked about include files earlier in this lesson? They'll allow us to create a piece of code like the email checker and include it multiple times across several pages. This way, when we want to change the code, we need edit only one file, not many.

But if we want to get this done, we'll have to use functions.

We've already used functions plenty of times. Every time we query the database or check the length of a string we're using functions. These functions are built into PHP. If you're a keen coder, you can extend PHP with your own customized functions. But that's a bit advanced for this tutorial. Instead we'll create functions that will reside within our PHP script.

A function is simply a block of code that we pass one or more values to. The function then processes the information and returns a value. The function can be as simple or complex as we like, but as long as we can pass a value in and get one out, we don't really care how complex it is. That's the beauty of functions.

Functions in PHP behave similarly to functions in C. When we define the functions, we must specify what values the function can expect to receive. It's tricky to get a handle on at first, but it prevents weird things from happening down the road. This is done because the variables inside a function are known as private variables. That is, they exist only inside the function. You may, for instance, have a variable in your script called \$myname. If you created a function and expected to use the same \$myname variable (with the same value), it wouldn't work. Alternatively, you could have the variable \$myname in your script and also create another variable called \$myname in your function, and the two would co-exist quite happily with separate values. I do not recommend doing this, however! When you come back and edit it six months later, you'll be breaking things left and right. There are exceptions to this rule as with all things, but that's outside the scope of this article.

So let's create a function. We'll start simply. We need to give the function a name and tell it what variables to expect. We also need to define the function before we call it.

```
<html>
<body>
<?php
function addnum($first, $second) {
    $newnum = $first + $second;
    return $newnum;
}
echo addnum(4,5);
?>
</body>
</html>
```

That's it! First, we created our function. Notice how we defined two new variables, called \$first and \$second. When we call the function, each variable is assigned a value based on the order in which it appears in the list - 4 goes to \$first, 5 to \$second. Then we simply added the two numbers together and returned the result. "Return" here simply means to send the result back. At the end of the script we print the number 9.

Let's create something that's more useful to our database application. How about something that gracefully handles errors? Try this:

```
<html>
<body>
<?php
function do_error($error) {
```



```

    echo "Hmm, looks like there was a problem here...<br>";
    echo "The reported error was $error.\n<br>";
    echo "Best you get hold of the site admin and let her know.";
    die;
}
if (!$db = @mysql_connect("localhost","user", "password")) {
    $db_error = "Could not connect to MySQL Server";
    do_error($db_error);
}
?>
</body>
</html>

```

Before running this, try shutting down MySQL or using a bogus username or password. You'll get a nice, useful error message. Observant readers will notice the @ symbol in front of mysql_connect(). This suppresses error messages so that you get the information only from the function. You'll also see we were able to pass a variable into the function, which was defined elsewhere.

Remember that I said functions use their own private variables? That was a little white lie. In fact, you can make variables outside of a function accessible to the function. You might create a function to query a database and display a set of results over several pages. You don't want to have to pass the database connection identifier into the function every time. So in this situation, you can make connection code available as a global variable. For example:

```

<html>
<body>
<?php
function db_query($sql) {
    global $db;
    $result = mysql_query($sql,$db);
    return $result;
}
$sql = "SELECT * FROM mytable";
$result = db_query($sql);
?>
</body>
</html>

```

This is a basic function, but the point is that you don't need to send \$db through when you call the function - you can make it available using the word global. You can define other variables as global in this statement, just separate the variable names by a comma.

Finally, you can look like a real pro by using optional function variables. Here, the key is to define the variable to some default in the function, then when you call the function without specifying a value for the variable, the default will be adopted. But if you do specify a value, it will take precedence.

Confused? For example, when you connect to a database, you nearly always connect to the same server and you'll likely use the same username and password. But sometimes you'll need to connect to a different database. Let's take a look.

```

<html>
<body>
<?php
function db_connect($host = "localhost", $user="username", $pass="graeme") {
    $db = mysql_connect($host, $username, $password);
    return $db;
}
$old_db = db_connect();
$new_host = "site.com";
$new_db = db_connect($new_host);

```

```
?>  
</body>  
</html>
```

Isn't that cool? The variables used inside the function were defined when the function was defined. The first time the function is called, the defaults are used. The second time, we connect to a new host, but with the same username and password. Great stuff!

Think about where you could use other functions in your code. You could use them for data checking, performing routine tasks, and so on. I use them a lot when processing text for display on a Web page. I can check, parse, and modify the text to add new lines and escape HTML characters in one fell swoop.

Now all that's left to do is to impart some words of wisdom.

Closing Advice

When it comes to databasing, there's a lot to learn. If you haven't done it already, find a good book about database design and learn to put together a solid database - on any platform. It's an invaluable skill and it will save you plenty of time and headache in the long run. Also, learn about MySQL. It's a complex but interesting database with a wealth of useful documentation. Learn about table structure, data types, and SQL. You can actually achieve some pretty impressive stuff if you know enough SQL.

Finally, there's PHP. The PHP Web site has nearly everything you need, from a comprehensive manual to mailing-list archives to code repositories. An excellent way to learn about PHP is to study the examples used in the manual and to check out the code archives. Many of the posted scripts consist of functions or classes that you can use for free in your own scripts without having to reinvent the wheel. Additionally, the mailing list is an excellent spot to check out if you get stuck. The developers themselves read the list and there are plenty of knowledgeable people there who can help you along the way.

Good luck and good coding!